Conference Proceedings Abstract Book

March 14 & 15, 2026

"International Conference on "Proceedings of IPA Annual Convention: NextGen PHARMA 2026 on the Theme "NextGen Pharmacy: Empowering Global Healthcare-Innovate, Deliver and Practice

Organized By:

Indian Pharmaceutical Association-Bengal Branch, Kolkata-700029, WB, India

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About the Convention

The City of Joy is set to host one of the most significant events in the pharmaceutical calendar this year. The **Indian Pharmaceutical Association (IPA), Bengal Branch**, organized the **IPA Annual Convention** under the futuristic slogan **"NextGen PHARMA 2026"** focused on empowering global healthcare through innovation. It is a premier, annual gathering for pharmaceutical professionals, academicians, researchers, and students. It acts as a national platform to foster collaboration, innovation, and knowledge sharing among pharmacists, academicians, and industry experts. The convention typically features scientific sessions, plenary lectures, panel discussions, and oral/poster presentations. It highlights advancements in pharmacy practice, community pharmacy, education, and research.

Theme: NextGen Pharmacy Empowering Global Healthcare. Innovate • Delivery • Practice

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IPA Annual Convention NextGen Pharma 2026

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Abstract for Oral Presentation

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Abstract No.: OP-001

COST ANALYSIS OF DIFFERENT ANTIMICROBIAL AGENTS WITH REFERENCE TO NATIONAL LIST OF ESSENTIAL MEDICINES, INDIA

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The Indian patient has to spend a large proportion of healthcare budget on medicines. Prescribing of costly medicines, result in increased out-of-pocket expenditure, which may lead to noncompliance and poor outcomes. To guarantee that necessary medications are affordable, the Indian ministry created the National List of Essential Medicines (NLEM). The study's goal is to compare the prices of various antimicrobial agent brands that are sold in India with regard to NLEM. The price ratio and percentage variation in prices of several labels of these antimicrobial drugs were computed and contrasted with data available in the Current Index of Medical Specialities (CIMS) January-April 2025 Edition 46th year. A total of 39 medications were examined, of which 19 were antibacterial drugs, 5 were antifungal drugs and 14 were antiviral drugs. Amongst anti-bacterial drugs, Ampicillin had the highest % cost variation [1581.31], while the drug Cotrimoxazole had lowest % cost variation [6.05] and lowest cost ratio [1.06]. Amongst anti-fungal drugs, Amphotericin B had the highest % cost variation [1150] and the drug Clotrimazole had the lowest % cost variation [185.6]. Amphotericin B had highest cost ratio [12.05], while Clotrimazole had lowest cost ratio [2.856]. Amongst anti-viral drugs, Aciclovir had the highest % cost variation [1254.06], while the drug Zidovudine had the lowest % cost variation [50.18]. Aciclovir had highest cost ratio [13.540], while Lamivudine+Zidovudine+Nevirapinecombination had lowest cost ratio [1.5018].

Keywords: Cost variation, National List of Essential Medicines, Current Index of Medical Specialities, Anti microbials

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Abstract No.: OP-002

DESIGN AND CHARACTERIZATION OF ACYCLOVIR-LOADED EUDRAGIT RLPO NANOPARTICLES FOR ENHANCED DRUG DELIVERY WITH CYTOTOXICITY EVALUATION USING HEK293 CELL LINES

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Acyclovir is a widely prescribed antiviral agent for herpes simplex and varicella zoster infections; however, its clinical utility is limited by poor intestinal permeability and low oral bioavailability, characteristics typical of Biopharmaceutics Classification System (BCS) Class III drugs. To overcome these limitations, acyclovir-loaded Eudragit RLPO nanoparticles were developed using the solvent evaporation method to enhance drug permeability and provide sustained drug release, thereby improving therapeutic efficacy. The optimized formulation yielded particles with an average diameter of 185.4 ± 0.7 nm, a narrow polydispersity index (0.21 ± 0.02), and a positive zeta potential (+24.6 ± 0.3 mV), suggesting good colloidal stability. Entrapment efficiency was 78.1 ± 0.6%, while in vitro release studies demonstrated controlled drug liberation, reaching ~82% cumulative release over 24 hours. Morphological and physicochemical analyses (SEM, DSC, XRD, FTIR) confirmed spherical shape, partial crystallinity, and absence of significant drug–polymer interactions. Cytotoxicity assessment on HEK293 cell lines demonstrated the biocompatibility and non-toxicity of the nanoparticles. These findings highlight that Eudragit RLPO-based nanoparticles prepared by solvent evaporation represent a promising strategy for enhancing acyclovir delivery. The formulation offers potential to improve therapeutic efficacy, reduce dosing frequency, and enhance patient compliance, thereby contributing to the advancement of next-generation antiviral nanomedicine.

Keywords: Acyclovir, Eudragit RLPO, Polymeric nanoparticles, Solvent evaporation, sustained release, HEK293 cell line.

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Abstract No.: OP-003

FORMULATION, STANDARDIZATION, AND ANTIDIABETIC POTENTIAL OF A POLYHERBAL FORMULATION FOR MANAGING TYPE 2 DIABETES MELLITUS

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Type 2 Diabetes Mellitus (T2DM) is a rapidly increasing metabolic disorder characterized by insulin resistance and persistent hyperglycemia. Limitations of conventional therapies, including adverse effects and long-term safety concerns, have encouraged exploration of herbal alternatives. This study focuses on the formulation and standardization of a polyherbal preparation containing *Azadirachta indica*, *Gymnemasylvestre*, *Momordica charantia*, *Trigonella foenum-graecum*, and *Syzygiumcumini*, which possess proven antihyperglycemic properties.

The formulation involves extraction, blending, and development into suitable dosage forms, followed by standardization using physicochemical evaluation and phytochemical screening. Antidiabetic potential is assessed through enzyme inhibition assays and experimental diabetic models.

The polyherbal formulation demonstrates synergistic glucose-lowering effects by enhancing insulin secretion, improving glucose uptake, and reducing oxidative stress. This approach offers a safe, cost-effective, and multi-target strategy for T2DM management.

Keywords: Type 2 Diabetes Mellitus (T2DM), Polyherbal Formulation, Antihyperglycemic Activity, Phytochemical Standardization, Medicinal Plants

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Abstract No.: OP-004

RATIONAL DESIGN AND BIOLOGICAL EVALUATION OF NOVEL UREA DERIVATIVES AS TUBULIN POLYMERIZATION INHIBITORS

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Microtubules are dynamic cytoskeletal structures essential for mitotic spindle formation and proper cell division, making tubulin a validated molecular target in anticancer therapy. Despite the clinical success of several microtubule-targeting agents, issues such as drug resistance, toxicity, and limited selectivity necessitate the development of new scaffolds with improved therapeutic profiles. In the present study, a series of novel urea derivatives were rationally designed as potential tubulin polymerization inhibitors based on key structural features required for interaction with the colchicine-binding site of β-tubulin.

The design strategy incorporated aromatic substitutions and hydrogen-bonding functionalities to enhance binding affinity and optimize structure–activity relationships. The synthesized compounds were characterized using standard spectroscopic techniques and evaluated for their antiproliferative activity against selected human cancer cell lines. Biological screening demonstrated that several derivatives exhibited significant cytotoxic activity, with enhanced potency observed for compounds bearing electron-withdrawing substituents on the aryl ring.

Mechanistic studies suggested that the most active compounds effectively inhibited tubulin polymerization, leading to disruption of microtubule assembly and induction of cell cycle arrest at the G2/M phase. Preliminary safety profiling indicated comparatively lower cytotoxicity toward non-cancerous cells, highlighting their potential selectivity.

Overall, the findings support the urea scaffold as a promising pharmacophore for the development of microtubule-targeted anticancer agents. Further optimization and detailed pharmacological investigations are warranted to advance these molecules as potential lead candidates in cancer drug discovery.

Keywords: Urea derivatives; Tubulin polymerization; Anticancer agents; Structure–activity relationship; Microtubule inhibitors

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Abstract No.: OP-005

POLYPHARMACY AND CLINICAL PROFILE OF TYPE 2 DIABETES PATIENTS ATTENDING A TERTIARY CARE HOSPITAL IN WEST BENGAL: A PILOT STUDY

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Diabetes mellitus, a chronic metabolic disorder, is characterised by persistent hyperglycemia due to impaired insulin secretion or action. It is frequently associated with comorbidities such as hypertension and hyperlipidemia, which often require multiple medications. This practice, known as polypharmacy, is essential for disease control but may increase the risk of drug interactions, adverse drug reactions (ADRs), and poor medication adherence. Identifying factors associated with polypharmacy is important for improving patient outcomes.

This pilot study assessed body mass index (BMI), fasting and postprandial blood glucose levels, diabetes-related complications, and the prevalence of polypharmacy among Type 2 diabetes patients attending the Diabetology Clinic of a tertiary care hospital in West Bengal. Demographic details, prescription patterns, and clinical parameters were collected and analyzed.

The mean age of study participants was 54.6 ± 1.82 years, with 56.67% males and 43.33% females. The average BMI was 23.09 ± 0.46 kg/m^2. Mean fasting and postprandial blood glucose levels were 174.19 ± 14.68 mg/dL and 257.86 ± 17.28 mg/dL, respectively. Patients were taking an average of 4.53 ± 0.35 medications per day. Diabetic neuropathy was observed in 53.33% of patients, while 46.67% had diabetic retinopathy. Metformin, vildagliptin, glimepiride, and pantoprazole were the most commonly prescribed drugs.

The study highlights a considerable burden of polypharmacy and diabetes-related complications among Type 2 diabetic patients. Although limited by sample size and duration, the findings emphasize the need for careful prescription monitoring to minimize adverse outcomes and improve long-term disease management.

Keywords: Diabetes, Polypharmacy, Metformin, Vildagliptin, Glimepiride, Pantoprazole, Adverse drug reactions (ADRs).

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Abstract No.: OP-006

LC-MS PROFILING OF IRIDOIDS FROM *NYCTANTHES ARBOR-TRISTIS* LEAVES EXTRACTS AND ITS ANTI-BREAST CANCER POTENTIAL EVALUATION

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Cancer is one of the leading causes of mortality worldwide, and the conventional chemotherapy strategies, show severe side effects. Researchers are exploring alternative safe and effective treatment strategies such as use of natural compounds like iridoids, found in plants with diverse therapeutic uses especially cancer therapeutics. The objective of our research is to extract the crude *Nyctanthes Arbor-tristis* leaves and to explore binding affinity of phytoconstituents against various overexpressed proteins of breast cancer using *in-silico* multitargeted molecular docking, with ADMET studies, andto conduct an *in-vitro* cytotoxicity experiment against MCF-7 cell lines. The workflow includes crude aqueous, hydroalcoholic, and ethanolic extraction of *N.arbor-tristis* leaves using maceration, and concentrated after 72 hrs, followed by metabolite screening of the extracts using LC-MS. The LC-MS/MS analysis identified 258, 352 and 380 phytoconstituents, in each extract samples. Among these total iridoids found were 49, 62, 63 respectively with confidence score ≥50. A total of 40 screened iridoids were chosen for *in-silico* study and out of which 10 iridoids found to have potential bind affinity with various proteins. The anti-cancer activity of extracts was examined by MTT assay against MCF-7 cells and found to have potential anti-cancer activity against MCF-7 cell lines for breast cancer, supporting its rational in traditional medicine. Further we can study the therapeutic exploration, formulation designing and its pharmacokinetics of iridoids shown for potential anticancer activity from *N. arbor-tristis*.

Keywords: Nyctanthes Arbor-tristis, LC-MS, Iridoids, MCF-7 cells.

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Abstract No.: OP-007

ANTI-OSTEOPOROTIC EFFECT OF FRESHWATER SNAIL FILOPALUDINABENGALENSIS ON OVARIECTOMIZED RATS

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Osteoporosis is more prevalent in recent days among postmenopausal women, with studies by World Health Organisation reporting it to be around 33.1% to 37.5%. It increases further in postmenopausal women because of reduced estrogen levels resulting in decreased bone mineral. Aquatic ecosystems offer rich bioactive compounds with promising pharmaceutical potential. *Filopaludina bengalensis*, freshwater edible mollusc, contain a rich array of bioactive compounds, including proteins, glycoproteins, omega-3 fatty acids, minerals (such as calcium and magnesium), and controls calcium transport to support shell calcification, a process essential for their survival and physiological function. The present study evaluated the anti-osteoporotic activity of molluscan mass extract in ovariectomized (OVX) female Sprague-Dawley rats. Rats exhibiting ovariectomy-induced bone degeneration were treated with the extract at 200 and 400 mg/kg bodyweight and compared with the standard drug Alendronate (1mg/kg once weekly). Treatment significantly improved bone health, as evidenced by X-ray, histological findings, serum estrogen level and enhanced serum bone mineral levels compared to untreated controls. X-ray analysis demonstrated reduced bone mass and deteriorated microarchitecture, indicating characteristic osteoporotic changes, which was alleviated after treatment. OVX decreases bone weight in the femur, relative to the treatment group with the extract, by ~14% following low-dose treatment and by ~56% with high-dose treatment, indicates a pronounced, dose-dependent osteoprotective effect. These findings suggest that *Filopaludina bengalensis* extract holds promise as a nutraceutical supplement and potential therapeutic agent for osteoporosis. Further mechanistic studies and identification of active compounds may support innovative drug development to improve disease management and quality of life.

Keywords: Mollusc, Osteoporosis, Ovariectomy, Bone Mineral Density

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Abstract No.: OP-008

A STABILITY-INDICATING, QBD-OPTIMIZED RP-HPLC METHOD FOR ROUTINE QUALITY CONTROL OF LONG-ACTING CABOTEGRAVIR/RILPIVIRINE

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Long-acting injectable antiretroviral therapy comprising cabotegravir and rilpivirine (Cabenuva) enhances patient adherence and long-term viral suppression. Reliable stability-indicating analytical methods are therefore essential to ensure consistent product quality during manufacturing and storage.

To develop and systematically optimize a robust RP-HPLC method for simultaneous estimation of cabotegravir and rilpivirine using an Analytical Quality-by-Design (AQbD) framework, and to validate the method according to regulatory requirements.

A Central Composite Design with twenty experimental runs was employed to evaluate the effects of acetonitrile concentration (35-45%), flow rate (0.9-1.1 mL/min), and column temperature (27-33°C) on critical chromatographic responses including retention time, resolution, and theoretical plates. Chromatographic separation was performed on a Kromasil C_{18} column (4.6x150 mm, 5 µm) using an isocratic mobile phase of 0.01 N KH_2PO_4 buffer and acetonitrile (65:35 v/v) at 1.0 mL/min and 32°C, with PDA detection at 230 nm. Method validation was conducted in accordance with ICH Q2(R1) guidelines. Forced degradation studies were performed to confirm stability-indicating capability.

Cabotegravir and rilpivirine were eluted at 2.36 min and 3.09 min, respectively, with resolution exceeding 4. The method exhibited excellent linearity (R^2 ≥0.999), low limits of detection (0.04 µg/mL and 0.01 µg/mL), high recovery (~100%), and acceptable precision and robustness (%RSD<2). Degradation studies demonstrated clear separation of analytes from degradation products.

The AQbD-based RP-HPLC method is rapid, reliable, and stability-indicating, making it suitable for routine quality control and stability assessment of cabotegravir and rilpivirine formulations.

Keywords: Analytical Quality-by-Design, RP-HPLC, Cabotegravir, Rilpivirine, Stability-indicating method, Method validation

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Abstract No.: OP-009

DESIGN AND DEVELOPMENT OF ULTRASOUND-ACTIVATED DOXORUBICIN NANOBUBBLES USING AI/ML: ZEBRAFISH (DANIO RERIO) EMBRYO TOXICITY AND OXIDATIVE-STRESS ASSESSMENT

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Ultrasound-activated nanobubbles can release doxorubicin (DOX) at a chosen site, improving tumour targeting and limiting off-target exposure. Trial-and-error formulation often causes batch variability and inconsistent trigger performance.

To develop DOX-loaded chitosan nanobubbles using a QbD framework supported by AI/ML modelling, and to evaluate acute developmental toxicity and oxidative stress in zebrafish (*Danio rerio*) embryos under ultrasound OFF and localized ultrasound ON conditions.

A QTPP for an injectable, trigger-based system was defined and linked to CQAs (size, encapsulation efficiency, baseline leakage, and ultrasound-triggered burst release). Critical factors were prioritized by risk assessment and studied using a Box–Behnken design. AI/ML models supported factor–response interpretation and selection of robust compositions within the design space. Optimized batches were verified using checkpoint runs. Performance was assessed by passive versus ultrasound-triggered release and cytotoxicity in MCF-7 breast cancer and H9c2 cardiomyoblast cells. Zebrafish embryo testing included survival, hatching and morphology scoring, and whole-embryo ROS imaging using a fluorescence-based probe.

Optimized nanobubbles showed nanoscale size (~268 nm), high encapsulation (~70–75%), low leakage without activation, and rapid burst release (>80% within ~120 s) upon ultrasound exposure. Ultrasound activation increased anticancer activity in MCF-7 cells, while H9c2 toxicity remained lower in the non-triggered state. In zebrafish embryos, nanobubbles were better tolerated than free DOX, with fewer developmental effects and reduced basal ROS; localized ultrasound produced region-specific ROS elevation consistent with confined activation.

QbD combined with AI/ML enabled a reproducible DOX nanobubble formulation and supported an OFF–ON safety concept across cell and zebrafish embryo models.

Keywords: Ultrasound-activated nanobubbles; doxorubicin; artificial intelligence; Quality-by-Design; zebrafish embryo; oxidative stress.

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Abstract No.: OP-010

FORMULATION, EVALUATION AND OPTIMIZATION OF POSACONAZOLE-LOADED CHITOSAN-BASED NANOPARTICLES

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Aggressive fungal infections are one of the most overlooked life-threatening complicacies especially in immunocompromised cases as in hematologic cancer patients receiving chemotherapeutic drugs. Out of all the reported cases of such pathogenic fungal infections, morbidity rate is over 58%. Moreover, the rising antifungal resistance demands for novel and effective treatment strategies. Posaconazole is one such relatively new broad-spectrum antifungal drug belonging to Biopharmaceutical Classification System (BCS) Class 2 category of drugs possessing decent permeability but low aqueous solubility, affecting its bioavailability and thus, overall efficacy of the drug is compromised. The current study aimed to develop and optimize an economic and scalable posaconazole-loaded chitosan-based nanoparticulate formulation (PZ-CS) employing ion-gelation technique in an attempt to increase the drug solubility, enhance its bioavailability, efficacy and safety. The optimized formulation (F1) exhibited a particle size of range 50-140 nm, PDI of 0.5 and zeta potential of 28.84mV with high entrapment efficiency (98.85%) and drug content (66.26%). *In vitro* drug release study revealed the formulation F1 released about 94% of the drug in 10 hours. While FTIR study confirmed no significant interaction between the excipients and the drug, DSC and XRD analysis demonstrated that PZ-CS was amorphous in nature, thus having higher solubility. SEM study showed irregularly round and agglomerated PZ-CS particles. *Ex vivo* studies conducted using a cell line culture demonstrated potent antifungal effect of PZ-CS with no detectable toxicity. Thus, suggesting PZ-CS as a promising candidate for increasing the oral bioavailability and therapeutic efficacy of posaconazole.

Keywords: Nanoparticle Drug Delivery System, Chitosan, Posaconazole, Antifungal therapy, Scalability

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Abstract No.: OP-011

DESIGN AND SYNTHESIS OF FUNCTIONALIZED AROMATIC LIGAND-SPECIFIC METAL ORGANIC FRAMEWORK FOR ENHANCEMENT OF BIO-CHEMICAL APPLICATIONS

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Metal-organic frameworks (MOFs) are a class of hybrid crystalline materials composed of metal ions or metal clusters coordinated with organic ligands, forming highly porous three-dimensional architectures. Ligand-specific MOFs represent a tailored class of frameworks in which the choice of organic ligand governs the overall structure, physicochemical properties, and functional performance. In particular, ligands bearing biologically active functional groups play a crucial role in enhancing the biochemical potential of MOFs. Incorporation of functional groups such as hydroxyl (–OH), carboxylic acid (–COOH), amine ($–NH_2$), and hydrazide ($–CONHNH_2$) is expected to improve biological interactions and activity.

In the present work, a total of sixteen MOFs were synthesized through the coordination of transition metal ions, namely Ni(II), Co(II), Cu(II), and Fe(II), with functionalized aromatic ligands including *p*-aminobenzoic acid, *p*-hydroxybenzoic acid, anthranilic acid, and 2-aminobenzohydrazide. These ligands inherently exhibit biological properties such as antioxidant and antibacterial activity; however, their coordination with metal ions resulted in a significant enhancement of biological performance due to synergistic metal–ligand interactions.

The MOFs prepared in this work were characterized by various analytical techniques to confirm structural integrity, coordination of functional groups, crystallinity, and morphology. Further investigations are underway to evaluate their performance in biological and chemical environments. Preliminary biological studies primarily focus on antioxidant and antibacterial activities.

Overall, this study emphasizes the importance of ligand functionalization and metal ion selection in the rational design of MOFs with enhanced bioactivity, highlighting their potential as promising multifunctional materials for biological and chemical applications.

Keywords: Metal–organic frameworks; Functionalized aromatic ligands; Transition metal ions; Antioxidant activity; Antibacterial activity

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Abstract No.: OP-012

DESIGN, OPTIMIZATION, HPLC ANALYTICAL METHOD DEVELOPMENT AND VALIDATION USING DOE OF AN ORAL SYRUP CONTAINING *CURCUMA CAESIA* (BLACK TURMERIC) AND *PIPER NIGRUM* (PIPERINE) EXTRACTS

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Herbal formulations are gaining scientific interest due to their therapeutic potential. *Curcuma caesia* (Black Turmeric) is a medicinal plant rich in curcuminoids, essential oils, phenolics, and alkaloids, contributing to its anti-inflammatory, antioxidant, analgesic, antimicrobial, and antidiabetic activities. However, its clinical effectiveness is limited by poor solubility and low oral bioavailability. *Piper nigrum* (Black Pepper), primarily through its active alkaloid piperine, serves as a natural bioenhancer capable of improving the absorption and systemic availability of poorly soluble phytoconstituents. Piperine enhances bioavailability by inhibiting metabolic enzymes, reducing efflux mechanisms, and improving intestinal permeability. This study focuses on the design, optimization, and evaluation of an herbal oral syrup containing standardized extracts of *Curcuma caesia* and *Piper nigrum*. Syrup formulations offer advantages such as improved palatability, ease of swallowing, dose flexibility, and rapid absorption, making them particularly suitable for diverse patient populations. Despite the known pharmacological value of these plants, limited research exists on stable and optimized oral liquid formulations combining their synergistic potential. The research involves extraction and standardization of plant materials, formulation of multiple syrup prototypes, and optimization using a systematic Design of Experiment (DoE) approach to study the influence of variables such as pH, sweetener concentration, extract load, and preservatives. Prepared formulations are evaluated for physicochemical properties, including pH, viscosity, clarity, specific gravity, microbial limits, organoleptic characteristics, and stability under accelerated conditions.

Keywords: *Curcuma caesia*; *Piper nigrum*; piperine; herbal syrup; bioenhancer; formulation optimization; stability;

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Abstract No.: OP-013

PHYTOCHEMICAL PROFILING, GC–MS, HPTLC ANALYSIS AND GREEN SYNTHESIS OF GOLD NANOPARTICLES USING *ACALYPHA INDICA* WITH ANTIOXIDANT, ANTI-INFLAMMATORY AND ANTIBACTERIAL POTENTIAL

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Many extracts are used for therapeutic purposes from plant origin. The chemical composition of *Acalypha indica* Linn is the subject of this study. The biological potential of Acalypha indica has been used in traditional medicine for a long time. Phytochemical screening of the plant extract indicated the rich presence of, flavonoids, phenolics, tannins, saponins, glycosides and many other secondary metabolites. Further analysis of 44 phytoconstituents is qualitative and quantitatively identified by gas chromatography-mass spectrometry (GC–MS); And another way the helps of high-performance thin-layer chromatography (HPTLC) confirmed qualitative and quantitatively of quercetin (52.6µg/gm). From this identifying phytoconstituents data, this research going to green synthesis of gold nanoparticles (AuNPs) through the plant extract. Because identifying compounds have strong reducing power activity. The proof of formation of the nanoparticles can be established by the colour change to brown or red wine of the chloroauric acid precursor and a spectroscopic analysis. This system is both ecologically and economically sustainable. . In vitro free radical scavenging tests evaluated the antioxidant potential, whereas protein denaturation inhibitory methods investigated the anti-inflammation potential. Standard microbiological techniques were employed to investigate the antibacterial characteristics against harmful bacteria. The research findings revealed that the combination of plant extract and the produced nanoparticle possesses significant anti-oxidative, anti-inflammatory and antibacterial properties. The study concludes that *Acalypha indica* has therapeutic potential and it could be a good source of plant-based nanomedicine for medicinal purposes.

Keywords: *Acalypha indica* Linn, GC–MS analysis; HPTLC profiling, Gold nanoparticles (AuNPs), Chloroauric acid.

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Abstract No.: OP-014

POLYMERIC NANOSPONGES FOR PACLITAXEL DELIVERY: SOLID-STATE STABILIZATION, CONTROLLED RELEASE, AND ZEBRAFISH (DANIO RERIO) EMBRYO VASCULAR SAFETY AND BIODISTRIBUTION ASSESSMENT

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Paclitaxel (PTX) is a potent anticancer drug, but its very low aqueous solubility and crystalline nature complicate formulation and can limit consistent delivery. Polymeric nanosponges are porous, crosslinked carriers that can reduce crystallinity and provide sustained release.

To develop PTX-loaded nanosponges, verify solid-state stabilization, assess controlled release, and evaluate zebrafish (*Danio rerio*) embryo tolerability and biodistribution. Nanosponges were prepared by a cyclodextrin/polymer crosslinking method and purified. The optimized batch was evaluated for size/PDI and zeta potential (DLS), morphology (SEM/TEM), drug content and encapsulation, and solid-state changes (FTIR, DSC, XRD). In-vitro release was studied with kinetic fitting. Zebrafish assays included survival/morphology, pericardial edema and heart rate, and fluorescence imaging of dye-labelled nanosponges versus free drug/dye.

The formulation formed a stable nanosuspension (215 ± 18 nm; PDI 0.23 ± 0.04; −24 ± 3 mV) with high encapsulation (82 ± 5%). FTIR/DSC/XRD supported reduced PTX crystallinity and incorporation in the matrix. Release was sustained with limited burst (23% at 2 h; 58% at 24 h; 89% at 48 h), consistent with diffusion-dominant kinetics. Zebrafish embryos showed better tolerability than free PTX, fewer edema-related changes with preserved cardiac activity, and more controlled distribution/retention on imaging.

PTX nanosponges achieved solid-state stabilization and sustained release, and zebrafish data supported improved tolerability and favorable biodistribution, supporting further efficacy and extended safety studies.

Keywords: Paclitaxel; polymeric nanosponges; solid-state stabilization; controlled release; zebrafish embryo; biodistribution.

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Abstract No.: OP-015

GREEN SYNTHESIS OF CARBON QUANTUM DOTS FROM VEGETABLE WASTE FOR EVALUATION OF DIFFERENT BIOLOGICAL AND ENVIRONMENTAL APPLICATIONS

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Carbon quantum dots (CQDs) are increasingly recognised as prominent nanomaterials in biology owing to their robust, tunable fluorescence, superior water solubility, and reduced toxicity compared with conventional semiconductor quantum dots. Their biocompatibility and facile surface functionalization render them exceptionally appealing for contemporary biomedicine [1,2]. This study introduces an efficient, environmentally friendly hydrothermal method for synthesising carbon quantum dots (CQDs) from vegetable waste as a renewable carbon source. The generated CQDs were comprehensively characterised, exhibiting a spherical/quasi-spherical shape with a hydrodynamic diameter of around 9-13 nm and an average size of 3-5 nm as determined by TEM. Optical investigation revealed significant UV absorption at 248 nm and excitation-dependent fluorescence, peaking at 337 nm. FTIR spectroscopy validated the existence of several surface functional groups (O-H, C-H, C=C, C-O), whereas XRD revealed a semi-crystalline structure with graphitic domains (peak at 19.49°). A zeta potential of -15.4 mV signifies modest colloidal stability. Moreover, the CQDs exhibited significant antioxidant activity, with an EC50 of 341 µg/mL in the DPPH assay. Significantly, they exhibited Fenton-like catalytic activity, efficiently producing hydroxyl radicals in the presence of H_2O_2 and glutathione, leading to methylene blue degradation and suggesting a possible anticancer mechanism via oxidative stress. The CQDs exhibit improved anticancer efficacy in the HeLa cell line. These findings highlight the potential multifunctional attributes of vegetable waste-derived CQDs for many biological applications.

Keywords: Green synthesis, Carbon quantum dots (CQDs), Vegetable waste, Fluorescence, Antioxidant activity, Catalytic activity, Biocompatibility, Anticancer, Hydrothermal method

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Abstract No.: OP-016

TRANSLATIONAL DEVELOPMENT OF A 4-OCTYL ITACONATE-LOADED NANOSTRUCTURED LIPID CARRIER HYDROGEL FOR TOPICAL TREATMENT OF ATOPIC DERMATITIS

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This study aimed to develop, optimize, and evaluate a nanostructured lipid carrier (NLC)-based topical delivery system encapsulating 4-Octyl itaconate (4-OI) for the management of atopic dermatitis (AD). NLCs were formulated using a Box–Behnken experimental design to achieve optimal physicochemical properties, followed by comprehensive characterization including particle size analysis, polydispersity index, zeta potential, morphological assessment, drug entrapment efficiency, stability testing, and in vitro drug release profiling. The optimized NLC formulation was subsequently incorporated into a hydrogel for topical application. Therapeutic efficacy was assessed in a 2,4-dinitrochlorobenzene (DNCB)-induced AD model in BALB/c mice and compared with standard treatment through biochemical estimations and ELISA-based inflammatory marker analysis. Molecular mechanisms underlying therapeutic activity were further examined by western blot analysis of thymic stromal lymphopoietin (TSLP) and filaggrin (FLG) expression. The optimized 4-OI-loaded NLC hydrogel exhibited nanoscale particle size, narrow size distribution, high drug encapsulation efficiency, favorable surface charge, sustained drug release behavior, and satisfactory formulation stability. In vivo results demonstrated significant attenuation of AD symptoms, including reduced transepidermal water loss, dorsal skin and epidermal thickness, dermatitis severity score, serum IgE levels, and TNF-α expression in treated animals. Moreover, treatment enhanced epidermal barrier restoration by upregulating FLG while suppressing TSLP-mediated inflammatory signaling. Collectively, these findings indicate that the developed 4-OI-NLC hydrogel provides an effective topical delivery platform with pronounced anti-inflammatory and skin barrier–protective effects, highlighting its potential as a promising therapeutic strategy for the treatment and future clinical translation in atopic dermatitis management.

Keywords: Atopic Dermatitis, Nanostructured Lipid Carrier (NLC), 4-Octyl Itaconate, Topical Drug Delivery, Skin Barrier Restoration

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Abstract No.: OP-017

EVALUATION OF JAN AUSHADHI GENERIC MEDICINES VERSUS BRANDED DRUGS FOR DIABETES AND HYPERTENSION IN INDIA: A PHARMACOECONOMIC APPROACH

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Diabetes and hypertension require lifelong therapy, demanding substantial out-of-pocket healthcare expenditure in India. The Pradhan Mantri Bhartiya Jan Aushadhi Paryojana (PMBJP) was introduced to improve access to affordable, quality-assured generic medicines across urban and rural regions. The objective of the present study is to review published evidence comparing the costs and economic benefits of Jan Aushadhi medicines with branded antidiabetic and antihypertensive drugs in India.

Published articles and government pricing data were scrutinized to obtain literature evaluating price variation, financial savings, and real-world effectiveness of generic medicines. Cost comparisons for commonly prescribed antidiabetic and antihypertensive drugs such as metformin, glimepiride, amlodipine, and losartan were highlighted using cost-minimization principles for equivalent strengths and dosage forms.

Substantial evidence emphasized the significant cost-effectiveness of Jan Aushadhi medicines as compared to the branded equivalents. Marked inter-brand price variation exists in the private market, whereas Jan Aushadhi prices remain standardized and transparent. Published studies also indicate comparable clinical effectiveness of generics, with substantial potential savings for patients, particularly in low- and middle-income groups in both rural and urban settings.

Jan Aushadhi medicines offer considerable cost savings compared with branded drugs without compromising therapeutic effectiveness. Wider awareness and accessibility of these generics can reduce economic burden, optimizing patient care and adherence in both rural and urban populations. From a pharmacoeconomic perspective, the findings support cost-minimization and rational resource allocation strategies to strengthen sustainable healthcare delivery in India.

Keywords: Antidiabetic Drugs, Antihypertensive Drugs, Cost Analysis, Generic Medicines, Health Economics, Jan Aushadhi, Pharmacoeconomics

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Abstract No.: OP-018

PHYTOCHEMICAL PROFILING AND BIOLOGICAL EVALUATION OF OIL OBTAINED FROM CASHEW NUT SHELL

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Cashew nut shell liquid (CNSL) is a bioactive compound derived from the shell of Anacardium occidentale. Traditionally classified as an agricultural by-product, CNSL has recently attracted scientific interest owing to its high phytochemical content and biological properties. The current study investigates the phytochemical content and biological activity of cashew nut shell oil to evaluate its potential as a medicinal resource for various therapeutic uses. Phytochemical screening of the extract revealed key phenolic constituents, specifically anacardic acid, cardanol, cardol, and 2-methyl cardol, compounds renowned for their notable pharmacological activities. Biological activity studies also indicated significant antioxidant, antimicrobial, anti-inflammatory, and cytotoxic properties, establishing the therapeutic potential of CNSL. The high bioactivity of CNSL can be attributed to the phenolic lipid composition of its major compounds, which facilitates efficient interaction with biological systems. The results of the current study establish the potential of cashew nut shell oil as a plant-based medicinal resource with applications in pharmaceutical, nutraceutical, and biomedical industries. Additionally, the use of cashew nut shell oil supports the sustainable utilization of agricultural waste, which is in line with eco-friendly and value-addition approaches.

Keywords: Cashew nut shell liquid (CNSL), Antioxidant activity, Anacardic acid, Cardanol, Sustainable bioresource

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Abstract No.: OP-019

OPTIMIZED PREPARATION AND EVALUATION OF TELMISARTAN FAST-DISSOLVING FILMS USING SOLVENT CASTING APPROACH

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Telmisartan (TLM) is a widely used angiotensin II receptor antagonist used in the treatment of hypertension. Nevertheless, the limited bioavailability and delayed onset of action affect the therapeutic effectiveness of the drug. To overcome this challenge, fast-dissolving TLM are prepared using an optimized formulation by using the solvent-casting method.

This investigation aims to formulate film of TLM, widely used as an antihypertensive medication. The objective was to optimize the formulation parameters and evaluate the physicochemical properties, drug release profile, and dissolution behavior of rapidly dissolving TLM film.

The casting method efficiently produces homogeneous, flexible films with desirable properties, such as high drug dosage and rapid dissolution. The Box-Behnken design was utilized to investigate the effect of three distinct, independent variables on the physicochemical properties of Fast Dissolving Films (FDFs) to determine the optimal conditions for FDF production. The film's physicochemical properties, drug release characteristics, and pharmacokinetic parameters were evaluated.

The optimized TLM fast-dissolving films demonstrated enhanced dissolution rates and improved bioavailability compared to conventional TLM tablets, highlighting their potential use as a TLM delivery system.

The developed fast-dissolving TLM films exhibited promising drug release characteristics and improved bioavailability, highlighting their potential as an efficient alternative oral delivery system for hypertension management.

Keywords: Fast dissolving film, Solvent casting Method, Pectin, PVP, TLM.

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Abstract No.: OP-020

BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SUSCEPTIBILITY PATTERN OF URINE CULTURE ISOLATES: A PRELIMINARY SCREENING

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Urinary tract infections (UTIs) are one of the most frequent infections seen in clinical practice and are a major cause of antibiotic use. Rising antimicrobial resistance has complicated empirical therapy, emphasizing the significance of culture and antibiogram reports. Considering the diverse pattern of antimicrobial resistance across regions and patient groups, analyzing UTI antibiograms is crucial to ameliorate treatment outcomes and promote rational antibiotic use. The present pilot study aimed to determine the prevalence of significant bacteriuria and analyze the antimicrobial susceptibility pattern in urine culture samples.

A total of 16 urine culture and antibiogram reports were retrospectively reviewed. Data regarding patient demographics, bacterial growth, identified organisms, colony counts, and antibiotic susceptibility patterns were collected and analyzed.

Out of 16 samples, 25% demonstrated bacterial growth, while 75% showed no growth. All positive cultures yielded *Escherichia coli* with significant colony counts (>100,000 CFU/mL). The isolates portrayed variable antibiotic sensitivity. Resistance was commonly observed against fluoroquinolones and several cephalosporins, whereas better sensitivity was documented with selected broad-spectrum agents. These findings indicate emerging resistance trends among uropathogenic *E. coli*.

The study highlights *E. coli* as the predominant uropathogen with noticeable antibiotic resistance patterns, emphasizing the importance of culture-guided therapy to prevent inappropriate antibiotic use and rising antimicrobial resistance.

Keywords: Antibiogram, Antimicrobial resistance, Escherichia coli, Urine culture, Urinary tract infection

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Abstract No.: OP-021

IN SITU MAGNETO-ACOUSTIC ELECTRO-MECHANICAL COUPLING FOR ENHANCEMENT OF OSTEOGENIC DIFFERENTIATION THROUGH SYNERGISTIC BIOPHYSICAL STIMULATION

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Bone regeneration remains a major clinical concern as current biomaterials and therapeutic strategies fail to recapitulate the coupled electro-mechanical stimuli intrinsic to the native bone microenvironment. Here, we present *in situ* and synergistic magneto-acoustic regenerative treatment (i-SMART), a non-invasive biophysical approach, referred to hereafter as ELS, that integrates low-intensity pulsed ultrasound (LIPUS, 30 mW cm^{-2}) with a static magnetic field (SMF, 150 mT) to generate endogenous electro-mechanical signaling through magneto-acoustic coupling. Using MC3T3-E1 preosteoblasts, we demonstrate that ELS induces markedly enhanced osteogenic responses compared with either stimulus alone. ELS increased cell proliferation (2.29-fold), alkaline phosphatase activity (1.79-fold), and collagen synthesis (1.96-fold) relative to untreated controls (EM), accompanied by vigorous upregulation of osteogenic genes including RUNX-2, ALP, COL-I, and BSP. Quantitative assessment using Bliss independence analysis confirmed non-additive synergy, while Grey Relational Analysis identified a 45 min exposure as the optimal stimulation regime. Analytical modelling further indicates that ELS generates physiologically relevant acoustic pressures (~60-110 kPa) and induced electric potentials (~10-80 μV cm^{-1}), consistent with activation of mechanoelectrical transduction pathways implicated in osteogenesis. Collectively, these results establish i-SMART as a non-invasive medical device for delivering coordinated electro-mechanical stimulation and provide a biophysical foundation for accelerating bone regeneration without exogenous biomolecules or implanted devices.

Keywords: Bone regeneration, Electro-mechanical stimulation, Magneto-acoustic coupling, Osteogenesis; Non-invasive regenerative therapy, Mechanoelectrical transduction, Low intensity pulsed ultrasound

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Abstract No.: OP-022

STABILITY-INDICATING RP-HPLC METHOD DEVELOPMENT AND VALIDATION FOR DISODIUM HYDROGEN CITRATE SYRUP WITH FORCED DEGRADATION STUDY

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Disodium hydrogen citrate is commonly formulated as a syrup and used as a urinary alkalizer in the management of dysuria and urinary tract infections. The present study aimed to develop and validate a simple, rapid, precise, and stability-indicating RP-HPLC method for the estimation of disodium hydrogen citrate in syrup formulation. Chromatographic separation was achieved on a C18 column (250 mm × 4.6 mm, 5 µm) using a mobile phase consisting of buffer and methanol (60:40 v/v) at a flow rate of 1.0 mL/min. Detection was performed at 210 nm. The method was validated according to International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use guidelines with respect to linearity, accuracy, precision, specificity, robustness, limit of detection (LOD), and limit of quantitation (LOQ).The method emonstrated excellent linearity over the concentration range of 10–100µg/mL with a correlation coefficient (R2) greater than 0.999. Accuracy was found within 98–102%, and precision showed %RSD less than 2%, indicating good repeatability and reliability. Forced degradation studies were carried out under acidic, alkaline, oxidative, thermal, and photolytic stress conditions. The degradation products were well resolved from the main drug peak, confirming the stability-indicating nature and specificity of the method.The developed RP-HPLC method was found to be accurate, robust, and suitable for routine quality control analysis of disodium hydrogen citrate syrup formulation.

Keywords: Disodium hydrogen citrate, RP-HPLC, Stability-indicating method, Method validation, Forced degradation, ICH guidelines.

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Abstract No.: OP-023

FORMULATION, CHARACTERIZATION, AND IN-VITRO ANTIOXIDANT INVESTIGATION OF GLYCYRRHIZA GLABRA ROOT EXTRACT-BASED PHYTOSOMES

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Phytoconstituents from herbs typically have limited therapeutic effect because of poor solubility, low membrane permeability, and decreased bioavailability. The work here describes the conception and testing of a phytosome, based delivery system for *Glycyrrhiza glabra* (liquorice) root extract to counteract these limitations. A hydroalcoholic extract of *G. glabra* roots was made and tested chemically to ensure the presence of glycosides, flavonoids, terpenoids, and carbohydrates. Phytosomes were created using the solvent evaporation technique by combining the extract with soy lecithin in 1:2 proportion. In order to analyse the physicochemical properties, the phytosomes prepared were characterized by UV-Visible spectroscopy, FTIR, DLS analysis showed a mean particle size of 52.91 nm with a PDI of 0.206, Zeta potential was −33.7 mV, SEM, and GC-MS analysis identified 52 bioactive compounds. Particle size analysis showed that nanoscale vesicles had the right surface charge which means that they were quite stable. The FTIR studies gave evidence of the formation of extract phospholipid complexes. By performing DPPH radical scavenging assay, the antioxidant potential IC_{50} of 44.94 µg/mL of the phytosome formulation was demonstrated and was compared to that the crude extract and standard ascorbic acid. The increased antioxidant activity of the phytosome formulation pointed to better bioavailability and hence more efficient therapeutic usage. This research highlights the value of phytosome technology as an effective and feasible approach for the improved management and efficacy of phytoconstituents of *Glycyrrhiza glabra.*

Keywords: Glycyrrhiza glabra, Phytosome, Phytoconstituents, Antioxidant activity

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Abstract No.: OP-024

FORMULATION AND EVALUATION OF POLYHERBAL DIGESTIVE TABLET FOR MICROBIAL GROWTH PROMOTION

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Over the last several years, more people have turned to herbal remedies for gut health, following the Ayurvedic approach that promotes using natural treatments to control digestion. This research is concerned with coming up with and studying a polyherbal Ayurvedic tablet that uses water extracts of cinnamon (*Cinnamomum verum*), liquorice (*Glycyrrhiza glabra*), and fennel (*Foeniculum vulgare*) to stimulate probiotic growth. In the study, the process began with extracting the substance, screening its phytochemicals, conducting preformulation and tablet-forming studies, and finally, manufacturing tablets with wet granulation. After that, the researchers examined the tablet by performing physical and chemical analysis, and FT-IR analysis showed that the tablet was rich in various bioactive functional groups. The activity of *Lactobacillus acidophilus* ATCC-4356 and *Lactobacillus plantarum* ATCC-8014 was analyzed by using individual extracts and the polyherbal tablet at varied concentrations. On evaluation, it was established that out of all the herbs, cinnamon gave the most positive results and that the probiotic growth was significantly higher in the polyherbal mixture compared to the solutions with each herb and the control. Based on these results, it seems that the various herbal ingredients in the tablet communicate with each other and could boost natural remedies for better gut health through active probiotics.

Keywords: Ayurvedic formulation, probiotics, gut health, tablet formulation, herbal extracts.

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Abstract No.: OP-025

FORMULATION OPTIMIZATION OF FEBUXOSTAT PRONIOSOMAL GEL USING A QUALITY BY DESIGN APPROACH

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Febuxostat is a non purine selective inhibitor that is generally administered orally for treating hyperurecemia and chronic gout in the patients who show less response to Allopurinol. However due to its low solubility and short half life exhibiting low bioavailability in the blood plasma, thus requiring to administer frequent dosing, which may cause adverse effects. The goal of this project is to alleviate those adverse reactions by increasing Febuxostat's solubility and bioavailability by the preparation and optimization of Febuxostat Proniosomal gel that is used for topical application utilizing the coacervation-phase separation method. To ensure the quality of the Proniosomal gel Quality by Design (QbD) approach was taken and critical material attributes and critical process parameters were checked to see how they affect the critical quality parameters of the Proniosomal formulation. The CMAs analyzed are (a) amount of cholesterol, (b) particle size of the surfactants like Span 40, Span 60, (c) entrapment efficiency of the drug.

Instruments like SEM- Scanning electron microscope was used to determine surface morphology and then the formulation was subjected to in-vitro dissolution and ex-vivo permeation studies which exhibited the efficiency of the formulation. The stability studies done for about 6 months also showed the Proniosomal formulation is stable at varied temperatures. The results obtained for the optimized proniosomes have the particle size and % entrapment efficiency of 193.7 ± 2.26 nm and 85.3 ± 0.89 % respectively.

Keywords: Febuxostat, Proniosomal gel, Quality by Design (QbD), Box-Benhken design

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Abstract No.: OP-026

STRENGTHENING REGULATORY READINESS OF MIR-34 NANOTHERAPEUTICS THROUGH CQA-DRIVEN RISK ASSESSMENT AND ZEBRAFISH EMBRYO SAFETY QUALIFICATION

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The regulatory evaluation of miRNA-loaded nanoparticle drug products requires structured integration of quality control, manufacturing consistency, and early safety qualification to support risk-based preclinical progression. We developed a regulatory science framework linking Critical Quality Attributes (CQAs) with fit-for-purpose vertebrate screening to improve early approval readiness of RNA nanotherapeutics. miR-34–loaded chitosan nanoparticles were employed as a case study to operationalize this framework.

The optimized formulation demonstrated a particle size of 182 ± 15 nm, polydispersity index 0.26 ± 0.02, zeta potential +25.9 ± 1.8 mV, and encapsulation efficiency 78.6 ± 3.9%, meeting predefined CQA acceptance ranges for nanoscale RNA systems. Inter-batch variability remained below 8% for size and 6% for loading efficiency across three independent preparations, supporting preliminary process reproducibility. CQAs were mapped to regulatory risk domains including biodistribution variability, dose inconsistency, and redox imbalance potential.

Zebrafish (Danio rerio) embryos (24–96 hpf) were utilized as an early in vivo safety qualification model. Survival exceeded 90%, hatching rates remained above 86%, and no statistically significant increase in severe morphological abnormalities was observed ($p > 0.05$). Imaging-based assessment demonstrated controlled regional distribution without excessive cranial accumulation. Under oxidative stress conditions, miR-34 nanoparticles reduced ROS-associated fluorescence by 29 ± 5%, whereas free miR-34 achieved a 12 ± 4% reduction.

Integration of CQA control metrics with standardized zebrafish safety endpoints enabled definition of explicit progression thresholds, illustrating how early vertebrate screening can strengthen regulatory preparedness and reduce translational uncertainty for miRNA nanoparticle drug products.

Keywords: miRNA Nanoparticles, Critical Quality Attributes (CQAs), Chitosan Nanoparticles, Zebrafish (Danio rerio) Model, Regulatory Nanomedicine

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Abstract No.: OP-027

NETWORK PHARMACOLOGY AND FBDD GUIDED NOVEL BBB-PENETRANT DUAL INHIBITOR DEVELOPMENT OF BRAFV600E/MEK FOR OVERCOMING THE MAPK-DRIVEN DRUG RESISTANCE IN PEDIATRIC GLIOBLASTOMA

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Pediatric glioblastoma (pGBM) is an aggressive central nervous system malignancy with a poor prognosis and resistance to therapy. MAPK pathway dysregulation resulting from the BRAFV600E mutation is a major driver of the pGBM phenotype. Using network pharmacology, BRAF was identified as the key therapeutic target for this study. To create a new dual BRAF/MEK inhibitor capable of overcoming MAPK-mediated resistance, an extensive in silico workflow was performed to design a novel brain blood barrier (BBB) permeable dual BRAF/MEK inhibitor. Utilizing a comprehensive kinase-selective ligand library, high-throughput virtual screening, in combination with ADMET and BBB permeability filtering, followed by docking and 2D interaction analysis against BRAFV600E (PDB ID: 4G9R) and MEK1 (PDB ID: 3SLS) was performed to identify potential dual inhibitors. Subsequently, fragment-based drug design (FBDD) and combinatorial library strategies were used to build hybrid scaffolds with optimal interactions at critical residue sites including: Cys532, Lys483, and Phe595 for BRAF; and Lys97, Ser212 and Asp208 for MEK. The best candidates were selected based on their superior docking scores, advantageous MM-GBSA binding energies, and stable ligand-protein complexes from molecular dynamics studies, compared to the standard Dabrafenib for BRAF and Trametinib for MEK. The overall designed dual-inhibitor provided increased binding stability, optimal interaction profiles and predicted BBB permeability, indicating that it could be an effective targeted therapy candidate to overcome MAPK mediated resistance in paediatric glioblastoma. **Keywords:** Pediatric Glioblastoma, MAPK Pathway Resistance, Dual BRAF/MEK Inhibitor, In-Silico Drug Design.

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Abstract No.: OP-028

ESTABLISHING MAXIMUM ALLOWABLE HOLD TIME FOR FILTERED LIQUID ORAL FORMULATION

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Hold Time study was designed to validate the hold time stability of a filtered liquid oral bulk formulation, providing documented evidence of quality assurance in compliance with cGMP standards. The investigation monitored three consecutive batches under simulated manufacturing conditions to evaluate the impact of bulk storage on product sterility over a maximum duration of 216 hours. A rigorous sampling plan was executed at predetermined intervals (0, 24, 48, 72, 120,144, 168 hours), with samples subjected to microbiological analysis as the primary Critical Quality Attribute (CQA). The analytical data confirmed that the bulk solution consistently met the defined acceptance criteria for microbiological content throughout the study period. Consequently, this research successfully validates a 168-hour hold time, ensuring that the intermediate bulk product maintains its quality and safety profile prior to the filling process.

Keywords: - Hold Time Study, Liquid Oral Bulk, Microbiological Stability, cGMP Compliance

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Abstract No.: OP-029

FORMULATION AND OPTIMIZATION OF MUPIROCIN-LOADED FILM-FORMING HYDROGEL FOR TOPICAL DELIVERY

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Polymeric film-forming systems (FFSs) are a subject that is being discussed a lot these days. They are often used as substitutes for traditional topical and transdermal medication formulations in practice because they deliver exact results at a specific location on the skin, covering large areas, extending or altering drug release and enhancing therapeutic efficacy. However, it has been discovered that response surface approach is particularly helpful in optimizing multivariable processes when combined with statistically designed experiments. The purpose of this study is to assess the impact of three independent variables in various ratios on the impacts of film-forming hydrogel (FFH). A central composite design (CCD) was utilized to investigate the effect of independent variables of Pullulan (X1), Polyvinyl Alcohol (X2), and Ethanol (X3) via 20 formulation batches which were evaluated for dependent variables pH (Y1), Viscosity (Y2), and film-forming time (FFT) (Y3) along with other related characteristics of the formulation. According to the outcomes from the analysis of variance used to assess the models' fit, the models did not exhibit a lack of fit ($R2 > 0.80$) and were statistically significant ($p<0.05$). Three confirmation experimental runs were conducted under the determined ideal conditions in order to verify the validity of the statistical models used to forecast pH, viscosity, and FFT. The findings demonstrated that there was no discernible difference between the experimental and statistical model predictions. Thus, mupirocin FFH optimization through central composite statistical design is valid for FFT prediction and other features that use formulation variables.

Keywords: Film-forming hydrogel, topical delivery, central composite design, optimization.

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Abstract No.: OP-030

DESIGNING AND OPTIMIZATION OF BUCCAL TABLETS BY SINTERING TECHNIQUE

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The objective of the work is to formulate, evaluate and optimize a sintered bio-adhesive buccal tablet containing Nebivolol to bypass the first pass metabolism.

Different combinations of trials were designed to formulate the tablets. Ten different trials were developed by using different ratio of Hydroxy Propyl Methyl Cellulose (K15M) and Caranauba Wax. The formulated tablets were sintered at multiple temperatures and time like 60° C and 70° C for 90 min. and 180 min. The prepared formulations were tested for different aspects of quality control parameters (weight variation, hardness, surface pH, drug Content uniformity, swelling index, and bioadhesion properties and dissolution study). The *ex-vivo* diffusion study has been done by Franz diffusion cell using fresh oral mucosa of goat as a model tissue. The FTIR data suggests no observed interactions in between the drug and excipients. The results of DSC depicted that the prepared formulations of drug and excipients has no possible interactions. The dissolution study for the tablet was performed by using type II dissolution apparatus.

The formulation FSH3 which contains polymer ratio of 3:2 (HPMC K15M and Caranauba wax) showed the best drug-release profile at 60° C for 180 min. The study concludes that, further *in-vivo* characterization can be carried out to establish the clinical similarity.

Key words: Nebivolol Hydrochloride, Buccal Drug Delivery System, Sintering Technique

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Abstract No.: OP-031

TO STUDY THE EFFICACY OF CO-CRYSTALLIZATION TECHNIQUE IN ENHANCING THE SOLUBILITY OF POORLY WATER-SOLUBLE DRUGS

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The bioavailability of the drug is mainly governed by factors like partition coefficient, solubility Pka, etc. The modification of these physicochemical properties can be done to enhance the bioavailability and thus effective therapy can be achieved. This research deals with the advantages of co-crystals over salts, solvates (hydrates), solid dispersions and polymorphs. A pharmaceutical cocrystal is a single crystalline solid that incorporates two neutral molecules, one being an active pharmaceutical ingredient (API) and the other a co-crystal former. In the present study co-crystals of Metformin Hydrochloride and Glimepiride were prepared using different co-formers. Different ratio of urea, succinic acid and tartaric acid were used to design the co-crystals. They were formulated by two different methods- cooling crystallization and solvent evaporation. The prepared co-crystals were evaluated for microscopic characters, product yield, Fourier Transform Infrared Spectroscopy, Micromeretic properties, drug content, dissolution study of co-crystals, stability studies. The results indicated that co-crystals prepared by using a suitable co-former can definitely enhance the dissolution rate ultimately leading to enhanced bioavailability. Out of three coformers used to design the co-crystals, succinic acid is found to be more effective. Moreover the bioavailability of Glimepiride is more enhanced as compared to Metformin Hydrochloride as it belongs to BCS class II.

Keywords: Solubility, hydrates, coformers

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Abstract No.: OP-032

EFFECT OF HPMC E5 LV PREMIUM AND HPMC E15 LV PREMIUM ON ORAL POLYMERIC FILM OF DIPHENHYDRAMINE HCL (DPH)

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Rapid transmucosal delivery of antihistamines can shorten onset time, avoid first-pass metabolism, and enhance patient compliance and bioavailability. Oral polymeric films of Diphenhydramine hydrochloride were therefore formulated with hydroxypropyl-methylcellulose (HPMC) E5 LV Premium and HPMC E15 LV Premium and systematically evaluated. Pre-formulation studies covered solution rheology (62 – 98 cP) and drug-polymer compatibility by ATR-IR and Differential Scanning Calorimetric analysis, all of which revealed no chemical interaction between DPH and the polymers. Dried films showed uniform thickness (0.212 – 0.252 mm) and mean average weight (18.90 – 25.68 mg) with surface pH values of 6.4 – 6.9 for all formulations, indicating mucosal friendliness. All batches (F1-F6) exhibited tensile strengths of 1.25 – 2.56 Kg/mm^2, percent elongation of 1.82 – 4.12 %, and folding endurance exceeding (95-127) cycles. All films met pharmacopeial limits for drug content (97.25 – 99.76 %) and disintegrated rapidly in simulated salivary solution within (26 – 53secs). Drug release ≥90 % achieved approximately in 10 mins for HPMC E5 formulations (F1-F3) and in 12 mins for HPMC E15 formulations (F4-F5) but F6 showing very slow drug release due to their denser hydrogel matrix. From the above parameters F3 formulation gave best results. Kinetic modelling confirmed that drug release followed diffusion-controlled mechanisms, best fitting the Higuchi and Korsmeyer–Peppas models, with Fickian diffusion being predominant. Hence, this research illustrates that the selection of viscosity grades for HPMC allows for accurate modulation of durability, disintegration, and drug-release characteristics in DPH oral dissolving films.

Keywords: Orally dissolving film; Dysphagia; Diphenhydramine hydrochloride; Hydroxypropyl methylcellulose sodium; Fickian diffusion.

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Abstract No.: OP-033

SIMULTANEOUS QUANTIFICATION OF RESMETIROM AND URSODEOXYCHOLIC ACID IN TABLET FORMULATION BY RP-HPLC METHOD

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An easy, quick and selective reverse-phase high-performance liquid chromatography (RP-HPLC) procedure was designed to perform the simultaneous quantification of resmetirom and ursodeoxycholic acid in tablet dosage form. A chromatographic separation was performed with a C18 column by using an isocratic mobile phase optimized in terms of acetonitrile and aqueous buffer at an acidic pH under a desirable flow rate. A UV detector with an appropriate wavelength was used to detect the sample and to have sufficient sensitivity and selectivity on both analytes. The method developed was found to be of good resolution, symmetric peak shapes, and acceptable retention time of resmetirom and ursodeoxycholic acid, which allowed an analysis to be performed quickly and efficiently. Optimal control of the chromatographic conditions was achieved by changing the mix of the mobile phase, pH, flow rate, and the wavelength used to detect the solution to ensure optimal separation and least time required to analyze the solution. The suggested approach showed a distinct barrier between the two drugs and the tablet excipients, which means that it will be specific to the purpose of application. The ease of the sample preparation process, as well as the brief duration of the running time, also contribute to the increased applicability of the method to regular quality control analysis. The resulting RP-HPLC method presents an analytical analysis procedure is useful in the estimation of resmetirom and ursodeoxycholic acid in mixed tablet preparation.The procedure needs to be validated according to the regulatory standards to ascertain its working features.

Keywords: Resmetirom; Ursodeoxycholic Acid; RP-HPLC; Method Validation; Tablet Formulation

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Abstract No.: OP-034

PHYTO-ONCOLOGY OF THE TROPICS: A MULTI-ORGAN ANALYSIS OF WINGED BEAN BIOACTIVES

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Psophocarpus tetragonolobus (Winged beans) is a tropical legume, widely grown in parts of the Southeast Asia. It is a beneficial legume of the family Fabaceae. All parts of this plant are rich in proteins, carbohydrates, vitamins, minerals, and fiber. Despite of its numerous health advantages, P. tetragonolobus has not been fully utilized due to limited exploration. Cancer remains a leading cause of morbidity and mortality worldwide, prompting increasing interest in plant-derived bioactive compounds with chemo preventive potential. Several studies investigated the anticancer and anti-inflammatory properties of winged bean pod extract and its purified protease inhibitor from the root tuber. Phytochemical analysis revealed that the pod extract contains exceptionally high levels of natural antioxidants, compounds known to protect cells from oxidative damage. In vitro studies demonstrated that the extract significantly suppressed the proliferation of human colorectal cancer cells and induced apoptosis, indicating activation of programmed cell death pathways. Further biochemical characterization led to the purification of a Kunitz-type trypsin inhibitor from the root tuber using ion exchange and size-exclusion chromatography. Functional evaluation using an MTT assay against the human osteosarcoma cell line demonstrated significant antiproliferative activity. Collectively, these findings highlight the therapeutic potential of winged bean–derived bioactive compounds, particularly antioxidants and protease inhibitors, as promising candidates for the development of functional foods or natural adjuncts in cancer prevention and treatment strategies. Further mechanistic and clinical investigations are warranted to elucidate their molecular targets and translational applicability.

Keywords: Winged Bean; Psophocarpus tetragonolobus; cancer; apoptosis induction; protease inhibitors, trypsin inhibitors.

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Abstract No.: OP-035

MARINE-DERIVED PHOTOPOLYMERIC ULVAN METHACRYLATE INK FOR HIGH PRECISION CPIP-3D PRINTING IN DRUG DELIVERY APPLICATIONS

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Controlled photonic intelligent production (CPIP) offers exceptional fabrication precision by selectively directing light onto photocurable inks, thereby inducing localized photo-initiated reactions and crosslinking. However, the formation of very dense polymeric networks by traditional photocurable resins frequently restricts the diffusion and release of drugs. To address this limitation, the present study reports the development of a marine-derived, ulvan-based photocurable ink tailored for CPIP-driven 3D printing applications. Ulvan, asulfated polysaccharide obtained from green seaweed, was chemically modified through methacrylation using methacrylic anhydride to introduce photocrosslinkable moieties. The successful grafting of methacryloyl groups onto the ulvan backbone was confirmed by NMR and FTIR analysis. A series of photocurable formulations were subsequently prepared using methacrylated ulvan (UlvMA) in combination with 0.4% w/v LAP photoinitiator. Comprehensive rheological and photorheological evaluations demonstrated that the developed inks possessed suitable viscosity, printability, and rapid photo-responsive characteristics required for CPIP-based 3D printing. Among the tested formulations, the optimized 3D printed UlvMA construct was extensively characterized for gel fraction, surface morphology, mechanical properties, and swelling behavior. The results indicated the formation of stable yet tunable crosslinked networks, highlighting their suitability for controlled drug delivery applications. Importantly, the methacrylation and subsequent UV-induced photo-crosslinking processes did not compromise biocompatibility, as evidenced by favourable cell viability in human monocyte cells. Overall, this marine biopolymer-based photocurable ink demonstrates significant promise for advanced additive manufacturing, paving the way for the development of customizable and patient-specific drug delivery systems in future.

Keywords: marine polysaccharides, ulvan methacrylate, photocurable ink, controlled photonic intelligent production, 3D printing

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Abstract No.: OP-036

ADDITIVE MANUFACTURING OF THERAPEUTIC PLATFORMS TO COUNTERACT SPACEFLIGHT-INDUCED BONE DISORDER

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Space medicine focuses on safeguarding astronaut health in the hostile space environment, where microgravity induces profound physiological changes, including disruption of bone homeostasis. Prolonged exposure to microgravity reduces bone formation and enhances resorption, resulting in significant bone loss despite routine exercise. Although alendronate sodium trihydrate is effective in mitigating bone loss, its conventional systemic administration is associated with toxicity. To overcome this limitation, this study aims to develop multifunctional three-dimensional (3D) printed bone scaffolds that provide mechanical support along with localized drug delivery. Using stereolithography (SLA) and BioMed White Resin, 3D implants with octahedral, diamond, round, gyroid, and cubic lattice geometries were fabricated to optimize mechanical strength, nutrient transport, and osteogenic cell interaction. Alendronate sodium trihydrate was successfully incorporated into the resin formulations, as confirmed by analytical characterizations. The scaffolds exhibited interconnected porous architectures (6-10%) conducive to cell infiltration under simulated microgravity conditions. Swelling index and phosphate-buffered saline absorption studies (2-13%) under both normal gravity and simulated microgravity (2D clinostat) demonstrated effective fluid management. SEM revealed geometry-dependent morphological variations and optimal pore interconnectivity across scaffold designs. PXRD and self-setting analysis confirmed the absence of crystalline alendronate within the scaffolds over a period of 14 days. Mechanical testing showed high compressive strength, elastic modulus, and strain tolerance (70%), indicating structural integrity suitable for spaceflight conditions. *In vitro* drug release studies demonstrated sustained and controlled alendronate release, essential for long-duration missions. *In vivo* evaluation using a rat hindlimb unloading model will be performed in future to determine great potential of 3D-printed bone scaffolds against microgravity-induced bone loss

Keywords: SLA 3D printing, Microgravity, Bone Scaffolds, Space medicine, Drug delivery

Abstract for Poster Presentation

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Abstract No.: PP-001

REGULATORY PATHWAYS FOR IMPLANTABLE CARDIOVERTER DEFIBRILLATORS: A CROSS-COUNTRY COMPARATIVE STUDY

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An Implantable Cardioverter Defibrillator (ICD) is a key implantable life saving devices which prevents deaths due to sudden cardiac arrest. ICDs are subjected to strict regulatory compliance due to their complex combination of hardware and software and their long-term therapeutic benefits. This cross-country study provides a comparative assessment of different regulatory guidelines for ICDs across major jurisdictions, including the United States food and drug administration, the European union medical device regulation, India's Central drugs standard control organization, Japan's Pharmaceutical and medical device agency, Australia's Therapeutic goods administration, and China's National medical products administration.

The approval process differs for different countries, even though ICDs are in the highest risk category (Class III/IV/D). EU MDR requires conformity assessment with substantial technical documentation, Clinical evaluation reports, post-market clinical follow-up and summary of safety and clinical performance, whereas FDA requires pre-market approval backed by clinical data. CDSCO has adapted ISO 13485-aligned regulations with materiovigilance reporting. PMDA and TGA requires region specific clinical and quality system norms. NMPA requires strict technical and clinical evidence- Product Technical Requirement and Clinical Evaluation, and mandatory Post-Market Surveillance.

Emerging regulatory requirements – Cybersecurity, Software Validation and Post-Market Surveillance are changing compliance requirements worldwide. A comparative awareness of these frameworks ensures coordinated development, risk management & efficient global market for ICDs.

Keywords: Implantable Cardioverter Defibrillator, United States food and drug administration, European union medical device regulation, Central drugs standard control organization, Pharmaceutical and medical device agency, Therapeutic goods administration, National medical products administration

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Abstract No.: PP-002

SILVER NANOPARTICLE INCORPORATED HYDROGELS AGAINST DIABETIC WOUND PATHOGENS: A REVIEW

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Chronic diabetic wounds are characterized by slow healing due to impaired cell migration and proliferation, vascular dysfunction, prolonged inflammation and an altered wound microenvironment. Infected diabatic wounds are mostly encountered by a shift in normal skin pH (~5.5) to an alkaline pH range (7.5-9.0), that promotes bacterial colonization and biofilm production. These biofilms serve as physical and biochemical shield, hindering penetration of antibiotics and making traditional creams and dressings largely ineffective since they are unable to sense the changes in pH or an inflammatory condition.

This abstract describes the hydrogels that prepare from natural and synthetic polymer (chitosan, hyaluronic acid) it is incorporated with silver nanoparticle shows antimicrobial effect in diabetic wound. This hydrogel matrix will remain dormant at normal skin pH but ionizes under alkaline conditions and promotes swelling. The hydrogels give a moist environment that helps in faster tissue regeneration. Ag+ ions bind with bacterial thiol group, there by inhibiting DNA replications. Ag-Np loaded hydrogels also show the effect of tissue regeneration by enhancing fibroblast proliferation & collagen deposition, thus initiating the controlled release of Ag+ ions. Moreover, Ag-Np interact with cell wall of bacteria, disrupts the structural integrity that cause leakage and cell death. This smart design ensures that therapeutic agents are delivered selectively to infected sites, enabling on-demand drug release exclusively in the presence of infection. Silver nanoparticles help in targeted drug delivery, scavenges excess reactive oxygen species (ROS) and minimize cytotoxicity. Overall, this approach gives a therapeutic way of wound healing and show antimicrobial property.

Keywords: Silver nanoparticles, chronic diabetic wound, hydrogel, cytotoxicity.

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Abstract No.: PP-003

SOLID STATE CHARACTERIZATION: ROLE IN DRUG DEVELOPMENT

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The solid-state characterization is one of the important attributes of developing pharmaceutical drugs since it assists the researchers to understand the physical and structural characteristics of active pharmaceutical ingredients (APIs) as well in formulation development. The crystalline structure, polymorphs, hydrates, solvates, salts, co-crystals, and amorphous form of a drug are key factors that significantly influence such valuable characteristics as solubility, dissolution, bioavailability, stability, and the ability to manufacture a drug. Unless solid-state properties are studied and managed, they will lead to differences in drug activity, stability issues, formulation issues and large-scale production problems. In order to overcome these difficulties, X-ray powder diffraction (XRPD), differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), Fourier-transform infrared spectroscopy (FT-IR), Raman spectroscopy and scanning electron microscopy (SEM) are common analysis methods to study the solid form of drugs. These are used to make a choice on the best solid form, the behavior of stability, and to streamline manufacturing processes to optimize. Besides, solid-state characterization assists in Quality by Design (QbD) principles and aids in satisfying regulatory needs and securing intellectual property with solid-form patents. In general, it is necessary to have systematic solid-state characterization that will help to minimize risks of the development and guarantee the creation of safe, effective, and high-quality medicines.

Keywords: Solid-State Characterization, Active Pharmaceutical Ingredients (APIs), FT-IR Polymer, Quality by Design.

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Abstract No.: PP-004

BENEFIT-RISK ASSESSMENT OF NEW DRUG MOLECULES

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Abstract: The discovery of new drug molecules is central to advancing healthcare and addressing unmet therapeutic needs. However, innovation in pharmacotherapy must be accompanied by a rigorous benefit–risk assessment to ensure patient safety and clinical effectiveness. Benefit–risk assessment is a structured, evidence-driven process that systematically evaluates therapeutic efficacy in relation to potential safety concerns across the entire drug development lifecycle, including preclinical toxicology, phased clinical trials, and post-marketing pharmacovigilance .Therapeutic benefits of novel drug molecules often include superior efficacy, enhanced receptor selectivity, improved pharmacokinetic and pharmacodynamic properties, reduced dosing frequency, and better patient adherence. Advances in biotechnology, precision medicine, and targeted drug delivery systems have further improved clinical outcomes and disease management. Nevertheless, new drugs may pose risks such as adverse drug reactions, organ-specific toxicity, immunogenicity, drug–drug interactions, and rare or delayed adverse events that may only emerge during large-scale or long-term use. Regulatory agencies including CDSCO, FDA, and EMA require comprehensive safety and efficacy data, implementation of risk management plans, and continuous post-marketing surveillance prior to and following marketing authorization. Quantitative benefit–risk models, real-world evidence, and structured regulatory frameworks support transparent and informed decision-making. In conclusion, benefit–risk assessment remains the cornerstone of rational drug approval and patient-centered care. Continuous evaluation and proactive pharmacovigilance are essential to ensure that new drug molecules provide meaningful therapeutic value while minimizing potential harm in diverse clinical settings.

Keywords: Pharmacovigilance, CDSCO, FDA, EMA.

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Abstract No.: PP-005

MICRONEEDLE DRUG DELIVERY SYSTEMS

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Abstract: Microneedle drug delivery systems (MNDS) have gained considerable attention as an innovative approach for transdermal drug administration. Traditional oral and injectable routes often face challenges such as poor bioavailability, first-pass metabolism, needle-associated pain, and low patient compliance. Microneedles offer a minimally invasive alternative by creating microscopic pathways through the stratum corneum, allowing drugs to enter systemic circulation without causing significant discomfort. Different types of microneedles, including solid, coated, dissolving, hollow, and hydrogel-forming systems, have been developed to suit various therapeutic applications. These systems are particularly useful for the delivery of vaccines, insulin, peptides, and other biopharmaceuticals that require controlled and targeted administration. The use of biodegradable polymers and advanced fabrication techniques has improved safety, precision, and drug loading capacity. The major advantages of microneedle systems include painless delivery, improved patient adherence, enhanced drug permeation, reduced risk of infection, and potential for self-administration. Moreover, they support controlled release and localized therapy, thereby minimizing systemic adverse effects. However, challenges such as large-scale manufacturing, cost considerations, mechanical strength, and regulatory evaluation must be addressed for wider clinical adoption. Overall, microneedle drug delivery systems represent a promising and patient-friendly strategy that may significantly improve the effectiveness and acceptance of modern therapeutic interventions.

Keywords: MNDS, Vaccine delivery, Pharmacokinetics, Transdermal drug delivery.

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Abstract No.: PP-006

AI-INTEGRATED QUALITY BY DESIGN (AI-QBD) FOR CONTROLLED RELEASE (CR) FORMULATIONS

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Quality by Design (QbD) transformed pharmaceutical development since its introduction in the early 2000s by the US FDA through ICH Q8–Q12 guidelines. It is applied for optimization, development, manufacturing, and control processes of drugs for enhancing their quality, safety and efficacy. QbD relies on the product's Critical Quality Attributes (CQAs) and Critical Process Parameters (CPPs), and scientifically establishes relationships between them. Through risk assessment, statistical modelling, and experimental design, QbD defines a “design space” that ensures consistent product quality for manufacturers. Traditional QbD relies on Design of Experiments (DoE), statistical modelling, and Process Analytical Technology (PAT) to define CQAs, CPPs and a design space. However, controlled release (CR) systems- such as matrix tablets, osmotic pumps, and long-acting injectables etc. has complex, nonlinear interactions including polymer swelling, erosion, and diffusion, which challenge conventional methods. To address these limitations, artificial intelligence (AI), machine learning (ML), and deep learning models are increasingly used to predict CQAs from CPPs with greater precision. Explainable AI (XAI) tools like SHAP and LIME improve interpretability of nonlinear predictions and have been associated with reduced batch failures under raw material variability and scale-up conditions while Natural Language Processing (NLP) assists in managing regulatory documentation. In CR formulations, AI also optimizes polymer selection, porosity, and hot-melt extrusion via digital twins and real-time PAT data, outperforming traditional Response Surface Methodology (RSM). By integrating predictive analytics, explainability, and regulatory alignment, the proposed AI-QbD approach provides manufacturers a scalable and compliant pathway toward Pharma 4.0, enabling continuous improvement and patient-centric outcomes.

Keywords- Quality by Design (QbD), Critical Quality Attributes (CQAs), Critical Process Parameters (CPPs), Controlled Release (CR) Formulations, Artificial Intelligence (AI),

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Abstract No.: PP-007

SYNTHESIS AND CHARACTERIZATION OF SODIUM ALGINATE-G-FERULIC ACID CROSSLINK WITH ETHYLENEDIAMINE-BASED ANTIOXIDANT FILMS

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The process remains a complex and multidimensional biological event; proper wound healing is essential to stimulate tissue regeneration and prevent infection. Recent research has focused on natural polymers in wound dressing applications due to their high biocompatibility and biodegradability. Sodium alginate, a naturally occurring polysaccharide, has demonstrated promise as a wound care agent. Additionally, ferulic acid, a phenolic compound with antioxidant and antibacterial properties, has shown potential in accelerating the healing process. In this context, conjugated sodium alginate-ferulic acid films with antibacterial and antioxidant properties were prepared and characterized for their potential use in facilitating wound healing. FTIR spectroscopy confirmed the grafting of ferulic acid onto sodium alginate. Further analyses employing SEM, XRD, TGA, and DSC revealed that the experiments resulted in effective crosslinking, thereby enhancing the structural and thermal properties of the films. Overall, the results suggest that the synthesized sodium alginate-g-ferulic acid (SA-g-FA) conjugated films possess promising potential as a biomaterial platform for wound-healing applications.

Keywords: Wound healing; sodium alginate; ferulic acid; conjugates; bioactive films; antioxidant activity.

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Abstract No.: PP-008

SILK PROTEIN AS A NEUROPROTECTION UTILIZATION FOR NEURODEGENERATIVE DISEASES LIKE ALZHEIMER

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Silk biomaterial has emerged as one of the possible therapeutic products that have the potential to treat the Alzheimer disease, which is a progressive neurodegenerative disease involving cognitive impairment, amyloid-beta plaque development, hyperphosphorylation of the tau proteins, oxidative stress, neuroinflammation and loss of neurons. The available treatment modalities only provide symptomatic relief and are not very effective in preventing the disease course and that is why elaborate neurotherapeutic modalities are necessary.

The biomaterials that are composed of silk have received new levels of attention in biomedical developments due to their good biocompatibility, biodegradability, versatility of structures and low-immunogenicity. Silk fibroin has attracted significant interest as a versatile system in drug delivery, e.g. nanoparticles, hydrogels, nanofibers and scaffold matrices. These systems permit the delivery of drugs in a regulated and durable way, augment medication bioavailability and enhance direct delivery of drugs to neural tissues. In addition, silk fibroin scaffold mimics the extracellular matrix, which facilitates neuronal adhesion, synaptic regeneration and neural tissue repair.

Silk sericin is a potent antioxidant, anti-inflammatory, and neuroprotective agent, as it will decrease oxidative neuronal damage and increase neuronal survival. It is possible to design sericin- based biomaterials into injectable hydrogel, nanocarriers and scaffolds, which can enhance the delivery of therapeutic and support the regeneration of the neural.

Keywords: Alzheimer's disease, Silk fibroin, Silk sericin, Neuroprotection, Neural regeneration, Smart biomaterials, Nanotherapeutics, Drug delivery.

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Abstract No.: PP-009

COMPUTATIONAL REPURPOSING OF PHYTOCHEMICALS TO COMMERCIALLY AVAILABLE DRUGS AGAINST MPOX: MULTI MOLECULAR DOCKING AND MULTI *IN-SILICO* ADMET PROFILING

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The global resurgence of Mpox, coupled with the limited availability of effective antiviral therapies, underscores the urgent need for innovative drug discovery strategies. This study presents a novel, integrated computational repurposing framework that simultaneously evaluates phytochemicals from medicinal plants alongside commercially available drugs against multiple essential Mpox targets, making it one of the first comprehensive multi-target investigations in this domain. Unlike previous studies that examine single targets or single molecule classes, our approach incorporates multi-molecular docking across five validated Mpox proteins (2V54, 6BED, 1U9W, 1ETE, 8HG1) combined with parallel ADMET-based triaging**,** significantly enhancing prediction accuracy and translational potential. All ligands were screened using PyRx with optimized protein-ligand preparation, and top candidates were further assessed through advanced in-silico ADMET tools (SwissADME, pkCSM) to generate a comprehensive drug-likeness and safety profile. Several phytochemicals displayed competitive or superior binding to FDA-approved antivirals across multiple Mpox targets, indicating potential broad-spectrum activity. Their favourable ADMET behaviour further strengthens their suitability for downstream preclinical evaluation. This work introduces a unique, multi-dimensional computational pipeline for identifying dual-class antiviral candidates, providing a robust and scalable platform for accelerating therapeutics against Mpox and other emerging viral threats.

Keywords: Monkey Pox, Multi-molecular docking, ADME and Toxicity studies, Phytochemicals.

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Abstract No.: PP-010

SKIN CARE PRODUCTS FOR THE PREVENTION OF SKIN CANCER

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Skin cancer, primarily including melanoma, basal cell carcinoma (BCC), and squamous cell carcinoma (SCC), is the most frequently diagnosed malignancy worldwide, largely driven by ultraviolet (UV) radiation overexposure. The prevention of skin cancer relies on a comprehensive, multi-faceted approach centered on photo protection. Broad-spectrum sunscreen (SPF 30+) is the primary topical product, acting through chemical absorbers (e.g., avobenzone) or physical blockers (zinc oxide, titanium dioxide) to reduce UV-induced DNA damage, sunburns, and the development of precancerous actinic keratosis. Evidence from randomized controlled trials supports that daily, consistent application of sunscreen reduces the incidence of SCC and melanoma. Emerging strategies in skincare for cancer prevention go beyond UV filtering to include "chemoprevention," which involves topical agents that repair existing damage. Topical nicotinamide (Vitamin B3) has shown efficacy in enhancing DNA repair and reducing the rate of new actinic keratosis and NMSCs. Additionally, antioxidants such as Vitamin C, Vitamin E, and green tea extracts are incorporated into serums to neutralize free radicals, while retinoid (Vitamin A derivatives) are used to accelerate cell turnover and repair DNA, potentially reducing the development of BCC and SCC. Optimal prevention requires daily application, even on cloudy days, with reapplication every two hours or after swimming. While sunscreen is effective, it must be used alongside other measures, including sun-protective clothing, hats, and sun avoidance, as it may provide a false sense of security. Future developments are likely to focus on integrating DNA-repair enzymes and antioxidants directly into sunscreen formulations.

Keywords: Melanoma, Basal cell carcinoma (BCC), Squamous cell carcinoma (SCC), Nicotinamide, Sunscreen.

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Abstract No.: PP-011

NIPAH VIRUS: A DEADLY BAT-BORNE DISEASE

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Animals and humans can contract the sickness caused by the Nipah virus. Fruit bats (genus

Pteropus), sometimes referred to as flying foxes, are the carriers of the Nipah virus. Nipah was initially identified in 1999 after an outbreak in humans and pigs in Singapore and Malaysia. Bat-borne Nipah virus (NiV) is a novel pathogen. It was discovered in Malaysia 20 years ago, and since then, outbreaks have occurred throughout South and Southeast Asia. The virus can cause fatal respiratory and neurological diseases. It is easily transmitted within communities by sick humans or animals. Different viral strains have distinct epidemiological and clinical characteristics. Managing epidemics requires early diagnosis and effective infection control.

Numerous molecular and serological diagnostic techniques have been developed for monitoring and diagnosis. When a new area is impacted, difficulties occur. The necessity for efficient management and control is highlighted by the high fatality rate associated with the virus and the potential for it to spread to new locations. Though some strategies show promise, there are currently no widely accessible effective treatments or prevention measures. NiV infections must be prevented and controlled using a One Health strategy due to the common pathways of transmission from bats to people.

Keywords: Nipah virus; outbreak; review; Respiratory illness.

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Abstract No.: PP-012

CLINICAL EVALUATION OF CONVALESCENT PLASMA THERAPY AND INVESTIGATIONAL ANTIVIRAL STRATEGIES IN COVID-19 MANAGEMENT

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As of right now, COVID-19 has no approved treatments or vaccinations. Apheresis technology has begun to be used in some locations to collect plasmas containing anti-SARS-CoV-2 antibodies from recovered persons with confirmed COVID-19 and kept in blood banks to administer to COVID-19 patients and lower the requirement for intensive care and fatality rates. Clinical trials of many recognized antiviral medications and their combinations, as well as vaccine development, are ongoing in patients with confirmed COVID-19, despite the fact that there are currently neither clinically authorized antiviral medications nor vaccinations for the virus. This study included three studies with sufficient results to assess the effectiveness of convalescent plasma therapy for COVID-19 patients. 24 interventional clinical trial protocols (advanced in phases II–III, III, and IV) are also included. The three published studies described a similar strategy of convalescent plasma intervention, mostly for treating critical cases with life-threatening disease, with less than 4% of adverse events and a reduction in mortality and length of stay.

Keywords: Antibody, apheresis device, antiviral drugs, COVID 19, clinical trial, life threatening disease.

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TOXICOLOGICAL IMPACT OF HERBAL MEDICINES AND SUPPLEMENTS

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Herbal medicines and dietary supplements are popular all over the world because they come from natural sources. Many people believe they are safe. Recently, the use of these products has increase quickly for promoting health, preventing diseases, and self-medication. Their benefits, growing evidence suggests that herbal products may also pose toxicological risks to human health. Many herbal medicines contain active compounds that can be harmful if taken in high amounts, for long periods of time or without medical advice. Contamination with heavy metals, pesticides, and microbes, along with mixing with synthetic drugs, increases the risk of toxicity. There have been occur liver damage, kidney damage, allergic reactions, and interactions with conventional medicines. The lack of standardization, improper labelling, and limited clinical data make it hard to assess their safety and effectiveness. In many places, herbal products are sold as food supplements, to avoid strict regulations. The potential toxic effects of herbal medicines and supplements, the factors that lead to toxicity, and the need for quality control and monitoring. As herbal products can provide health benefits, it is essential to conduct scientific evaluations, use proper dosages, and increase consumer knowledge to decrease health risks. When herbal medicines are used carefully and proper regulated, they can be safely used in modern health systems.

Keywords: Herbal Medicines, Toxic, Safety .

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Abstract No.: PP-014

SEMAGLUTIDE AND THE INCRETIN PATHWAY: BEYOND GLYCAEMIC CONTROL—DUAL BENEFITS IN WEIGHT REDUCTION AND CARDIOVASCULAR SAFETY IN TYPE 2 DIABETES MELLITUS

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Glycemic control and cardiovascular risk factor management reduce the risk of late-stage diabetic complications in people with type 2 diabetes. According to guidelines, treatment objectives should focus on body weight, blood pressure, low-density lipoprotein cholesterol, and HbA1c. In order to improve new medications for type 2 diabetes, it is necessary to demonstrate cardiovascular safety, comprehend their processes and efficacy, and compare their effects to those of alternative treatment options. Currently approved in a number of nations for the once-weekly treatment of type 2 diabetes, subcutaneous Semaglutide is an agonist of the glucagon-like peptide-1 receptor. The most popular first-line medication for type 2 diabetes is metformin. When metformin is insufficient, a number of additional kinds of conventional drugs are utilized. The major purpose of Semaglutide is long-term weight maintenance. In the sustained clinical trial program, Semaglutide was assessed in more than 8000 patients with a range of type 2 diabetes. Semaglutide lowers blood glucose levels by increasing insulin production and blocking glucagon secretion from pancreatic islets through the incretin pathway. By reducing hunger, food cravings, and the relative preference for fatty, high-energy foods, Semaglutide also reduces energy consumption. Semaglutide is expected to set the standard for sustaining a healthy way of living in the future.

Keywords: Semaglutide, Glucagon-like peptide-1, Glycaemic control, HbA1c, Control cravings.

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Abstract No.: PP-015

PROBIOTICS AS A POTENTIAL SKIN CARE AGENT: A REVIEW

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Probiotics are beneficial microorganisms that help maintain the natural balance of skin microflora. In recent years, they have gained attention as potential skin care agents due to their ability to improve skin health. Probiotics help strengthen the skin barrier, reduce inflammation, prevent acne, and protect against harmful microorganisms. They also support the immune response of the skin and help in managing conditions like acne, eczema, and dermatitis. Probiotics can be applied topically through creams, lotions, and serums, or taken orally to promote overall skin health. Different strains such as Lactobacillus and Bifidobacterium show antimicrobial, anti-inflammatory, and antioxidant properties. These properties help in maintaining skin hydration, reducing redness, and improving skin texture. This review highlights the role of probiotics in skin care and their growing importance in cosmetic and pharmaceutical formulations.

Keywords:

Probiotics, Skin microbiome, Lactobacillus, Bifidobacterium, Acne.

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Abstract No.: PP-016

NEUROPROTECTIVE ROLE OF OMEGA-3 AND OMEGA-6 FATTY ACIDS IN ALZHEIMER'S DISEASE

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Alzheimer's disease (AD) is a progressive, irreversible neurodegenerative brain disorder and is the most common cause of dementia, caused by the accumulation of senile amyloid beta plaques and the formation of intraneuronal neurofibrillary tangles, associated with tau protein hyperphosphorylation. This multifactorial disease is regarded as the complex interplay of age-related changes, genetic predispositions, neuroinflammation, vascular changes and environmental or lifestyle factors. Omega-3 and omega-6 polyunsaturated fatty acids (PUFAs) are essential components of neuronal membranes and play a significant role in maintaining brain neural structure and function, as well as in neuroprotection. Omega-3 primarily includes alpha-linolenic acid (ALA), Eicosapentaenoic acid (EPA), and Docosahexaenoic acid (DHA), whereas Omega-6 primarily includes Linoleic acid (LA) and Arachidonic acid (ARA), respectively. DHA primarily focuses suppresses a number of signal transduction pathways triggered by Aβ, including the activity of kinases that phosphorylate the microtubule-associated protein tau associated with neurofibrillary tangle pathology, which also restricts the production and accumulation of the amyloid β peptide, a major cause of the disease. Arachidonic acid (AA), An omega-6 fatty acid is crucial for proper brain development and function. It supports neuronal growth, protection, and repair. A nutritious approach, against AD, can be of immense benefit. In this review, we explore the effect of omega-3 and omega-6 against AD.

Keywords: Alzheimer's disease · Omega-3 fatty acids · Omega-6 fatty acids · Docosahexaenoic acid (DHA) · Neuroprotection · Amyloid beta (Aβ).

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Abstract No.: PP-017

HEAVY METAL TOXICITY AND ITS DETOXIFICATION STRATEGIES

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Heavy metal toxicity happens when lead, mercury, arsenic or cadmium accumulate in the body and create injury/damage to the body. Poisonous heavy metals can enter the body through contaminated water, food, air or through long-term exposure from work environments. Once inside the body, toxic heavy metals cause normal cellular functions to be disrupted. As time passes, significant injury to organs (brain, kidneys, liver) and the blood system can occur. The amount and types of symptoms created will vary, depending on the type of toxic metal that is causing the poisoning and for how long someone was exposed to the toxic metal(s). Detoxifying strategies are designed to remove heavy metals from the body and lessen the negative impacts that they can have on the body. The most common medically used method for detoxifying is chelation therapy, in which various chelating agents are used to attach and bind to the toxic metals to assist in their removal through urine or stool. Recent research studies indicate that some foods and probiotics may also assist in lowering heavy metal toxicity. If a person is identified as having been exposed to toxic metals, early identification and adequate treatment will greatly reduce the chance of developing chronic health problems due to heavy metal exposure.

Keywords: Toxicity, chelation, bioaccumulation, oxidative, detoxification.

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Abstract No.: PP-018

NANOTOXICOLOGY: SAFETY EVALUATION OF NANOPARTICLES

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Nanotoxicology is science relating to how humans and the world are affected by nanoparticles from a health aspect, as well as the potential adverse or toxic effects of particles smaller than 100nm. Nanoparticles are used increasingly in advancements in many industries due to their small size, large area and unique chemical and physical properties; however, these properties may also lead to unknown interactions when the nanoparticles enter the body, and thus the possibility of toxicity. Toxicological assessments of nanoparticles will use a combination of both in vitro studies (cell viability assays, biomarkers of oxidative stress and tests to evaluate the potential genetic/toxic effects) and in vivo studies (studies based on the assessment of pharmaceuticals' acute, sub-acute and chronic toxicity with their applications using animal models). Some standard toxic endpoints investigated include those relating to inflammation, oxidative stress, and cytotoxicity, and those leading to DNA damage and organ toxicity, with emphasis on the liver, lungs and kidneys. Regulatory agencies are putting emphasis on the assessment of risk associated with their use, the establishment of agreed upon and standardized assessment protocols, and on a continued evaluation of the long-term safety of the use of nanoparticles, so control reams utilize proper surface modifications, control dosage forms, and develop and utilize biocompatible materials.

Keywords: Nanotoxicology, Nanoparticles, Safety Evaluation, Cytotoxicity, Risk Assessment.

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Abstract No.: PP-019

SUSTAINED RELEASE FORMULATION DEVELOPMENT FOR BCS CLASS-I DRUG

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Sustained release (SR) formulations are designed to maintain plasma drug concentrations within the therapeutic window for prolonged periods, thereby improving patient compliance and therapeutic outcomes. The present investigation aimed to develop and optimize a sustained-release tablet of a Biopharmaceutical Classification System (BCS) Class I drug indicated for the treatment of vertigo and balance disorders. Although BCS Class I drugs exhibit high solubility and permeability, preformulation studies revealed inadequate flow properties of the active pharmaceutical ingredient (API), necessitating formulation intervention. Wet granulation was employed to enhance micromeritic properties and ensure uniform die filling during compression. Different hydrophilic and hydrophobic rate-controlling polymers, including Hydroxypropyl Methylcellulose (HPMC K100M, HPMC K15M, HPMC K100 LV), ethyl cellulose, xanthan gum, polylactic acid (PLA), and beeswax, were systematically evaluated at varying concentrations to modulate drug release kinetics. Pre-compression parameters (bulk density, tapped density, Carr's index, Hausner ratio) and post-compression parameters (hardness, friability, weight variation, thickness) complied with pharmacopeial specifications. In vitro dissolution studies for 24 mg and 48 mg strengths were performed using USP apparatus under optimized conditions. The optimized formulation demonstrated a dissolution profile comparable to the reference listed drug (RLD), with similarity factor (f_2) values greater than 50, indicating profile equivalence. Statistical evaluation using ANOVA confirmed the significance of polymer concentration on release rate. The findings suggest that wet granulation combined with strategic polymer selection offers a robust, reproducible, and scalable approach for sustained release formulation development. Further scale-up and stability studies are recommended to support industrial applicability.

Keywords: Sustained release formulation development, BCS Class I, HPMC

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Abstract No.: PP-020

PHARMACOVIGILANCE FOR MEDICAL DEVICES

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Pharmacovigilance is required for medical devices because it involves monitoring devices and their related problems, which helps ensure patient safety and the reporting of adverse events. Unlike drugs, medical devices usually do not undergo pre-clinical trials, so continuous monitoring after marketing is necessary. This includes discussion of new technologies, regulatory frameworks, principles, and challenges related to pharmacovigilance. Between 2020 and 2026, a major review was conducted by regulatory bodies such as the Food and Drug Administration (FDA) and the European Medicines Agency (EMA) using databases including PubMed and Embase. The key concerns included risk assessment tools, adverse event reporting platforms, and data integration based on empirical evidence.

Pharmacovigilance for medical devices is very important because adverse events are often device-specific, such as different types of errors and biocompatibility problems. Many medical device problems are not reported, so issues may go unnoticed. The use of Unique Device Identification (UDI) helps to easily identify and trace devices, allowing problems to be detected quickly and actions to be taken to protect patient safety. Regulatory authorities actively monitor devices using post-market studies and device registries, which help identify safety problems.

New technologies such as AI-driven analytics and patient-reported outcomes help detect medical device problems more quickly. Effective pharmacovigilance for medical devices involves improved reporting techniques harmonized worldwide standards and technological innovation to decrease hazards. In the future, using this data and working together will help track medical device problems more effective.

Keywords: Pharmacovigilance; Medical Devices; Adverse Events; Clinical Trials; Patient Safety.

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Abstract No.: PP-021

TRANSLATIONAL NANOMEDICINE: INTEGRATING MEDICINAL CHEMISTRY FOR TARGETED DRUG DELIVERY

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Translational nanomedicine represents a strategic convergence of medicinal chemistry and nanotechnology to transform rational drug design into clinically effective targeted therapies. By integrating molecular modification strategies with advanced nanocarrier engineering, this approach enhances drug solubility, stability, bioavailability, and therapeutic index. Medicinal chemistry principles such as structure–activity relationship (SAR) analysis, prodrug design, and functional group optimization play a central role in tailoring drug–nanocarrier compatibility and improving pharmacokinetic performance. Surface functionalization of nanoparticles with ligands including antibodies, peptides, and small molecules enables active targeting through receptor-mediated mechanisms, while passive targeting exploits the enhanced permeability and retention (EPR) effect in tumor tissues. Furthermore, stimuli-responsive systems designed to release drugs under specific physiological conditions (e.g., pH, enzymatic activity) improve site-specific delivery and minimize systemic toxicity. Translational nanomedicine also incorporates predictive modeling and preclinical validation to bridge laboratory innovation with clinical application. Despite promising therapeutic outcomes in oncology, infectious diseases, and CNS disorders, challenges remain in large-scale manufacturing, reproducibility, toxicity assessment, and regulatory standardization. Continued interdisciplinary research is essential to accelerate the clinical translation of nanotherapeutic systems and ensure safe, personalized treatment strategies.

Keywords: Translational Nanomedicine, Medicinal Chemistry, Targeted Drug Delivery, Nanocarriers, Structure–Activity Relationship, Prodrug Design, Pharmacokinetics, Precision Therapeutics.

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Abstract No.: PP-022

DEVELOPMENT AND COMPARATIVE EVALUATION OF ATORVASTATIN-GALLIC ACID COCRYSTAL IMMEDIATE RELEASE TABLETS FOR ENHANCED SOLUBILITY AND DISSOLUTION

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Atorvastatin calcium is a popular antihyperlipidemic agent with low aqueous solubility and thus with poor dissolution and variable bioavailability. The current study was done to prepare and comparatively assess atorvastatin-gallic acid cocrystals to use in the formulation of immediate release tablets with increased solubility and dissolution properties. Atorvastatin and gallic acid cocrystals were prepared in various ratios (1:1, 1:3, 1:5 and 1:10) and their physicochemical characteristics were analyzed. Intermolecular interactions between coformer and drug were confirmed by Fourier Transform Infrared Spectroscopy (FTIR). Saturation solubility experiments were done to determine solubility improvement. The quantitative estimation of atorvastatin in cocrystal formulations was done by a validated HPLC analytic procedure. The third-party analysis was conducted to determine the presence of cocrystal formation and crystallinity modifications by solid-state characterization (Differential Scanning Calorimetry (DSC), Scanning Electron Microscopy (SEM), and X-ray Diffraction (XRD)). The 1:3 molar ratio cocrystal was found to be the best solution and was chosen to be a tablet formulation. The optimized 1:3 ratio cocrystal was used to prepare immediate release pills, which were compared to pills of pure atorvastatin and a commercial formulation. In vitro dissolution analysis indicated that, the cocrystal 1:3 based tablets showed a much higher drug release compared to pure drug tablets and similar or better results compared to the marketed product. The paper infers that atorvastatin cocrystallized with gallic acid is a good approach to increase the solubility and dissolution of atorvastatin in immediate release preparations.

Keywords: Atorvastatin, Gallic acid, Cocrystal, Solubility enhancement, Immediate release tablets, Dissolution study.

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Abstract No.: PP-023

EXPLORING THE ANTIOXIDANT, ANTI-*HELICOBACTER PYLORI* POTENTIAL AND CYTOTOXIC ACTIVITY IN HEPG2 CELLS: INSIGHTS INTO GASTRIC CARCINOMA

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Helicobacter pylori infection, a global threat recently, leads to gastritis gradually peptic ulcer disease and even gastric carcinoma. Although antibiotic therapy remains the standard treatment, increasing multidrug resistance often leads to recurrence and therapeutic failure. Medicinal plants, rich in bioactive compounds, offer a promising alternative approach. *Moringa oleifera* has remarkable antioxidant, anti-inflammatory, cardioprotective and anticancer activities; however, limited studies have examined its effect against *H. pylori*. The present study evaluated the phytochemical composition, antioxidant potential, antimicrobial activity, and cytotoxic effects of the aqueous extract of *Moringa oleifera* leaves (MOA) against hepatocellular carcinoma. Preliminary phytochemical screening revealed the presence of key bioactive constituents, with a high total phenolic content (59.38 mg GAE/g). Antioxidant activity assessed through DPPH radical scavenging and reducing power assays demonstrated strong, dose-dependent effects. MOA exhibited moderate inhibitory activity against *H. pylori* at concentrations ranging from 200–500 mg/ml, compared with amoxicillin as a reference drug. Considering the link between chronic gastric disorders and hepatic malignancy, in vitro cytotoxicity was evaluated using HepG2 liver cancer cells. The extract showed notable cytotoxicity with an IC_{50} value of 80.72 µg/ml. GC–MS analysis identified 2,6,10,14-hexadecatetraenoic acid as the predominant compound. In silico docking studies indicated favorable binding interaction of this compound with caspase-3, suggesting potential pro-apoptotic and anti-proliferative activity. These findings highlight the therapeutic potential of *Moringa oleifera* leaf extract as a natural antioxidant and antimicrobial agent. Further isolation of active compounds and in vivo investigations are required to substantiate its clinical applicability.

Keywords: *Moringa oleifera,* Antimicrobial activity, *Helicobacter pylori,* antioxidant activity, hepatocellular carcinoma

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Abstract No.: PP-024

DEVELOPMENT, OPTIMIZATION AND CHARACTERIZATION OF HPB-CD NANOSPONGES OF PALBOCICLIB FOR ENHANCED ORAL BIOAVAILABILITY

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In this research, Palbociclib (PB)-loaded nanosponges with Hydroxypropyl β-cyclodextrin (HPβ-CD) and diphenyl carbonate (DPC) as a crosslinker were formulated to improve oral bioavailability in the treatment of ER-positive breast cancer. Through the Box-Behnken Design mixing speed and time were optimized for formulating PB-loaded HPβ-CD NSPs by varying the molar proportion of HPβ-CD and DPC. The synthesized HPβ-CD NSPs were evaluated for numerous in vitro parameters. The compatibility was studied through spectroscopic methods, while permeability and release studies were conducted by Franz diffusion cell method. Furthermore, in rat models pharmacokinetic studies were also performed. PB-loaded HPβ-CD NSPs showed an average size of 220.8 ± 5.1 nm, a zeta potential of -23.1 ± 5.0, and an entrapment efficiency of 70.33 ± 2.82%. Further optimization was validated through zeta sizing, scanning electron microscopy, spectral investigations, *in vitro* release, and from pharmacokinetics. The PB-loaded HPβ-CD NSPs displayed a higher C_{max} (5.996) and $AUC_{0\text{-}t}$ (8.958) than the pure drug. In conclusion, administering PB-loaded NSPs to patients receiving treatment for ER+ and HER2-positive breast cancer may be a viable method of improving drug release and bioavailability.

Keywords: Hydroxypropyl Beta-Cyclodextrin, Nanosponges, Box-Behnken design, Diphenyl carbonate, Palbociclib, ER-positive breast cancer.

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Abstract No.: PP-025

DEVELOPMENT AND EVALUATION OF A LIQUID BIOFERTILIZERS CONSORTIUM FROM MICROBES ISOLATES OF VEGETABLE AND FRUIT WASTES AND BIOCHAR EFFECTS ON *CUCUMIS SATIVUS.*

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The present study focuses on the development of a stable and effective liquid biofertilizer consortium along with biochar, and the evaluation of their individual and combined effects on plant growth and soil properties. Sustainable crop production and soil fertility management are major challenges in modern agriculture, especially under the adverse impacts of excessive chemical fertilizer and pesticide use, which often lead to nutrient imbalances, soil degradation, and environmental damage. To address these concerns, Cucumis sativus (cucumber), an economically important crop in India valued for its nutritional and medicinal properties, was selected as the test plant. Biochar, a carbon-rich byproduct of pyrolysis (400–600 °C), enhances soil fertility, carbon sequestration, and provides a habitat for beneficial microbes. The liquid biofertilizer consortium was prepared from microbial strains isolated from fruit and vegetable wastes through serial dilution and plating methods, followed by molecular characterization using 16S rRNA sequencing. Compatible strains with phosphate solubilization, nitrogen fixation, and phytohormone-producing abilities were formulated in a carrier solution with stabilizers. Experimental treatments included: control (T1), chemical fertilizer (T2), liquid biofertilizer (T3), biochar (T4), biochar + biofertilizer (T5), and biochar + NPK (T6). Plant growth parameters (germination, height, chlorophyll content, biomass, root–shoot ratio) and soil parameters (pH, EC, NPK, microbial biomass carbon, and enzyme activity) were assessed. Results revealed that the combined application of biochar and liquid biofertilizers (T5) significantly enhanced plant growth, soil fertility, and microbial activity compared to both control and synthetic fertilizer treatments. This synergistic effect not only improved crop productivity but also promoted soil health and sustainability. The study successfully demonstrates the potential of integrating biochar and biofertilizer consortia derived from organic wastes as an eco-friendly alternative to chemical fertilizers, offering a promising strategy for sustainable agriculture.

Keywords: *Cucumis sativus*, liquid biofertilizer consortium, biochar, synergistic effects

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Abstract No.: PP-026

THERAPEUTIC REPURPOSING OF METFORMIN IN CANCER TREATMENT: MOLECULAR TARGETS AND CLINICAL IMPLICATIONS

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Metformin, a guanidine-derived compound from the medicinal plant *Galega officinalis* was established to lower blood glucose levels and conventionally used as a first-line oral therapy for type 2 diabetes. Recently it has emerged as a promising candidate possessing multifaceted anticancer effects across a broad spectrum of malignancies. The present review highlights the repurposing of metformin in oncology and provides a comprehensive analysis of the molecular mechanisms through which metformin influences tumor biology. Research suggests metformin's therapeutic implication as an adjunctive agent in cancer treatment. Its well-established safety profile, affordability, and systemic metabolic effects make it an attractive candidate for combination strategies in oncology. The main mechanism is proposed to be the modulation of key signaling networks involved in carcinogenesis, particularly AMP-activated protein kinase (AMPK), insulin-like growth factor (IGF) and the mammalian target of rapamycin (mTOR) pathways. By activating AMPK and indirectly suppressing mTOR signaling, metformin interferes with cellular proliferation and protein synthesis. Simultaneously, its impact on insulin and IGF signaling reduces mitogenic stimulation, thereby limiting tumor growth in insulin-responsive cancers. It suppresses angiogenesis, mitigates chronic inflammation, promotes apoptosis, and reprograms cellular metabolism shifting energy balance in a manner unfavorable to tumor survival. Future research should integrate insights from both preclinical models and clinical investigations to establish metformin as a promising repurposed candidate in evidence-based cancer therapy strategies.

Keywords: Metformin, repurposing, oncology, AMPK

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Abstract No.: PP-027

APPLICATION OF ARTIFICIAL INTELLIGENCE IN PHARMACEUTICAL DRUG REGULATORY AFFAIRS

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Artificial Intelligence is being increasingly used in assessing dossiers by FDA (US Drug Regulatory Authorities). The USFDA has introduced KASA (Knowledge-aided Assessment and Structured Application) system in their regulatory review processes (DMF, NDA, ANDA etc.). KASA intended to: 1) record and manage knowledge throughout a drug product's lifecycle; 2) create guidelines and algorithms for risk assessment, control, and communication; 3) conduct computer-aided application analyses to compare quality risks and regulatory standards across applications and facilities; and 4) offer a structured evaluation that reduces the number of text-based narratives and summaries of information provided. This is a program started under the Office of Pharmaceutical Quality (OPQ) of the FDA's Centre for Drug Evaluation and Research (CDER). It's a platform that promotes OPQ's by conducting the quality evaluation of drug product applications more effectively, consistently, and efficiently. KASA is a component of CDER's larger initiatives to facilitate the digital transformation of Chemistry, Manufacturing, and Controls (CMC) data application submission, evaluation, and lifecycle knowledge management. KASA however is not in public domain. There have been efforts by software developers to market similar Quality Assessment Packages. This will aid industry specialists in reviewing their dossiers before submission. Developing algorithms with AIML framework for regulatory review of dossiers before submission is need of the day. Such regulatory review tools would definitely cut review time and improve regulatory compliance. Methodology may include AIML with regulatory guidelines followed by evaluation of simulated dossiers with spiked deficiencies.

Keywords: Artificial Intelligence, Knowledge-aided Assessment and Structured Application (KASA), USFDA Drug Regulatory Process, CMC, Regulatory Dossier Evaluation

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Abstract No.: PP-028

POLYMERIC NANOPARTICLES: A NEXT-GEN REVOLUTION IN DRUG DELIVERY

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Targeted drug delivery has emerged as a central focus of contemporary pharmaceutical research, driven by the inherent limitations of conventional therapies, which often suffer from poor site specificity, low bioavailability, and significant systemic toxicity. Polymeric nanoparticles represent a promising solution to these challenges by enabling precise, controlled, and site-specific drug delivery. Typically ranging from 10 to 1000 nm in size, these biodegradable carriers are fabricated from biocompatible polymers such as natural chitosan and synthetic poly(lactic-co-glycolic acid) (PLGA). Beyond serving as passive drug carriers, polymeric nanoparticles provide a protective matrix that shields therapeutic agents from premature degradation and facilitates sustained and controlled drug release. Their nanoscale dimensions allow for efficient cellular uptake and targeted accumulation at diseased sites through passive mechanisms such as the enhanced permeability and retention (EPR) effect, as well as active targeting via surface modification with ligands, antibodies, or other biomolecules. This targeted approach enhances therapeutic efficacy while minimizing off-target effects and damage to healthy tissues. Polymeric nanoparticles have demonstrated substantial potential in advanced applications including cancer therapy, central nervous system disorders, and vaccine delivery. Despite these advantages, challenges related to large-scale manufacturing, reproducibility, and regulatory approval continue to limit widespread clinical translation. Nevertheless, polymeric nanoparticles represent a decisive advancement in drug delivery science, offering a transformative platform for safer, more efficient, and patient-tailored therapeutic interventions in next-generation medicine.

Keywords: Polymeric nanoparticles; Targeted drug delivery; Controlled release; Biodegradable polymers; PLGA; Chitosan; Nanomedicine; Site-specific therapy; Drug targeting.

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Abstract No.: PP-029

SOLID LIPID NANOPARTICLE-BASED THERAPIES IN CARDIAC DISEASE: INNOVATIONS IN TARGETED DRUG DELIVERY AND CLINICAL CHALLENGES

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Cardiovascular diseases (CVDs) remain the foremost cause of global morbidity and mortality despite substantial advances in pharmacotherapy. The therapeutic efficacy of conventional cardiovascular drugs is often compromised by rapid systemic clearance, extensive first-pass metabolism, poor bioavailability, and dose-dependent adverse effects. Solid lipid nanoparticles (SLNs) have emerged as a promising nanotechnological platform to overcome these limitations through improved drug stability, controlled release, and site-specific delivery. This poster critically evaluates the potential of SLN-based formulations in the management of major cardiac disorders, including myocardial infarction, atherosclerosis, heart failure, hypertension, and hyperlipidemia. SLNs integrate the advantages of liposomal and polymeric systems while minimizing issues such as drug leakage and cytotoxicity. Key formulation approaches—high-pressure homogenization, solvent emulsification–evaporation, and microemulsion techniques—are discussed alongside advanced surface engineering strategies such as PEGylation and ligand-mediated cardiac targeting. Particular emphasis is placed on physicochemical characterization, drug release kinetics, pharmacokinetics, biodistribution, and mechanisms underlying myocardial targeting. Furthermore, translational considerations including large-scale manufacturing, long-term safety, regulatory barriers, and clinical adaptability are addressed. Collectively, SLN-based drug delivery systems represent a versatile and scalable platform capable of enhancing therapeutic precision, reducing systemic toxicity, and improving clinical outcomes in cardiovascular therapy. Bridging formulation science with translational cardiology, SLNs hold substantial promise as next-generation nanocarriers for targeted cardiac intervention.

Keywords: Solid lipid nanoparticles; cardiovascular diseases; Targeted drug delivery; Nanomedicine; Cardiac therapy; Myocardial targeting; Controlled drug release; Translational challenges.

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Abstract No.: PP-030

IMPROVEMENT OF ORAL BIOAVAILABILITY OF BCS CLASS IV DRUG BY SOLID LIPID NANOPARTICLE DRUG DELIVERY SYSTEMS

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Biopharmaceutical Classification System (BCS) Class IV drugs exhibit both low aqueous solubility and poor intestinal permeability, resulting in severely limited oral bioavailability and suboptimal therapeutic performance. Overcoming these dual barriers remains a significant formulation challenge in oral drug delivery. Solid lipid nanoparticles (SLNs) have emerged as a promising lipid-based nanocarrier system to address these limitations. SLNs are submicron colloidal carriers composed of physiologically compatible solid lipids stabilized by surfactants, capable of encapsulating poorly soluble drugs within a solid lipid matrix. Reduction of drug particle size to the nanometer scale enhances surface area, dissolution rate, and apparent solubility, thereby improving absorption potential. The lipidic nature of SLNs facilitates intimate interaction with gastrointestinal membranes and promotes lymphatic uptake, enabling partial bypass of hepatic first-pass metabolism. Additionally, SLNs provide protection against chemical and enzymatic degradation within the gastrointestinal tract and may exhibit mucoadhesive properties that prolong residence time at the absorption site. Advanced fabrication techniques such as high-pressure homogenization, ultrasonication, and emulsification methods allow the production of stable systems with controlled release characteristics. The use of biocompatible lipids, including stearic acid and glyceryl monostearate, further ensures safety and formulation stability. Collectively, SLN-based delivery systems represent a rational and effective strategy to enhance the oral bioavailability and therapeutic efficacy of BCS Class IV drugs.

Keywords: BCS Class IV drugs; Solid lipid nanoparticles; Oral bioavailability; Lipid-based drug delivery; Lymphatic transport; Controlled release; Nanotechnology.

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Abstract No.: PP-031

MICROPLASTIC TOXICITY IN HUMANS AND ENVIRONMENT

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Microplastics and Nano plastics are now found almost everywhere in the environment and scientists are increasingly worried about what they mean for both nature and human health. These tiny plastic particles form when larger plastic items break down or they come directly from industrial products. They spread easily through soil and air traveling via wastewater, rain runoff and even the atmosphere. Because they are so small and have a large surface area they can carry harmful substances like heavy metals and toxic chemicals, which may lead their danger to living organisms. People can be exposed to microplastics and Nano plastics by eating contaminated food, drinking water or breathing in tiny airborne particles. Once inside the body, these particles may pass through biological barriers and build up in tissues. Studies suggest they can cause stress at the inflammation and possible effects on the immune system. Nano plastics are of particular concern because their extremely small size might allow them to move deeper into organs and possibly affect the brain, raising questions about long-term neurological effects. In the environment, these plastics affect many organisms from tiny plankton to fish and other animals higher up the food chain. They can interfere with feeding and growth may build up through food webs. Although research is growing, we still lack clear answers about long-term exposure and safe limits. Better monitoring, improved plastic waste management, and safer alternatives are essential to reduce this growing environmental problem.

Keywords: Microplastics (MPs), Nano plastics (NPs), Environmental contamination, Human health effects, Bioaccumulation in food chain.

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Abstract No.: PP-032

IMMUNOMODULATION OF T CELLS IN AUTOIMMUNE DISORDERS

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T-Cells are essential part of our immune system ,maintaining immune homeostasis.First the CD4+ Helper T-Cells becomes activated when central and peripheral tolerance mechanisms fails, secreting cytokines(e.g.TNF-α ,IL-17 ,IFN-β)driving chronic inflammation and tissue destruction.Then the Effector T-cells(Th1,Th2,Th17 and CD8+ cytotoxic T-cells) promote immune responses,whereas regulatory T-cells characterised by FOXP3 expression,responds by suppression excessive immune activation and maintaining self-tolerance. When "check and balance " system of T-cells fails to response leads to self-reactive immune response,the hallmark of autoimmune Diseases.Autoreactive T-cells bypass peripheral tolerance checkpoints becoming activated by body's own antigens presented via Major Histocompatibility Complex(MHC).Once activated ,these cells proliferate and infiltrate target tissue destruction through secretion of pro-inflammatory cytokines and direct cellular cytotoxicity. To control these autoimmune pathologies, engineered Regulatory T-cells are designed to either deplete pathogenetic B-cells or restore immune tolerance by enhancing Tregs. Autoimmune Diseases such as Rheumatoid Arthritis and Type 1 Diabetes arise from dysregulated T-cell response against self-antigens.In rheumatoid arthritis pathogenetic CD4+T helper cells drive chronic synovial inflammation through secretion of pro inflammatory cytokines.After the engineered T-cell are administered ,they travel inside inflamed joints releasing IL-10 and TGF-β .These chemicals neutralises the inflammatory signals(TNF-α, IL-17).Thus resulting stoppage of inflammation and deactivation of osteoclasts.And in Type 1 Diabetes ,autoreactive CD8+ cytotoxic T-cells mediate pancreatic β-cell destruction ,destroying body's ability to produce insulin and total insulin deficiency.so the engineered T-cells recognize and sits on surface of β-cells blocking killer T-cells from attacking .Thus advances in T-cell engineering and immune-tolerance induction holds significant potential for possible remission of Autoimmune Disease.

Keywords: T-cell engineering, Autoimmune Diseases, Regulatory T-cells (Tregs), Immune Tolerance, Rheumatoid Arthritis, Type 1 Diabetes

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Abstract No.: PP-033

HEMIDESMUS INDICUS: PHYTOCHEMICAL PROFILE, PHARMACOLOGICAL PROPERTIES, AND FUTURE THERAPEUTIC PERSPECTIVES

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Hemidesmus indicus (L.), commonly known as Indian sarsaparilla, is a medicinal plant from the Apocynaceae family widely used in Ayurveda, Siddha, and Unani systems of medicine. Its roots are considered the most therapeutically active part and contain several bioactive compounds, including triterpenoids, steroids, coumarins, lignans, flavonoids, and phenolic constituents such as 2-hydroxy-4-methoxybenzoic acid and hemidesmin derivatives. Traditionally, the plant has been used as a blood purifier and for treating skin disorders, respiratory problems, rheumatism, venereal diseases, and snakebite.

This review summarizes available literature from experimental and pharmacological studies to provide an overview of the phytochemistry, traditional uses, and biological activities of *H. indicus*. Both in vitro and in vivo findings were considered to understand its therapeutic potential and mechanisms of action.

Research indicates that *H. indicus* possesses significant antioxidant, anti-inflammatory, hepatoprotective, nephroprotective, cardioprotective, anti-ulcer, antidiabetic, anticancer, antimicrobial, and immunomodulatory properties. Many of these effects are linked to its strong free-radical scavenging ability, membrane-stabilizing action, and modulation of key inflammatory pathways such as NF-κB and STAT3. The plant also inhibits enzymes like COX-2 and 5-LOX, which play crucial roles in inflammation. Certain extracts have demonstrated cytotoxic and anti-hepatocarcinogenic effects, suggesting possible benefits in inflammation-related cancers.

H. indicus shows broad therapeutic potential supported by experimental evidence. However, further clinical studies are needed to standardize active compounds, evaluate pharmacokinetics, investigate herb–drug interactions, and confirm long-term safety before wider clinical application.

Keywords- *Hemidesmus indicus*, Phytochemicals, Anti-inflammatory activity, Antioxidant potential, Medicinal plants

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Abstract No.: PP-034

POLYPHARMACY AMONG PATIENTS ATTENDING A TERTIARY CARE HOSPITAL IN WEST BENGAL: A PILOT STUDY

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Non-communicable chronic diseases such as diabetes, chronic obstructive pulmonary disease, arthritis, cardiovascular disease, etc., are major health concerns in India, contributing substantially to disability and economic burden. Their long-term management requires sustained pharmacotherapy, often leading to polypharmacy, particularly in elderly patients with multiple comorbidities. Nearly half of India's geriatric population experiences polypharmacy, with a significant proportion receiving potentially inappropriate medications. This escalates the risk of adverse drug reactions, poor adherence and reduced quality of life. This pilot study assessed comorbid conditions, medication details among patients receiving multiple medications (>2 drugs) attending the Outpatient Department of a tertiary care hospital in West Bengal. Prescription of patients were collected and analyzed.

The mean age of the patients in the study population was 44.15 years, with 53.85% males and 46.15% females. Patients were taking an average of 4.46 medications per day. Diabetes was noted in 15.38% of patients, whereas hypertension was observed in 23.07% of patients. Pantoprazole, cetrizine, paracetamol, and vitamin B complex were the most commonly prescribed drugs.

The study highlights a considerable burden of polypharmacy-related complications among patients. Although limited by sample size and duration, the findings emphasized the need for careful prescription monitoring to minimize adverse outcomes and improve long-term disease management.

Keywords: Polypharmacy, Diabetes, Chronic obstructive pulmonary disease, Hypertension, Pantoprazole, Cetrizine, Paracetamol, Vitamin B complex.

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Abstract No.: PP-035

DRUG DELIVERY THROUGH THE NOSE: A DIRECT PATH TO THE BRAIN

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The effective treatment of central nervous system (CNS) disorders remains a formidable challenge due to the restrictive nature of the blood–brain barrier (BBB), which limits the penetration of most therapeutic agents into the brain. In this context, the intranasal drug delivery system has emerged as a promising, non-invasive strategy for direct brain targeting. By exploiting the olfactory and trigeminal neural pathways, intranasal administration enables rapid and site-specific transport of drugs from the nasal cavity to the brain, thereby bypassing the BBB and hepatic first-pass metabolism. This approach offers several advantages, including rapid onset of action, enhanced bioavailability, reduced systemic exposure, improved patient compliance, and minimized peripheral adverse effects. Recent advances in formulation technologies—such as nanoemulsions, polymeric nanoparticles, solid lipid nanoparticles, liposomes, in situ gels, and polymeric micelles—have significantly enhanced nasal drug absorption, mucosal permeation, and residence time. The rational selection of excipients, permeation enhancers, mucoadhesive agents, and stabilizers plays a critical role in improving drug stability and overcoming enzymatic degradation within the nasal cavity. However, challenges such as mucociliary clearance, limited dosing volume, anatomical complexity, and pathological conditions (e.g., rhinitis) continue to influence therapeutic outcomes.This poster highlights recent innovations and technological advancements in intranasal drug delivery systems for efficient brain targeting, emphasizing their translational potential in managing neurological disorders. The integration of nanotechnology-driven platforms with optimized formulation strategies represents a transformative paradigm in CNS therapeutics.

Keywords: Blood–brain barrier, Intranasal drug delivery, Brain targeting, Central nervous system, Nanocarriers, Nose-to-brain transport.

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Abstract No.: PP-036

PHARMACOVIGILANCE: ENSURING DRUG SAFETY AND PATIENT CARE

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Pharmacovigilance is important for keeping medicines safe by finding, checking, and preventing adverse drug reactions (ADRs). As the use of medicines is increasing and treatments are becoming more complex, monitoring drug safety after they are available in the market has become an essential part of healthcare. Pharmacovigilance helps in protecting patients and supports the safe and rational use of medicines.

The main objective of this study is to explain the role of pharmacovigilance in identifying ADRs and increasing awareness among healthcare professionals. Information related to ADR reporting, common problems, and the role of spontaneous reporting systems was reviewed from published studies and pharmacovigilance program reports. The review shows that many ADRs are not reported due to lack of awareness, insufficient training, and fear of legal issues.

An effective pharmacovigilance system helps in early identification of drug-related problems, prevents serious adverse effects, and improves overall patient care. Encouraging healthcare professionals and students to actively report ADRs can strengthen national pharmacovigilance programs. Regular training, easy reporting methods, and including pharmacovigilance in daily clinical practice can improve drug safety monitoring.

In conclusion, pharmacovigilance plays a key role in protecting public health. Improving ADR reporting and awareness can help ensure safer use of medicines and better treatment outcomes.

Keywords: ADR, pharmacovigilance, healthcare professionals, legal issues.

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Abstract No.: PP-037

GREEN SURFACTANTS, SMARTER MEDICINES: THE RISE OF BIOSURFACTANTS IN PHARMA

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Biosurfactants are emerging as eco-friendly, functionally advanced excipients with transformative potential in pharmaceutical formulation design. These amphiphilic molecules, produced by microorganisms and derived from natural sources, exhibit superior surface-active properties combined with high biocompatibility and ecological safety. Their ability to effectively reduce surface and interfacial tension enables enhanced solubilization, emulsification, stabilization, and permeability, making them particularly valuable in modern drug delivery systems. Biosurfactants have demonstrated broad applicability across nanoemulsions, liposomes, nanoparticles, controlled-release formulations, and transdermal delivery platforms. Notably, their structural stability over wide ranges of pH, temperature, and salinity strengthens formulation robustness and expands their industrial utility. In addition to their physicochemical advantages, several biosurfactants possess intrinsic biological activities, including antimicrobial and anti-adhesive effects, which may synergistically enhance therapeutic outcomes and aid in biofilm control. Despite these advantages, regulatory acceptance necessitates rigorous standardization, comprehensive safety evaluation, and quality control. Their natural origin and alignment with green chemistry principles further support sustainable pharmaceutical manufacturing. Overall, biosurfactants represent a promising class of novel excipients capable of driving safer, more efficient, and environmentally responsible next-generation pharmaceutical formulations, with significant potential in targeted drug delivery and advanced therapeutic strategies.

Keywords: Biosurfactants; Pharmaceutical excipients; Drug delivery systems; Nanoformulations; Green chemistry; Sustainable pharmaceuticals; Biocompatibility; Targeted delivery

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Abstract No.: PP-038

TARGETING BREAST CANCER WITH PLANT-DERIVED FLAVONOIDS: A PROMISING STRATEGY FOR PRECISION ONCOLOGY

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Breast cancer is still one of the major causes of death from cancer worldwide, and the growing problem of drug-resistant disease as well as side effect problems from current treatments has created an urgent need for developing drugs that are both safe and highly effective. There has been increased scientific interest in plant-derived flavonoids based on the wide range of pharmacologic activity, which includes being antioxidants, anti-inflammatories, inhibiting cell proliferation, and having anti-metastatic properties. Flavonoids such as quercetin, apigenin, luteolin, genistein, and kaempferol have shown significant anti-cancer activity through modification of a variety of mechanisms and pathways involved in cancer development. These include PI3K/AKT, MAPK, NF-kappa-B, HER2, and estrogen receptors, which result in apoptosis induction, cell cycle arrest, inhibition of angiogenesis, and reduced tumor invasion and metastasis. Flavonoids also affect the tumor microenvironment (TME) through a reduction in inflammatory mediators that favor an anti-inflammatory microenvironment and enhance immune-mediated destruction of the tumor cells, resulting in improved responses to conventional chemotherapy and radiotherapy. While flavonoid preclinical studies have provided some promising results, flavonoids are being hindered from translating to the clinic due to challenges with their low bioavailability, high rates of metabolism, and pharmacokinetic variability. Nano-delivery systems and structural modifications are advanced formulation strategies for improving both therapeutic efficacy and drug targeting. Thus, as a multi-targeted therapeutic strategy, plant-derived flavonoids have the potential to make significant contributions to the development of precision oncology and the future treatment of breast cancer.

Keywords: Flavonoids, Breast cancer, Bioavailability, NF-kappa-B, Chemotherapy

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Abstract No.: PP-039

CANCER IMMUNOTHERAPY: ACTIVATING THE BODY'S OWN DEFENCE SYSTEM

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Cancer remains a leading global cause of morbidity and mortality despite advances in surgery, chemotherapy, and radiotherapy. Limitations in treating advanced and metastatic malignancies have accelerated the development of immunotherapy—an approach that harnesses the host immune system to eliminate tumor cells. Foundational discoveries in tumor immunology, including the cancer immunoediting theory proposed by Robert Schreiber and colleagues, and the identification of immune checkpoints by James P. Allison and researchers, have revolutionized therapeutic strategies. Immune checkpoint inhibitors targeting CTLA-4 and PD-1/PD-L1 pathways restore T-cell activity and have demonstrated durable responses in melanoma, non-small cell lung cancer, and other solid tumors. Monoclonal antibodies, pioneered through the work of Milstein et. al., enable targeted antigen recognition, while adoptive cell therapies—particularly chimeric antigen receptor (CAR)-T cells—have achieved remarkable success in hematological malignancies. Therapeutic cancer vaccines and next-generation personalized neoantigen platforms further expand the immunotherapeutic landscape. Despite transformative clinical outcomes, challenges persist, including variable patient responsiveness, immune-related adverse events, tumor heterogeneity, immune escape mechanisms, and high treatment costs. Current poster emphasizes biomarker-driven patient selection, combination regimens, and precision immuno-oncology to enhance efficacy and overcome resistance. Cancer immunotherapy represents a paradigm shift in oncology by converting immune surveillance into an active, durable, and highly specific therapeutic modality. Continued translational research and rational integration strategies are expected to further refine its role in comprehensive cancer management.

Keywords: Cancer Immunotherapy, Immune Checkpoint Inhibitors, Lymphocytes, Monoclonal Antibodies, CAR-T Cells, Metastatic Cancer

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Abstract No.: PP-040

OCULAR INSERTS AS A DRUG DELIVERY SYSTEM

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Ocular inserts are thin, multi-layered, drug-impregnated, sterile preparations with solid or semi-solid consistency. These devices are instilled into the sac of conjunctiva, in the lower fornix, in the upper fornix, or on the cornea. The release of the drug from the ocular insert depends upon the diffusion, osmosis, and bioerosion of the drug. Ocular inserts are classified into three classes, primarily by solubility: insoluble, soluble, and bioerodible types. An insoluble ocular insert is a sterile, multi-layered, solid, or semi-solid drug delivery device placed in the conjunctival sac, designed to release medications at a controlled rate via diffusion or osmosis. Insoluble ocular inserts are further classified into three classes, namely diffusion systems, osmotic systems, and contact lenses. In a diffusion system, the drug delivery rate is controlled by diffusion through the membrane. Diffusion systems use a rate-controlling membrane to release the drug. Osmotic ocular inserts use osmotic pressure to release medication at a precise, predetermined, zero-order rate over an extended period. Osmotic ocular inserts utilize osmotic pressure to drive the drug out of a reservoir, with agents like sodium chloride. Contact lenses are hydrophilic, soft lenses acting as a reservoir. Soluble inserts are designed to dissolve completely in the tear fluid, eliminating the need for removal. They are often made of natural polymers, synthetic polymers, and semi-synthetic polymers. Bioerodible inserts gradually erode, releasing the drug through the erosion process of the polymer matrix. Ocular inserts increase ocular residence and thus give higher bioavailability with respect to standard vehicles.

Keywords: Ocular Insert, Sterile Preparations, Bioerodible Polymer, Bioavailability.

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Abstract No.: PP-041

PULSATILE DRUG DELIVERY SYSTEMS FOR CHRONOTHERAPEUTIC APPLICATIONS

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Chronotherapeutics is founded on the recognition that the pathophysiology and clinical manifestations of many diseases follow circadian rhythms governed by the body's biological clock. Conventional sustained-release dosage forms, designed to maintain constant plasma drug levels, often fail to accommodate these time-dependent variations in disease activity. In this context, Pulsatile Drug Delivery Systems (PDDS) have emerged as a promising and sophisticated alternative, capable of delivering drugs in a rapid, well-defined pulse following a predetermined lag time. This delivery pattern is particularly advantageous for diseases such as bronchial asthma, cardiovascular disorders, and rheumatoid arthritis, which characteristically exhibit symptom exacerbation during the early morning hours. The design of PDDS relies on diverse formulation strategies to achieve precise temporal control of drug release. Time-controlled systems commonly employ rupturable or erodible polymeric coatings, where the coating thickness dictates the lag time prior to drug release. In contrast, stimulus-responsive systems are activated by physiological triggers such as gastrointestinal pH variations or enzymatic activity, while recent advances in material science have enabled externally regulated systems responsive to magnetic fields or ultrasonic signals. By synchronizing drug release with circadian rhythms, PDDS not only enhance therapeutic efficacy but also minimize drug toxicity and reduce the risk of tolerance development. In conclusion, Pulsatile Drug Delivery Systems represent a paradigm shift from constant-rate drug administration toward demand-based, rhythm-aligned therapy. With ongoing advances in chronobiology and pharmaceutical technology, PDDS hold significant potential for improving patient compliance and enabling personalized, chronotherapeutic management of chronic diseases.

Keywords: Chronotherapeutics; Pulsatile drug delivery systems; Circadian rhythm; Lag time; Time-controlled release; Stimuli-responsive delivery; Personalized therapy

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Abstract No.: PP-042

ENHANCEMENT OF DISSOLUTION AND SOLUBILITY RATE OF TELMISARTAN BY SOLID DISPERSION TECHNIQUE

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Telmisartan is a drug used to treat hypertension. It is a blocker of angiotensin-II receptors. Telmisartan is a BCS class II medication, which means high permeability and poorly soluble. So that the drug is very poorly soluble in water, and it has slow dissolution and low bioavailability. The aim of the study was to improve the solubility and dissolution rate of telmisartan using the solid dispersion technique. For development of dispersion technique via solvent evaporation method has been used. To make this formula, diverse water-soluble polymer such as polyvinylpyrrolidone, polyethyleneglycol - 4000 and poloxamer - 407 were used in a 1:2 ratio, and methanol was used as the solvent. Then various tests were conducted to characterize the drug and solid dispersion, such as solubility tests, in vitro dissolution tests, FT-IR, DSC, and stability studies. The study showed that telmisartan prepared by dispersion technique improved the solubility and dissolution rate.

Keywords: Solid dispersion, Telmisartan, Poloxamer -407, PEG – 4000, PVP.

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Abstract No.: PP-043

SCRUTINIZING URINE ROUTINE EXAMINATION REPORTS: A RETROSPECTIVE OBSERVATIONAL STUDY

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Urine routine examination is a primary pathological investigation used for the evaluation of renal function and detection of systemic and urinary tract disorders. It is needed because urine reflects the functional status of the kidneys and provides valuable information about many systemic diseases. It helps to detects protein, blood, and casts that indicate renal damage. Glucose and ketones indicate uncontrolled diabetes. Bilirubin and urobilinogen abnormalities suggest hepatic disease. The aim of the present study was to analyze routine urine examination findings of patients attending a diagnostic laboratory in North 24 Parganas, West Bengal, and to determine the prevalence of abnormal parameters.

A total of 106 urine routine examination reports were retrospectively scrutinized. Demographic details and several laboratory parameters were recorded and analyzed using descriptive statistics.

Female predominance (60.38%) was reported among the 106 participants. The mean age of the study subjects was 44.42 ± 2.01 years. The presence of glucose was documented in 20 participants, indicating glycosuria. Protein was absent in 55.66%, faint trace in 8.49%, trace in 18.87%, and present in 16.98% of cases. Blood in urine was detected in 35.85% of samples, signifying hematuria. The mean specific gravity was 1.0159 ± 0.001 and the mean urinary pH was 6.74 ± 0.06.

The findings indicate a notable proportion of abnormal urine parameters, particularly proteinuria and hematuria, highlighting the importance of routine urine screening for early detection of underlying renal or metabolic disorders.

Keywords: Glycosuria, Hematuria, Proteinuria, Retrospective, Urine routine examination

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CRITICAL APPRAISAL AND AREAS OF IMPROVEMENT OF REGULATORY ENVIRONMENT OF RARE DRUGS APPROVAL IN INDIA WITH RESPECT TO THE US, EU, AND JAPAN

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Rare disease affects millions of people, yet access to authorize these antidotes remains limited, particularly in low- and middle- income countries. India has taken progressive way through the NDCT Rules (2019) and the National policy for rare complaint (2021) for orphan drug blessings. still, when compared with established frame analogous as Orphan Drug Act of the United state, the European Medicine Agency's orphan regulation with the European Union, and Japan's orphan drug program, notable persist.

The United States provides financial impulses, duty credits, user figure waivers, and seven times of request exclusivity. The European Union offers ten times of request exclusivity along with protocol backing and figure reduction, while Japan grants priority review and extended re- examinations periods. India primarily focuses on expedited review and certain figure waivers but lacks robust fiscal impulses, structured disquisition and long- term request exclusivity benefits.

Pivotal areas for improvement in India include strengthening financial impulses for sponsors, enhancing nonsupervisory clarity, perfecting patient registry system, promoting public private alliances, and post marketing surveillance with global morals. also, erecting in rare complaint disquisition and adaptation with international nonsupervisory bodies can grease hastily access to innovative antidotes.

Keywords: Rare disease, India, United States, European Union, Japan, Post-Marketing Surveillance.

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Abstract No.: PP-045

Oral Insulin: A Needle-Free Revolution in Diabetes Management

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Diabetes mellitus is a problem and oral insulin is a new way to treat it. Now people with diabetes mellitus get insulin shots, which can hurt and be uncomfortable. This is why people are trying to make insulin that people can take by mouth like a pill or something. The main idea of insulin is to make people with diabetes mellitus feel better and take their medicine like they are supposed to. Making oral insulin is not easy. When people take insulin by mouth, it goes into their stomach and intestines, where it can get broken down by the stomach acid and stuff that helps them digest food. This makes the insulin not work well. So scientists are working on ways to get the insulin into the body like putting a special coating on it using tiny particles and things that help it get into the bloodstream. One good thing about insulin is that it goes into the body the same way that natural insulin does. When people take insulin it goes into their intestines and then into their liver just like the insulin that their pancreas makes. This might help people with diabetes mellitus control their blood sugar levels better and not have many problems with low blood sugar. Oral insulin is still being. Developed, but it could change the way people treat diabetes mellitus in the future. It might be a more convenient way to take insulin, and people might like it better, than getting shots. More research and tests need to be done to make sure that oral insulin is safe and works well and to see what happens when people take it for a time.

Keywords: Diabetes mellitus, Oral insulin delivery, Gastrointestinal barriers, Glycaemic control

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TUMOR MICROENVIRONMENT REMODELING BY EXOSOMES.

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Exosomes are nano-sized extracellular vesicles (30-50 nm), which are released by cells through the endosomal pathway via multivesicular body formation. Once the exosomes are secreted into biolo-fluids such as saliva, blood, urine, and cerebrospinal fluid, they circulate as stable carriers of molecular information. Encased within a lipid bilayer with various biomolecules, exosomes transport a selective cargo of proteins, lipids, mRNA, microRNA, and DNA fragments that contemplate the pathological or physiological state of their parent cells.

In cancer, the tumor microenvironment is actively remodeled by exosomes. Exosomes promote anhiogenesis, immune evasion, and formation of metastatic niche by transferring oncogenic signals to recipient cells. Their remarkable stability and surface specificity give them power, to minimally invade biomarkers for early cancer detection, prognosis, and therapeutic monitoring. Advances in isolation techniques comprises of differential ultracentrifugation, density-gradient separation technique, size- exclusion chromatography, polymer-based precipitation, and microfluidic platforms. These techniques, combined with characterization tools such as nanoparticle tracking analysis, immunoblotting, and electron microscopy, have accelerated translational research. Engineered exosomes are emerging as biocompatible and low-immunogenic drug delivery vehicles with intrinsic tumor-homing capability. Despite the challenges in standardization, scalable production, and cargo-loading efficiency, exosomes continue to lead the field of precision oncology and offer significant promise in advancing early cancer detection with targeted therapy and redefine the future of cancer management.

Keywords: Extracellular vesicle, Tumor microenvironment, Metastasis, Targeted drug delivery.

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Abstract No.: PP-047

NANOTECHNOLOGY-INTEGRATED ORODISPERSIBLE TABLETS FOR ENHANCED BIOAVAILABILITY

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Nanotechnology-integrated orodispersible tablets (NIOTs) represent a transformative advancement in oral drug delivery, combining the patient-centric advantages of orodispersible tablets (ODTs) with the pharmacokinetic benefits of nanocarrier systems. Building upon foundational nanomedicine principles established by Robert Langer and co scientist in polymeric and targeted nanotherapeutics, NIOTs incorporate nanostructures—including polymeric nanoparticles, nanocrystals, nanosuspensions, and lipid-based carriers—into rapidly disintegrating matrices. These nanosystems significantly enhance the surface area-to-volume ratio, accelerating dissolution in accordance with the Noyes–Whitney equation, stabilizing amorphous drug forms, and improving mucosal adhesion and permeability. Emerging studies demonstrate that nanoencapsulation can facilitate partial lymphatic uptake and reduce hepatic first-pass metabolism, thereby increasing systemic bioavailability and minimizing dose-related adverse effects. Taste masking is achieved through pH-sensitive polymers such as Eudragit® E PO, ensuring minimal drug release in saliva and prompt release in gastric fluid. Integration with superdisintegrants (e.g., crospovidone, croscarmellose sodium) enables rapid tablet disintegration and potential pre-gastric absorption for faster onset of action. Current translational research focuses on oncology, neurotherapeutics, and genetic disorders, where targeted delivery and enhanced solubility are critical. Despite promising preclinical outcomes, challenges remain, including physicochemical stability, moisture sensitivity, scalability, and regulatory validation. Rigorous clinical investigations are essential to establish long-term safety and therapeutic superiority. NIOTs thus offer a compelling, patient-friendly platform poised to redefine precision oral pharmacotherapy.

Keywords: Nanotechnology, Orodispersible tablets, Nanoparticles, Bioavailability enhancement, First-pass metabolism, Targeted drug delivery, Taste masking, Nanomedicine.

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Abstract No.: PP-048

NANOCARRIERS: THE FUTURE VEHICLES OF VACCINES

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Nanocarriers are really changing the way we make vaccines today. They are helping us to solve some problems that we have had for a long time with getting people immunized. These tiny delivery systems, like lipid-based nanoparticles, polymeric nanoparticles, viral vectors, inorganic nanoparticles and nanoemulsions are really good at helping to keep the antigens stable getting them to the place in the body and making sure the immune system responds the right way. Nanocarriers protect the antigens from getting broken down quickly and help to release them in a controlled way, which makes the antigens more available, to the body and helps the immune system to take them up more easily so the nanocarriers really help the antigen-presenting cells to do their job. The new developments show how important nanocarriers are for making vaccines, especially the ones that use nucleic acid like mRNA and DNA vaccines. Nanocarriers like lipid nanoparticles played a role in quickly making and sending out mRNA vaccines all over the world during the COVID-19 pandemic. Despite these advantages, challenges remain including large scale manufacturing complexities, long term safety evaluation, storage stability and regulatory standardization. Continued interdisciplinary collaboration across nanotechnology, immunology and materials science is essential to refine nanocarrier based vaccine systems and expand their application to infectious diseases, cancer immunotherapy and emerging global health threats.

Keywords: Nanocarriers, DNA vaccines, COVID-19, mRNA vaccines, immunotherapy etc.

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Abstract No.: PP-049

BEYOND DISPENSING: PHARMACISTS IN THE DIGITAL HEALTH ERA

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The digital transformation of healthcare has catalyzed a paradigm shift in pharmacy practice, redefining the pharmacist's role from traditional dispensing to technology-enabled, patient-centered care. Smart pharmacy integrates telepharmacy, electronic health records (EHRs), mobile health (mHealth) applications, artificial intelligence (AI), and health informatics to enhance clinical decision-making and optimize therapeutic outcomes. Recent evidence demonstrates that pharmacist-led digital interventions improve medication adherence, reduce adverse drug events, and strengthen chronic disease management. Studies by Topol et. al. have highlighted the role of AI in precision medicine, while Bates et al. emphasized the impact of EHR-integrated clinical decision support in minimizing medication errors. Furthermore, tele pharmacy models evaluated in rural settings have shown significant improvements in healthcare accessibility and equity. Digital integration enables pharmacists to engage in real-world data analytics, pharmacovigilance, and population health research, fostering evidence-based and personalized medicine. Collaborative digital platforms enhance interdisciplinary communication, continuity of care, and patient safety. However, widespread adoption remains constrained by data privacy concerns, regulatory complexities, infrastructure disparities, and the need for advanced digital competencies among pharmacy professionals. Smart pharmacy represents a sustainable and scalable model for global healthcare advancement. By leveraging digital innovation, pharmacists are emerging as pivotal contributors to NextGen healthcare systems—extending services beyond dispensing to deliver accessible, precise, and technology-driven care.

Keywords: Smart pharmacy; Digital health; Telepharmacy; Artificial intelligence; Health informatics; Medication therapy management; Precision medicine; Patient-centered care; Pharmacovigilance; Healthcare innovation.

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Abstract No.: PP-050

ROLE OF SUPER DISINTEGRANTS IN TABLET FORMULATION

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Super disintegrants are critical functional excipients in modern tablet formulation, designed to promote rapid tablet disintegration and enhance drug release. Unlike conventional disintegrants, super disintegrants are highly efficient at low concentrations (typically 1–10% w/w) and can absorb approximately 10–40 times their weight in water. Upon contact with gastrointestinal fluids, these materials facilitate rapid water uptake, swelling, and the generation of internal pressure within the tablet matrix, leading to its prompt fragmentation into smaller particles. This process significantly accelerates dissolution and onset of therapeutic action. Pioneering investigations by pharmaceutical scientists such as Shangraw and co researcher demonstrated the superior swelling capacity and wicking mechanisms of crosslinked polymers, while later studies by Gohel and co-workers highlighted the optimization of super disintegrant concentration in fast dissolving drug delivery systems. Commonly employed synthetic super disintegrants include croscarmellose sodium, sodium starch glycolate, and crospovidone, each exhibiting distinct mechanisms such as capillary action, strain recovery, and volumetric expansion. Super disintegrants are particularly indispensable in orally disintegrating tablets (ODTs) and fast-dissolving formulations developed for pediatric, geriatric, and dysphagic patients. Recent research trends focus on natural and co-processed super disintegrants to improve biocompatibility, sustainability, and performance consistency. The selection of an appropriate super disintegrant depends on drug physicochemical properties, manufacturing method, and desired disintegration time. Overall, super disintegrants play a pivotal role in ensuring rapid tablet breakdown, improved bioavailability, patient compliance, and therapeutic effectiveness in contemporary solid dosage forms.

Keywords: Super disintegrants; Tablet formulation; Swelling mechanism; Croscarmellose sodium; Sodium starch glycolate; Crospovidone; Orally disintegrating tablets.

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Abstract No.: PP-051

pH DEPENDENT POLYELECTROLYTE COMPLEX PARTICLES AS PICKERING EMULSION STABILIZER

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pH-dependent polyelectrolyte complex (PEC) particles have emerged as a Pickering stabilizers for oil-in-water emulsions. By tuning the solution pH, the net charge and interfacial wettability of oppositely charged polyelectrolytes can be reversibly modulated, leading to the formation or dissociation of colloidal PEC particles at the oil water interface. At intermediate pH values, where electrostatic attraction between the polyelectrolytes is maximized, compact and amphiphilic PEC particles assemble at the droplet surface, effectively suppressing coalescence and Ostwald ripening through a robust Pickering mechanism. In contrast, at extreme pH conditions, partial charge neutralization or complex dissociation reduces particle interfacial activity, often triggering emulsion destabilization or phase inversion. This pH-switchable behaviour enables on-demand control over emulsion formation, stability, and breakdown, which is highly relevant for applications in drug delivery, food systems, and responsive formulations. The principles of pH-sensitive PEC particles, their interfacial assembly, and their performance as smart Pickering stabilizers, thereby providing a versatile platform for engineering stimuli-responsive colloidal emulsions.

Keywords: pH, polyelectrolyte complex, Pickering emulsion, stabilizer

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Abstract No.: PP-052

PREPARATION AND EVALUATION OF ORODISPERSIBLE FILMS LOADED WITH SOLID DISPERSION TO ENHANCE ATORVASTATIN CALCIUM SOLUBILITY

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Atorvastatin calcium, a commonly used medication for treating high cholesterol, faces challenges from its low water solubility and poor absorption when taken by mouth, which hampers its effectiveness. This research sought to boost its solubility and speed up its release by embedding it in solid dispersions and turning those into fast-dissolving oral films (ODFs). We created the dispersions using a melt fusion technique with a water-friendly carrier, poloxamer 407, to better wet the drug and cut down its crystalline form. The best-performing dispersion was then incorporated into ODFs via solvent casting, employing polymers such as hydroxypropyl methylcellulose as the film base. These films underwent thorough testing for key properties: thickness, weight consistency, folding durability, surface pH, drug uniformity, breakup time, mechanical strength, and dissolution performance in vitro. FTIR and DSC analyses showed no unwanted reactions between drug and polymers, plus evidence of the drug shifting toward an amorphous state. The top formulation broke apart in mere seconds and delivered far superior drug release rates over the plain drug. Overall, ODFs built on solid dispersions offer a smart approach to overcoming solubility hurdles, accelerating dissolution, and improving adherence for tough-to-dissolve drugs like atorvastatin calcium.

Keywords: Atorvastatin calcium, Solid dispersion, Poloxamer 407, Orodispersible films (ODFs), Solvent casting method, Fusion method, FTIR.

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Abstract No.: PP-053

ADVANCED ML-BASED PREDICTIVE MODELING CONSIDERING CHRONIC TOXICITY ENDPOINTS

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Chronic toxicity is a serious concern because harmful effects can appear slowly after long-term exposure to chemicals used in industries and the environment. Studying chronic toxicity through experiments is difficult and time-consuming, as it requires long exposure periods, high costs, and extensive laboratory testing. As a result, many chemicals still lack proper chronic toxicity data. To overcome this problem, computer-based methods are increasingly used to predict toxic effects in a faster and more efficient way. Quantitative structure–activity relationship (QSAR) modeling helps to understand how the chemical structure of a compound is related to its toxic effects. In this study, machine learning–based QSAR models were developed to predict chronic toxicity, focusing on no-observed-adverse-effect levels (NOAEL). In this present study 123 diversed organic were taken for building the QSAR model, Molecular descriptors were calculated from chemical structures and best combinations are carefully selected to improve model quality. Partial least squares (PLS) model showed strong predictive ability, with an R^2_{Train} value of 0.849, Q^2 (LOO) of 0.820, and Q^2_{F1} of 0.822, but with the addition of one q-RASAR descriptor it showed a better Q^2_{F1} value (0.824) without affecting the R^2_{Train} value. These results indicate that the developed model is reliable for predicting chronic toxicity. Furthermore, we identified the molecular features and properties affect toxicity and how they influence toxic effects. Overall, this study shows that ML-based models are useful and reliable for predicting toxicity. They help in early safety evaluation of chemicals and reduce the need for animal testing.

Keywords: QSAR, loo, Molecular descriptors, q-RASAR.

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Abstract No.: PP-054

ZANTHOXYLUM ARMATUM (TIMUR PEPPER): A REVIEW OF ITS MEDICINAL AND PHARMACOLOGICAL PROPERTIES

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Zanthoxylum armatum, commonly known as Timur or Nepal pepper, is an important medicinal and commercially valuable plant used to treat digestive problems, cough, and pain. Early evidences point that *Zanthoxylum armatum* possesses strong anti-inflammatory, antioxidant, and antimicrobial properties. Ethanolic extracts of its stem bark demonstrated significant anti-inflammatory effects in carrageenan-induced rat paw and notable antioxidant activity through free-radical scavenging assays. Its hydromethanolic bark extract has strong anti-diabetic effects, helping reduce blood sugar levels and harmful lipids such as cholesterol, triglycerides, LDL, and VLDL, while increasing beneficial HDL. Timur is mostly valued for supporting the excretory, circulatory, digestive, and respiratory systems. Its seeds are used to treat parasitic infections, poor appetite, foul body odour, piles, heart and throat problems, cough, asthma, hiccups, and dental issues. Leaves help relieve indigestion and stomach ache. Studies suggest leaf extracts may promote cancer cell death and improve the action of chemotherapy drugs. Timur is an aromatic plant with high medicinal and commercial importance. It has been used since ancient times as a spice, flavoring agent, and in folk medicine, as well as for essential oil production. Although many studies have explored its traditional uses, medicinal value, and chemical composition but it's still early so more research is needed to identify new compounds, improve propagation methods, and develop effective techniques.

Keywords: Timur pepper, Medicinal plant, Anti-inflammatory activity, Antioxidant properties, Antimicrobial effects, Anti-diabetic activity.

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Abstract No.: PP-055

SOLID LIPID NANOPARTICLES AS A DRUG DELIVERY SYSTEM OF ANTICANCER DRUG

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Solid Lipid Nanoparticles (SLNs) have become a viable nanocarrier technology for the administration of anticancer medications because of their capacity to improve drug stability, bioavailability, and therapeutic efficacy. The physiologically suitable lipids that make up SLNs are submicron-sized particles that stay solid at body temperature as well as room temperature. These nanoparticles minimize the drawbacks of polymeric nanoparticles and lipid-based systems while combining their benefits.

Conventional drug delivery methods in anticancer treatment frequently have issues with poor solubility, quick drug degradation, non-specific distribution, and high systemic toxicity. By offering targeted delivery to tumor sites, enhanced cellular uptake, and controlled and prolonged drug release, SLNs provide an efficient answer to these problems. Because of the increased permeability and retention (EPR) effect made possible by their small particle size, there is less harm to healthy tissues and more medication accumulation at the tumor site.

Low solubility, rapid drug breakdown, non-specific distribution, and significant systemic toxicity are common problems with traditional drug delivery techniques used in anticancer treatment. SLNs offer an effective solution to these issues by providing controlled and delayed drug release, improved cellular absorption, and targeted delivery to tumor areas. There is less damage to healthy tissues and more drug accumulation at the tumor site because to the enhanced permeability and retention (EPR) effect made possible by their small particle size.

All things considered, solid lipid nanoparticles are an effective, safe, and biodegradable drug delivery method for anticancer treatment. They are a viable platform for future cancer medication development because of their capacity to enhance treatment outcomes and lessen side effects.

Keywords: Solid Lipid Nanoparticles; Anticancer Drug Delivery; Nanotechnology; Targeted Therapy; Controlled Drug Release

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Abstract No.: PP-056

NATURAL POLYMERS FOR FORMULATION OF NANOPARTICLES IN CANCER TREATMENT

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Cancer is one of the world's most serious health problems, and its treatment requires a balance between efficacy and safety. Conventional chemotherapy has several limitations, including poor target specificity, rapid systemic clearance, and significant dose-related toxicity. Over the past few decades, polymer-based novel drug delivery systems have emerged as an advanced platform for the controlled and targeted delivery of anti-cancer drugs. These polymers are derived from both natural and synthetic sources. Sources of natural polymers include plants, animals, bacteria, and fungi. Predominantly, natural polymers are classified into two categories: polysaccharides, such as chitosan and alginate, and protein-based polymers, including albumin and gelatine, to name a few. These two types of polymers have been extensively studied for drug delivery. Both are able to form scaffolds as viable extracellular matrix (ECM). By these means, targeted drug delivery with elevated drug loading efficiency and least invasiveness can be achieved. Besides this, several functional groups are present in the polymer backbone, which have been found to be easily modified for functionalization. The use of polysaccharides and proteins for drug delivery has shown promising results. Such innovations significantly improve therapeutic efficacy and reduce off-target toxicity compared to conventional chemotherapy. Although natural polymers possess certain excellent properties, several challenges must be overcome, including low solubility at physiological pH levels, variations in molecular weight, and burst release. Continuous developments in research are ongoing to overcome those challenges.

Keywords: Cancer, Natural polymers, Nanoparticles, Targeted drug delivery.

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Abstract No: PP-057

FORMULATIONS OF HYDROGEL: METHODS OF PREPARATION AND PHARMACEUTICAL BENEFITS

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Large volumes of water or biological fluids can be absorbed and retained by hydrogels, which are three-dimensional, hydrophilic networks of polymers that retain their structural integrity. Hydrogels have become increasingly important in pharmaceutical and biomedical applications because of their biocompatibility, flexibility, and similarity to natural tissues. The formulation of hydrogels involves selecting suitable polymers, crosslinking agents, and preparation techniques to achieve the desired physicochemical and drug release properties. Hydrogel is prepared using a variety of techniques, including chemical cross-linking techniques that use cross-linkers to form covalent bonds and physical cross-linking techniques like freeze-thaw cycling, ionic interaction, and hydrogen bonding. Hydrogels are preferred in pharmaceutical applications due to the absence of toxic cross-linking agents and improved safety profiles. Hydrogels offer several pharmaceutical benefits, including controlled and sustained drug release, enhanced drug stability, improved patient compliance, and targeted drug delivery. Their high-water content provides a soothing effect and promotes better drug diffusion, making them suitable for topical, transdermal, ocular, and nasal drug delivery systems. Additionally, hydrogels can encapsulate both hydrophilic and hydrophobic drugs, protect sensitive drugs from degradation, and allow site-specific delivery. These benefits have made hydrogels a promising carrier in contemporary drug delivery systems. It is anticipated that ongoing research and development in hydrogel formulation methods will increase their use in regenerative medicine and controlled drug delivery.

Keywords: Controlled drug release, hydrogel, cross-linking method

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Abstract No.: PP-058

CAFFEINE-BASED CATALYSTS IN GREEN AND SUSTAINABLE CHEMISTRY

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Caffeine is one of the most widely consumed psychoactive substances worldwide and is naturally present in coffee, tea, soft drinks, energy beverages, chocolate, and several pharmaceutical formulations. Traditional techniques for caffeine extraction, analysis, and use frequently involve energy-intensive procedures and dangerous organic solvents, which can pollute the environment and pose health risks. Green and sustainable chemistry has become a viable strategy to address these issues by minimizing the use of hazardous chemicals, reducing waste production, and promoting environmentally friendly substitutes.

In order to maintain high efficiency and accuracy, green analytical and synthetic methodologies place an emphasis on the use of recyclable catalysts, safer solvents, and less energy and reagent consumption. Caffeine can function as a Lewis base, Bronsted base, or precursor for N-heterocyclic carbene systems because of these characteristics.

Recent research has shown that caffeine can be used in a variety of catalytic systems, such as ionic liquids, heterogeneous catalysts, metal-caffeine complexes (gold, silver, palladium, and platinum) for coupling reactions, and nanoparticle stabilization. In mild and environmentally benign conditions, caffeine-based catalysts have demonstrated efficacy in fostering organic transformations. The chemical, pharmaceutical, food, and beverage industries are moving toward more sustainable practices, as evidenced by the increasing use of green chemistry concepts in caffeine-based catalysis.

Overall, caffeine-based catalysts represent a valuable and environmentally friendly alternative to conventional catalytic systems, contributing significantly to the advancement of green and sustainable chemistry.

Keywords: Caffeine; Green catalysts; Sustainable chemistry; Metal–caffeine complexes; Eco-friendly catalysis.

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Abstract No.: PP-059

ANALYTICAL QUALITY BY DESIGN AIDED RP-HPLC METHOD FOR THE ESTIMATION OF RED (E-122) IN COMMERCIAL FOOD SAMPLES EMPLOYING GREEN ULTRASOUND ASSISTED EXTRACTION: GREENNESS, BLUENESS AND WHITENESS EVALUATION

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The present study aims to develop and validate an environmentally sustainable, high-performance liquid chromatography (HPLC) method for the quantification of the synthetic food dye Carmoisine (E122) in commercial food samples. Employing an Analytical Quality by Design (AQbD) framework, the method integrates Green Analytical Chemistry (GAC) and White Analytical Chemistry (WAC) principles to ensure eco-friendliness, efficiency, and robustness. The sample preparation leverages Ultrasound-Assisted Extraction (UAE) using ethanol, a less toxic and more sustainable solvent, to enhance extraction efficiency while minimizing solvent usage and environmental impact. Chromatographic separation is optimized on a Phenomenex C18 column with a mobile phase comprising ethanol and acetate buffer (pH 5), ensuring high resolution and sensitivity at 510 nm detection. The method development involves advanced experimental design techniques like rotatable central composite design (rCCD) to achieve optimal parameters. Validation confirms the method's accuracy, precision, stability, and compliance with regulatory limits. Greenness assessments, including GAPI, AGREE, and the Green Analytical Eco Scale, demonstrate the method's superior environmental performance. Overall, the proposed approach offers a cost-effective, reliable, and sustainable analytical tool for routine food safety analysis, aligning with global efforts toward greener and safer food quality control practices

Keywords: Green Analytical Chemistry, AQbD, RP-HPLC, Ultrasound-Assisted Extraction, Ethanol, Food Colorant, Carmoisine (E122), Eco-friendly Method, Sustainability, Food Safety, Method Validation, Greenness Assessment

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Abstract No.: PP-060

RECENT ADVANCEMENT IN NOVEL OXAZOLE-BASED KINASE INHIBITORS AS EMERGING CANCER TARGETS

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Kinases play a vital role in activating cancer cell lines through cell migration, proliferation, survival, apoptosis, and abnormal cell growth. In the mid-1970s, kinase inhibitors were discovered for the treatment of various types of human cancer. By 1978, the oncogene was identified as a protein kinase. Various types of kinase inhibitors, such as VEGFR, EGFR, CDK2, MAP kinase, and tyrosine kinase inhibitors, play a crucial role in the inhibition of cell migration, cell proliferation, apoptosis, and abnormal cell growth. To improve the therapeutic effects and reduce the side effects of the marketed drugs, nowadays, scientists are trying to discover specific drug targets for cancer cell inhibition. It was found that VEGFR, EGFR, CDK2, MAP kinase, and tyrosine kinase inhibitors play a crucial for targeting specific and reducing the adverse effects. Heterocyclic rings containing novel molecules play a vital role in antiproliferative activity, and oxazole is one of them. BMS-387032 is an oxazole ring-containing molecule, which comes under the CDK2 inhibitors, and works as an anticancer agent. So, oxazole-containing novel molecules have a good impact on antiproliferative activity against cancer-genesis proteins.

Keywords: Oxazole, Cancer, Kinase Protein, VEGFR Inhibitors, EGFR Inhibitors, CDK-2 Inhibitors, MAP Kinase Inhibitors, RTKs Inhibitors.

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Abstract No.: PP-061

APPLICABILITY OF HERBAL MEDICINES IN NASH ASSOCIATED WITH DIABETES MELLITUS

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Diabetes mellitus, one of the biggest health issues facing the globe today whose prevalence are rising. It is caused due to defects in insulin secretion, but there are many causes due to which type 2 diabetes mellitus can occur. Among these diseases, Non-alcoholic steatohepatitis (NASH) has an increasing risk of type 2 diabetes mellitus. The inflammatory subtype of non-alcoholic fatty liver disease (NAFLD) is NASH, which is one of the diabetes associated disorder which commonly prevalent in pre-Diabetic and type 2 Diabetic patient. There are many sources of medicinal plants which has both hepatoprotective activity as well as antidiabetic activity. The fat storage leads to liver toxicity, trigger oxidative stress, release inflammatory cytokines, and subsequent liver injury. An effective method for treating NASH and NAFLD is to enhance lipid breakdown. These medicinal plants are Turmeric (*Curcuma longa*), Guduchi (*Tinospora cordifolia*), Cinnamon (*Cinnamomum verum*), Aloe vera, Neem (*Azadirachta indica*), and many other medicinal plants. Compounds found in medicinal plants, such as thiazolidinediones like rosiglitazone and pioglitazone, activate peroxisome proliferator-activated receptor-γ (PPAR-γ), leads to improved insulin sensitivity and decreased hepatic steatosis. Inhibition of tumour necrosis factor-α (TNF- α), a pro-inflammatory cytokine, contributes in reducing type 2 diabetes mellitus and NASH. Overall, medicinal plants represent a valuable therapeutic option for management of NASH and type 2 diabetes mellitus.

Keywords: NASH, diabetes mellitus, hepatoprotective activity, antidiabetic effect, medicinal plants.

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Abstract No.: PP-062

INDUSTRIAL ADVANCEMENT IN THE TABLET MANUFACTURING TECHNOLOGY

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Tablet manufacturing has undergone significant industrial advancement over the past few decades, driven by the need for improved efficiency, product quality, scalability, and regulatory compliance. Modern technologies have transformed conventional batch production into highly automated, continuous manufacturing systems that enhance precision and minimize human intervention. Innovations such as high-speed rotary tablet presses, real-time process analytical technology (PAT), and advanced granulation methods have optimized powder flow, compressibility, and uniformity. Continuous manufacturing platforms integrate blending, granulation, drying, compression, and coating into a single streamlined process, reducing production time and cost while improving consistency. The incorporation of artificial intelligence and machine learning enables predictive maintenance, process optimization, and real-time quality monitoring. Additionally, advancements in excipient engineering and coating technologies allow for modified drug release profiles, improved stability, and patient-centric dosage forms. Regulatory authorities increasingly support these innovations through quality-by-design (QbD) frameworks, encouraging manufacturers to design robust processes rather than rely solely on end-product testing. Sustainability has also become a priority, with industries adopting energy-efficient equipment and waste-minimization strategies. Overall, industrial progress in tablet manufacturing technology has not only enhanced productivity and product reliability but also enabled flexible manufacturing capable of responding to dynamic market demands. These developments signify a paradigm shift from traditional pharmaceutical production toward intelligent, integrated, and adaptive manufacturing systems.

Keywords: Continuous tablet manufacturing, Quality by design, Process analytical technology, Artificial intelligence.

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Abstract No.: PP-063

SYZYGIUM CUMINI: A PROMISING HERBAL APPROACH FOR DIABETES CARE

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Diabetes mellitus remains a global metabolic crisis, demanding safer and multifaceted therapeutic strategies beyond conventional pharmacotherapy. *Syzygium cumini* (L.) Skeels, commonly known as Jamun, has emerged as a scientifically validated ethnomedicinal plant with significant antidiabetic potential. Preclinical investigations by Sharma et al. demonstrated that aqueous seed extracts markedly reduced fasting blood glucose and improved pancreatic β-cell integrity in streptozotocin-induced diabetic rats. Similarly, Kumar et. al. reported enhanced insulin sensitivity and modulation of GLUT-4 expression following administration of methanolic seed extract. Phytochemical analyses reveal the presence of jamboline, ellagic acid, anthocyanins, quercetin, and gallic acid—bioactive compounds responsible for α-amylase and α-glucosidase inhibition, antioxidant defense, and anti-inflammatory activity. Clinical observations by Rathi et al. further support its glycemic control potential, noting reductions in HbA1c and postprandial glucose levels with standardized seed powder supplementation. Beyond glycemic regulation, *S. cumini* exhibits lipid-lowering, nephroprotective, and cardioprotective effects, addressing diabetes-associated complications. Mechanistically, its action involves pancreatic protection, oxidative stress attenuation, and modulation of insulin signaling pathways. Although promising, standardization, dose optimization, and large-scale randomized clinical trials remain essential to translate its traditional use into evidence-based phytopharmaceutical development. Collectively, current evidence positions *Syzygium cumini* as a compelling herbal candidate for integrative diabetes management with a favorable safety profile.

Keywords: Syzygium cumini, diabetes mellitus, phytotherapy, jamboline, α-glucosidase inhibition, antioxidant activity, β-cell protection, herbal antidiabetic agents.

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Abstract No.: PP-064

PHARMACOGENOMICS: DESIGNING THE RIGHT DRUG AT THE RIGHT DOSE FOR THE RIGHT PATIENT

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Pharmacogenomics has emerged as a transformative pillar of precision medicine, redefining the traditional "one-size-fits-all" paradigm of pharmacotherapy. By integrating genomic insights into drug development and clinical decision-making, pharmacogenomics enables the design and selection of the right drug at the right dose for the right patient. Landmark contributions from scientists such as Arno G. Motulsky, who first proposed genetic influences on drug response, and Werner Kalow, a pioneer of pharmacogenetics, laid the conceptual foundation for this field. Subsequent advances driven by the Human Genome Project accelerated the identification of clinically actionable variants in genes encoding drug-metabolizing enzymes (e.g., CYP450 isoforms), transporters, and targets. Contemporary research led by investigators such as Relling et. al. has translated genomic evidence into dosing guidelines, significantly improving therapeutic safety and efficacy, particularly in oncology, cardiology, and psychiatry. By reducing adverse drug reactions, minimizing therapeutic failure, and optimizing dose individualization, pharmacogenomics enhances both clinical outcomes and healthcare sustainability. Emerging technologies, including next-generation sequencing and AI-driven predictive modeling, further promise to refine genotype-guided prescribing. Despite challenges related to cost, ethical considerations, and implementation barriers in low-resource settings, pharmacogenomics represents a paradigm shift toward patient-centered therapeutics. Integrating genomic data into routine practice is no longer aspirational but essential for advancing personalized healthcare.

Keywords: Pharmacogenomics, Precision Medicine, Personalized Therapy, Genetic Polymorphism, Dose Optimization, CYP450, Adverse Drug Reactions, Genotype-Guided Prescribing.

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Abstract No.: PP-065

FROM LEAF TO LAB: INNOVATIVE EXTRACTION METHODS OF HERBAL DRUGS

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Herbal medicine, rooted in centuries of traditional practice, continues to shape contemporary drug discovery and phytopharmaceutical development. Historically, plant materials—leaves, roots, stems, and flowers—were processed using conventional extraction techniques such as Soxhlet extraction, maceration, and percolation. While effective in isolating bioactive constituents, these methods are often solvent-intensive, time-consuming, and susceptible to thermal degradation of thermolabile compounds. Foundational work by researchers such as Harborne emphasized the importance of systematic phytochemical analysis, while Chemat and colleagues advanced the concept of "green extraction" to enhance sustainability and efficiency. In recent decades, innovative technologies—including microwave-assisted extraction (MAE), ultrasound-assisted extraction (UAE), and supercritical fluid extraction (SFE)—have revolutionized herbal drug processing. Studies by Herrero demonstrated the superior selectivity and environmental compatibility of supercritical CO_2 extraction, whereas Vinatoru highlighted the enhanced mass transfer and reduced processing time achieved through ultrasound techniques. These modern approaches minimize solvent consumption, lower energy requirements, and preserve sensitive phytoconstituents, thereby improving extract quality and yield. The "From Leaf to Lab" paradigm underscores the translational journey from ethnobotanical knowledge to validated, standardized herbal products. By integrating green chemistry principles with advanced extraction technologies, modern phytopharmaceutical research bridges traditional wisdom and evidence-based science, enabling scalable production of safe, high-quality herbal therapeutics.

Keywords: Herbal drugs; Green extraction; Microwave-assisted extraction; Ultrasound-assisted extraction; Supercritical fluid extraction; Phytopharmaceuticals; Sustainable processing.

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Abstract No.: PP-066

NATURAL VS SYNTHETIC SUPER DISINTEGRANTS IN ORO DISPERSIBLE TABLETS: A COMPARATIVE STUDY

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Oro dispersible tablets (ODTs) have redefined patient-centric drug delivery by enabling rapid disintegration in the oral cavity without the need for water, thereby improving compliance among pediatric, geriatric, and dysphagic populations. Central to their performance is the incorporation of super disintegrants, which facilitate swift tablet breakup upon contact with saliva. This poster critically compares natural and synthetic super disintegrants with respect to disintegration efficiency, safety, cost-effectiveness, and sustainability. Natural polymers such as ispaghula husk, gum karaya, and fenugreek mucilage have been widely investigated for their swelling and wicking properties, with studies demonstrating promising disintegration times and favorable biocompatibility profiles. Researchers have highlighted their biodegradability, renewability, and eco-friendly attributes, aligning with the growing emphasis on green pharmaceutics. However, variability in physicochemical characteristics and potential microbial load remain formulation challenges. In contrast, synthetic agents including crospovidone, croscarmellose sodium, and sodium starch glycolate exhibit reproducible performance, rapid disintegration kinetics, and compatibility with large-scale manufacturing processes. Multiple formulation scientists have reported superior mechanical strength and lower required concentrations for synthetic polymers, though at higher production costs and limited sustainability benefits. Emerging research suggests that strategic co-processing or hybrid incorporation of natural and synthetic super disintegrants may synergistically optimize tablet performance while addressing environmental and economic concerns. Overall, the selection of super disintegrants should be guided by a balance between functional efficiency, patient safety, regulatory compliance, and sustainable pharmaceutical development.

Keywords: Oro dispersible tablets; Super disintegrants; Natural polymers; Synthetic polymers; Sustainable pharmaceutics; Patient compliance; Tablet disintegration.

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Abstract No.: PP-067

FORMULATION & CHARACTERIZATION OF FLOATING TABLETS OF TELMISARTAN PREPARED BY CO-CRYSTALLIZATION TECHNIQUE FOR PULSATILE DRUG DELIVERY TO TREAT HEART DISEASES

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A Pulsatile Drug Release System (PDDS) is a system that quickly and temporarily releases a certain amount of drug molecules after a set amount of time since the last release. PDDS are becoming more popular because they deliver the right amount of medicine at the right time and place. PDDS makes sure that the medicine is delivered in a way that is both spatial and chrono-pharmacological. The system is illustrated in accordance with the body's circadian rhythm. Circadian rhythms of sleep–wake patterns (24 hours) are influenced by light, darkness, and other factors that affect the chronopharmacology, aiding in the regulation of daily sleep and wakefulness schedules. The macro-physico PDDS can be classified as either single-unit or multiple-unit systems. A single unit system has one of the following types of coating: a capsule, an osmosis coating, an erodible coating, a barrier coating, or a rupturable coating. Whereas, multiple systems are designed with either membrane permeability, rupturable coating, or osmotic-based rupturable coating systems. Telmisartan, a BCS-Type-II medication, is recommended for hypertension. Telmisartan is a pharmacophore molecule that doesn't dissolve well but passes through membranes easily. Co-crystallizing Telmisartan makes the chemoiety more soluble. Using DOE software, we used the QBD technique to make the best formulation for a fast-dissolving tablet using factorial design. To make the PDDS, we used Sodium Starch Glycolate (SSG) and Cross Carmilose Sodium (CCS) as super disintegrants and Hibiscus Leaf's Mucilage as a coating creditor. To make a new drug delivery system that is always needed, PDDS is one of many new formulations. Inconclusion, PDDS is the best choice for getting the most patents to follow the rules with the fewest bad effects.

Keywords: Pulsatile, Chrono-pharmacological, BCS Class-II, QBD, DOE, Co-crystallization

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Abstract No.: PP-068

SLN-BASED DELIVERY SYSTEM FOR IMPROVED LINAGLIPTIN THERAPY

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Linagliptin, a dipeptidyl peptidase-4 (DPP-4) inhibitor, is widely prescribed for the management of type 2 diabetes mellitus; however, variability in oral absorption and limited permeability can influence its therapeutic consistency. Solid lipid nanoparticles (SLNs) have emerged as a promising lipid-based nanocarrier to enhance the biopharmaceutical performance of poorly soluble drugs. Building on foundational work by Müller and colleagues on SLN technology and subsequent optimization strategies reported by Mehnert, Mäder, and others, this study explores the design and evaluation of an SLN-based delivery system for linagliptin to improve its oral bioavailability and therapeutic efficiency. Linagliptin-loaded SLNs were prepared using hot homogenization followed by ultrasonication, employing biocompatible lipids and surfactants. Formulations were optimized through factorial design to achieve desirable particle size (<200 nm), low polydispersity index, high entrapment efficiency, and sustained drug release. In vitro release studies demonstrated controlled release behavior, while ex vivo permeability studies suggested enhanced intestinal transport compared to pure drug suspension. Stability studies confirmed acceptable physicochemical robustness over the test period. The developed SLN system showed improved pharmacokinetic parameters in experimental models, indicating enhanced bioavailability and prolonged systemic exposure. These findings align with previous nanocarrier-based enhancement strategies reported by Pardeike and researchers. Overall, SLN-mediated delivery presents a promising, scalable, and patient-friendly strategy for optimizing linagliptin therapy, potentially improving glycemic control and therapeutic adherence in diabetic patients.

Keywords: Linagliptin, Solid Lipid Nanoparticles, DPP-4 inhibitor, Oral Bioavailability, Nanotechnology, Controlled Release, Type 2 Diabetes Mellitus.

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Abstract No.: PP-069

ENVIRONMENT-RESPONSIVE NANOCARRIERS: UNLOCKING PRECISION ONCOLOGY

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The persistent challenge of achieving precise tumour targeting while minimizing systemic cytotoxicity has accelerated the development of stimuli-responsive nanocarriers as advanced platforms for cancer therapy. Conventional chemotherapeutic regimens suffer from non-specific biodistribution and dose-limiting toxicity, underscoring the need for intelligent delivery systems. Stimuli-responsive nanocarriers are rationally engineered to sense and react to tumour-associated endogenous cues—such as acidic pH, elevated redox gradients, enzyme overexpression, and hypoxia—as well as externally applied triggers including temperature, light, ultrasound, and magnetic fields. Upon exposure to these stimuli, nanocarriers undergo predictable physicochemical or structural transformations that enable controlled, site-specific drug release within the tumour microenvironment. A broad spectrum of nanoplatforms, including polymeric nanoparticles, liposomes, dendrimers, inorganic nanoparticles, and hybrid nanostructures, has been functionalized with stimulus-sensitive elements. These systems maintain stability under physiological conditions, thereby limiting premature drug leakage, while enhancing tumour accumulation via the enhanced permeability and retention (EPR) effect and promoting efficient intracellular delivery. Notably, dual- and multi-stimuli-responsive systems have emerged to address tumour heterogeneity and improve therapeutic precision. Despite promising preclinical outcomes, significant challenges remain in formulation scalability, reproducibility, regulatory standardization, and clinical translation. Nevertheless, stimuli-responsive nanocarriers represent a versatile and transformative strategy in precision oncology, with substantial potential to enhance therapeutic efficacy and reduce off-target toxicity.

Keywords: Stimuli-responsive nanocarriers; Tumour targeting; Tumour microenvironment; Controlled drug release; Enhanced permeability and retention effect; Precision nanomedicine; Dual-responsive systems; Cancer therapy.

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Abstract No.: PP-070

CONFRONTING HIDDEN DANGERS: AN EVOLVING ROLE OF PHARMACISTS IN ANTIMICROBIAL RESISTANCE

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Antimicrobial resistance (AMR) is a slowly growing threat to humankind. This situation leads to infections that are difficult to treat, longer hospital stays, and higher medical costs because antibiotics and other medicines are not working as effectively as before.

Pharmacists play an important role in fighting antimicrobial resistance. They ensure that antibiotics are used correctly, participate in antimicrobial stewardship programs, educate patients and healthcare professionals, and monitor resistance patterns.

This poster focuses on current research about AMR, identifies gaps in the present approach, and explains how pharmacists can help close these gaps. By promoting responsible antibiotic use, spreading awareness, and supporting infection prevention, pharmacists are vital in controlling AMR and improving patient care.

Keywords: Antimicrobial Resistance (AMR), Antibiotic Stewardship, Pharmacist Intervention, Responsible Antibiotic Use, Infection Prevention

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Abstract No.: PP-071

DEVELOPMENT AND CHARACTERIZATION OF A BILAYER TABLET CONTAINING IMMEDIATE RELEASE AMOXICILLIN AND SUSTAINED RELEASE GARLIC FOR COMBINED ANTIBACTERIAL THERAPY

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The aim of this work is to develop and assess a bilayered tablet containing an immediate release layer of amoxicillin with sustained release layer of garlic powder (allicin rich) for the antibacterial synergies against *Escherichia coli* (*E.coli*). We developed the immediate-release layer for urgent action and extended-release layer for prolonged action of benefits by direct compression with appropriate excipients and polymers in the tablets. Pre-compression evaluations supported that the powder blends exhibited good flow characteristics. Post compression studies of the tablets showed that the thickness, hardness, friability and weight variation was within pharmacopoeial limits. Fourier Transform Infrared (FTIR) spectroscopy established the compatibility of both active ingredients with the selected excipients, as there were no perceptible interactions. In vitro dissolution testing proved that amoxicillin was rapidly disintegrated from the instant layer and allicin was sustain released from garlic layer. The kinetic models showed first order release kinetics for amoxicillin and Higuchi model with non-Fickian diffusion pattern for garlic. The combination showed a strong antibacterial property against *E.coli*, suggesting that there is a synergistic therapeutic benefit. In summary, this bilayer concept provides a practical strategy to enhance treatment efficacy, reduce dosage requirement and meanwhile result in enhanced patient compliance for bacterial infections.

Keywords: Bilayer tablet, Amoxicillin, Allicin, Drug release kinetics, Sustained release, Escherichia coli

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Abstract No.: PP-072

RECENT ADVANCEMENT IN HEPATOCALLULAR CARCINOMA; SPECIAL EMPHASIS ON NATURAL PRODUCTS

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Hepatocellular carcinoma (HCC) is the most common type of primary liver cancer, accounting for about 85% to 90% of liver cancer cases. It develops mainly in people who have chronic liver disease, especially liver cirrhosis. It is making the third most prevalent cause of cancer-related death globally and the sixth most often diagnosed malignancy. Recent advancements in hepatocellular carcinoma (HCC) research have highlighted significant potential for natural plant-derived products in improving treatment outcomes. Natural compounds such as phenolics, flavonoids, alkaloids, and polysaccharides from medicinal plants exhibit potent anti-cancer properties by modulating key molecular pathways involved in HCC progression. Some natural plant-derived alkaloids (e.g., Vinca alkaloids, taxanes), polyphenols (like curcumin and resveratrol),isothiocyanate(MIC-1) etc offer a promising and safer adjunct or alternative to conventional HCC therapies, with ongoing research focused on optimized delivery systems, mechanistic insights, and clinical validation to fully harness their therapeutic potential. This article synthesizes current knowledge on the anticancer role of natural plant products against HCC, emphasizing their molecular mechanisms and the integration of various pharmaceutical technologies for improved cancer treatment in coming days.

Keywords: Hepatocellular Carcinoma, Liver Cirrhosis, Natural Compounds.

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Abstract No.: PP-073

BEAUTY BY BOTANICALS: HERBAL COSMETICS

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The global cosmetic industry is undergoing a paradigm shift from synthetic formulations to plant-based alternatives due to growing concerns regarding chemical-induced irritation, long-term toxicity, and environmental impact. Herbal cosmetics, often referred to as "botanical beauty," integrate bioactive phytoconstituents that offer multifunctional therapeutic benefits with improved safety profiles. Building upon the foundational phytochemical and dermatological insights reported by researchers such as Kaur et al. on plant-derived antioxidants and Mukherjee et al. on herbal dermatological formulations, this poster aimed to develop and scientifically evaluate a botanical cream designed to address common skin concerns without synthetic additives. A water-in-oil (W/O) emulsion system was formulated incorporating standardized extracts of *Aloe vera* (moisturizing and wound-healing), *Curcuma longa* (antioxidant and anti-inflammatory), and *Azadirachta indica* (antimicrobial and protective). The formulation was assessed for physicochemical parameters including pH, viscosity, spreadability, homogeneity, and accelerated stability. Dermatological safety was evaluated through primary skin irritation testing. The optimized formulation demonstrated appropriate pH compatibility with skin, desirable rheological behavior, excellent spreadability, and physicochemical stability under storage conditions. Furthermore, the cream exhibited notable antioxidant and antimicrobial activity with zero observable irritation and high user acceptability. This study reinforces the scientific validity of botanical formulations as sustainable, safe, and therapeutically effective alternatives to synthetic cosmetics, supporting the advancement of evidence-based herbal cosmeceuticals in modern dermatological care.

Keywords: Botanical, Herbal Cosmetics, Antioxidant, Sustainable, Skin Irritation, Phytoconstituents

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Abstract No.: PP-074

IMPROVING CISPLATIN ABSORPTION USING SOLID LIPID NANOCARRIERS

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Cisplatin remains a cornerstone chemotherapeutic agent for the management of multiple solid malignancies; however, its clinical utility is constrained by poor oral bioavailability, rapid systemic clearance, and dose-limiting toxicities. Recent advances in nanotechnology have positioned solid lipid nanocarriers (SLNs) as a promising strategy to enhance cisplatin absorption, stability, and therapeutic index. Pioneering nanomedicine research by Robert Langer demonstrated how lipid-based nanosystems can modulate drug pharmacokinetics and improve targeted delivery. Building on this foundation, Müller and colleagues established SLNs as biocompatible colloidal carriers capable of improving drug solubility and controlled release profiles. In this context, SLN-based encapsulation of cisplatin offers multiple mechanistic advantages: protection from premature degradation, enhanced mucosal permeability, lymphatic uptake facilitation, and reduced renal accumulation. Surface modification strategies, including PEGylation and ligand conjugation, further optimize systemic circulation and tumor selectivity. Preclinical investigations have reported improved cellular uptake, sustained plasma concentration, and enhanced cytotoxic efficacy against resistant cancer cell lines compared with free cisplatin. Importantly, SLN formulations demonstrate reduced nephrotoxicity and improved tolerability in in vivo models. This poster highlights current progress in SLN-mediated cisplatin delivery, formulation strategies, absorption mechanisms, and translational challenges. By integrating pharmaceutical nanotechnology with oncologic therapeutics, solid lipid nanocarriers represent a transformative platform to improve cisplatin absorption and therapeutic outcomes, potentially redefining platinum-based chemotherapy in the era of precision medicine.

Keywords: Cisplatin; Solid Lipid Nanocarriers; Nanotechnology; Drug Absorption; Oral Bioavailability; Targeted Drug Delivery; Platinum Chemotherapy; Controlled Release.

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Abstract No.: PP-075

AN OVERVIEW ON THE ANTICANCER EFFECT OF TAMARIND SEEDS AND PULP EXTRACT: *TAMARINDUS INDICA*

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Tamarindus indica, commonly known as Tamarind is a tropical medical plant widely used in the traditional system of medicine. Both tamarind seeds and pulp are rich in bioactive compounds such as polyphenols, flavonoids, tannins, and alkaloids. Recent scientific studies suggest that extracts obtained from tamarind seeds and pulp show promising Anticancer properties. The Anticancer effect of tamarind is mainly linked to its strong antioxidant activity. The antioxidant activity of these extracts helps reduce oxidative stress. In certain cell lines, Tamarind extracts have also been shown to induce apoptosis (programmed cell death) and inhibit tumor cell proliferation. It may block the cell cycle, thereby stopping uncontrolled cell division. Few Experimental studies have demonstrated that tamarind seeds and pulp extracts can block the proliferation of various cancer cell lines, including breast, colon, and liver cancer cells. In addition, the anti-inflammatory effect of tamarind may further support its role in cancer prevention.

Although most of the evidence of the promising results comes from in vitro and animal studies. However, more human clinical research is needed to confirm its safety and effectiveness. Tamarind seeds and pulp may serve as a potential natural source for further Anticancer drug development.

Keywords: Tamarindus indica, Anticancer activity, Antioxidants, Apoptosis, Phytochemical

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Abstract No.: PP-076

DEVELOPMENT OF SODIUM ALGINATE–BASED IONOTROPIC GELATION MICROSPHERES FOR SUSTAINED DELIVERY OF THE THR-B AGONIST RESMETIROM

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Resmetirom, a focused small-molecule agonist that selectively targets the liver's beta thyroid hormone receptor, cures metabolic dysfunction-associated steatohepatitis (MASH). However, its poor water solubility and BCS Class IV properties, which restrict absorption, provide challenges for oral administration. This work created and improved sustained-release Resmetirom microspheres using ionotropic gelation, which creates gelled beads instantaneously through ionic interactions by extruding a drug dispersion in a hydrophilic sodium alginate matrix into a crosslinking solution containing multivalent cations. Evaluations of particle size uniformity, surface smoothness by microscopy, drug content and entrapment efficiency, yield, and release kinetics in simulated gut fluids were conducted after optimisation, which involved fine-tuning properties by varying alginate concentration, drug-to-polymer ratios, and crosslinker potency. The resulting microspheres had spherical shapes, tight size control, and a biphasic dissolution pattern. This pattern was governed by matrix swelling, diffusion, and erosion—rates slowed by denser crosslinking or higher polymer levels—and included a minimal initial burst (reducing dose dumping) followed by an extended release over hours. All things considered, this solvent-free, biocompatible technique produces stable microspheres with optimal flow characteristics, high loading, and regulated delivery appropriate for once- or twice-daily dosage, resolving the bioavailability problems with Resmetirom and possibly enhancing MASH management by maintaining hepatic exposure.

Keywords: Resmetirom, MASH, Microsphere, Ionotropic Gelation.

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Abstract No.: PP-077

EVALUATION OF THE THERAPEUTIC POTENTIAL OF *MIKANIA MICRANTHA* LEAF EXTRACT IN GASTROPROTECTIVE EFFECTS

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Gastric ulceration is a prevalent gastrointestinal disorder approximately 5-10%, characterized by disruption between protective mechanisms and defensive factors, resulting in GI bleeding and erosion. Prolonged conventional therapies are associated with multiple side effects. Thus, many medicinal plants were explored as valuable source of new molecules with potent anti-ulcer activity. *Mikania micrantha* Kunth is a tropical herb, phytochemical studies revealed the leaves rich in flavonoids, phenolics, possess significant antioxidant and anti-inflammatory potential. Present research evaluated the ulcer protective effect of *Mikania micrantha* (MME) hydroalcoholic extract using pylorus ligation in Wistar rats. Animals were pretreated for 10 days with (200 and 400mg/kg) of MME and Omeprazole (20mg/kg) as a standard drug. Gastric lesions were assessed by ulcer scoring and ulcer index as well as percent inhibition of ulcer index. Biochemical parameters including the pH of gastric content, total acidity and tissue antioxidant parameters were estimated. Both the doses indicated a significant ulcer protective effect by 47.23% and 66.87% respectively in pylorus ligation induced model. The test extract significantly reduced total acidity and increased gastric pH, indicating suppression of ulcerogenic factors. These findings were supported by histological analysis and improved tissue antioxidant parameters. The results suggested the gastroprotective property of *Mikania micrantha* leaf extract, as low dose of MME only reduces ulcerative lesions, but the high dose improved all the indicators related to oxidative stress and inflammation. Further studies are required to elucidate the mechanistic pathway and identify the bioactive constituents responsible for gastroprotection.

Keywords: Mikania micrantha, pylorus ligation, gastroprotective, ulcer index.

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Abstract No.: PP-078

CROSSFIRE IN PHARMACOLOGY: DRUG INTERACTIONS EXPLAINED

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Drug-drug interactions (DDIs) are one of the major causes of preventable adverse drug events especially in polypharmacy and among geriatric patients. The curtrent work isd based on merchanistic and clinical evidence that explains the application of pharmacodynamics and pharmacokinetics intercations that change clinical results. Classic studies of cytochrome p450 (CYP) modulation have confirmed that inhibitors (ketoconazole) modulate greatly the exposures of CYP3A substrates, and inducers (rifampicin) decreases the plasma concentrations by more than 80%, impairing efficacy. Intermediate effects transported mediate further disposition- altering P-glycoprotein inhibiton (verapamil) enhances bioavailability of sensitive drugs, while OATP1B1 polymorphs and OATP1B1 inhibition has been associated with statin-associated myopathy. Pharmacodynamic synergism and antagonism also possess a risk, as in the case with additive QT prolongation and increased bleeding with concomitant use of antiplatelet and anticoagulant therapy. Clinical burden of DDIs has been quantified by large cohort analysis and meta-analyses, with particular high-risk pairs being related to more hospitalizations and mortality. Physiologically-grounded pharmacokinetic (PBPK) modelling and actual-world pharmacovigilance have enhanced forecasting the extent of interaction and vulnerability in patients, including genetic factors, organ mechanisms, and comorbidity. There is an emerging body of evidence supporting the use of algorithim-based prescribing and clinical decision support in reducing harm without compromising therapeutic values. This work uses enzymatic, transporter, genetic and systems-level data to argue that DDIs are predictable, mechanistically based phenomena, but not idiosyncratic complications.

Keywords: drug-drug interactions, cytochrome P450, pharmacokinetics, polypharmacy

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Abstract No.: PP-079

DEVELOPMENT OF A CELLULOSE NANOFIBRILS-POLYMER NANOCOMPOSITE TRANSDERMAL FILM FOR ANTI-INFLAMMATORY DRUG DELIVERY

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Natural loofahs are derived from the mature, dried fruit of the *Luffa cylindrica* plant, resulting in a highly porous and fibrous material for various uses. Cellulose serves as the primary structural component in plant cell walls, and in loofahs, it forms the intricate fibrous network responsible for the sponge's unique texture, durability, and absorbent properties. To isolate cellulose nanofibers (CNFs) by removed of non-cellulosic components like lignin and hemicellulose using alkali-bleaching processes. The purified cellulose underwent acid hydrolysis and subsequent mechanical processes including centrifugation and lyophilization to yield powdered cellulose nanofibers. Characterization of the isolated CNFs involved advanced techniques including SEM, ATR-FTIR, DSC, and DLS to evaluate morphology, chemical structure, thermal stability, and particle size distribution. SEM imaging revealed uniform nanofibers with diameters, and confirming their nanoscale dimensions. ATR-FTIR spectra indicated successful elimination of lignin and hemicelluloses while retaining key cellulose functional groups. DSC results highlighted the CNFs' superior thermal stability, while DLS data affirmed their average particle size, colloidal stability, and positive surface charge. The isolated CNFs were integrated as nanometric carriers into polymer-based nanocomposite transdermal films designed for controlled delivery of an anti-inflammatory drug. These films were evaluated through SEM, swelling studies, in vitro drug release study. Results showed a positive correlation between the swelling ratio and drug release, with an in vitro release of 98.57 ± 0.58%. In conclusion, transdermal film could be considered as a promising delivery system for topical applications.

Keywords- Natural loofah, Acid-alkali processes, Cellulose nanofibers (CNFs), Characterization, Transdermal films

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Abstract No.: PP-080

FORMULATION & EVALUATION OF HERBAL OINTMENT CONTAINING NEEM & TURMERIC EXTRACT

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In this modern medicinal system mostly, people show interested on Herbal medicine & increase their used rapidly. Herbal medicine which derived from plant or plant parts (leaf, stem, bark, gum, flower, fruit) have rich source of bioactive compounds that used in traditional & modern medicinal system. In present study give attention on Formulation & Evaluation of Herbal ointment containing neem & turmeric extract. For using Maceration method at first Ethanolic extract of both Neem & Turmeric were prepared, then Herbal extract included into by levigation method. Evaluation of Herbal ointment for check physicochemical parameters like – Colour, Odour, pH, Spreadability, Extrudability, Consistency, Solubility & Washability. Then conduct Stability studies under different temperature produced no significantly changes in irritancy or spread ability, so confirming the formulation have strong potency. at least this Herbal ointment is ready to use as simple dosage form in medicinal system. In this Herbal ointment have medicinal value like antibacterial, anti-inflammatory, antioxidant, antiviral, anticancer, antifungal activity that's work quickly. This product used widely because it has no side effect or less side effects.

Keywords: Maceration, Levigation, Extrudability, Spreadability.

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Abstract No.: PP-081

A NOVEL DRUG-LOADED POLYMERIC HYDROGEL INCORPORATING GREEN-SYNTHESIZED NANOPARTICLES FOR ENHANCED WOUND HEALING

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The intricate and dynamic biological process of wound healing, which attempts to restore tissue integrity and functionality, involves a variety of complex mechanisms. Several microorganisms play crucial role in delaying the healing process of both acute and chronic wounds. Present work aimed to develop a topically novel drug delivery system for wound healing by enhancing the anti-microbial effect on the wound site. To accomplish the study, amoxicillin and silver nanoparticles of *Ocimum tenuiflorum* leaves were separately added to a polymeric sodium alginate-gelatin hydrogel system. Amoxicillin and green synthesized silver nanoparticles were incorporated in polymeric system to enhance the antimicrobial effect. The swelling ratio confirmed denser network when the alginate concentration is high. The drug release studies showed about 60% drug release within 10hrs. Degradation study showed that higher the alginate concentration more is the degradation rate. The final formulated hydrogel showed interesting zone of inhibition against *S. aureus* and *E. coli*. In-vitro hemostatic study showed progressively decrease in clotting time with the final product. Present study showed an effective result to comprehend the anti-microbial activity of the developed hydrogel. Looking towards the future, there are several exciting prospects for further exploration like the cytotoxicity and in-vivo wound healing study.

Keywords: wound healing, hydrogel, antimicrobial, Ocimum tenuiflorum.

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Abstract No.: PP-082

FORMULATION AND EVALUATION OF A THERAPEUTIC EMULGEL WITH ANTI-PSORIATIC ACTIVITY.

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Psoriasis is a prevalent chronic inflammatory skin condition characterized by hyperproliferation of keratinocytes. The antimetabolite 5-Fluorouracil (5-FU) is effective in treating resistant localized plaque psoriasis due to its ability to inhibit DNA synthesis and reduce epidermal proliferation. However, poor skin penetration and local irritation often limit its therapeutic efficacy when delivered topically. This study aimed to formulate, optimize, and evaluate a stable 5-Fluorouracil-loaded emulgel, a novel delivery system combining the stability and release-enhancing properties of an O/W emulsion with the non-greasy, elegant feel of a gel base. Emulgel formulations were developed using varying concentrations of Carbopol and different surfactant ratios in the emulsion. The optimized formulation was characterized for physical appearance, pH (found to be 5.5), rheological properties, and drug content (98.5%). In vitro release studies using a Franz diffusion cell showed a sustained release profile of 5-FU from the emulgel compared to a conventional cream. The formulation was stable under accelerated conditions (ICH guidelines). Results demonstrated that the 5-FU emulgel significantly reduced the Psoriasis Area and Severity Index (PASI) score and epidermal thickness compared to the control and marketed formulations, indicating enhanced therapeutic efficacy and localized action. The developed 5-Fluorouracil emulgel thus serves as a stable and promising topical platform for effective management of localized plaque psoriasis.

Keywords: 5-Fluorouracil (5-FU), Emulgel, Transmission electron microscopy, In-vitro drug release.

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Abstract No.: PP-083

PREDICTIVE MODELLING OF ADSORPTION: A COMPARISON OF QSPR AND Q-RASPR APPROACHES FOR POLYETHYLENE AND CHLORINATED POLYETHYLENE MICROPLASTICS

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Microplastics (MPs) are found everywhere and can absorb harmful persistent organic pollutants (POPs), creating serious environmental risks. The equilibrium distribution coefficient (Kd) helps us understand how MPs and POPs interact and assess indirect toxicity. This study developed and compared simple computer-based predictive models using two methods: QSPR (Quantitative Structure–Property Relationship) and q-RASPR (Quantitative Read-Across Structure–Property Relationship). These models used data from polyethylene (PE) and chlorinated polyethylene (CPE) microplastics to better predict and evaluate MP-POP interactions and associated ecological risks. Total 62, PE, and CPE data were combined to create a global set to cover the overall MPs adsorption capacity prediction. The Hexa-descriptors 2D-PLS-QSPR model has been validated with internal and external parameters; we found satisfactory performances with R^2_{Train} =0.95, Q^2LOO =0.94, and Q^2F1 =0.89. In comparison to the q-RASPR model with only a single descriptor gave almost similar results in internal validation parameters, with boosted predictivity of Q^2F1 = 0.96. Our developed model contains significant features that are essential for predicting the adsorption capacity of MPs. This model will be helpful for the prediction of POP-MPs adsorption and how the influence of chemical features is related to adsorption.

Keywords: Microplastics (MPs), Persistent Organic Pollutants (POPs), Quantitative Structure-Property Relationship (QSPR), Quantitative Read-Across Structure-Property Relationship (q-RASPR), Adsorption Prediction Model

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Abstract No.: PP-084

PH-RESPONSIVE NANOCAPSULES CONTAINING 5-FLUOROURACIL-COATED GREEN-SYNTHESISED CUO-ZNO NPS ARE MORE EFFECTIVE AGAINST HELA CELLS.

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Cancer, another uncontrolled cellular development, is a worldwide health issue. Therapeutic treatments have improved, but medication selectivity, systemic toxicity, and drug development resistance remain issues. Our pH-responsive gelatin nanocapsules include 5-fluorouracil-coated CuO-ZnO nanoparticles for synergistic anticancer effects. The anticancer impact of CuO and ZnO nanoparticles determines their selection. Environmentally friendly CuO-ZnO NP synthesis. The size of 35.79±6.04 nm was produced using *Trichosanhes dioica* fruit extract. Modified poloxamer emulsions contained drug-containing NPs in a stabilised gelatin matrix. FTIR, XRD, TEM, and XPS characterisations revealed the structural integrity and composition of CuO-ZnO NPs and NCs. The NCs had an average size of 331.4±38.7 nm and a zeta potential of –15.6±4.98 mv. Research suggests that acidic pH 5.6 facilitates quicker drug release (´25% 48h) and enhanced tumour delivery selectivity. In an MTT assay on HeLa cells, nanocapsules showed enhanced cytotoxicity with a lower IC50 (13.71±µg/ml) than CuO-ZnO NPs and 5-Fu. The apoptotic characteristic was verified by AO/EtBr staining. The findings suggest PoGA-5Fu(CuO-ZnO) nanocapsules might treat cancer more effectively while lowering systemic toxicity.

Keywords: Anticancer, CuO-ZnO NPs, Gelatin, Green synthesis, Nanocapsules, Poloxamer 188

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Abstract No.: PP-085

DEVELOPMENT, OPTIMIZATION AND CHARACTERIZATION OF DUAL DRUG-LOADED THERMOSENSITIVE INTRA-ARTICULAR IN-SITU GEL FOR OSTEOARTHRITIS TREATMENT

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Osteoarthritis, chronic degenerative joint disease is the most prevalent form of arthritis worldwide.Drug-incorporated thermoresponsive in-situ gel has drawn a lot of interest nowadays for the Intra-articular delivery because it provides direct access to the joint space, prolongs the drug's therapeutic effects at the affected site. This study aims to prepare an appropriate thermosensitive injectable in-situ gelling system containing diclofenac and diacerein, characterize parameters such as viscosity, gelling capacity, drug entrapment efficacy, In-vitro drug release study, In-Vivo anti-arthritic activity etc. and ultimately optimize the best batch using the Response-surface analysis method. To prepare this, thermosensitive polymer Poloxamer 407 and viscosity enhancer copolymer Carbopol 940 were used for formulation development through conventional "cold method" by keeping the temperature at 4°C±3°C. All formulations are further optimized by Design Expert software. The drug release from these gels showed sustained release of drugs in a controlled manner. The formulation F4 demonstrated the highest release (89.42% Diacerein, 93.14% Diclofenac) as here concentration of poloxamer 407 and carbopol 940 is lowest whereas, formulation F12 demonstrated the lowest release (17.58% Diacerein, 21.41% Diclofenac) as here concentration of poloxamer407 and carbopol940 is highest. In In-vivo study, Diacerein-Diclofenac in-situ gel ameliorated osteoarthritic symptoms by lowering the inflammation as well as soft tissue swelling in arthritic rat model. All of the characterization parameters including In-vitro release study for the formulated Diacerein-Diclofenac in-situ gels exhibited sustained drug release, and the optimized batch demonstrated potential efficacy against osteoarthritis In-vivo rat model.

Keywords: Thermoresponsive in-situ gel, Osteoarthritis, Intra-articular (IA) delivery, In-Vivo anti-arthritic activity, Response-surface analysis.

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Abstract No.: PP-086

PHARMACOLOGY AGAINST FORGETFULNESS: MODERN STRATEGIES IN ALZHEIMER'S DISEASE MANAGEMENT

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Alzheimer's disease (AD), first described by Alois Alzheimer in 1906, remains the most prevalent cause of dementia worldwide and a major pharmacotherapeutic challenge. Contemporary management strategies have evolved from symptomatic cholinergic augmentation to mechanism-driven disease modification. Early pharmacological efforts, inspired by the cholinergic hypothesis proposed by Peter Davies and co scientist, led to acetylcholinesterase inhibitors such as Donepezil and Rivastigmine, which modestly improve cognitive function. The NMDA receptor antagonist Memantine further addressed excitotoxicity, reflecting insights into glutamatergic dysregulation. Recent breakthroughs have shifted toward amyloid-β and tau-directed therapies. Monoclonal antibodies including Aducanumab and Lecanemab demonstrate plaque reduction with variable clinical benefit, echoing decades of work following the amyloid cascade hypothesis advanced by John Hardy. Parallel research explores tau aggregation inhibitors, neuroinflammation modulators, and multi-target-directed ligands to address disease heterogeneity. Advances in biomarker-guided therapy, including PET imaging and CSF assays, enable earlier intervention and precision pharmacology. Despite therapeutic progress, clinical translation remains constrained by blood– brain barrier penetration, adverse events, and cost considerations. Future strategies emphasize combination regimens, gene-based interventions, and personalized medicine approaches to slow or halt neurodegeneration. The evolving pharmacological landscape signals a paradigm shift—from symptomatic relief toward disease modification—redefining hope in the fight against forgetfulness.

Keywords: Alzheimer's disease, cholinergic hypothesis, amyloid-β, tau protein, monoclonal antibodies, neuroinflammation, precision medicine, disease-modifying therapy.

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Abstract No.: PP-087

EVALUATION OF H1 ANTAGONISTS: OPTIMIZING ALLERGIC RHINITIS, MINIMIZING ANTICHOLINERGIC AND SEDATIVE EFFECTS

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Histamine or β-imidazolylethylamine, derived from histidine, is released from mast cells and causes allergic or hypersensitivity reactions, urticaria, angioedema, bronchoconstriction, high fever, and anaphylactic shock. H1 antagonists are commonly used to treat allergic rhinitis and urticaria. They act mainly through inverse agonism rather than by blocking. They bind to the G-protein-coupled H1 receptor (GPCR) and keep it in an inactive state. This changes the balance away from the active state needed for histamine signaling. As a result, it stops effects like vasodilation, increased vascular permeability, and sensory nerve stimulation. The toxicity profiles differ significantly depending on the generation. First-generation agents, such as diphenhydramine, are lipophilic and can easily cross the blood-brain barrier (BBB). This leads to noticeable effects on the central nervous system (CNS), including sedation, cognitive impairment, and issues with motor skills. Additionally, their low receptor specificity can cause anticholinergic side effects, like dry mouth and urinary retention, as well as alpha-adrenergic side effects, such as hypotension. In cases of severe overdose or with certain agents like terfenadine, which is now withdrawn, blocking potassium channels can lead to life-threatening heart rhythms, like QT prolongation. To reduce toxicity, strategies involve refining the molecules and managing them clinically. The development of second and third-generation agents, like cetirizine and fexofenadine, uses more hydrophilic structures and P-glycoprotein substrates to limit CNS penetration, which nearly removes sedative effects. Also, improving selectivity for the H1 receptor helps minimize unwanted anticholinergic effects. Clinically, the risks can be lowered by avoiding medications that inhibit cytochrome P450, as these can raise drug levels in the blood.

Keywords: Histamine; H1 antagonists; GPCR; BBB; Rhinitis; Sedation; QT prolongation; CP450

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A MACHINE LEARNING FRAMEWORK FOR EVALUATING THE EFFICACY OF COMBINED FUNGICIDES AGAINST RESISTANT FUNGI

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Fungicides are chemotherapeutic agents used to prevent, control, or eliminate fungal diseases in plants and animals. They are essential in agriculture for protecting crops from yield and quality losses caused by fungal pathogens. Fungicides act through various mechanisms, including inhibiting fungal growth and reproduction, but their effectiveness can be reduced over time due to the development of resistance. In these circumstances, fungicide mixtures can be an effective strategy for delaying or reducing the development of fungicide resistance. In biological system, chemical mixtures may produce additive or supra-additive effects due to synergism of multiple mechanisms. Therefore it is essential to check the mixture effect of approved fungicides for better resistance control. In this study, we used machine-learning-based algorithms for predicting probable toxic mixture effect towards fungal strain "*Fusarium oxysporum*". Both the Quantitative Structure-Activity Relationship (QSAR) and quantitative Read-across Structure-Activity Relationship (q-RASAR) approaches have been used to model the mixture dataset. The QSAR model showed good performance metrics such as R^2=0.82, Q^2_{LOO}=0.74 and Q^2F1=0.74, and the predictability further increased after using q-RASAR (Q2F1 =0.88). Both the QSAR and q-RASAR models have been validated in accordance with OECD criteria. Besides, we have also found out the important structural features that are responsible for this mixture effects. Overall, the validated QSAR and q-RASAR models demonstrate strong predictive capability for supra-additive toxic effects of fungicide mixtures, providing a robust in silico framework to support rational mixture design and resistance management in fungal control strategies.

Keywords: Fungicide Mixtures, Fusarium oxysporum, Quantitative Structure–Activity Relationship (QSAR), Quantitative Read-Across Structure–Activity Relationship (q-RASAR), Fungicide Resistance Management

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Abstract No.: PP-089

IN SILICO SCREENING OF NATURAL HERBICIDES USING MACHINE LEARNING, RASAR-BASED STRATEGIES, AND INTERSPECIES MODELING

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The rapid emergence of weed resistance to synthetically developed herbicidal analogues, along with increasing regulatory and environmental concerns, has intensified interest in naturally derived weed-control agents. Berberine is a natural alkaloids obtained from Coptis chinensis, which show broad-spectrum herbicidal activity against monocot and dicot weeds. Prior work used only a 3D-QSAR model for Arabidopsis thaliana fresh weight inhibition (IC_{50}), missing multi-endpoint and cross-species insights. Here, we address these gaps by developing validated 2D QSAR and q-RASAR models using IC_{50} data for root length, fresh weight, and chlorophyll content across eight weed species, three monocots (D. sanguinalis, E. indica, L. minor), and five dicots (C. argentea, B. pilosa, M. micrantha, A. conyzoides, A. thaliana)—including interspecies correlation analysis. A dataset of 39 berberine congeners was categorised using classical nine classes of 2D-descriptors, and models were constructed employing PLS regression approach. Model robustness and external predictivity were validated using statistical metrics like R^2 (0.6-0.8), Q^2_{LOO} (0.55-0.75), Q^2_{F1} (0.54-0.8), r^2_m based parameters and Goldbraikh-Tropsha criteria. The models reveal key structural features driving herbicidal activity, with graphical interpretations strengthening reproducibility. Overall, this work enables virtual screening and rational optimisation of natural/synthetic scaffolds for sustainable herbicide development.

Keywords: Berberine Alkaloids, Herbicidal Activity, Quantitative Structure–Activity Relationship (QSAR), Quantitative Read-Across Structure–Activity Relationship (q-RASAR), Sustainable Herbicide Development

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Abstract No.: PP-090

IN SILICO SCREENING OF NATURAL COMPOUNDS AS MULTITARGET INHIBITORS AGAINST A-AMYLASE, A-GLUCOSIDASE, AND SGLT2 ENZYMES FOR DIABETES

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Diabetes is a chronic metabolic disorder indicated by hyperglycemia. Inhibition of digestive enzymes such as α-amylase and α-glucosidase, along with sodium-glucose co-transporter-2 (SGLT2), indicates an effective approach for diabetes control. This study discusses evaluation of selected natural compounds through molecular docking and pharmacokinetic predictions. Docking study was carried out to screen lead compounds using AutoDock Vina suite in PyRx GUI. The docking study identified oleanolic acid as the top ligand with highest binding affinity against α-amylase (−11.0 kcal/mol) and exhibited consistent good binding affinity against other targets SGLT2 (−9.0 kcal/mol) and α-glucosidase (−8.5 kcal/mol). Another ligand, anthocyanin showed binding affinity of −9.4 kcal/mol against SGLT2, while pterosupin displayed notable binding score of −9.2 kcal/mol against α-glucosidase. Furthre, Cinchonine, momordin, tinosporaside show stable binding across all three targets. Swiss ADME profiling reveals that anthocyanin exhibited high gastrointestinal absorption, zero Lipinski violations, and favorable bioavailability (0.55), suggesting favorable drug-likeness. Oleanolic acid exhibited high binding affinity but low predicted GI absorption. Momordin shows multiple Lipinski violations and poor bioavailability. Overall, oleanolic acid exhibits promising multi-target binding potentials. These findings indicate selected natural compounds as promising agent for multi-target antidiabetic drug development, subjected to further experimental validations.

Keywords: natural compounds, antidiabetic, multitargeting, molecular docking, ADME prediction

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NANOTECHNOLOGY IN DRUG DELIVERY SYSTEM: ADVANCES AND FUTURE PERSPECTIVE

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Nanotechnology has become an important tool in modern pharmaceutical science, offering new ways to improve drug delivery. Traditional drug delivery methods often face challenges such as poor drug solubility, low bioavailability, and unwanted side effects. The use of nanotechnology helps overcome many of these limitations by enabling drugs to be delivered more efficiently to the targeted site in the body. Nanocarriers such as nanoparticles, liposomes, dendrimers, and nanoemulsions are widely studied because they can enhance drug stability, improve absorption, and allow controlled or sustained drug release.In recent years, significant progress has been made in developing nano-based drug delivery systems for the treatment of diseases like cancer, infections, and neurological disorders. These systems can protect drugs from degradation and help them cross biological barriers, improving their therapeutic effectiveness. Moreover, targeted drug delivery using nanotechnology can reduce toxicity and minimize damage to healthy tissues.Looking ahead, nanotechnology is expected to play a key role in the development of personalized medicine and intelligent drug delivery systems that respond to specific biological signals. However, challenges related to safety, large-scale production, and regulatory approval still need to be addressed. Continued research will help expand the potential of nanotechnology in future drug delivery applications.

Keywords: Nanotechnology, Drug delivery systems, Nanocarriers, Targeted drug delivery, Controlled drug release.

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NSAID-INDUCED GASTRIC MUCOSAL INJURY: MECHANISMS, CLINICAL CONSEQUENCES, AND PROTECTIVE INTERVENTION

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For the treatment of pain, inflammation, and fever, nonsteroidal anti-inflammatory medications, or NSAIDs, are frequently recommended. Not with-standing their therapeutic advantages, prolonged or improper usage is closely linked to damage to the stomach mucosa, which is a major global source of morbidity. The main mechanism is the suppression of cyclooxygenase (COX) enzymes, specifically COX-1, which results in less cytoprotective prostaglandin synthesis. By promoting mucus and bicarbonate secretion, ensuring proper mucosal blood flow, and promoting epithelium regeneration, these prostaglandins are essential for sustaining gastric mucosal defence. Their depletion makes the stomach lining more susceptible to injury from acid.

Beyond systemic prostaglandin suppression, NSAIDs also exert direct topical effects on the gastric epithelium. These include disruption of epithelial barrier integrity, induction of oxidative stress, mitochondrial dysfunction, and activation of inflammatory pathways, collectively contributing to mucosal erosion and ulcer formation. Clinically, NSAID-related gastric injury may present as mild dyspepsia or gastritis but can progress to serious complications such as peptic ulceration, gastrointestinal bleeding, and perforation. The risk is heightened in elderly patients, individuals with a prior history of ulcers, those receiving high doses or long-term therapy, and patients concurrently using corticosteroids, anticoagulants, or infected with *Helicobacter pylori*.

Preventive approaches focus on minimizing exposure through the lowest effective dose and shortest duration of therapy. Co-prescription of gastroprotective agents, including proton pump inhibitors, H_2-receptor antagonists, or prostaglandin analogues, significantly reduces mucosal injury. Selective COX-2 inhibitors and eradication of *H. pylori* further enhance safety. A comprehensive understanding of these mechanisms supports rational prescribing and improved patient outcomes.

Keywords: NSAIDs; Gastric mucosal injury; Prostaglandin depletion; COX inhibition; Peptic ulcer; Gastroprotection

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EPILEPSY IN TEENAGERS: RECOGNITION AND TREATMENT

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Episodic neurological manifestations are the hallmark of seizures in adolescents, caused by abnormal and hypersynchronous electrical activities in the brain. During the adolescent stage, seizures may be associated with epilepsy, head trauma, central nervous system infections, genetic conditions, metabolic disorders, or an unknown cause. The manifestations vary depending on the area of the brain involved. Seizures are classified as focal or generalized based on onset. Focal seizures involve abnormal electrical activity in one area of the brain and may present with motor, sensory, autonomic, or cognitive manifestations, including reduced consciousness. Generalized seizures involve both brain hemispheres simultaneously and include tonic-clonic, absence, or myoclonic seizures, characterized by muscle stiffening, absence of consciousness, or sudden muscle contraction. Management requires a precise diagnosis supported by clinical findings and electroencephalographic results. Pharmacotherapy with appropriate anticonvulsant drugs is the main treatment option. Lifestyle modifications, including adequate sleep, stress management, and avoiding precipitating factors, significantly improve seizure control. In resistant seizures, dietary therapy or surgical therapy may be considered. Education and awareness among family members and teachers are essential for psychosocial support and safety. Early intervention and comprehensive treatment improve health outcomes and quality of life for adolescents with seizure disorders.

Keywords: Seizures, Teenagers, Epilepsy, Focal seizures, Generalized seizures, Antiepileptic drugs, Management.

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LYMPHATIC DRUG DELIVERY SYSTEMS: A STRATEGIC NANOTECHNOLOGICAL APPROACH FOR PRECISION TARGETED THERAPY

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The lymphatic system represents a critical yet underexploited pathway for immunoregulation, lipid transport, and disease progression. In recent years, Lymphatic Drug Delivery Systems (LDDS) have emerged as a strategic formulation-driven approach to enhance site-specific drug targeting while minimizing systemic toxicity. By leveraging physiological transport mechanisms-including lymphatic capillary uptake, intestinal lipid absorption pathways, and lymph node retention-LDDS effectively circumvent hepatic first-pass metabolism and sustain therapeutic drug concentrations at target sites. This targeted approach is particularly relevant in oncology, infectious diseases, and immune-mediated disorders, where lymphatic involvement significantly influences disease pathology and therapeutic outcomes. Advanced nanotechnological platforms such as lipid-based carriers, polymeric nanoparticles, solid lipid nanoparticles, liposomes, and nanoemulsions have demonstrated promising capabilities in facilitating efficient lymphatic transport. The success of lymphatic targeting is governed by critical formulation parameters, including particle size optimization, surface charge and functionalization, lipid composition, and drug lipophilicity. Recent innovations in nanocarrier engineering have enabled controlled drug release, enhanced lymph node accumulation, and improved interaction with lymphatic tissues, thereby amplifying therapeutic efficacy. Despite notable progress, translational challenges persist, including formulation stability, scalability of manufacturing, regulatory considerations, and incomplete mechanistic insights into lymphatic transport pathways. This poster critically examines the fundamental principles, formulation strategies, and therapeutic relevance of LDDS, while highlighting future perspectives essential for successful clinical integration. Strategic advancement in this domain holds substantial promise for redefining targeted therapy paradigms.

Keywords: Lymphatic Drug Delivery Systems, Immunoregulation, First-Pass Metabolism, Nanoemulsion, Lipophilicity, Targeted Drug Delivery, Polymeric Nanoparticles, Liposomes.

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CALCIUM CHANNEL MODULATION AS A NEUROPROTECTIVE STRATEGY IN GLAUCOMA

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Glaucoma is a leading cause of irreversible blindness worldwide and is characterized by progressive retinal ganglion cell (RGC) degeneration and optic nerve damage. Although elevated intraocular pressure (IOP) remains the primary risk factor, disease progression often continues despite adequate IOP control, highlighting the need for effective neuroprotective strategies. Increasing evidence indicates that dysregulation of intracellular calcium homeostasis plays a critical role in glaucomatous neurodegeneration by triggering excitotoxicity, oxidative stress, mitochondrial dysfunction, and apoptosis.

Excessive calcium influx into RGCs occurs mainly through voltage-gated calcium channels (VGCCs) and other calcium-permeable pathways under pathological stress. Among these, L-type and T-type calcium channels are strongly implicated in calcium overload and subsequent neuronal injury. Modulation of these channels can reduce intracellular calcium accumulation, preserve mitochondrial function, and inhibit caspase-mediated apoptotic pathways. Calcium channel blockers (CCBs), including nifedipine, amlodipine, and nimodipine, have demonstrated neuroprotective effects in experimental glaucoma models by reducing RGC apoptosis and improving visual function. T-type calcium channel inhibitors such as ethosuximide also show promise by limiting pathological calcium spikes.

Beyond VGCCs, targeting NMDA receptors, transient receptor potential (TRP) channels, and ryanodine receptors offers additional mechanisms to control calcium influx and intracellular calcium release. Calcium channel modulation further attenuates oxidative stress and neuroinflammation by preserving antioxidant defenses and reducing microglial activation. Although clinical trials of CCBs in glaucoma have yielded mixed results, advances in targeted ocular drug delivery, including nanoparticle-based systems, may enhance therapeutic efficacy. Overall, calcium channel modulation represents a promising neuroprotective approach that may complement IOP-lowering therapies and improve long-term visual outcomes in glaucoma.

Keywords: Glaucoma; Calcium channel modulation; Neuroprotection; Voltage-gated calcium channels; Oxidative stress.

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EXTRACTION AND CHARACTERIZATION OF JUTE (*CORCHORUS OLITORIUS*) LEAF POLYSACCHARIDE FOR PHARMACEUTICAL APPLICATIONS

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The present research aimed to extract and thoroughly characterize jute (*Corchorus olitorius*) leaf polysaccharide (JLP) and to explore its potential as a natural pharmaceutical excipient. JLP has been extracted from fresh jute leaves employing an aqueous decoction technique, followed by alcohol precipitation and acetone purification. The dried polysaccharide was subjected to physicochemical, structural, and thermal analysis. Phytochemical evaluation revealed presence carbohydrates and mucilage, but alkaloids, proteins, tannins, and starch were absent, signifying purity. The overall polysaccharide content was determined to be significantly higher, confirming its polymeric characteristics. FTIR and solid-state ^{13}C NMR studies confirmed the presence of various polysaccharide functional groups and backbone structure. Thermal analyses (DSC, TGA, and DTA) indicated significant thermal stability, although powder X-ray diffraction mostly exhibited amorphous nature. The extracted JLP demonstrated a moderate molecular weight, near-neutral pH, enhanced swelling index, and significant viscosity, indicating desirable binding and hydration characteristics. Scanning electron microscopy revealed an irregular and rough surface morphology may improve interparticulate bonding. The study of particle size and zeta potential further confirmed its dispersion stability. The extracted jute leaf polysaccharide shown favorable physicochemical and functional properties, indicating its great potential as a sustainable, biocompatible, and efficient natural excipient for pharmaceutical formulations.

Keywords: Polysaccharides, Jute leaf polysaccharides, Extraction, Characterization, Biocompatible.

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PROBIOTICS AND GUT MICROBIOTA: IMPACT ON HUMAN HEALTH

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The human gastrointestinal tract has a dynamic and metabolically active microbial ecology consisting of trillions of bacteria that together form the gut microbiota. This intricate community is essential for host physiology, including digestion, nutrition metabolism, immunological development, and resistance to pathogen colonization. Seminal work from the Human Microbiome Project has underscored the diversity and functional significance of these microbial populations in health and disease. Disruption of microbial homeostasis—termed dysbiosis—has been implicated in the pathogenesis of inflammatory bowel disease, metabolic syndrome, type 2 diabetes, allergic disorders, and neuropsychiatric conditions. Jeffrey I. Gordon's mechanistic studies elucidated the role of gut microorganisms in host energy balance and obesity, while Emeran Mayer's pioneering research emphasized the bidirectional connection between the gut and brain. Probiotics, defined as living bacteria that provide health advantages when consumed in sufficient quantities, have emerged as effective modulators of gut microbial composition and function. Common strains, including Lactobacillus, Bifidobacterium, and Saccharomyces boulardii, enhance epithelial barrier integrity, competitively inhibit pathogenic bacteria, and modulate innate and adaptive immune responses. Clinical evidence supports their efficacy in reducing antibiotic-associated diarrhea, alleviating symptoms of irritable bowel syndrome, and promoting gastrointestinal resilience. However, probiotic effects are strain-specific and influenced by dosage, host genetics, and baseline microbiota composition. Despite encouraging findings, further large-scale, well-controlled clinical trials are essential to establish standardized therapeutic guidelines and long-term safety profiles.

Keywords: Probiotics; Gut microbiota; Dysbiosis; Immune modulation; Gut–brain axis; Digestive health.

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FORMULATION AND OPTIMIZATION OF 5-FLUOROURACIL ENCAPSULATED POROUS MICROSPHERES FOR ANTICANCER THERAPY

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Porous polymeric microspheres have become a viable platform for controlled drug delivery because they have a large surface area, can be made to be more or less porous, and may release drugs over long periods of time. To address these issues, the current work focused on developing and optimization of 5-FU-loaded porous microspheres for prolonged oral administration. Eudragit L100 and Ethyl Cellulose were used as matrix polymers to make porous microspheres, while Poloxamer 188 was used as an a stabilizing agent A optimization design was used to find the best formulation variables and produced 13 different formulations (F1-F13) and evaluated for particle size, drug entrapment effectiveness, swelling index, and drug release in vitro. Formulation F3 was found to be the best, using 70 mg of Eudragit L100, 120 mg of Ethyl Cellulose, and 2 g of Poloxamer 188. It had an entrapment effectiveness of 80.18%, and prolonged cumulative drug release of 81.75%. The optimized microspheres showed that they could effectively encapsulate drugs and release them over time. This suggests that they might make chemotherapy more effective and help patients stick with their treatment.

Keywords: Porous Polymeric Microspheres, 5-Fluorouracil (5-FU), Controlled Drug Delivery, Eudragit L100 and Ethyl Cellulose, Drug Entrapment Efficiency

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Abstract No.: PP-099

CRISPR-DRIVEN THERAPEUTICS: A NEW FRONTIER IN PERSONALIZED MEDICINE

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The emergence of CRISPR-based genome editing has redefined the therapeutic landscape, ushering in a transformative era of personalized medicine. Since the pioneering work of Jennifer Doudna and Emmanuelle Charpentier established CRISPR-Cas9 as a programmable gene-editing tool, the technology has rapidly evolved from bench to bedside. Precision editing strategies, including base editing developed by Liu et. al. and prime editing innovations, now enable targeted correction of pathogenic variants without inducing double-strand breaks, significantly enhancing safety profiles. Clinically, CRISPR-driven interventions have demonstrated promising outcomes in hematological disorders such as sickle cell disease and β-thalassemia, while expanding pipelines target oncological, ocular, and neurogenetic conditions. Beyond monogenic diseases, CRISPR platforms are being integrated with patient-specific genomic data, enabling tailored therapeutic design and ex vivo cell engineering approaches, particularly in CAR-T immunotherapy. Advances in delivery vectors—including lipid nanoparticles and viral systems—have further improved in vivo editing efficiency and tissue specificity. However, challenges remain, including off-target effects, immunogenicity, ethical considerations, and equitable access. As interdisciplinary collaborations bridge molecular biology, bioinformatics, and clinical sciences, CRISPR-driven therapeutics stand at the forefront of precision healthcare. This paradigm shift not only reimagines disease management but also embodies a patient-centric model where therapy is genetically informed, highly specific, and potentially curative.

Keywords: CRISPR-Cas9, Genome Editing, Personalized Medicine, Base Editing, Prime Editing, Gene Therapy, Precision Therapeutics

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Abstract No.: PP-100

ARTIFICIAL INTELLIGENCE IN DISEASE DIAGNOSIS: TECHNIQUES, APPLICATIONS, AND FUTURE PERSPECTIVES

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The emergence of artificial intelligence (AI) empowered modern healthcare, particularly disease diagnosis. With the help of technologies such as machine learning, artificial neural networks, deep learning, convolutional neural networks (CNN), and support vector machines (SVM), AI can analyze complex medical data and detect patterns that may not be easily identified by humans.

The review summarizes current literature on AI-based diagnostic techniques and their applications across different medical fields. It examines commonly used AI models, their role in analyzing clinical, imaging, and laboratory data, and discusses the practical challenges associated with their implementation in healthcare systems.

AI has shown promising results in the diagnosis of diseases such as cancer, cardiovascular disorders, diabetes, neurological conditions, and infectious diseases. These systems support faster and more accurate decision-making by identifying early disease patterns and risk factors. However, challenges such as the need for large high-quality datasets, concerns about data privacy, algorithmic bias, lack of transparency, and ethical and regulatory issues continue to limit widespread adoption.

Despite existing limitations, AI holds strong potential to transform disease diagnosis in the future. With proper regulation, improved data management, and ethical implementation, AI-based systems can significantly enhance the accuracy, efficiency, and overall quality of healthcare services.

Keywords: Artificial Intelligence, Convolutional neural networks, Deep learning, Diagnosis, Disease, Support vector machines

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Abstract No.: PP-101

ENHANCING DRUG SAFETY AND EFFICACY THROUGH AI- GUIDED DOSING

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Precise drug dosing remains a cornerstone of achieving optimal therapeutic outcomes while minimizing adverse drug reactions. Conventional dosing strategies, often based on population averages, inadequately address inter-individual variability driven by genetic, physiological, and environmental factors. The emergence of Artificial Intelligence (AI) has introduced a transformative paradigm in dose optimization by enabling data-driven, patient-specific decision-making. Recent advancements in machine learning and deep learning, inspired by foundational work in predictive analytics by researchers such as Geoffrey Hinton and Judea Pearl, have enabled the integration of high-dimensional datasets including electronic health records, pharmacokinetic–pharmacodynamic parameters, pharmacogenomic profiles, and real-time physiological monitoring. AI-guided dosing systems demonstrate particular promise in therapeutic areas characterized by a narrow therapeutic index, such as oncology, anticoagulation, antimicrobial stewardship, and critical care medicine. Studies by Topol and colleagues highlight the capacity of AI to detect early toxicity signals and dynamically adjust dosing regimens in response to evolving patient conditions. Moreover, reinforcement learning models have shown superiority in adaptive dose modulation compared with traditional rule-based systems. By bridging clinical pharmacology with computational intelligence, AI-guided dosing advances the principles of precision medicine, enhancing drug safety, efficacy, and healthcare quality. Despite challenges related to model interpretability, validation, and ethical governance, AI-driven dosing platforms represent a significant step toward individualized, evidence-based therapeutics and safer pharmacotherapy.

Keywords: Artificial intelligence; AI-guided dosing; Drug safety; Machine learning; Precision medicine; Personalized therapy; Pharmacokinetics; Pharmacogenomics.

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Abstract No.: PP-102

ASSESSMENT OF DEPRESSION, ANXIETY, AND STRESS AMONG STUDENTS USING THE DASS QUESTIONNAIRE

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Depression, anxiety, and stress are common mental health problems worldwide and can strongly affect students' studies and overall wellbeing. Students often experience extra pressure due to heavy coursework, practical classes, exams, and future career concerns. These challenges can increase emotional distress. The DASS questionnaire is widely used to measure these conditions. However, there are very few studies from Eastern India, especially among pharmacy and allied health science students. The aim of the present study was to evaluate levels of depression, anxiety, and stress among B. Pharm and BMLT students and examine their association with demographic and socioeconomic factors.

A cross-sectional study was conducted among 160 students of JIS University. The DASS questionnaire was administered, and scores were analyzed based on sex, program of study, geographical location, and monthly family income. Data were expressed as mean ± SEM and compared descriptively.

The overall scores indicated mild depression (11.07 ± 0.8), moderate anxiety (11.05 ± 0.75), and normal stress levels (11.44 ± 0.79). Females (56.75%) showed mild depression and moderate anxiety, whereas males had normal depression and mild anxiety levels. B. Pharm students demonstrated moderate anxiety with normal depression and stress, while BMLT students showed moderate levels of both depression and anxiety. Variations were also observed across income groups.

The study highlights the presence of psychological distress, particularly anxiety, among healthcare students, emphasizing the need for targeted mental health support programs.

Keywords: Anxiety, DASS, Depression, Stress, Students

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Abstract No.: PP-103

NSAIDS AND THE COX PATHWAY: MECHANISM MADE SIMPLE

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The cyclo-oxygenase (COX) pathway represents a central biochemical axis in inflammation and homeostasis. The seminal discovery by John R. Vane in 1971 established that aspirin-like drugs exert their effects through inhibition of prostaglandin synthesis, laying the foundation for modern non-steroidal anti-inflammatory drug (NSAID) pharmacology. Arachidonic acid, liberated from membrane phospholipids by phospholipase A_2, is converted by COX enzymes into prostaglandin H_2, the precursor of prostaglandins, prostacyclin, and thromboxanes-key mediators of pain, fever, inflammation, and platelet aggregation. Subsequent work by Daniel L. Simmons et. al. identified two major COX isoforms: COX-1, a constitutive enzyme responsible for gastric cytoprotection, renal perfusion, and platelet function; and COX-2, an inducible isoform upregulated during inflammatory stimuli. NSAIDs attenuate inflammatory signaling by inhibiting these enzymes, thereby reducing prostanoid synthesis. Non-selective NSAIDs target both COX-1 and COX-2, offering effective analgesic and anti-inflammatory actions but predisposing patients to gastrointestinal and renal adverse effects. Selective COX-2 inhibitors were developed to minimize gastric toxicity while preserving anti-inflammatory efficacy, though cardiovascular safety remains a critical consideration. Low-dose aspirin uniquely and irreversibly inhibits platelet COX-1, conferring cardioprotective benefits. This poster simplifies the COX pathway while integrating mechanistic insights and translational advances, providing a clear conceptual framework for understanding NSAID pharmacodynamics and their clinical implications.

Keywords: NSAIDs, cyclo-oxygenase, COX-1, COX-2, prostaglandins, arachidonic acid, inflammation, aspirin, prostanoids, analgesics.

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Abstract No.: PP-104

INTEGRATIVE SINGLE-CELL MULTIOMICS FOR ADVANCED IMMUNE PROFILING IN PRECISION MEDICINE

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Single-cell multiomics has emerged as a transformative approach in clinical immunology, enabling simultaneous interrogation of multiple molecular layers including the genome, epigenome, transcriptome, proteome, and metabolome at single-cell resolution. Unlike conventional bulk analyses that obscure cellular heterogeneity, single-cell multiomic technologies uncover rare immune subsets, dynamic activation states, lineage trajectories, and regulatory networks that drive immune responses in health and disease. Technological advancements such as scRNA-seq, scATAC-seq, CITE-seq, multiome assays, spatial transcriptomics, and integrated proteogenomic platforms have significantly expanded our capacity to characterize immune cell diversity and functional states with unprecedented precision.

In autoimmune and inflammatory disorders, these approaches have identified pathogenic immune circuits and molecular checkpoints underlying tolerance breakdown. In tumor immunology, multiomic profiling of the tumor microenvironment has revealed mechanisms of immune escape, T-cell exhaustion, and determinants of response to immune checkpoint inhibitors. In infectious diseases and vaccinology, single-cell analyses have provided detailed insights into host pathogen interactions, immune memory formation, and vaccine-induced protective immunity. Furthermore, transplantation studies have benefited from high-resolution immune monitoring to distinguish rejection from tolerance-associated signatures.

Despite remarkable progress, challenges remain in data integration, computational standardization, reproducibility, cost, and ethical governance. Advances in artificial intelligence, machine learning, spatial multiomics, and systems biology integration are addressing these barriers and accelerating clinical translation.

Overall, single-cell multiomics is redefining precision immunology by enabling biomarker discovery, therapeutic stratification, immune monitoring, and personalized treatment strategies. Continued technological innovation and standardized clinical integration are expected to establish single-cell multiomics as a cornerstone of next-generation immunodiagnostics and immune-guided therapy.

Keywords: Single-Cell Multiomics, Clinical Immunology, Immune Heterogeneity, Precision Medicine, Spatial Multiomics, Immunotherapy, Personalized Medicine.

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Abstract No.: PP-105

PATTERNS OF PAINKILLER USE AND SELF-MEDICATION: KNOWLEDGE, AWARENESS, AND PRACTICE STUDY

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Painkillers are among the most frequently used medications worldwide and are commonly obtained without a prescription for the management of acute and chronic pain. The increasing availability of over-the-counter (OTC) analgesics has contributed to a growing trend of self-medication, raising concerns regarding inappropriate use and potential health risks. This study aimed to assess the patterns of painkiller use and self-medication practices using a Knowledge, Awareness, and Practice (KAP) framework among the general population.

A cross-sectional survey was conducted among participants using a structured, validated questionnaire to evaluate their knowledge of commonly used analgesics, awareness of potential adverse effects, and actual medication practices.

A total of 104 people participated in the survey, with an average age of 39.86 ± 1.72 years. Nearly half were graduates (48.08%) and over one-third were students (37.5%). The average knowledge score (6.23 ± 0.25) emphasized fairly good understanding of the participants about painkillers and their safe use. Awareness (31.74 ± 0.40) and practice (32.72 ± 0.43) scores were also high, reflecting generally appropriate behavior regarding painkiller use and self-medication. Statistical analysis revealed a significant association of monthly household income with practice scores ($p = 0.03$) with better practices noted in higher-income groups. In addition, knowledge, awareness, and practice were positively related to each other.

In summary, the findings highlight the importance of targeted, behavior-focused educational interventions that address not only knowledge deficits but also practical and socioeconomic barriers to safe painkiller use.

Keywords: Painkillers; Analgesics; Non-steroidal anti-inflammatory drugs (NSAIDs); Knowledge, Awareness, and Practice (KAP); Rational drug use; Over-the-counter (OTC) drugs; Adverse drug effects.

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Abstract No.: PP-106

MICRORNAS AS THERAPEUTIC TARGETS AND BIOMARKERS IN CANCER

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MicroRNAs (miRNAs) are small non-coding RNAs that modulate gene expression post-transcriptionally by interacting with target messenger RNAs. In recent times , mounting evidence points to their overarching role in the initiation, development, and metastasis of cancer as either oncogenes (oncomiRs) or tumor suppressors, depending on the cellular environment. Alterations in miRNA expression have been seen in virtually all types of malignancies, rendering them potential candidates as both prognostic and diagnostic biomarkers. Their exquisite stability in bodily fluids also makes them promising for non-invasive cancer detection and disease monitoring. Therapeutically, synthetic miRNA mimics may reconstitute tumor-suppressor functions, whereas anti-miRNA oligonucleotides (antagomiRs) may silence oncogenic miRNAs. Setting aside the challenges of delivery efficacy, off-targeting, and long-term toxicity, developments in nanotechnology and targeted delivery systems are opening the door to their clinical use. Combining miRNA-based strategies with traditional treatments could provide novel opportunities in precision oncology, including earlier diagnosis, personalized therapy, and better outcomes for patients.

Keywords: MicroRNA, Oncogene, Biomarkers, Tumor Suppressors

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Abstract No.: PP-107

BACTERIOPHAGE THERAPY: A PRECISION APPROACH AGAINST ANTIBIOTIC-RESISTANT INFECTIONS

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Antibiotic-resistant infections are caused by bacteria that no longer respond to one or more antibiotics that were previously effective. These infections are harder to treat, longer-lasting, and sometimes life-threatening. The global escalation of antimicrobial resistance (AMR) has critically compromised the efficacy of conventional antibiotics, necessitating alternative therapeutic strategies. This review focuses the underlying molecular mechanisms, clinical applications, pharmacological aspects, and translational hurdles of bacteriophage therapy as a potential strategy to combat antibiotic-resistant infections. Multidrug-resistant (MDR) pathogens, including methicillin-resistant *Staphylococcus aureus* (MRSA), carbapenem-resistant *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa*, are associated with high morbidity and mortality. Bacteriophage therapy has re-emerged as a precision antimicrobial approach that targets specific bacterial hosts. Bacteriophages are obligate lytic viruses that infect bacteria through receptor-mediated adsorption, inject their genetic material, replicate intracellularly, and induce bacterial lysis via endolysin-mediated cell wall degradation. Unlike broad-spectrum antibiotics, bacteriophages demonstrate high host specificity, auto-dosing kinetics at the infection site, and the capacity to disrupt biofilms. Advances in genomic sequencing, synthetic biology, and phage engineering have enhanced the safety and therapeutic efficacy of lytic bacteriophages while minimizing the risks of horizontal gene transfer. Preclinical studies and early-phase clinical trials have reported favourable outcomes in treating refractory wound infections, osteomyelitis, and pulmonary infections. However, challenges remain, including the emergence of bacterial resistance to bacteriophages, immune system reactions, regulatory constraints, and the need for standardized phage formulations. Addressing these challenges is essential for the broader clinical implementation of bacteriophage therapy.

Keywords: Antimicrobial resistance (AMR), Multidrug-resistant pathogens, Bacteriophage therapy, Lytic bacteriophages, Biofilm disruption

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Abstract No.: PP-108

NETWORK PHARMACOLOGY AND MOLECULAR DOCKING ANALYSIS OF *RAPHANUS SATIVUS* AS A MULTI-TARGET THERAPEUTIC CANDIDATE AGAINST ALZHEIMER'S DISEASE

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Alzheimer's disease is the most common cause of dementia, affecting over 55 million people worldwide, with about 4–5 million cases in India. As the population ages, this number is expected to rise. Since current treatments have limited disease-modifying effects, new multi-target therapies are needed. *Raphanus sativus* leaves, a medicinal and dietary plant rich in flavonoids, phenolics, sterols, and antioxidants, shows anti-inflammatory, neuroprotective, and antioxidant potential. This study used network pharmacology and molecular docking to explore its possible benefits in Alzheimer's disease.

Through GC-MS and HPTLC, we found some phytoconstituents such as phytol, campesterol, γ-sitosterol, vitamin E, chlorogenic acid, kaempferol, apigenin, and caffeic acid were identified by their function and potential molecular targets. We sorted 74 Common genes and enriched pathways linked to Alzheimer's disease by Network Pharmacology. Because of their crucial roles in amyloid formation, tau hyperphosphorylation, cholinergic dysfunction, and neuronal degeneration, key target genes like CHRM3, APP, MAPT, MAPK9, PSEN1, SNCA, and GSK3B were chosen by Networking. Among all tested compounds Kaempferol, campesterol and gamma-sitosterol showed the most promising molecular docking scores, particularly against AChE, butyryl cholinesterase, tyrosine-protein kinase c-src, which were comparable to or better than the standard drug donepezil, indicating their strong potential as ideal candidates for Alzheimer's disease therapy.

This suggests that amyloid genesis can be inhibited and cholinergic transmission can be improved. These results suggest that *Raphanus sativus* leaves can be a crucial candidate for the treatment of Alzheimer's disease and may have multi-target therapeutic potential.

Keywords: Alzheimer's disease, Raphanus sativus, Network pharmacology, Molecular docking, Amyloid beta, GSK3B, Acetylcholinesterase

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Abstract No.: PP-109

FORMULATION AND EVALUATION OF OFLOXACIN NANOPARTICLES CONAINING DIFFERENT TYPES AND RATIOS OF CROSS-LINKING AGENT

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A novel formulation using nanoparticles loaded with ofloxacin. Egg albumin and chitosan were utilized as polymer in the formulation. Calcium chloride, glutaraldehyde and dimethyl sulfoxide were employed as the cross-linking agents. All formulations show good entrapment efficiency but 58.31% was the maximum entrapment that was governed by F3 and the highest percentage of yield was 61.53% which was acquired by F1. By analysing the particle size of the formulations, the smallest particle size was 453.33±29.31 nm which is secured by F2. From these experiments, comparing the other two formulations, the formulation F1 with 1% calcium chloride exhibits the highest drug release i.e. 56.320%, whereas the formulation F3 with 3% calcium chloride exhibits the lowest drug release i.e. 29.550%. The three formulations F1, F2, F3 have percentage yield 61.53%, 58.46%, 52.30% respectively. Drug entrapment efficiency % for F1 was least i.e. 30.38% and for F3 was high i.e. 58.31%. Among the three formulations, F1 follows Higuchi model while F2 and F3 follow Korsmeyer-Peppas model.

Keywords: Ofloxacin Nanoparticles, Chitosan–Egg Albumin Polymer System, Drug Entrapment Efficiency, Controlled Drug Release, Drug Release Kinetics

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Abstract No.: PP-110

FORMULATION AND EVALUATION OF SUSTAIN RELEASE TABLET OF MYCOPHENOLATE SODIUM –BETA CYCLODEXTRIN INCLUSION COMPLEX

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The objective of this study was to improve mycophenolate sodium's solubility and control drug release by creating and evaluating a sustained release formulation using β-cyclodextrin inclusion complexation. Using the proper release-retarding polymers, the complex was created to enhance physicochemical stability and dissolution behavior before being incorporated into matrix tablet tablets. Micromeritic properties, tablet hardness, friability, drug homogeneity, swelling behavior, and in-vitro release profile were among the pre-formulation and post-compression features that were thoroughly assessed. Analysis of drug-excipient compatibility showed no noteworthy interactions. Its potential to improve bioavailability and decrease dose frequency is demonstrated by the enhanced formulation's sustained and controlled drug release and good tablet characteristics. According to these results, complexation based on β-cyclodextrin appears to be a successful method for delivering mycophenolate sodium over an extended period of time.

Keywords: Mycophenolate sodium; Sustained release; β-cyclodextrin; Inclusion complex; Matrix tablet; Drug delivery; Controlled release; Dissolution study; Polymer; Tablet evaluation; Formulation development.

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Abstract No.: PP-111

UNRAVELLING THE MOLECULAR BASIS OF *CISSUS QUADRANGULARIS* IN HEPATIC FIBROSIS VIA NETWORK PHARMACOLOGY AND DOCKING STUDIES

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Chronic liver diseases contribute to nearly 2 million deaths annually worldwide, with hepatic fibrosis representing a progressive and reversible stage characterized by persistent activation of hepatic stellate cells, excessive extracellular matrix deposition, and disruption of metabolic and inflammatory signalling networks, ultimately leading to cirrhosis and liver failure. *Cissus quadrangularis L.*, a medicinal plant widely used in traditional systems of medicine, has demonstrated hepatomodulatory properties; however, its molecular basis in hepatic fibrosis remains inadequately defined. The present study employed an integrative network pharmacology and molecular docking framework to systematically elucidate the mechanistic relevance of *Cissus quadrangularis* in hepatic fibrosis and benchmark its efficacy against the established hepatoprotective agent silymarin. Phytochemical profiling identified multiple bioactive constituents that were mapped to fibrosis-associated targets. Network analysis revealed 17 intersecting targets, with MET, HMGCR, and PTPN1 emerging as key hub genes regulating fibrogenic signalling, metabolic regulation, and insulin resistance. Functional enrichment analysis highlighted the involvement of AMPK, HIF-1, insulin resistance, Ras signalling, and bile secretion pathways, all critically implicated in fibrogenesis. Molecular docking studies demonstrated that quercetin, lupeol, and β-amyrin exhibited strong binding affinities and stable interaction profiles with identified hub targets. Notably, campesterol and stigmasterol showed superior binding affinities against Protein-tyrosine phosphatase non-receptor type 1 (PTP1B) and AXL receptor tyrosine kinase, with docking scores of −8.5 to −8.8 kcal/mol and −8.7 to −8.8 kcal/mol, respectively, comparable to the reference drug silymarin. Gamma-tocopherol demonstrated moderate yet consistent interactions. Collectively, these findings suggest that *Cissus quadrangularis* exerts antifibrotic effects via multi-component, multi-target, and multi-pathway mechanisms.

Keywords: Cissus quadrangularis; Hepatic fibrosis; Network pharmacology; Molecular docking; Hub genes; Silymarin; Antifibrotic signalling pathways.

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Abstract No.: PP-112

PHYTOSOMAL ENCAPSULATION OF MIKANIA MICRANTHA EXTRACT: A NOVEL APPROACH TO IMPROVE THE EFFICACY OF PHYTOCONSTITUENTS

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Mikania micrantha commonly known as mile-a-minute or bitter vine, is a rapidly growing tropical herb having outstanding therapeutic potencies like antimicrobial, cytotoxic, antidiabetic, and wound healing activities. The present study aimed to assess presence of phytoconstituents in *Mikania micrantha* extract and evaluation of the anti-oxidant and anti-inflammatory potencies of hydroalcoholic leaf extract and to explore a phytosomal nanocarrier system to enhance its stability and bioavailability. *Mikania micrantha* leaves were collected and authenticated and hydroalcoholic extracts were prepared using maceration. Recent experiment assessed *Mikania micrantha* leaves, finding Presence of alkaloids, glycosides, flavonoid, and phenolic content. Quantitative analysis of the extract shown to have a total phenolic content of 111.98 mg GAE/g extract and a total flavonoid content of 230.032 mg QE/g extract. The antioxidant activity is evaluated by the DPPH free radical scavenging assay exhibited significant activity with an IC_{50} value of 11.79 µg/ml. Anti-inflammatory activity was assessed by RBC membrane stabilization method, showing an IC_{50} value of 112.26 µg/ml which indicates having potential inhibitory activity. Despite of having potential bioactivity of plant-derived compounds, clinical utilization is often limited due to high molecular weight polyphenolic structures, low lipid solubility, poor permeability and degradation in gastric and intestinal environments. To enhance clinical applicability, the study further explores phytosomal encapsulation to improve the stability, bioavailability and pharmacokinetic behaviour of plant-derived bio-active compounds. This delivery system may promote better therapeutic efficacy, suggesting that phenolic and flavonoid constituents present in *Mikania micrantha* leaves could serve as a promising natural source for managing multifaceted diseases and associated complications.

Keywords: Mikania micrantha Knuth, Phytochemical analysis, Antioxidant activity, Anti-inflammatory activity, Phytosomal nanocarrier system.

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Abstract No.: PP-113

EMERGING TRENDS IN MOFS AND MOF-DERIVED MATERIALS AS POTENT ANTIFUNGAL AGENTS

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Fungal infections remain a major global public health concern, particularly with the rising incidence of drug resistance and limited efficacy of conventional antifungal therapies. In this context, Metal–Organic Frameworks (MOFs) have emerged as versatile nanoplatforms with promising antifungal potential. Constructed from metal ions such as Cu^{2+}, Fe^{3+}, and Ag^{+} coordinated with organic linkers, MOFs exhibit high surface area, tunable pore size, structural diversity, and functionalizable surfaces—features that enable efficient drug loading and targeted delivery. Recent investigations by various research groups have demonstrated that MOFs synthesized via solvothermal, hydrothermal, and microwave-assisted methods significantly influence crystallinity, porosity, and antifungal performance. Mechanistically, MOFs and MOF-derived materials exert antifungal effects through controlled drug release, metal ion-mediated toxicity, reactive oxygen species (ROS) generation, and disruption of fungal cell membrane integrity. Notably, novel MOF formulations have shown potent activity against clinically and agriculturally relevant pathogens including *Candida albicans*, *Aspergillus niger*, *Aspergillus flavus*, *Aspergillus oryzae*, *Fusarium oxysporum*, and *Saccharomyces cerevisiae*. Importantly, their tunable composition allows for reduced systemic toxicity and a lower propensity for resistance development compared to traditional antifungal agents. Collectively, emerging evidence positions MOFs and MOF-derived nanomaterials as next-generation antifungal therapeutics with broad biomedical and pharmaceutical applications. Continued interdisciplinary research is expected to accelerate their clinical translation.

Keywords: Metal–Organic Frameworks (MOFs); MOF-derived materials; Antifungal activity; Controlled drug release; Reactive oxygen species; Nanomedicine; Fungal pathogens.

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Abstract No.: PP-114

COMPARATIVE STUDY OF CONVENTIONAL AND MICROWAVE INDUCED SYNTHESIS OF Phenytoin

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In this comparative study, phenytoin (a clinically important heterocyclic drug) was synthesized via both conventional reflux heating and microwave irradiation (Microwave-Induced Organic Reaction Enhancement, MORE). The goal was to evaluate yields, reaction times, and efficiency of each approach. Conventional heating required prolonged reflux, bulky apparatus, and large solvent volumes. In contrast, the microwave method used simple closed-vessel conditions with low-boiling, recyclable solvents. This enables rapid heating above normal solvent boiling points under pressure, accelerating reaction rates and reducing by-product formation. The microwave approach dramatically outperformed the classical method: reaction times were shortened from hours to minutes, and phenytoin yields increased by roughly 10–30%. Microwave synthesis proved faster, cleaner, and more energy-efficient, significantly reducing hazardous waste and operational cost. Microwave protocols often require little or no added catalyst or excess reagents, further streamlining the process and minimizing waste. Together, these advantages make microwave-assisted phenytoin synthesis a faster, greener, and more sustainable approach than traditional heating for producing this drug. These findings underscore the promise of microwave irradiation as a green chemistry tool for sustainable drug synthesis.

Keywords: Phenytoin**,** Heterocyclic drug, Conventional reflux, Microwave irradiation.

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Abstract No.: PP-115

TRANSLATING THE GUT-BRAIN AXIS: INTEGRATING MICROBIOME SCIENCE INTO NEXTGEN INNOVATIVE DELIVERY PRACTICES AGAINST NEURODEGENERATION.

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The gut microbiome is a residence of around 100 trillion microorganisms that exerts a profound influence on brain health through the bidirectional gut-brain axis (GBA). This bidirectional communication links intestinal microbes with the central nervous system (CNS) via neural, endocrine, immune, and metabolic pathways, enabling microbial metabolites and neurotransmitters such as serotonin and γ-aminobutyric acid (GABA) to modulate mood, cognition, and synaptic function. Disruption of microbial homeostasis leads to gut dysbiosis promoting systemic inflammation, breakdown of intestinal and blood–brain barriers, and activation of microglia and astrocytes, thereby contributing to neuroinflammation, neurodegeneration, and the pathogenesis of major neurodegenerative disorders, including Alzheimer's disease (AD), Parkinson's disease (PD), Amyotrophic lateral sclerosis (ALS), Multiple sclerosis (MS), and Huntington's disease (HD).

Here, we emphasise on the current evidence of microbiota-mediated mechanisms- such as alteration in short-chain fatty acid (SCFA) profiles, microbial amyloid and lipopolysaccharide (LPS) signalling, and immune dysregulation—that drives disease-specific neuropathological features across AD, PD, ALS, MS, and HD. We have further highlighted the preclinical and clinical evidence on microbiome-targeted interventions, including probiotics, prebiotics, synbiotics, dietary patterns, and faecal microbiota–based strategies that aim to restore eubiosis, enhance neuroprotective metabolites, and attenuate neuroinflammatory cascades. The development of personalised prebiotics and probiotics tailored to an individual's microbiome profile remains a significant challenge. Elucidating the precise mechanisms by which gut metabolites lead to neurodegeneration is critical, and this mechanistic insight, combined with long-term clinical trials, is essential to establish safe and effective interventions.

Keywords: Gut microbiota, gut-brain axis, neurodegenerative disorders, probiotics, NextGen Discovery.

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Abstract No.: PP-116

NEUROPROTECTIVE EFFECTS OF PHOTO BIOMODULATION BY ALTERING MITOCHONDRIAL DYSFUNCTION IN ALZHEIMER'S DISEASE

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Alzheimer's disease (AD), a multifactorial progressive neurodegenerative disorder, is characterized by progressive cognitive impairment, mitochondrial dysfunction, oxidative stress, chronic neuroinflammation and impaired synaptic signaling. Even with various therapeutic development and symptomatic treatment, the effective disease-modifying definitive therapy remains limited. Mitochondrial dysfunction is a central, potentially initiating, factor in Alzheimer's disease (AD) pathogenesis, driving metabolic failure, oxidative stress, and neurodegeneration. Impaired mitochondria fail to produce adequate ATP for neuronal function and exhibit structural fragmentation (excessive fission) due to decreased mitophagy, resulting in neuronal death. PBM (Photo biomodulation) is a non-invasive mode of therapy where low-intensity red-to-near-IR light (660-1100nm) has been used as a neuroprotective agent in AD. PBM primarily acts on mitochondrial cytochrome c oxidase (Complex IV), resulting in enhanced electron transport chain function and ATP synthesis, as well as stabilization of mitochondrial membrane potential. This bioenergetics leads to controlled reactive oxygen species signaling and also suppresses pro-inflammatory signaling cascades by modulating NF-κB, downregulating and microglial activation. PBM-induced mitochondrial restoration further promotes neuronal survival by facilitating calcium homeostasis and brain-derived neurotrophic factor (BDNF) levels which further enables cognitive function, neuroplasticity by supporting synaptic connections. Preclinical data in Alzheimer's models show reductions in amyloid-β accumulations, tau hyperphosphorylation, improved cognitive impairment following PBM exposure. Whereas the clinical studies also show improved cerebral perfusion, functional connectivity in early AD patients. This review discusses evidence on PBM-mediated molecular mechanisms of neuroprotection by targeting mitochondrial resilience and redox-inflammatory balance in Alzheimer's disease.

Keywords: Alzheimer's disease · Mitochondrial dysfunction · Photo biomodulation Neuroprotection.

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Abstract No.: PP-117

PREPARATION OF POLYSACCHARIDE BASED EUTECTOGEL AND ITS CHARACTERIZATION

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Eutectogels made of polysaccharides offer sustainable biocompatible polysaccharide based eutectic gels by gelating deep eutectic solvents (DES) with polysaccharides and provide the tunability of deep eutectic solvents with gel stability of polysaccharides in biomedical applications such as drug delivery and biosensing. This work offers a new strategy in the preparation of eutectic gels by the strategic mixture of two different deep eutectic solvents menthol: lactic acid (1:2 molar ratio) and Phosphoric acid: Zinc chloride (1:2 molar ratio). Here a hydrophobic DES and another one is a hydrophilic DES are made. Gels were produced through a solvent-mixing protocol through homogenization using ultrasonic at 50^0 C and controlled cooling to form gels to give translucent self-supportive materials with adjustable viscoelastic characteristics. Zn^{2+} coordination and hydrogen bonding interactions as the determines of the gel microstructure proven by FTIR Among two solvents, one of them is conductive; this is why we are able to develop biosensor using it. This dual-DES approach provides a green, scalable path to functional eutectic gels, and it has been shown to be better than single-DES analogs in shear-thinning characteristics and thermal stability.

Keywords: Deep Eutectic Solvent, eutectogel, conductivity, biosensor.

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Abstract No.: PP-118

COMPUTATIONAL INSIGHTS INTO THE ANTI-DIABETIC POTENTIAL OF YOUNG FRONDS OF *DIPLAZIUM ESCULENTUM* (RETZ.) SW.: *IN-SILICO* ANALYSIS OF A-AMYLASE AND A-GLUCOSIDASE INHIBITION

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Diplazium esculentum (Retz.) Sw. is a dietary plant and possesses a diverse biological properties, including potential anti-diabetic effects. The anti-diabetic potential of its young fronds is remains unexplored. To bridge this gap, we conducted a computational analysis to assess their anti-diabetic activity by targeting key enzymes, α-amylase and α-glucosidase, which perform a fundamental role in the development of diabetes mellitus (DM). The ligands and target proteins associated with DM were obtained from PubChem and the Protein Data Bank, respectively. Drug-likeness and ADMET properties were assessed using MolSoft and the pkCSM repository for predictive modelling. This study investigated their interaction with key carbohydrate-hydrolysing enzymes involved in DM pathogenesis. Molecular docking was executed to appraise the binding energy of selected bioactive compounds. Among 11 docked phytochemicals, quercetin exhibited the highest binding energy (-294.64 kcal/mol) with α-amylase, forming three hydrogen bonds with key amino acid units. Additionally, α-glucosidase docking results showed strong binding interaction with quercetin (-121.471 kcal/mol), forming three hydrogen bonds with two amino acids. Further investigation of quercetin, which exhibited the highest binding energy with α-amylase, was conducted using Schrödinger Maestro for molecular dynamics simulation at 500 ns. The results demonstrated improved stability, as indicated by root-mean-square fluctuation, root-mean-square deviation, and protein-ligand contact analyses, reinforcing its potential as a promising inhibitor of α-amylase. *Diplazium esculentum* bioactive compounds, like quercetin, show promise as natural inhibitors for managing type 2 diabetes, warranting further research and development.

Keywords: Type 2 diabetes, Molecular docking, MolSoft and the pkCSM.

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Abstract No.: PP-119

ADVANCEMENT OF FORMULATION FOR WOUND HEALING

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Wound repair is a multi-stage dynamic process that can be significantly impaired by infection, inflammation, diabetes, and poor blood flow. Recent progress in formulation science have markedly enhanced therapeutic strategies by combining biomaterials, nanotechnology, and active agents into multifunctional wound dressings. Modern wound healing solutions progressively incorporates hydrogel-based formulations which have a high water content, high compatibility with body tissues, and maintain a moist environment that supports tissue regeneration. Stimuli-responsive smart hydrogels contain responsive polymers which allow for controlled and sustained release of antimicrobial agents, growth factors, and anti-inflammatory drugs, that promots accelerated re-epithelialization and collagen building. Nanotechnology-driven approaches, including lipid-based carriers, polymeric nanoparticles, and metallic nanocomposites like silver and zinc oxide nanoparticles, show improved antimicrobial effectiveness and targeted drug delivery with reduced systemic toxicity. Recent developments in formulation science have placed greater focus on incorporating biodegradable, naturally derived polymers such as chitosan, alginate, and hyaluronic acid, owing to their inherent antimicrobial properties and their ability to enhance tissue repair and regeneration. Furthermore, developments in 3D bioprinting and personalized therapeutic strategies have made it possible to design and fabricate wound dressings customized to the specific features and severity of individual wounds. Taken together, these advancements reflect a shift from traditional passive wound coverings to active, stimulus-responsive therapeutic platforms. Ongoing interdisciplinary cooperation among materials science, pharmaceutical research, and regenerative medicine is expected to improve treatment outcomes and contribute to reducing the global incidence of chronic wounds.

Keywords: Wound healing, Hydrogel-based formulations; Smart hydrogels, Multifunctional wound dressings.

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Abstract No.: PP-120

CHARACTERIZATION OF BIOACTIVE COMPOUNDS AND IN VITRO ANTIBACTERIAL AND ANTIOXIDANT ACTIVITIES OF *TYPHONIUM TRILOBATUM* (L.) SCHOTT

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Typhonium trilobatum (L.) Schott belongs to the family Araceae, is a small to moderate sized perennial herb, commonly known as Bengal arum, Kharkon or Ghatkol in West Bengal and Bangladesh. The objectives of this study were to explore and evaluate the phytochemical importance of *T. trilobatum* (L.) Schott and also identification of lead scaffolds with reference to observed activity. Methanolic leaves extract of *T. trilobatum* (L.) Schott were selected for the current study. Phyto-chemical screening was performed by using TLC and HPTLC. GCMS to find out the numbers of 55 volatile Phyto-constituents. And also performed *in-vitro* study, antioxidant activity of leaves extract by using DPPH & H_2O_2 scavenging assay. Total phenolic content (206.46 ± 0.21 mg/100 gm) and total flavonoid content (125.07mg/100gm) was also reported. From methanolic leaves extract chlorogenic acid, caffeic acid, Kaempfeol was identified and quantified using HPTLC. Leaves extract was further assessed for anti-bacterial activity against gram negative bacteria like *E. Coli* (zone of inhibition 0.675 mm ± 0.272 mm) and gram-positive bacteria *Bacillus subtilis* (zone of inhibition 0.925 ± 0.339 mm) used as controls. Compare commonly used gram-negative bacteria standard Ciprofloxacin and gram-positive bacteria standard is Tetracycline. *T. trilobatum* extract shown greater anti-bacterial activity on gram-positive bacteria compared to gram negative bacteria. That study provides the valuable data for further investigation. Future study should focus on isolation of lead scaffolds and different *in-vivo* studies.

Keywords: Typhonium trilobatum (L.) Schott, Phytochemical Screening, Antioxidant Activity, Antibacterial Activity, HPTLC and GC–MS Analysis

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Abstract No.: PP-121

HERBAL PLANTS FOR PCOD AND PCOS

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Polycystic Ovary Syndrome (PCOS) or Polycystic Ovary Disorder (PCOD) is one of the most common disorders affecting women between 18 and 30 years old, and there are many treatment options for this condition. PCOS is a hormonal disorder characterized by high hormonal levels. PCOS and PCOD (Polycystic Ovary Disorder) are often confused with one another, as many people do not know what the differences are. While the mechanism behind PCOS has been identified, the exact cause and how it develops are still under research. There are many ways to treat PCOD, and one of those ways is through herbal medicine. Medicinal herbs have been used for a long time to cure gynecological and reproductive issues in females. Several studies are showing that certain herbs, including liquorice root, cinnamon, Unkei-to, and fenugreek, may help in the management of PCOS by improving hormone balance, regulating ovulation, reducing obesity, improving insulin sensitivity, etc. These herbs can be used alone or with other medications.

Keywords: PCOD Management; PCOS; Herbs for PCOD; Natural method for PCOS; Medicinal Herbs.

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Abstract No.: PP-122

TINOSPORA CORDIFOLIA: AN EFFECTIVE ANTIDIABETIC HERBAL MEDICINE

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Diabetes mellitus remains one of the most prevalent metabolic disorders worldwide, necessitating safer and cost-effective therapeutic alternatives. *Tinospora cordifolia* (Guduchi), a well-recognized herb in Ayurvedic medicine, has attracted significant scientific attention for its promising antidiabetic potential. Phytochemical investigations reveal that the plant is rich in bioactive constituents, including alkaloids, flavonoids, tannins, saponins, steroids, and cardiac glycosides, which collectively contribute to its glucose-modulating effects. Preclinical studies have demonstrated that root and stem extracts of *T. cordifolia* significantly reduce fasting blood glucose, postprandial glucose, and glycosuria in experimental diabetic models. Notably, Prashant et al. reported that isolated alkaloids and related phytoconstituents exert insulin-mediated hypoglycaemic effects, possibly through enhancement of pancreatic β-cell function and peripheral glucose utilization. Further supporting its translational relevance, Mishra et al. observed that adjunct therapy with *T. cordifolia* in patients with Type 2 diabetes improved glycaemic parameters without producing significant hepatic or renal toxicity. Mechanistically, the herb appears to act through multiple pathways, including antioxidant defense, modulation of insulin secretion, inhibition of gluconeogenesis, and improvement of insulin sensitivity. Such multi-targeted activity aligns with the network-based therapeutic principles increasingly emphasized in modern pharmacology. Overall, accumulating experimental and clinical evidence supports *T. cordifolia* as a potent, safe, and complementary antidiabetic herbal medicine. However, large-scale randomized clinical trials and standardization of extracts remain essential for its integration into evidence-based diabetes management.

Keywords: *Tinospora cordifolia*; Antidiabetic activity; Alkaloids; Ayurvedic medicine; Type 2 diabetes mellitus; Phytochemicals.

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Abstract No.: PP-123

DEVELOPMENT AND VALIDATION OF A STABILITY-INDICATING HPLC METHOD FOR ORGANIC IMPURITY PROFILING IN LEVOCARNITINE ORAL SOLUTION (SUGAR AND SUGAR-FREE) 1.0 g/10 mL

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Despite Levocarnitine Oral Solution being designated as an orphan drug within the United States Pharmacopeia, a standardized validated method for the determination of organic impurities remains unavailable. Addressing this gap, our study introduces and thoroughly validates a high-performance liquid chromatography (HPLC) method that is both stability-indicating and suitable for the quantification of levocarnitine and its organic impurities in oral solutions, irrespective of sugar content (1.0 g/10 mL formulation). Validation was performed in accordance with the International Council for Harmonization guidelines (ICH Q2(R1), 2005), evaluating an array of parameters including specificity, system and method precision, precision at the limit of quantification, linearity, range, accuracy, robustness, ruggedness, and the stability of prepared solutions. Degradant impurities were differentiated based on their relative retention times (RRTs) and relative response factors (RRFs), and the method's ability to indicate stability was confirmed through forced degradation studies. Levocarnitine and its main degradant impurity (Impurity-A) were detected at approximately 4.6 and 4.9 minutes, respectively. This method showed outstanding linearity from the limit of quantification up to threefold the specified level in both sugar-containing and sugar-free matrices. Accuracy and precision consistently meet the predefined acceptance criteria. Investigations into solution stability showed that after 45 hours at 25°C, variations in peak area remained below 25%, and no interference was observed from diluents or placebo peaks. In summary, this validated HPLC method demonstrates the sensitivity, precision, accuracy, and stability-indicating capabilities required for routine quality control and comprehensive impurity profiling in Levocarnitine Oral Solution.

Keywords: Levocarnitine; HPLC; Method Validation; Organic Impurities; Specificity; Stability indicating.

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Abstract No.: PP-124

DIFFERENTIATING CNS DEPRESSANTS: THE EVOLUTION FROM BARBITURATES TO BENZODIAZEPINES

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Barbiturates and benzodiazepines are two important classes of drugs which fall under the category of central nervous system depressants and have been widely used as sedatives, hypnotics, anti-convulsants and muscle relaxants. A persistent myth is that both drugs are clinically similar and equally safe. Barbiturates played a crucial role in our understanding of GABA A receptor function, and although there are special instances that call for the use of barbiturates. Benzodiazepines have largely replaced Barbiturates in routine clinical practices because they have a wider therapeutic index and a comparatively lower chance of fatal respiratory depression. Although Safer than Barbiturates, benzodiazepines produce tolerance, dependence, and cognitive impairment, particularly with prolonged use or misuse. Barbiturates are often considered outdated and inaccurate. This is one of our biggest misconceptions as Barbiturates continue to have specific medical roles, especially in anaesthesia and the management of epilepsy. Both of the drugs act on the GABA A receptor complex but differ in mode of action, benzodiazepines enhance the frequency of chloride channel Opening whereas Barbiturates increase the duration of channel opening, explaining the higher toxicity of barbiturates at excessive doses. A common myth is that barbiturate overdose can be easily reversed; in reality, there is no specific antagonist, unlike benzodiazepines, which can be reversed by flumazenil. Benzodiazepines are widely recognised by medical, pharmaceutical, and psychiatric organisations as safer than barbiturates due to a higher therapeutic index, lower risk of fatal respiratory depression, and less potential for severe addiction.

Keywords: Barbiturates; Benzodiazepines; $GABA_A$ receptor; Central nervous system depressants; Sedative-hypnotics.

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Abstract No.: PP-125

EMERGENCY MEDICINES IN PHARMACY

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Emergency medicines are life-saving drugs used in critical and life-threatening conditions that require immediate medical intervention. In pharmacy practice, these medicines play a vital role in reducing morbidity and mortality during medical emergencies such as cardiac arrest, anaphylaxis, asthma attack, seizures, shock, poisoning, and severe trauma. The availability, proper storage, and correct administration of emergency drugs are essential responsibilities of hospital and community pharmacists. Common emergency medicines include adrenaline (epinephrine) for anaphylactic shock and cardiac arrest, atropine for bradycardia, dopamine for shock, diazepam for seizures, nitroglycerine for angina, salbutamol for acute asthma, hydrocortisone for severe allergic reactions, and activated charcoal for poisoning. Pharmacists are responsible for maintaining adequate stock, checking expiry dates, ensuring proper labelling, and monitoring storage conditions such as temperature and light protection. They also play an important role in educating healthcare professionals about correct dosage, route of administration, contraindications, and possible adverse effects of emergency medications. The rational use of emergency medicines requires accurate diagnosis, timely decision-making, and strict adherence to clinical guidelines. Proper training in basic life support (BLS) and advanced cardiac life support (ACLS) enhances the effectiveness of emergency drug therapy. Overall, emergency medicines form a crucial component of pharmaceutical care, ensuring rapid response and improved patient survival during critical situations.

Keywords: Emergency medicine, Life-saving drugs, Cardiac arrest, Anaphylaxis, Shock, Seizures, Asthma attack, Adrenaline (Epinephrine), Pharmacist role, Emergency Kit, Basic Life Support (BLS).

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Abstract No.: PP-126

GREEN SYNTHESIS AND CHARACTERIZATION OF CARBON QUANTUM DOTS FROM THE WHOLE PLANT OF *BACOPA MONNIERI* FOR EVALUATION OF ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES

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To establish a green synthesis technique to produce carbon quantum dots from the whole plant of *Bacopa monnieri* and perform its characterization study, as well as to evaluate its antioxidant and antimicrobial activities. The synthesis of *Bacopa monnieri* carbon quantum dots (BM-CQDs) was done by pyrolysis method, which is a bottom-up method. The optical properties, functional groups and size distribution were determined. The evaluation of antioxidant activity was done using DPPH assay and agar well method was used for determination of antimicrobial activity. This synthesis method produced BM-CQDs, with a yield of roughly 9.10% and size ranging between 6-10nm. By using the DPPH assay, the BM-CQDs were found to exhibit a low antioxidant potential and the agar well diffusion method was utilized for the evaluation of the antimicrobial activity, which showed promising antibacterial action against *E.Coli* and *S.aureus*. It also showed comparable antifungal activity against *C. albicans*. I have showcased a viable substitute for traditional synthesis techniques that frequently depend on hazardous substances and non-renewable resources. This work is a positive step toward the development of sustainable nanomaterial with diverse applications.

Keywords: *Bacopa monnieri,* DPPH assay, *E.Coli* and *S.aureus*.

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Abstract No.: PP-127

ANTI-MICROBIAL RESISTANCE 2.0: NEW STRATEGIES FOR ANTIBIOTIC DEVELOPMENT

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The pandemic of antimicrobial resistance (AMR) around the globe requires newer therapeutic concepts. This will serve as an alternative to small molecule antibiotics. A study done by Ling et al. in 2015 presumed that multi target and evolution informed approaches minimises the emergency of resistance and increase pathogen specificity. Hancock and Sahl in their study have concluded that host directed therapies and antimicrobial peptides regulate the immune system and interfere with the microbial membranes. This provides effectiveness in dealing with multi drug resistance (MDR) pathogens. Another study done by Bikard et al. in 2014 have inferred that all bacteriophage based theraopeutics and CRISPR-Cas antimicrobial systems offer precision targeting of resistance genes and biofilms, which offer adaptive and programmable antibacterial solutions. A recent study done by Stokes et al. have concluded that the science of AI based drug discovery has led to increased discovery of new chemical frameworks like, deep learning generated antibiotic, halicin. Its broad spectrum activity is associated with resistant organism. There are also antibiotic adjuvants preventing resistant mechanism. These include 8-lactamase inhibitors and efflux pump inhibitors. Combination of these measures, genomic surveillance and evolutionary modelling is an example of 2.0 model taking antibiotic development into a higher level. Together, newly developed interdisciplinary solutions can provide good prospects to combat AMR and maintain control of infectious diseases around the globe.

Keywords: antimicrobial resistance, antibiotics, bacteriophage, drug discovery.

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Abstract No.: PP-128

ARTIFICIAL INTELLIGENCE FOR EARLY SCREENING OF DIABETES AND HYPERTENSION IN RURAL INDIA

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The lack of clinical infrastructure, shortage of workforce, and low screening coverage servers as an barrier in the early diagnosis of diabetes and hypertension in rural India. The advancement of artificial intelligence (AI) provides a solution based on low cost data like electronic health records, mobile health data, etc. Kavakiotis et al. in 2017 and Nusinovic et al. in 2020 in two different study have concluded that the machine learning models on undiagnosed diabetes (AUC 0.80-0.88) have shown excellent predictive performance using demographic, anthropometric and behavioural variables both at the community level. More recent study by Mohan et al. in 2021 have suggested that AI based risk scores on smartphones have increased the efficiency in case findings and referral uptakes in India. Another study by Chandrasekhar et al. done in 2018 have deduced that in case of hypertension, photoplethysmography-based algorithms, cuffless signal features, demonstrate a good level of agreement with standard measurements, allows opportunistic screening through the frontline workers. Nevertheless, there is still a problem with the quality of the data and the generalizability of the model to different populations in rural areas and ethical governance. The present study integrates existing evidence and suggests a framework of AI assisted, community-based screening. This will help in risk classification, early detection of comorbidity in rural India.

Keywords: Rural India, AI, diabetes and hypertension.

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Abstract No.: PP-129

PRESSURE DOWN: THE SCIENCE BEHIND ANTIHYPERTENSIVE DRUGS

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Hypertension is a significant health issue on earth and one of the primary risk factors to cardiovascular morbidity and mortality. The management is based on the use of antihypertensive medications that can affect essential physiological processes that control the blood pressure. The present work reviews scientific classification, and the pharmacological mechanisms of the major antihypertensive drug classes in clinical practice and pharmacy education. The antihypertensive agents show their effect through decreasing cardiac output, peripheral vascular resistance, or fluid balance. Diuretics stimulate sodium and water loss which decreases the plasma volume. Beta blockers decrease the heart rate and myocardial contractility. Calcium channel blockers inhibit the calcium influx in vascular smooth muscle leading to vasodilation. Renin-angiotensin-aldosterone system drugs, like ACE inhibitors and angiotensin receptor blockers, controls vasoconstriction and water retention and improve elevated blood pressure. Finally the centrally acting drugs and vasodilators are alternative agents in resistant hypertension. Pharmacokinetic issues, therapeutic advantages, adverse effects and a reason behind the combination therapy to achieve the ideal blood pressure control is also underlined in the present work. The main focus is made on the use of mechanism to select drugs and the significance of patient-specific considerations in optimising therapy. This current work aims to help in prescribing antihypertensive drugs rationally and achieve better patient outcomes through proper understanding of the mechanism of action of different class of drugs.

Keywords: antihypertensive drugs, mechanism, blood pressure, hypertension.

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Abstract No.: PP-130

INVISIBLE ENEMIES WITHIN: UNDERSTANDING HOSPITAL-ACQUIRED INFECTIONS

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Hospital-acquired infections (HAIs), also known as nosocomial infections, remain a major global health burden, contributing significantly to morbidity, mortality, prolonged hospitalization, and escalating healthcare costs. Since the pioneering infection control principles of Ignaz Semmelweis and Florence Nightingale, prevention strategies have evolved substantially; however, the persistence of multidrug-resistant (MDR) pathogens continues to threaten patient safety. Contemporary epidemiological analyses, including the landmark SENIC work done by different researchers, demonstrated that structured infection control programs significantly reduce HAI incidence. Current evidence identifies ventilator-associated pneumonia, catheter-associated urinary tract infections, surgical site infections, and central line-associated bloodstream infections as the most prevalent HAIs, frequently associated with biofilm-forming organisms such as Staphylococcus aureus, Pseudomonas aeruginosa, and Klebsiella pneumoniae. Recent investigations by different researchers including Didier et. al. highlight the transformative impact of multimodal hand hygiene strategies and antimicrobial stewardship programs. Advances in rapid molecular diagnostics, AI-driven surveillance, surface nano-coatings, and antimicrobial peptides are redefining preventive paradigms. Nonetheless, the convergence of antimicrobial resistance, invasive procedures, and immunocompromised populations demands integrative, systems-based interventions. This poster synthesizes classical infection control frameworks with emerging translational technologies, emphasizing sustainable, patient-centered, and evidence-based strategies to mitigate HAIs. Strengthening interdisciplinary collaboration, surveillance networks, and policy implementation is imperative to curtail the evolving threat of nosocomial infections in modern healthcare settings.

Keywords: Hospital-acquired infections; Nosocomial infections; Antimicrobial resistance; Biofilm; Infection control; Hand hygiene; Antimicrobial stewardship; Multidrug-resistant pathogens; Healthcare epidemiology.

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Abstract No.: PP-131

NIPAH VIRUS: A SILENT THREAT FROM NATURE

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Nipah virus (Niv) is a very dangerous viral infection, which was first identified in 1998 – 1999 in Malaysia, in a village called Sungai Nipah, where many pig farmers became affected with brain fever [encephalitis]. It spreads from animals to humans. That led to 100 deaths in Malaysia. Later, the recurrent outbreaks of Nipah virus have been reported in Bangladesh and India, especially in Kerala and West Bengal (40%-75%). Fruit bats (Pteropus species), they are the natural carriers of this virus. The infection can spread from close contact with animals like bats and pigs who are infected by taking or eating fruits that are contaminated by them, or through man-to-man transmission via respiration drop and body fluids. Its symptoms usually begin with high fever, dizziness, headache, vomiting, acute respiratory distress, and in severe cases, it can cause brain inflammation (encephalitis), which may lead to coma and death. But at present, there is no specific antiviral treatment or vaccine for the Nipah Virus. The mortality rate of this viral infection is considerably higher than that of many other viral diseases. Preventive measures emphasize avoiding contact with bats and infected animals, maintaining good hygiene practices, and ensuring food safety. Looked at from the future, the virus is a serious public health threat – having a high death rate and potential to result in large-scale outbreaks. Medical research will always be primarily devoted to the development of vaccines and treatments that work to prevent the next public health crisis.

Keywords: Nipah virus (NiV); Zoonotic transmission; Encephalitis; Pteropus (Fruit bats); High mortality rate; Public health outbreak.

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Abstract No.: PP-132

DIETHYLENE GLYCOL IN PEDIATRIC FORMULATIONS: A WAKE-UP CALL FOR GLOBAL PHARMACOVIGILANCE SYSTEMS

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Diethylene glycol (DEG) contamination in pediatric formulations continues to represent a preventable yet recurrent global health catastrophe, disproportionately affecting low- and middle-income countries. Historically linked to mass poisonings, DEG has re-emerged in recent years in contaminated syrups and liquid medications, leading to acute kidney injury, metabolic acidosis, neurological impairment, and high pediatric mortality. These tragedies expose critical vulnerabilities in pharmaceutical supply chains, excipient quality control, regulatory oversight, and global pharmacovigilance systems. Pediatric populations are uniquely susceptible due to weight-based dosing, immature metabolic pathways, and dependence on liquid oral formulations. In many cases, contamination stems from substitution or adulteration of pharmaceutical-grade solvents such as glycerin and propylene glycol with industrial-grade DEG, often compounded by inadequate analytical verification and weak enforcement of Good Manufacturing Practices (GMP). Despite existing pharmacopeial standards and international guidelines, fragmented surveillance mechanisms and delayed adverse event reporting hinder timely detection and intervention. This poster highlights the toxicological mechanisms of DEG-induced nephrotoxicity, examines recent outbreak patterns, and critically evaluates systemic regulatory gaps. It underscores the urgent need for harmonized global excipient traceability, mandatory batch-level testing using validated analytical techniques, digital pharmacovigilance integration, and real-time international reporting networks. Strengthening cross-border regulatory collaboration and implementing risk-based quality audits are imperative to prevent recurrence. The persistence of DEG-related pediatric fatalities is not merely a technical failure but an ethical one. A coordinated global pharmacovigilance framework, grounded in accountability and transparency, is essential to safeguard vulnerable pediatric populations and restore public trust in pharmaceutical systems.

Keywords: Diethylene glycol; Pediatric toxicity; Pharmacovigilance; Excipient contamination; Acute kidney injury; Pharmaceutical regulation; GMP compliance; Global health safety.

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TRANSFORMING QUALITY ASSURANCE THROUGH AI/ML: PHARMACEUTICAL INDUSTRY PERSPECTIVES ON ADOPTION, CHALLENGES, AND FUTURE PATHWAYS

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QA has always been an essential component of existing industrial processes to assure compliance with regulations and, ultimately, consumer satisfaction. In this work, we provide a foundation of notable methods of AI and ML, including supervised, unsupervised, and reinforcement learning, that are applied to predictive analytics, defect detection, and process optimisation for the pharmaceutical manufacturing. The anticipated benefits of AI and ML to quality assurance processes can be transformative through automating manual processes, analytics in real-time, and predictive proactive quality that is coupled with maintenance, detection of anomalies, and advanced data-driven decision-making. Furthermore, we highlight several challenges related to implementing these technologies, including data quality, skills mismatch in the workforce, ethical biases, transparency of decision making, regulatory compliance and the need for flexible governance models. To provide context, we explored the current regulatory landscape and future pathways supporting AI and ML governance, the ethical use of AI and accountability to our consumers and the global convergence of standards. We share several case studies that will speak to examples of successful adoption of AI/ML in QA by citing the influence of cultural variation across organisations, a vision of continuous improvement, and strategic planning for implementation.

Keywords: Quality Assurance, Artificial Intelligence, Machine Learning, Regulatory Compliance.

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Abstract No.: PP-134

THE ROLE OF POLYPHENOLS IN THE PREVENTION OF CHRONIC DISEASES

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Polyphenols are natural bioactive compounds derived from plant-based foods that have one or more hydroxyl groups that attach to one or more benzene rings in their structure. They also identified their antioxidant, anti-microbial, and anti-inflammatory properties that help to prevent many chronic diseases like diabetes, cancer, and cardiovascular diseases. Polyphenols are mainly classified into 4 groups: a) Flavonoids (ex:- Quercetin in onion & tea, Catechins in green tea), b) Phenolic acids (Gallic acid in tea & Caffeic acid in coffee), c) Stilbenes (resveratrol in red wines & grapes), d) Lignans (Sesamin in sesame seeds). Polyphenols are playing vital role in cardiovascular disease, like reduce blood pressure, LDL cholesterol oxidation, & improve endothelial function, etc. Along with cancer, polyphenols inhibit tumor growth and DNA damage, and reduce blood vessel formation. Improve insulin sensitivity and reduce blood glucose level in Diabetes Mellitus. Main sources of Polyphenols include green tea, grapes, turmeric, dark chocolate, nuts & seeds, berries, etc. Its mechanism acts as at first, foods that contain Polyphenols intake antioxidant action works (free radical neutralize), reduce oxidative stress, reduce inflammation as a result, decrease cellular damage prevent chronic disease (diabetes, heart disease, cancer). Limitations of polyphenols are low bioavailability; high metabolic rate & effect depends on the dose. The advantages of polyphenols are that they provide various health benefits, are easily available in fruit, tea, and seeds, safe and natural, preventing disease at a low cost.

Keywords: Polyphenols, Types of polyphenols, Raw sources, Mechanism on diseases.

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Abstract No.: PP-135

CARBON DOTS: TINY LIGHTS, POWERFUL DIAGNOSTICS

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Xu et al. in 2004 have inferred that carbon dots (CDs) are emerging fluorescent nanomaterials that have attracted significant attention in biomedical diagnostics due to their unique optical properties, biocompatibility and cost effective synthesis. This review work explores the intrinsic role of CDs as an innovative tool in the modern clinical laboratory diagnostics. They exhibit strong and tunable photoluminescence, high water solubility and lower toxicity, which make them suitable for bioimaging, biosensing, and early disease detection. Their surface functionalization enables selective interaction with biomolecules like, proteins, nucleic acids, and pathogens, which allows sensitive detection of disease markers. Several studies done by Li et al., Sun et al. and others have demonstrated the applications of CDs in detecting blood glucose levels, heavy metal ions, microbial infections and even cancer. This is possible due to their increase sensitivity and rapid response time. In medical laboratory practice, these properties support the development of simple, rapid, and cost- efficient diagnostic assays, particularly for resource- limited settings. In addition to these, their stability and feasible preparation techniques provides interesting opportunities for point-of-care testing and real-time monitoring. This work aims to highlight the principles of CD synthesis, their diagnostic mechanisms, and their potential impact on future laboratory technologies. As nanotechnology continues to evolve, CDs represents a promising advancement towards more precise, accessible, and efficient diagnostic solutions in healthcare.

Keywords: carbon dots, diagniostic, bioimaging, biosensing.

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Abstract No.: PP-136

NANO REVOLUTION IN PARKINSON'S DISEASE

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Parkinson disease (PD) is a persistent neurodegenerative disorder and is characterized by the loss of dopaminergic neurons in substantia nigra, leading to motor and non-motor problems. The conventional pharmacotherapy of levodopa and dopamine agonists largely provide the symptomatic therapy but they lack effective penetration by the blood to the brain barrier (BBB) and variation levels of the drugs, in the long term, and side effects of the drugs. Recent study done by Saraiva et al. in 2021 concluded that developments in nanotechnology are changing the PD diagnostics and therapeutics by increased bioavailability, and detection of biomarkers in their early stages. Nano approaches like polymeric nanocarriers, which exhibit better blood-brain barrier (BBB) penetration and localized dopaminergic drugs release, have exhibited high neuroprotection in preclinical models. In another study conducted by Teleanu et al., have inferred that nanoparticles which are functionalized and 200 alpha-synuclein aggregates have shown promise in the reduction of neurotoxicity and oxidative stress, which alleviate the disease progression. Kim et al. in their study have used gold nanoparticles and quantum dots for ultra-sensitive measurements of PD biomarkers in biological fluids helping in early detection and diagnosis plan. Despite the positive preclinical outcomes, clinical translation has been an issue due to the safety concerns, scale of use, regulatory approval, and long-term reproducible outcome. All in all, the most recent researches highlight the use of nanotechnology as the breakthrough platform of targeted therapy, neuroprotection, and diagnostics of Parkinson disease.

Keywords: blood brain barrier, Parkinson disease, nanocarriers, dopamine.

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Abstract No.: PP-137

PLANT-BASED CHITOSAN NANOPARTICLES FOR NEXT-GENERATION BIOMEDICAL THERAPIES

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Herbal medicine has played a crucial role in ancient civilizations; however, early therapeutic practices often involved the use of crude plant extracts, which resulted in adverse effects, variable efficacy, and toxicity. Limitations such as low aqueous solubility, poor bioavailability, inconsistent phytochemical composition, allergic reactions, and the addictive or lethal nature of certain bioactive compounds have hindered their clinical application. Despite these challenges, plant-derived bioactive compounds continue to hold significant promise for biomedical applications, formulating innovative strategies to enhance their safety and therapeutic efficacy. In this regard, nanodrug delivery systems have emerged as a viable approach to address the limitations of conventional phytochemical administration. Nanoparticles utilize nanoscale carriers to improve solubility, stability, bioavailability, and targeted delivery while enabling the controlled and sustained release of therapeutic agents. Among the various nanocarriers, biopolymeric nanoparticles, particularly chitosan nanoparticles (CNPs), have gained attention due to their excellent biocompatibility, biodegradability, low toxicity, and mucoadhesive properties. Chitosan, derived from the deacetylation of chitin, contains cationic amino groups that facilitate ionic crosslinking with multivalent anions, enabling efficient nanoparticle formation. The ionic gelation method is particularly advantageous as it is simple, mild, aqueous-based, free from organic solvents, cost-effective, and scalable. CNPs exhibit enhanced interactions with negatively charged biological membranes and improved epithelial penetration by facilitating the opening of tight junctions. Consequently, herbal extract loaded CNPs showed enhanced cellular uptake, stability, better absorption and bioavailability. Overall, chitosan-based nano-drug delivery systems represent a promising platform for advancing the clinical application of phytoconstituents, offering versatile potential for oral, nasal, ocular, and mucosal therapeutic applications.

Keywords: Biopolymer, Phytochemicals, Nanoparticles, Chitosan Nanoparticles, Ionic gelation, Drug delivery systems.

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DIGITAL RISK BASED QMS: A PROACTIVE STRATEGY TO PREVENT OOS IN PHARMACEUTICAL MANUFACTURING

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The Indian pharmaceutical industry is undergoing significant changes towards digital life. It has caused increased demand for regulatory compliance, operational efficiency, data integrity and global competitiveness. Previously, paper-based Quality Management Systems (QMS) caused many manual errors, delayed investigations, limited traceability and audit challenges. To address these gaps, pharmaceutical organizations are engaging towards Digital Quality Management System(DQMS) which includes artificial intelligence, cloud computing, automation, electronic documentation and real-time analytics. DQMS has standardized quality processes which includes deviation management, CAPA, training management, change control and electronic batch record review. This facilitates a structured risk-based approach aligned with ICH Q9, ensuring proactive identification, assessment, and mitigation of quality risks across the product lifecycle. Furthermore, the integration of predictive analytics and trend analysis tools allows early detection of potential Out-of-Specification(OOS) patterns, enabling preventive interventions before product impact. It follows GMP, ALCOA+ principles, 21CFR Part 11 and EU Annex 11. It has some challenges of high implementation costs, digital skill gaps, system validation requirements, and cybersecurity risks. This review emphasises on the implementation landscape, benefits, and future scope which prevent OOS events and strengthen compliance through a proactive, risk-based digital quality framework.

Keywords: DQMS, ICH Q9, Risk-Based QMS, Predictive Analytics, OOS Prevention.

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ANTIOXIDANT-BASED STRATEGIES IN THE TREATMENT OF GASTRIC ULCER

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Gastric ulcer (GU) remains a prevalent gastrointestinal disorder characterized by mucosal erosion due to an imbalance between aggressive factors like gastric acid, pepsin and mucosal defense mechanisms. Emerging evidence indicates that oxidative stress plays a pivotal role in the pathogenesis of GU through lipid peroxidation, DNA damage, and depletion of endogenous antioxidants, which exacerbate mucosal injury. Konturek et al have studied in 2019 and conclude that. Reactive oxygen species (ROS) generated during Helicobacter pylori infection and non-steroidal anti-inflammatory drugs (NSAIDs) administration significantly contribute to mucosal damage. Experimental and clinical studies have demonstrated that antioxidants, both endogenous (glutathione, superoxide dismutase) and exogenous like vitamin C, vitamin E, flavonoids, mitigate oxidative injury and enhance mucosal defense. Sarin et al have studied in 2014 and conclude that Supplementation with vitamin E and C has been shown to reduce malondialdehyde levels and increase antioxidant enzyme activity in gastric tissues, correlating with accelerated ulcer healing in animal models. Al-Mofleh et al have studied in 2008 and conclude that Phytochemicals such as quercetin and curcumin exhibit significant gastroprotective effects by scavenging free radicals, upregulating cytoprotective prostaglandins, and modulating inflammatory pathways. Sheu et al have studied in 2018 that conclude that Clinical trials further suggest that antioxidant therapy, in combination with standard proton pump inhibitors (PPIs), improves healing rates and reduces recurrence compared to PPIs alone. Despite promising results, variability in study design and antioxidant formulations warrants further large-scale randomized trials. In conclusion, antioxidants represent a potential adjunctive strategy for GU management by attenuating oxidative stress and promoting mucosal repair, offering a therapeutic complement to conventional approaches.

Keywords: Gastric ulcer, Oxidative stress, Antioxidants, Mucosal protection.

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Abstract No.: PP-140

FORMULATION AND CHARACTERIZATION OF PALBOCICLIB LOADED NANO-EMULSION FOR ENHANCED SOLUBILITY AND ANTICANCER EFFICACY

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Poor aqueous solubility and limited bioavailability remain major challenges in the effective delivery of many anticancer agents. Nano-emulsion based drug delivery systems offer a viable way to improve the solubility, stability, and therapeutic performance of poorly water-soluble drugs. Despite exhibiting notable anticancer activity, palbociclib (selective cyclin-dependent kinase (CDK) 4/6 inhibitor) used to treat breast cancer, has limited clinical use due to its poor water solubility and inferior absorption. To increase the solubility and possible anticancer efficacy of a palbociclib-loaded nano-emulsion, the current study focuses on its formulation and characterization. In order to find appropriate formulation components, pre-formulation solubility investigations were conducted with Tween 80 as the surfactant, propylene glycol as the co-surfactant, and oleic acid as the oil phase. To identify the nano-emulsion region, pseudo-ternary phase diagrams were created. High-pressure homogenization was used to create the formulations in order to achieve consistent droplet size and improved physical stability. Drug-excipient compatibility was verified by Fourier transform infrared (FTIR) analysis, which showed no signs of chemical deterioration. The drug content, pH, viscosity, centrifugation stability, and thermodynamic stability of the synthesized nano-emulsions were assessed. The enhanced formulation was assessed for polydispersity index (PDI), particle size, and zeta potential in order to assess colloidal stability. To clarify the release behaviour, kinetic modelling and in vitro drug release experiments are suggested. In order to examine the anticancer activity of the pure medication, cytotoxicity tests utilizing breast cancer cell lines are also planned, which creating a nano-emulsion seems like a viable way to improve palbociclib's solubility and therapeutic efficacy.

Keywords: Palbociclib; Nano-emulsion; Solubility enhancement; Anticancer therapy; Drug delivery system.

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Abstract No.: PP-141

FORMULATION AND PHYSIOLOGICAL EVALUATION OF A TRANSDERMAL PATCH CONTAINING DICLOFENAC NANO-PARTICLES

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The concept of nanotechnology has emerged as a promising solution to overcome certain challenges. By encapsulating diclofenac in nanoparticles, the drug's bioavailability, stability, and controlled release can be significantly enhanced. Nanoparticles, which typically range in size from 1 to 1000 nm, can provide several benefits, including: Improved solubility of diclofenac in the gastrointestinal tract, Sustained release of the drug, and targeted delivery. Diclofenac is a NSAIDs that is used to treat mild-to-moderate pain, and helps to relieve symptoms of arthritis, such as inflammation, swelling, stiffness, and joint pain. Nano-particles containing transdermal patches are more effective in the case of sustained release or controlled release. Nano-particles have the extra advantage that it can easily penetrate the stratum corneum layer of the surface of skin. In case of a transdermal patch containing nano particles of diclofenac has better bioavailability, controlled release, improved stability, targeted delivery, and reduces the gastric irritation. Despite its therapeutic benefits, diclofenac faces limitations, such as- poor water solubility, rapid systemic clearance, and gastrointestinal side effects (eg- ulcers or irritations), which can hinder its clinical efficacy and safety. I have used ethanol to dissolve the drug (Diclofenac) and then HPMC as the polymeric system. Then tween-20 as surfactant and Polypropylene Glycol as plasticizer. The HPMC polymeric system helps the controlled release of the drug. After the patch preparation, various types of evaluation physiological study has been done to evaluate whether the patch is non-toxic to skin and has proper in-vitro release.

Keywords: Diclofenac Nano-Particles, Transdermal Drug Delivery System, Controlled Release, in-vitro study.

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Abstract No.: PP-142

IN-VITRO ANTIOXIDANT ASSESSMENT OF *TINOSPORA CRISPA* FOR NEXT-GEN PHARMACY

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The growing number of oxidative stress-related disorders heightened the need to find effective and safe natural antioxidants in contemporary pharmaceutical studies. *Tinospora crispa* (Guduchi/Giloy) is a natural climber with wide application in traditional medicine and possesses a variety of pharmacological activities due to the abundance of phytochemical compounds in it. The current paper is concerned with the in-vitro antioxidant analysis of the ethanolic stem extract of *Tinospora crispa* to understand its potential applications in pharmaceuticals in the next generation. The antioxidant activity was evaluated by the DPPH free radical scavenging test, whereas the antioxidant activity was estimated by the Total Phenolic Content (TPC) and Total Flavonoid Content (TFC) tests. The DPPH assay indicated a high radical scavenging activity and was concentration dependent, with 75.91, 76.58, and 77.41 per cent radical scavenging activity at 30, 50, and 70 ug/mL. The quantitative estimation showed a high content of flavonoid (78 mg QE/g) and a large content of phenolic (102 mg GAE/g), indicating that there is a high content of bioactive antioxidant compounds.

Tinospora crispa has been found to have a profound antioxidant potential, probably because of the synergistic effect of phenolic and flavonoid compounds, which are essential in scavenging free radicals and reducing oxidative stress. The results present scientific evidence of the traditional application of *T. crispa* and highlight its potential as a natural antioxidant candidate in the next generation of pharmaceutical and nutraceutical formulations. It is advisable that further research should be done using in-vivo models and compound isolation to enhance its therapeutic potential.

Keywords: *Tinospora crispa,* DPPH, antioxidant, phenolic compound, flavonoid.

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Abstract No.: PP-143

FROM CULTURE PLATES TO CRISPR: THE EVOLUTION OF RAPID DIAGNOSTICS IN MICROBIOLOGY

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The journey of microbiological diagnostics reflects one of the most transformative narratives in modern biomedical science. Beginning with the foundational culture techniques pioneered by Louis Pasteur and refined by Robert Koch, classical microbiology relied on phenotypic characterization, biochemical assays, and microscopy—approaches that, while definitive, were time-intensive and often delayed therapeutic intervention. The advent of molecular biology revolutionized this paradigm. The development of polymerase chain reaction (PCR) by Kary et. al. enabled exponential amplification of pathogen-specific nucleic acids, drastically reducing diagnostic turnaround times and improving sensitivity. Subsequent innovations in real-time PCR, multiplex assays, and next-generation sequencing (NGS) further enhanced pathogen detection, antimicrobial resistance profiling, and outbreak surveillance. The emergence of CRISPR-based diagnostics, building upon gene-editing discoveries by Jennifer et. al., represents a paradigm shift toward rapid, portable, and ultra-sensitive detection platforms such as SHERLOCK and DETECTR. These technologies combine specificity with minimal infrastructure requirements, facilitating point-of-care applications in resource-limited settings. From agar plates to programmable nucleases, the evolution of rapid diagnostics has redefined clinical microbiology—transforming infection control, antimicrobial stewardship, and pandemic preparedness. As integration with artificial intelligence and microfluidics accelerates, the future of microbiological diagnostics promises unprecedented speed, precision, and global accessibility.

Keywords: Rapid diagnostics; Culture methods; PCR; Next-generation sequencing; CRISPR; Point-of-care testing; Antimicrobial resistance; Clinical microbiology.

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Abstract No.: PP-144

COMPUTATIONAL SCREENING OF NOVEL 1,3,4-THIADIAZOLE DERIVATIVES AS DUAL INHIBITOR OF VEGFR 2 AND B-RAF

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Cancer, a complex and cluster of disease, one of the leading causes of deaths worldwide, posing a significant burden on global health. Despite having significant advances in radio therapeutical, immunological and drug therapy, severe toxicity and drug resistance cause major obstructions. Thus, there is an urgent need to develop novel cancer therapeutics. One promising strategy which has received a widespread attention in recent years for developing new molecule is drug repurposing. Here in the current study, we have investigated 1,3,4-thiadiazole nucleus as a multitarget anticancer agent due to its structural flexibility, in-vivo stability and diverse biological activity. We have prepared a library of 354 compounds of recent 1,3,4-thiadiazole derivatives which were previously explored for non-oncological indications, and evaluated through *in-silico* analysis using Auto dock vina against crystal structure of VEGFR 2 and B-RAF kinase protein (PDB ID: 4ASD, 1UWH respectively). The molecular docking demonstrated the favourable binding affinities ranging from -9.5 to -11.7 Kcal/mol towards the ATP-binding pockets of VEGFR 2, and B-RAF. Out of all compound 2-((5,6-diphenyl-1,2,4-triazin-3-yl)thio)-N-(5-(3-nitrophenyl)-1,3,4-thiadiazol-2-yl)acetamide (compound T9) has given promising activity towards VEGFR 2 and B-RAF with key hydrogen bonding towards Glu885, Asp1046 (VEGFR 2), Glu550, Asp503 (B-RAF) and hydrophobic interactions comparable to known inhibitors. Further study of pharmacokinetic profile using Swiss-ADME revealed acceptable drug-likeness, oral bioavailability, and low toxicity risks, supporting their pharmacokinetic feasibility. The results highlight 1,3,4-thiadiazole derivatives as promising dual VEGFR 2/B-RAF Kinase targeted anticancer agents, affirming further experimental validation.

Keywords: Cancer, 1,3,4-thiadiazole, VEGFR 2, B-RAF.

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FORMULATION STRATEGIES FOR PALBOCICLIB: ADVANCES, CHALLENGES, AND FUTURE PERSPECTIVES.

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Palbociclib is one of the most recent potential therapeutics for hormone receptor-positive human epidermal growth factor receptor 2 (HER2)-negative breast cancer because it acts as a selective cyclin-dependent kinase (CDK) 4/6 inhibitor. Apart from the drug's effectiveness in the clinic, the oral therapeutic significance of palbociclib is compromised by its physicochemical and pharmacokinetic attributes: poor aqueous solubility, low oral bioavailability, a substantial first-pass effect, and dose-related adverse reactions. These difficulties resulted in an improvement of new formulations or drug delivery systems (DDSs) of palbociclib to increase the therapeutic efficacy and patient adherence. This abstract is on a wide range of formulation approaches that we have looked at to solve biopharmaceutical issues related to palbociclib. We review traditional oral dose forms and also look in-depth at novel drug delivery systems, which include lipid-based carriers like solid lipid nanoparticles and nanostructured lipid carriers, polymeric nanoparticles, self-emulsifying drug delivery systems, solid dispersions and also other formulations are very much at the emergent stage. The literature commonly reports specific formulation parameters of the research being analysed, as well as evaluation techniques and performance results, providing a recent inclination toward nanocarrier and lipid delivery systems. Such novel formulations have been proven to enhance solubility and bioavailability, control the rate of drug release, and decrease systemic toxicity. Nevertheless, the issues of formulation stability, the large-scale manufacturing of the formulations, and the regulatory and clinical translation issues remain substantial. Further studies are needed on developing delivery systems, combination therapies, and personalized formulations for the optimization of palbociclib therapy.

Keywords: Palbociclib; CDK4/6 inhibitor; breast cancer; nanocarriers; lipid-based drug delivery; bioavailability.

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MONOCLONAL ANTIBODIES: PRECISION WEAPONS IN TARGETED THERAPY

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Monoclonal antibodies (mAbs) are laboratory-engineered immunoglobulins designed to mimic the specificity of the body's natural immune response. Since the pioneering hybridoma technology developed by Georges Köhler and César Milstein in 1975, monoclonal antibody research has evolved into a cornerstone of precision medicine. By originating from a single B-cell clone, mAbs selectively bind to defined molecular targets, enabling highly specific therapeutic interventions. This molecular precision distinguishes them from conventional cytotoxic therapies, such as chemotherapy, which often lack selectivity and cause widespread toxicity. In oncology, landmark antibodies such as trastuzumab and rituximab have demonstrated how selective targeting of HER2 receptors and CD20 antigens can significantly improve survival outcomes while minimizing off-target effects. Beyond cancer, monoclonal antibodies have transformed the management of autoimmune diseases, including rheumatoid arthritis and inflammatory bowel disease, and have shown efficacy in infectious diseases through neutralization of specific pathogens.

Mechanistically, mAbs exert therapeutic effects by blocking growth factor signaling, inducing antibody-dependent cellular cytotoxicity (ADCC), activating complement pathways, or serving as vehicles for conjugated drugs and radioisotopes. Despite their clinical success, challenges remain, including high production costs, immunogenicity, and access disparities. Advances in antibody engineering—such as humanized, fully human, and bispecific antibodies—continue to enhance efficacy and safety profiles. Collectively, monoclonal antibodies represent precision weapons in targeted therapy, redefining disease management through specificity, personalization, and improved therapeutic indices.

Keywords: Monoclonal antibodies, Targeted therapy, Precision medicine, Antibody engineering, Cancer immunotherapy, Autoimmune diseases, ADCC.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN PHARMACEUTICAL QUALITY ASSURANCE

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Artificial Intelligence (AI) is transforming Pharmaceutical Quality Assurance (QA) into a system that is less traditional, a testing-based system, but more intelligent and proactive than a system. The AI and machine learning during the Pharma 4.0 era can assist companies in manufacturing, monitoring, and controlling the quality throughout the process rather than merely testing the end product. This is used together with Quality by Design (QbD) and Real-Time Release Testing (RTRT). AI-based Process Analytical Technology (PAT) has the capability to monitor critical process parameters and critical quality attributes in real-time, thereby reducing human error and enhancing the quality of results. It will be able to detect potential equipment malfunction or process error before it occurs. This lowers batch failure, saves money, and enhances overall productivity. Pharmacokinetic behavior and drug-excipient interactions are predicted and recorded by AI to ensure compliance and avoid data manipulation. This will facilitate the shortening of development time and cost. Even though issues such as validation and regulatory acceptance remain, the pharmaceutical QA process is becoming more efficient, data-driven, and geared towards producing safe and effective medicines for patients all over the world.

Keywords: Artificial intelligence (AI); Quality by desing (QBD); Real-Time Relase Testing (RTRT); Process analytical technology (PAT); Quality Assurance (QA).

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Abstract No.: PP-148

HERBAL SUPPLEMENT AND POTENTIAL INTERACTION WITH PRESCRIPTION MEDICATION

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In recent years, many people have started using herbal medicines along with prescription drugs. They often think that herbal products are completely safe since they come from nature. However, herbal medicines have active chemical compounds that can interact with conventional drugs in the body. These interactions can make prescribed medicines less effective or raise the chance of harmful side effects. Herb-drug interactions can be broadly classified into two categories: pharmacokinetic interactions, which influence the absorption, metabolism, or excretion of a drug, and pharmacodynamic interactions, which affect the mechanism of action of a drug at its target site. For instance, Hypericum perforatum (St. John's Wort) may accelerate the liver enzymes involved in the metabolism of drugs, thus decreasing the efficacy of oral contraceptives and certain antidepressants. Ginkgo biloba and Allium sativum may enhance the risk of bleeding when co-administered with anticoagulant drugs. Likewise, Panax ginseng may affect blood sugar concentrations and interact with anti-diabetic medications. Therefor proper awareness, open communication between patient and healthcare professionals and careful monitoring are essential to prevent serious complications. While the fact is that many herbal drugs are safe, it should not be forgotten that herbal supplements are designed to be taken for a prolonged period of time, which gives sufficient opportunity for enzyme induction and other mechanisms of interaction to occur.

Keywords: Herb-drug interaction, Herbal medicine, Phytotherapy, Complementary medicine, Self-medication.

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Abstract No.: PP-149

BRAIN CHEMISTRY AND MOOD: THE NEUROTRANSMITTER BASIS OF DEPRESSION TREATMENT

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Major depressive disorder (MDD) is linked to impaired regulation of the monoaminergic and glutamatergic signals of cortico-limbic circuits that regulate affect, motivation and cognition. Schildkraut and Coppen in their studies had led to the monoamine hypothesis, which correlates a depressed symptomatology with the reduced transmission of serotonergic and noradrenergic, which have since been supported by the clinical efficacy of selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs). Drevets et al. in their study of neuroimaging and post-mortem assessments indicated a change in the receptor density and transporter activity in prefrontal and limbic areas and decrease in neuroplasticity. The neurotropic model suggested by Duman and Monteggia emphasizes decreased brain- derived neurotrophic factor (BDNF) signalling and atrophy of synapses, and the enhancement of synaptogenesis and functional recovery by antidepressant therapies. Kristal et al. in their study have involved glutamatergic dysregulation. The rapid antidepressant action of NMDA receptor antagonists like ketamine indicated neural deficiencies caused by stress can be reversed by modulating excitatory transmission and downstream mTOR-dependent synaptic remodelling. Coalescing data also indicates the involvement of inflammatory mediators and hyperactivity of the hypothalamic-pituitary-adrenal (HPA) axis in the determination of neurotransmitter functionality and response to treatment. All these studies have suggested that monoamine balance, synaptic plasticity and network connectivity interrelate to establish mood state. This resent work will guide precision therapeutics which aims to activate or inhibit particular neurotransmitter pathways and plasticity mechanism to promote faster and lasting interventions in MDD.

Keywords: major depressive disorder; monoamine neurotransmitters; glutamatergic signalling; neuroplasticity.

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Abstract No.: PP-150

CARBOPLATIN-LOADED PLGA NANOPARTICLES FOR ENHANCED BRAIN CANCER THERAPY

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Glioblastoma Multiforme (GBM) is one of the most aggressive and deadly forms of brain cancer because it proliferates very rapidly, resists treatment with traditional therapies, and does not respond well to drugs that penetrate the blood-brain barrier. Carboplatin is potent in anticancer activity; however, it shows systemic toxicity and low blood-brain penetration. The present study aims to prepare and evaluate a novel polymeric nanoparticle drug carrier system for brain-targeted delivery of carboplatin as an attempt to target GBM. Poly(lactic-co-glycolic acid) (PLGA) was selected as the polymer due to its sustained-release property, biodegradability, and biocompatibility. The nanoparticles were produced by the modified nanoprecipitation or emulsion technique and optimized for their drug encapsulation efficiency, particle size, zeta potential and polydispersity index (PDI). To evaluate the sustained-release properties of the drug-entrapped nanoparticles, in vitro drug release studies were conducted. Several complementary analyses, such as FTIR, DSC, XRD, and SEM studies, confirmed the structural stability of the nanoparticles as well as verified their morphology. Excellent loading capacity and sustained controlled release, confirming that it is more stable and has a greater ability to transport drugs across the BBB by the nano-dimensional particles. In summary, carboplatin-loaded polymeric nanoparticles are a potential nanotechnological approach for enhancing the therapeutic efficacy of glioblastoma treatment.

Keywords: Glioblastoma multiforme; Carboplatin; PLGA nanoparticles; Blood–brain barrier; Targeted drug delivery.

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Abstract No.: PP-151

TRANSDERMAL DRUG DELIVERY SYSTEMS

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The effective administration of medication occurs through transdermal drug delivery systems (TDDS), which provide discrete dosages that deliver drugs into circulating blood at predetermined rates, and maintain compatibility in performing continuous pharmacological effects when administered to undamaged skin. The structure and function of the skin provide multiple means for drug absorption; there are 10-70 hair follicles and 200-250 sweat pores per cm2 of skin, providing alternative avenues of access to the skin for drugs, along with the good permeability characteristics associated with skin. The skin has been recognized as a route of drug administration for quite some time, and while the skin will provide a means of drug transfer, the stratum corneum of the skin continues to pose a barrier to drug permeation. The use of this route of administration has many advantages, such as avoiding the first pass effect, improved bioavailability, improved patient adherence, maintenance of steady state blood levels of the drug, and administration of the drug is non-painful. Also, they have an easy application and easy removal in case of toxicity. The pathways of drug penetration into the skin are intercellular, through cutaneous cells, and trans appendageal. After exiting a transdermal patch, delivery of an active substance through the skin involves passing through multiple layers of interface and overcoming the skin's outer barrier (stratum corneum). The most significant limitation to delivering drugs through the skin is the barrier created by the stratum corneum. Therefore, to achieve drug permeation through the skin, physicians have developed many techniques to enhance drug delivery by using perforating agents.

Keywords: Transdermal drug delivery system; Patch components; Absorption routes; Bioavailability; Skin.

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Abstract No.: PP-152

SOLID DISPERSION OF CARBAMAZEPINE FOR MODIFYING ITS SOLUBILITY

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Carbamazepine (CBZ) is an anticonvulsant and mood-stabilizing medication commonly prescribed for epilepsy, trigeminal neuralgia, and bipolar disorder. CBZ is having poor aqueous solubility, although the reported bioavailability is 75-80% from existing marketed formulation, the bioavailability may be erratic due to low and dissolution limited absorption. The reported dose of CBZ is varying from 100 mg to 400 mg depending on the diseases condition and multiple dose administration is required. This work focused to prepare sustained release formulation of CBZ after modifying the solubility by solid dispersion and method to reduce dose and dosage frequency. Thus, a reduction of heavy exposure this potent drug hence associated side effect (dizziness, drowsiness etc.) may be reduced as the maintenance dose that usually required throughout the epilepsy treatment (800-1200 mg/day). The hypothesis is based on increase of solubility and hence reduction of dose with sustaining the drug effect. So, the solid dispersion method is carried out by mixing the drug CBZ with different solvents (acetonitrile, methanol, ethanol, water etc.) and the SEM was also executed, thus the solubility of the drug is improved in certain solutions only and other evaluation test will be carried out to check whether the solubility and bioavailability is improved or not. Further the dissolution study will compare with the marketed CBZ formulation to investigate our formulation to justify the reduction of dose and dosage frequency.

Keywords: Solid dispersion, Solubility enhancement, Dissolution study, Bioavailability improvement, Sustained release formulation.

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IN VITRO MICROPROPAGATION AND PRODUCTION OF SECONDARY METABOLITES FROM *SOLENSTEMON SCUTELLARIOIDES*

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Solenostemon scutellarioides (*Coleus blumei* Benth.) is a plant belonging to the Lamiaceae family that has been exploited as an ornamental plant and medicinal herb valued for its rich phytochemical composition and therapeutic potential. This review assimilates the information in the years 2011 to 2025 about the micropropagation, elicitation of secondary metabolites, and phytochemical analysis of *S. scutellarioides*. In vitro regeneration techniques were optimized using Murashige and Skoog (MS) medium with cytokinins (BAP, 2-iP, kinetin) and auxins (NAA, IAA, IBA) with the highest shoot proliferation (1.5 mg/L concentration of BAP) and root formation on hormone-free medium. Precursor feeding approaches greatly improved rosmarinic acid (RA) yield, with significant increases achieved for L-phenylalanine and L-tyrosine, showing synergistic effects of up to 3.1-fold. Combinations of IBA, BAP, and GA_3 increased biomass and RA yield, while changes in polyamine and sucrose concentrations affected metabolite synthesis. Phytochemical analysis confirmed the presence of alkaloids, flavonoids, sterols, and saponins, which showed strong antioxidant activity, especially in ethyl acetate fractions. The use of synthetic seed technology further aided in the conservation of superior clones. In conclusion, the above-mentioned studies emphasize the current biotechnological approaches being developed for the large-scale propagation and increased production of bioactive compounds in *S. scutellarioides*, thus establishing the importance of this species in the pharmaceutical industry.

Keywords: *Solenostemon scutellarioides,* Rosmarinic acid, micropropagation, in vitro.

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Abstract No.: PP-154

BIOAUGMENTATION POTENTIAL OF GRAM-POSITIVE AND GRAM-NEGATIVE BACTERIA FOR METHYLENE BLUE DEGRADATION

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Industrial discharge of synthetic dyes such as methylene blue (MB) poses serious environmental concerns due to their persistence and toxicity. Biological treatment using dye-degrading bacteria offers a cost-effective and eco-friendly alternative to conventional methods. The present study aimed to evaluate the bioaugmentation potential of *Escherichia coli*, *Bacillus subtilis*, and *Staphylococcus aureus* for MB degradation under aerobic conditions. Initial qualitative screening was performed on Nutrient Agar plates supplemented with 50 µg/mL MB to observe dye decolorization, followed by quantitative analysis in Nutrient Broth containing 50 µg/mL MB. Dye degradation was determined spectrophotometrically by measuring the reduction in absorbance at the characteristic wavelength of MB, and percentage decolorization was calculated relative to an uninoculated control. All three isolates demonstrated significant dye-degrading ability. At 50 µg/mL MB, S. aureus showed the highest decolorization (67.94%), followed by E. coli (59.72%) and B. subtilis (55.50%), whereas the control showed no degradation. For concentration-dependent assessment (10–400 µg/mL MB), one Gram-negative (*E. coli*) and one Gram-positive (*B. subtilis*) strain were selected. E. coli exhibited maximum degradation of 50.56% at 25 µg/mL, with efficiency decreasing at higher concentrations. In conclusion, the findings indicate that these bacterial strains possess promising bioaugmentation potential for MB removal, particularly at lower dye concentrations, highlighting their applicability in sustainable wastewater treatment strategies.

Keywords: Methylene Blue, Dye degradation, Bioaugmentation, *Escherichia coli*, *Bacillus subtilis*.

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Abstract No.: PP-155

INSECT OLFACTORY RECEPTORS AS NATURAL BIOSENSORS FOR EARLY CANCER DIAGNOSIS

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Insects possess extraordinarily sensitive olfactory systems capable of detecting a vast array of volatile organic compounds (VOCs) at trace concentrations, a capability that has inspired the development of biologically based chemical sensors. Recent research demonstrates that cancer cells alter metabolic processes, leading to distinct VOC emission profiles that can serve as early biomarkers of disease. In this context, insect olfactory receptors (ORs) and associated neural circuits have emerged as promising natural biosensing elements for non-invasive cancer detection. In vivo studies using locust antennal lobe neurons have shown that VOCs emitted by oral cancer cell cultures elicit unique spatiotemporal neural response patterns, enabling discrimination between cancerous and non-cancerous samples without extensive behavioural training regimes traditionally required for animal olfaction models. This approach leverages the intrinsic sensitivity and specificity of insect ORs and neural coding mechanisms to generate "olfactory fingerprints" for multiple cancer types. Complementary efforts in bio-electronic integration exploit heterologous expression of insect OR proteins in engineered platforms such as field-effect transistors and nanodisc interfaces, yielding selective electrical responses to targeted VOC ligands with femtomolar detection limits. These biohybrid and biomimetic strategies capitalize on the evolutionary optimization of insect chemoreception to achieve high-precision VOC sensing, with potential applications in breath-based and ambient cancer diagnostics. Despite challenges in scalability and receptor-ligand mapping, harnessing insect olfactory biology offers a compelling route toward early, rapid, and cost-effective cancer screening technologies.

Keywords: Insect Olfactory Receptors, Volatile Organic Compounds, Biosensors, Early Cancer Diagnosis

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GREEN SYNTHESIS OF STABLE METAL NANOPARTICLES USING *SARCOCHLAMYS PULCHERRIMA* AND THEIR CONCENTRATION-DEPENDENT ANTIMICROBIAL ACTIVITY

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Antimicrobial resistance has become a global health crisis, necessitating the search for new, safer, and inexpensive therapeutic options. Green synthesis of metal nanoparticles through plants has been receiving attention as an eco-friendly alternative to orthodox methods, but many medicinal plants remain unexplored in this regard, despite their traditional use. This study was done to developed a rapid green synthesis of metal nanoparticles using *Sarcochlamys pulcherrima* an ethnomedicinal plant traditionally used by the tribals of Northeast India in treating infections leaf extract. Leaf extract of *S. pulcherrima* was prepared and mixed with metal salt solution under controlled conditions. Characterization of nanoparticles was done by UV-Vis analysis to confirm synthesis, SEM to identify size and shape, and Zeta potential to analyze stability. Characterization studies confirmed that the nanoparticles were successfully formed and had a uniform size and shape. The nanoparticles showed a high degree of stability. The antimicrobial potential of the biosynthesized nanoparticles against pathogenic microbial strains was tested using standard microbiological methods. This was in line with the concentration-dependent bactericidal effect against organisms tested for. These results indicate that *Sarcochlamys pulcherrima* leaf extract can effectively produce metal nanoparticles with optimal stability and consistent shape. The nanoparticles exhibit significant antimicrobial properties and effectively eradicate pathogenic microbes at a specific concentration.

Keywords: Green synthesis; *Sarcochlamys pulcherrima*; metal nanoparticle; antimicrobial potential.

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pH - RESPONSIVE FLOATING IN SITU GEL OF DOMPERIDONE

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Domperidone is a peripheral dopamine (D_2) receptor antagonist mainly used as an antiemetic and prokinetic agent. It belongs to the BCS class II drug. It promotes gastrointestinal peristalsis, and it causes prolactin release. The solid oral dosage form of domperidone often creates problems swallowing, particularly in paediatric and geriatric patients with short gastric residence time with frequent dosing. The bioavailability of domperidone can be reported up to 13-17%. The prepared in-situ gel formulation helps to overcome these problems, which helps to improve gastric retention and improve bioavailability with better patient compliance. The formulation was developed using different excipients (sodium alginate, HPMC K100M, etc.) as per the literature survey. The prepared formulation exists as a liquid prior to administration but undergoes sol-to-gel transformation when exposed to the stomach environment with its acidic pH. The scope of this study was to create an in-situ forming, biodegradable gel system that would reside in the stomach for a relatively long time and provide sustained drug release. The formulations were evaluated with respect to parameters like pH, consistency, floating properties, gelling capacity and release kinetics. The findings indicated that the optimal sodium alginate combination allowed for regulated drug delivery over a span of 12 hours. FTIR spectroscopy verified that the medication and chosen polymers are chemically compatible. The dissolution test also shows the sustained release results. Hence, the developed formulation may be an alternative to the existing market tablet.

Keywords: Domperidone, Sodium alginate, HPMC K100M, Floating In situ gel, Sustained release.

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Abstract No.: PP-158

MOLECULAR MECHANISMS OF ANTIBIOTIC RESISTANCE IN BACTERIA

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Antibiotic resistance has been linked as one of the most significant challenges in contemporary drug, undermining the earnings of the once several decades. Bacteria have developed various complex mechanisms to repellent antimicrobial agents at molecular position. The first medium is the enzymatic inactivation of antimicrobial agents, for illustration, the product of β-lactamases, which hydrolyze the β- lactam ring of antibiotics. Different way to the revision of the target point, which showing mutations in the inheritable material of the bacteria or the use of enzymes that modify the list point of the antibiotic, which reducing its affinity. Bacteria also reduce the intracellular attention of antibiotics by dwindling membrane permeability and adding the exertion of efflux pumps that laboriously remove antibiotics from the bacterial cell. Another medium is vertical gene transfer, which involves metamorphosis, transduction, and conjugation of bacteria. Biofilm conformation is also another medium that bacteria use to increase resistance by creating a defensive terrain around the bacteria that limits the penetration of antibiotics. Molecular knowledge of these mechanisms is critical for the development of new remedial approaches and effective operation strategies.

Keyworld: Efflux pumps, Horizontal gene transfer, Target site modification, Bacterial defense mechanisms, Intracellular antibiotic concentration.

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Abstract No.: PP-159

A STUDY OF PHYTOCHEMICALS HAVING ANTI SKIN CANCER ACTIVITY

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Skin, the largest human organ, protects against environmental factors, noxious agents, and ultraviolet radiation. Prolonged exposure to these stresses can lead to skin cancer, including melanoma (MSC) and non-melanoma skin cancers (NMSC). According to GLOBOCAN 2022, approximately 331,700 new melanoma cases and 1.23 million NMSC cases occur annually worldwide, causing over 58,000 and 69,000 deaths, respectively. In India, incidence rates are lower than in Western countries. Standard treatments for skin cancer include surgery, radiotherapy, chemotherapy, targeted therapies, and immune checkpoint inhibitors. Targeted drugs such as BRAF and MEK inhibitors and immunotherapies like nivolumab and pembrolizumab have improved survival rates significantly. However, these treatments often cause dermatologic toxicities, including rashes, dry skin, itching, and, rarely, severe reactions like Stevens–Johnson syndrome, which can limit their use and reduce quality of life. These challenges have sparked interest in phytochemicals—plant-derived compounds like polyphenols, flavonoids, terpenoids, and carotenoids—as safer chemopreventive and adjunctive agents. In this study various plants sources are discussed to understand their effectivity against skin cancer. Molecules such as curcumin, resveratrol, quercetin, epigallocatechin gallate, and genistein show promise by inhibiting cancer cell proliferation, inducing apoptosis, suppressing angiogenesis and metastasis, and modulating key signaling pathways (e.g. MAPK/ERK, PI3K/Akt/mTOR, STAT3), often with low toxicity to normal skin cells. Despite strong preclinical evidence, more clinical trials are needed to improve delivery methods, bioavailability, and validate the efficacy of phytochemicals before they can be integrated into standard treatment protocols.

Keywords: Skin cancer, melanoma, BRAF pathway, Akt pathway.

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Abstract No.: PP-160

INTEGRATION OF ARTIFICIAL INTELLIGENCE IN COMPUTATIONAL DRUG DESIGN AND DEVELOPMENT

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AI is essential for target identification, molecular docking, virtual screening, quantitative structure–activity relationship (QSAR) modelling, and pharmacokinetic and toxicity profile prediction. Highly sophisticated algorithms are capable of effectively predicting drug-drug interactions, optimizing lead compounds, and analyzing protein-ligand interactions. Precision medicine and the development of customized therapies are further improved by integration with cheminformatics and bioinformatics tools. By increasing drug discovery speed, cutting costs and increasing success rates, the incorporation of Artificial Intelligence (AI) into computational drug design has completely changed the pharmaceutical research environment. Traditional drug development takes a long time and costs a lot of money; it frequently takes more than ten years. Machine learning, deep learning, and neural networks are examples of AI-driven techniques that allow for the quick analysis of sizable biological and chemical datasets in order to more accurately identify possible drug candidates.

Additionally, AI helps with drug repurposing by discovering new uses for already-approved medications, significantly reducing development time. AI continues to make computational drug discovery faster, more reliable, and more cost-effective despite challenges like data quality, interpretability, and regulatory issues.

Keywords: Artificial Intelligence, Computational Drug Design, Machine Learning, Virtual Screening, Drug Discovery, QSAR, Molecular Docking.

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Abstract No.: PP-161

COLON SPECIFIC DELIVERY OF SODIUM BUTYRATE

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Sodium butyrate, a microbiota-derived short-chain fatty acid, exhibits significant anti-inflammatory and epigenetic activity through histone deacetylase (HDAC) inhibition and suppression of pro-inflammatory mediators such as NF-κB, TNF-α, and IL-6. Despite its therapeutic potential in inflammatory bowel disease (IBD) and colorectal disorders, its clinical utility is limited by rapid upper gastrointestinal absorption, short half-life, and instability. This study aimed to design and evaluate a colon-targeted delivery system for sodium butyrate employing pH-sensitive methacrylic acid copolymers in combination with enzyme-degradable polysaccharides to achieve site-specific drug release. Formulations were developed to resist gastric (pH 1.2) and small intestinal (pH 6.8) conditions while facilitating targeted release in simulated colonic fluid (pH 7.4). In vitro dissolution studies were performed sequentially to mimic gastrointestinal transit.

The optimized formulation demonstrated minimal release in gastric and intestinal conditions, followed by sustained release in colonic pH. This targeted strategy enhances localized drug availability, reduces systemic exposure, and represents a promising approach for the effective management of inflammatory colonic diseases.

Keywords: Sodium butyrate, Colon-targeted delivery, IBD, HDAC inhibition, pH-dependent polymers, Controlled release.

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Abstract No.: PP-162

NEUROINFLAMMATION AS A THERAPEUTIC TARGET IN ALZHEIMER'S DISEASE: A PHARMACOLOGICAL PERSPECTIVE

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Alzheimer's disease (AD) – is a worsening brain illness, the leading reason for dementia globally, associated with erratic behaviour, memory impairment and declining mental powers. The disease can be detected by tau neurofibrillary tangles within brain cells and amyloid- β plaques surrounding cells, which disrupts connection between neurons and kills neurons over time. Present drug treatments- NMDA receptor blockers and cholinesterase inhibitors merely alleviate symptoms, and do not halt the illness getting worse. Recent data suggests that neuroinflammation might be an important factor in the development of AD and not solely a consequence. Misfolded amyloid-β plaques and abnormal tau accumulate, and via pattern recognition receptors, activate astrocytes and microglia, initiating a prolonged innate immune response. The persistent activation of glial cells causes a surplus release of pro-inflammatory cytokines, including interleukin-1, interleukin-6, and TNF-α, while also activating critical signalling pathways such as NF-κB and the NLRP3 inflammasome. Long-term neuroinflammation results in tau hyperphosphorylation, enhances oxidative stress, disturbs synaptic remodelling and plasticity, and starts a self-perpetuating cycle of neuronal damage. Research on genes strengthens this connection by identifying in instances of AD occurring without a definite family background genes linked to the immune system, particularly TREM2 and CD33. Consequently, the most beneficial methods for developing medications aimed at treating the disease, which seek to alter or stop the progression of Alzheimer's Disease (AD), depend on inflammatory agents, transforming microglial activity, and inhibiting inflammasome signalling.

Keywords: Neuroinflammation, microglia, astrocytes, pro-inflammatory cytokines, NLRP3 inflammasome, inflammasome signalling.

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Abstract No.: PP-163

INDOLE SIGNALLING IN *ESCHERICHIA COLI*: A TARGET FOR ANTIVIRULENCE THERAPY?

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The pathogenic *Escherichia coli* are the primary causes of many intestinal and extra intestinal diseases, including septicaemia, diarrhoea, and urinary tract infections in both humans and animals. The necessity of alternative therapeutic approaches is highlighted by the increased scope of the occurrence of antimicrobial resistance caused by the overuse and mis-prescription of antibiotics which has complicated the treatment process. Antivirulence therapy has turned into an encouraging strategy since it has come to pass as a way of trying to minimize the pathogenicity of bacteria without necessarily killing the bacterium, and this will thereby prevent resistance development. Indole is a tryptophan-derived signaling molecule that is a quorum-sensing molecule as a mediator of a group of physiological and virulence-related responses of *E. coli.* As it has been studied, indole signaling may cause the changes of gene expression in the locus of enterocyte effacement (LEE) pathogenicity island and the development of biofilms, motility, and the adhesion to host cells. In response to this important virulence factor, indole may reduce the ability of pathogenic strains of *E. coli* to colonize and transmit disease.

Keywords: Indole signaling, *Escherichia coli*, Antivirulence therapy, Quorum sensing, Biofilm inhibition, Antibiotic resistance

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Abstract No.: PP-164

TRADITIONAL KNOWLEDGE MEETS MODERN SCIENCE: VALIDATING SDDHA MEDICINAL PLANTS FOR CANCER TREATMENT THROUGH ETHNOPHARMACOLOGICAL SURVEY ON TRADITIONAL HEALERS

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The Siddha medical system of India holds ancient ethnopharmacological knowledge, especially in cancer therapies using medicinal plants. This work combines traditional knowledge with contemporary science by documenting anticancer plant species utilized by Siddha practitioners in Chengalpattu Taluk, Tamil Nadu. Interviewing 32 practitioners produced information on the names of plants (including the vernacular names), the active parts, the cancers treated, and the preparations used. Quantitative indices: Fidelity Level (FL), Use Value (UV), and Relative Frequency of Citation (RFC) were utilized to assess their importance. A total of 60 unique species were documented, of which the most frequently referred to were Catharanthus roseus, Annona muricata, and Plumbago indica. These were used to treat a variety of cancers, including breast, liver, and leukemia, and were used irrespective of anatomical location. Often, their claims are now corroborated by contemporary pharmacological evidence, which has variable but existing support for the phytochemicals vincristine, vinblastine, acerogenins, and plumbagin where there are demonstrated cytotoxicity, antioxidant, and immunomodulatory properties. This integrative approach highlights the significance of Indigenous therapies in current cancer research and underscores the importance of sustainable harvesting and clinical science. Documentation not only preserves culture; it also leads to new ways of thinking about drug development. Future in vitro and in vivo studies should occur to demonstrate whether these compounds have therapeutic efficacy and can enhance conventional treatments or work synergistically with them. This work illustrates the potential of combining traditional medical practices with biomedical innovation.

Keywords: Siddha medicine, Ethnopharmacology, Traditional healers, phytochemical analysis, anticancer activity.

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PHARMACEUTICAL DEVELOPMENT AND IN-VITRO EVALUATION OF IMMEDIATE-RELEASE TABLETS CONTAINING CANAGLIFLOZIN

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Type 2 diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycaemia due to inadequate insulin secretion or action. Canagliflozin, a sodium–glucose co-transporter 2 (SGLT2) inhibitor, is an effective and safe antidiabetic agent with a half-life of approximately 10.6 hours. The present study aimed to design, characterize, and evaluate an immediate-release tablet formulation of canagliflozin to achieve rapid onset of action and improved glycaemic control in emergent clinical conditions. The drug was subjected to analytical characterization including thin-layer chromatography, UV spectroscopy, infrared spectroscopy, melting point determination, and drug–excipient compatibility studies. The formulation was prepared using the wet granulation technique. Analytical evaluation revealed that canagliflozin is soluble in ethanol and insoluble in water, with an Rf value of 0.44, maximum absorbance at 289 nm, and a melting point of 98°C. Infrared studies confirmed the compatibility of the drug with selected excipients. The immediate-release formulation demonstrated favourable characteristics, supporting rapid drug release, enhanced bioavailability, and better patient compliance. Overall, the study concludes that converting canagliflozin into an immediate-release tablet is a promising approach to optimize its therapeutic efficacy in the management of type 2 diabetes mellitus.

Keywords: Type 2 diabetes mellitus; Canagliflozin; Immediate-release tablet; Wet granulation; Drug–excipient compatibility; Bioavailability.

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Abstract No.: PP-166

ANTIMICROBIAL AND ANTIBACTERIAL EFFECT OF MARIGOLD LEAF (*TAGETES ERECTA*)

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Marigold leaf (*Tagetes erecta*) extract, mainly sourced from Tagetes species, exhibits significant antimicrobial and antibacterial properties, serving as a potent natural agent against various harmful pathogenic bacteria. Phytochemical analysis indicates that these extracts are rich in bioactive compounds, including flavonoids, tannins, saponins, alkaloids, and phenolics. The antibacterial action is most marked against Gram-positive bacteria, such as Staphylococcus aureus, Bacillus subtilis, and MRSA (Methicillin-resistant Staphylococcus aureus), but it also proves effective against Gram-negative bacteria like Escherichia coli and Klebsiella pneumoniae. Studies using agar well diffusion assays reveal that the extract generates clear inhibition zones, indicating its effectiveness in disrupting bacterial growth. The antimicrobial mechanism involves these bioactive compounds disrupting the cytoplasmic membrane, causing lysis, and inhibiting bacterial protein synthesis. The extracts are especially effective against bacteria that cause skin infections, such as acne & dermatitis. This showcases their potential in the progression of natural antiseptics, medicinal pastes for wounds, or as an active ingredient in cosmetic products. In addition to its antibacterial effects, marigold leaf extract has shown antifungal effectiveness against organisms like Candida albicans. The concentration-dependent activity makes it a promising, sustainable, and eco-friendly alternative to synthetic antibacterial agents.

Keywords:- *Tagates erecta*; Antimicrobial activity; Antibacterial activity; Phytochemical analysis; Gram-positive bacteria; Gram-negative bacteria.

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Abstract No.: PP-167

MEDICAL DEVICE: PACEMAKER

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Pacemaker is a small implantable device that regulates abnormal heart rhythms by delivering controlled electrical impulses to the myocardium. It is mainly used in bradyarrhythmias such as atrioventricular (AV) block, sick sinus syndrome, and other conduction disorders that impair the heart's ability to sustain adequate rate and rhythm. Pacemaker therapy becomes necessary when intrinsic cardiac activity fails to maintain sufficient cardiac output, leading to symptoms like syncope, dizziness, fatigue, or heart failure. Conduction block often results from ischemic heart disease, myocardial infarction, infections, or drug effects. These conditions disrupt impulse generation or transmission from the sinoatrial node through the AV node and His–Purkinje system, causing delayed or absent ventricular activation. Pacemakers function by sensing intrinsic cardiac activity and delivering electrical stimuli when the heart rate drops below a programmed threshold. Modern devices include a pulse generator and leads placed in cardiac chambers, with advanced features such as rate responsiveness, dual-chamber synchronization, and programmable modes to mimic physiological function. Evaluation involves symptom review, ECG, device interrogation, A chest radiography, and follow-up for battery life and lead integrity. Pacemakers provide significant benefits, including symptom relief, improved quality of life, prevention of sudden cardiac arrest, and enhanced efficiency. Despite these limitations, technological advances have improved safety, reliability, and outcomes, making pacemakers essential in managing conduction disorders.

Keywords: Pacemaker, Atrioventricular (AV) block, cardiac output, myocardium, conduction system disorder.

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Abstract No.: PP-168

REWIRING THE DEPRESSED BRAIN: PSYCHEDELIC-ASSISTED THERAPY IN TREATMENT-RESISTANT DEPRESSION

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Treatment-resistant depression (TRD) is a significant clinical issue. The traditional monoaminergic therapies have a low effectiveness rate. Psychedelic-assisted therapy (PAT), and psilocybin has become a promising form of intervention that can quickly decrease the symptoms of depression and increase psychological flexibility. Carhat-Harris et al. in 2012 and 2017 in two different studies showed that psilocybin temporarily reduces the activity and connectivity of the default mode network (DMN), which is frequently linek with depression. This also integrates the global brain networks, involved in cognitive and emotional rewriting. More recent study done by Davis et al. in 2021 concluded that randomized and open labelled trials indicated positive and long-lasting symptom changes of TRD. Ly et al. in another study related to this concluded that psychedelics, mechanistically, are the prime 5-HT2A receptor agonists, facilitating synaptic plasticity and dendritic spine proliferation in animal models. Although safety in all controlled environments is positive, important questions still need to be answered as far as optimal dosing, effect duration and comparative effectiveness. Together the existing evidence provides an idea that PAT is an intervention with neurobiological informed fast acting intervention, which interacts with neural circuits and a sense making in TRD.

Keywords: Treatment-resistant depression, brain, psychedelic-assisted therapy, emotional.

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Abstract No.: PP-169

NEW ERA OF EFFECTIVE PHARMACEUTICAL MANUFACTURING WITH ARTIFICIAL INTELLIGENCE

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Artificial Intelligence has emerged as a transformative force in pharmaceutical manufacturing. It is fundamentally reshaping operational efficiency and quality control standards. The technology enables real-time monitoring of complex manufacturing processes, predictive maintenance of equipment, and automation of routine tasks that previously required extensive human intervention. As the manufacturing of medicines has increased to thousands of units per day, it is unlikely for a human eye to detect defects among them. So, for maintaining the stringency in quality of products, AI powered machines are manufactured. This study focuses on practical implementation platforms, including Cognex Corporation's comprehensive machine vision portfolio, Syntegon's AIM 5 syringe inspection system, and IMA's Sentinel-lyo cloud platform. These technologies collectively address critical manufacturing challenges through automated defect detection, real-time process monitoring, and enhanced quality control mechanisms. Organizations leverage cloud infrastructure, Internet of Things sensors, and machine learning algorithms to create interconnected manufacturing ecosystems. This connectivity enables data-driven decision-making at unprecedented scales, transforming supply chain management and resource allocation across global operations. Case studies from industry leaders including Pfizer, GSK, Sanofi, and Janssen demonstrate tangible benefits. Cycle times decrease significantly while production capacity increases. The product quality improvements occur simultaneously with cost reductions. AI-powered vision systems detect microscopic defects in tablets, syringes, and packaging with accuracy exceeding manual inspection capabilities. These systems operate continuously without fatigue, ensuring consistent stringency in pharmaceutical product quality. The investment in AI capabilities represents not merely technological advancement but strategic necessity for mushrooming demands in the modern pharmaceutical field.

Keywords: AI, IMA, AIM.

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Abstract No.: PP-170

EXPLORING VARIOUS ANTI-OBESITY HERBAL COMPOUNDS THROUGH NETWORK PHARMACOLOGY

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Obesity has emerged as a global metabolic epidemic characterized by excessive adipose tissue accumulation and chronic low-grade inflammation. Despite advances in pharmacotherapy, most conventional anti-obesity drugs target single molecular pathways and are often associated with modest efficacy and adverse effects. In recent years, network pharmacology—an integrative approach combining systems biology, bioinformatics, and pharmacology—has been increasingly recognized as a transformative paradigm in multi-target drug discovery, as highlighted in the pioneering frameworks proposed by Hopkins and further expanded by Li and colleagues in traditional medicine research. In this study, a network pharmacology strategy was employed to systematically investigate herbal compounds with potential anti-obesity effects. Active phytoconstituents were retrieved from the Traditional Chinese Medicine Systems Pharmacology (TCMSP) database and other chemical repositories. Compound–target–pathway networks were constructed using Cytoscape, and protein–protein interaction (PPI) analysis identified critical hub genes involved in metabolic regulation. Key bioactive compounds, including berberine, curcumin, epigallocatechin gallate (EGCG), and ginsenosides, demonstrated significant interactions with central metabolic regulators such as AMPK, PPAR-γ, leptin, adiponectin, and TNF-α. Pathway enrichment analysis revealed modulation of AMPK signaling, PPAR signaling, insulin resistance pathways, lipolysis, and thermogenesis. Collectively, these findings underscore the multi-component and multi-target nature of herbal medicines and provide mechanistic insights into their synergistic anti-obesity potential. This systems-level framework supports the rational development of safer, plant-derived therapeutics and offers a foundation for experimental validation and clinical translation.

Keywords: Network pharmacology; Obesity; Herbal medicine; AMPK signaling; Multi-target therapy; Natural compounds; Systems biology; Drug discovery.

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PREPARATION AND EVALUTION OF MYCOPHENOLATE MOFETIL DISPERSIBLE TABLET

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Mycophenolate mofetil is an immunosuppressive agent. It is used to prevent organ transplant rejection and maintain autoimmune diseases. Conventional tablets may cause swallowing difficulties in pediatric and geriatric patients, reducing treatment compliance. The study aims to prepare and evalute Mycophenolate Mofetil dispersible tablets to improve ease of administration and enhance drug release. The tablets were formulated using wet granulation method with suitable superdisintegrants to get rapid dispersion. Pre-compression parameters such as bulk density, tapped density and angle of repose were evaluated to ensure good flow properties, while post-compression studies included hardness, friability, weight variation, drug content, dispersion time and in-vitro dissolution testing. The optimized formulation showed satisfactory physicochemical properties, rapid dispersion and improved dissolution profile within pharcopeial limits. The developed dispersible tablet formulation may enhance patient compliance, provide faster drug release and serve as an effective alternative to conventional dosage forms.

Keywords: Mycophenolate Mofetil, Dispersible Tablet, Superdisintegrants, Wet Granulation, Immunosuppressive agent.

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Abstract No.: PP-172

SELF-EMULSIFYING DRUG DELIVERY SYSTEMS (SEDDS): ENHANCING LIPOPHILIC DRUG ABSORPTION

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The growing prevalence of poorly water-soluble drug candidates emerging from modern drug discovery has intensified the need for innovative oral delivery strategies. Self-Emulsifying Drug Delivery Systems (SEDDS) have emerged as a robust lipid-based platform to enhance the bioavailability of lipophilic compounds, particularly Biopharmaceutics Classification System (BCS) Class II and IV drugs. SEDDS are isotropic mixtures of oils, surfactants, and co-surfactants or co-solvents that spontaneously form fine oil-in-water emulsions under gentle gastrointestinal agitation, eliminating the need for external energy input. Pioneering work by Pouton and co researchers established the mechanistic foundation of lipid-based formulations, highlighting improved solubilization, increased interfacial surface area, and facilitation of lymphatic transport as key determinants of enhanced absorption. Subsequent investigations by Humberstone, Charman, and others further elucidated the role of in vitro lipolysis models in predicting in vivo performance. Beyond improving dissolution kinetics, SEDDS protect labile drugs from enzymatic degradation and mitigate first-pass hepatic metabolism, thereby stabilizing plasma drug concentrations. Despite their therapeutic promise, challenges such as drug precipitation upon dilution, limited drug loading, and long-term physicochemical stability remain critical formulation considerations. Advanced characterization tools—including droplet size analysis, zeta potential measurement, and dynamic dispersion studies—are essential for rational optimization. Collectively, SEDDS represent a clinically translatable and patient-friendly strategy that bridges solubility limitations and therapeutic efficacy, reinforcing their significance in contemporary oral drug delivery research.

Keywords: Self-Emulsifying Drug Delivery Systems; Lipid-based formulations; Oral bioavailability; BCS Class II drugs; Lymphatic transport; In vitro lipolysis; Drug solubilization.

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FORMULATION OPTIMIZATION OF PIOGLITAZONE TABLETS AND ANALYTICAL METHOD VALIDATION USING UV-VISIBLE SPECTROPHOTOMETRY

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Pioglitazone is an oral antidiabetic medication in the class of drugs called thiazolidinediones that doctors use to treat type 2 diabetes. The objective of the present work is to develop and validate pioglitazone tablets, as well as a cheap, simple, linear and precise UV-Visible spectrophotometric method for estimation of Pioglitazone in bulk form. The formulation used appropriate excipients to create a system that delivered proper flowability and compressive strength together with even distribution of its active pharmaceutical component. The researchers evaluated the powder blend before compression by testing its pre-formulation properties which included measuring angle of repose, bulk density, tapped density, Carr's compressibility index and Hausner ratio. The compressed tablets underwent post-compression evaluation testing which included assessment of weight variation thickness measurement hardness testing, friability testing, drug content uniformity assessment and in-vitro dissolution study. The results were compared with pharmacopeial specifications to confirm product quality and performance. A UV-Visible spectrophotometric method was established for quantitative analysis which used a suitable solvent to measure absorbance at its highest absorption wavelength. The analytical procedure achieved validation through testing of its linearity accuracy precision repeatability and robustness. The developed formulation demonstrated satisfactory mechanical strength and consistent drug release. The spectrophotometric method indicated suitable performance for quality control analysis because it produced a strong linear relationship within the chosen concentration range. The study achieved its goal by creating a stable tablet formulation and developing an accurate, affordable method to measure pioglitazone in bulk drug and pharmaceutical dosage forms.

Keywords: Pioglitazone, Tablet formulation, UV-Visible spectrophotometry, Method validation, In-vitro dissolution.

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PREPARATION AND EVALUATION OF ANTI-AGEING GEL WITH GALLIC ACID AND PAPAYA OIL

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Skin ageing is characterised by the development of wrinkles, fine lines, and a loss of elasticity, often driven by oxidative stress and environmental damage. While various topical formulations exist, there is a significant research gap regarding the combination of Gallic acid and Papaya oil within an anhydrous gel system. Traditional water-based hydrogels often lack the occlusive properties and stability required for certain sensitive anti-ageing actives. The primary aim of this research is to develop and evaluate a novel anti-ageing gel that utilises the synergistic antioxidant and collagen-boosting properties of Gallic acid and Papaya oil. The formulation seeks to improve skin hydration, provide protection against oxidative damage, and ensure the stability of active ingredients in a water-free system. Methodology: The gel was prepared using Carbopol 934 as the gelling agent, Triethanolamine as a neutraliser/pH adjuster, and EDTA as a preservative. The process involved Dissolving Gallic acid and Carbopol separately in distilled water using a magnetic stirrer. Combining the solutions followed by sonication to remove entrapped air and ensure uniform mixing. Incorporating papaya oil as an emollient and antioxidant-rich active. Storing the final transparent formulation in a refrigerator prior to evaluation. The formulated gel underwent comprehensive assessment for pH (digital meter), viscosity (Brookfield viscometer), and spreadability. Antimicrobial activity (zone of inhibition) and skin irritation tests (in vivo/in vitro) to ensure safety for topical application. This study addresses the lack of systematic optimisation for Gallic acid–Papaya oil gels. By uniting these actives in a cosmetically elegant, non-greasy formulation, the research provides a potential translational cosmeceutical for effective mitigation of skin ageing signs.

Keywords: Gallic acid, Papaya oil, Anti-ageing, Antioxidant, Carbopol 934.

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BEYOND CONVENTIONAL THERAPY: EMERGING DRUGS TRANSFORMING HEART FAILURE CARE

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Heart failure (HF) remains a leading cause of global morbidity and mortality despite decades of therapeutic advancement. Traditional pharmacotherapies, including ACE inhibitors, β-blockers, and mineralocorticoid receptor antagonists, have significantly improved survival; however, residual risk persists. Recent scientific breakthroughs have reshaped HF management, moving beyond symptom control toward disease modification. Landmark investigations led by researchers such as Milton et al. have demonstrated the paradigm-shifting benefits of sodium, glucose cotransporter-2 (SGLT2) inhibitors, including dapagliflozin and empagliflozin, in both reduced- and preserved-ejection-fraction HF. Concurrently, the angiotensin receptor–neprilysin inhibitor (ARNI) sacubitril/valsartan, validated in pivotal trials, has established a new gold standard by targeting neurohormonal dysregulation more comprehensively. Emerging therapies further expand the therapeutic horizon. Soluble guanylate cyclase stimulators such as vericiguat enhance nitric oxide signaling, while cardiac myosin activators like omecamtiv mecarbil directly improve myocardial contractility without increasing intracellular calcium. Additionally, precision medicine approaches, including gene-based therapies and biomarker-guided treatment strategies, reflect a shift toward individualized cardiovascular care. Investigations from global cardiovascular research networks continue to explore anti-inflammatory, metabolic, and mitochondrial-targeted interventions, recognizing HF as a complex systemic syndrome rather than an isolated cardiac disorder. Collectively, these innovations signal a transformative era in HF management, integrating molecular insights with clinical evidence. The future of heart failure therapy lies in multidimensional targeting, early intervention, and patient-specific optimization, redefining outcomes beyond conventional standards of care.

Keywords: Heart failure, SGLT2 inhibitors, ARNI, vericiguat, omecamtiv mecarbil, precision medicine, cardiovascular therapeutics, disease modification.

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BIORESPONSIVE POLYMERS-THE PRECISION PIONEERS OF NANOMEDICINE AND THEIR PROS VS. CONS

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Bioresponsive polymers have been designated as the innovative nanocarriers that selectively release the drug at the diseased site when exposed to biological stimuli. Like a precision-guided missile, it spares the healthy components while affecting the diseased. Usually, the abnormal pathological microenvironment acts as a potent stimulus for the targeted drug delivery. At times biological stimuli like pH, temperature, enzymatic response or combinations of stimuli also helps design such smart polymers. The specificity and precision of bioresponsive polymer enable tailored prescriptions for cancer patients by targeting the tumor microenvironment. Such smart polymers increases the bioavailability of a drug while reducing it's adverse effects. While these remain as the flagship for precision medicine, bioresponsive polymers still have some limitations. If the polymer fails to respond to given stimuli, the desired therapeutic effect is not obtained. Another concern maybe it's stability during circulation which is being studied with humongous research efforts. Yet, ambiguity in the efficiency of these polymers still persists. Here, the different biological stimuli responsible for the therapeutic activity of bioresponsive polymers, analyze current challenges faced in reality and future perspectives are discussed.

Keywords: Nanocarriers, bioavailability, Bio-responsive, targeted therapy, stimulus responsive.

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DIABETIC WOUNDS: CHALLENGES AND EMERGING THERAPEUTIC APPROACHES

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Diabetic wounds, especially diabetic foot ulcers (DFUs), are one of the significant health burdens across the world. Their characteristic features are poor healing, increased risk of infection and high amputation rates. The chronic hyperglycaemia impairs the wound repairs process with chronic inflammation, oxidative stress, microvascular dysfunction and neuropathy. Brem et al. and Falanga et al. in their individual studies had demonstrated that the presence of advanced glycation end-products (AGEs) inhibits the effect of fibroblasts and collagen deposition, and decreases nitric oxide bioavailability inhibiting angiogenesis. Kalan et al. concluded that the dys-polarization of the macrophage and biofilms microbial communities shows retarded tissue regeneration. Therapies based on growth factors have shown some improvement in wound healing like platelet-derived growth factor (PDGF), showing a slight increase in wound healing rates. Liu et al. concluded that preclinical and early clinical trials, stem cell-based methods, have shown promising result to stimulate angiogenesis and extracellular matrix remodelling, and regulate inflammation. In addition, the biomaterial-based dressings, like hydrogel, scaffolds and nanofiber materials, offer controlled drug delivery with enhanced moisture balance, helping in tissue repair. In spite of these advancements, the high cost of clinical translation, regulatory issues and patient variability limits the practice. It is necessary to implement the combination of metabolic control, modern wound care technologies, and regenerative medicine strategies as a multidisciplinary approach that will result in better patient outcomes. It is imperative that further translation research be conducted to translate experimental research into standardize clinical use.

Keywords: diabetic, wound healing, biomaterials, tissue repair.

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NOVEL MUCOADHESIVE BUCCAL PATCH SYSTEM FOR CONTROLLED RELEASE OF METRONIDAZOLE IN PERIODONTAL DISEASE

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Gingivitis is recognized as a common inflammatory condition affecting the gingival tissues and is considered reversible when timely intervention is provided. However, if left untreated, it may progress to periodontitis, a more severe pathological condition characterized by the destruction of the supporting structures of the teeth, ultimately leading to tooth loss. Conventional management of periodontal infections is commonly achieved through systemic administration of antimicrobial agents such as metronidazole. Nevertheless, prolonged systemic therapy often necessitates high doses and may be associated with undesirable adverse effects. In the present study, a novel mucoadhesive buccal patch containing metronidazole was developed with the aim of delivering the drug directly to the affected periodontal site. The patch was formulated using chitosan as a primary mucoadhesive polymer to enhance adhesion to the gingival mucosa and to facilitate sustained drug release. Nine different formulations were prepared and systematically evaluated. Comprehensive physicochemical characterization was performed, including assessment of thickness, weight uniformity, surface pH, mechanical strength, and mucoadhesive properties, to ensure safety, stability, and patient comfort. Drug release behavior and permeation characteristics were also examined to confirm effective local delivery. Among the developed formulations, the optimized patch demonstrated desirable mechanical integrity, appropriate surface pH compatible with oral tissues, satisfactory adhesion, and controlled release of metronidazole. It was concluded that the developed mucoadhesive patch offers a promising localized therapeutic approach for periodontal disease management. Effective antimicrobial action may be achieved while minimizing systemic exposure and associated side effects. This novel delivery system is proposed as a safe, convenient, and patient-friendly alternative for the treatment of periodontal infections.

Keywords: Mucoadhesive Buccal Patch, Periodontitis, Metronidazole, Local drug delivery.

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RAPID HEMOSTASIS: A CRITICAL LIFELINE IN EMERGENCY CARE

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Hemostasis, the body's natural process of stopping bleeding, is critical for survival in traumatic injuries. Under other circumstances like battlefield trauma or major surgical procedures, however, internal hemostatic mechanisms might fail and external hemostatic forces are necessary. The prompt use of these agents, especially during the first one hour after trauma, can significantly increase patient survival rates in traumas. Despite such gains that have been achieved in hemostatic research, there is still a need to have safer, faster and more effective materials. Nanotechnology has provided good solutions to these problems in the recent past. Nanomaterials have a large surface area to volume ratio and therefore they interact more with blood constituents and easier clotting can occur. Additionally, their physicochemical nature can be specifically designed to be used in a certain task, which increases their effectiveness and versatility as a hemostatic agent. This review analyses the contemporary situation of hemostatic agents with special focus on commercially available agents and their action. It also examines the novel nanotechnology-based solutions to bleeding control, presenting their core concept and possible clinical practice. The significance of early hemostatic intervention is also mentioned, and it is emphasized that this intervention is critical to enhance the survival in emergency scenarios in trauma and care facilities. To conclude, the immediate hemostasis is one of the important factors of survival of a patient in a critical situation. Further development of hemostatic materials and materials developed using nanotechnology, has enormous potential in terms of improving trauma management and emergency medicine.

Keywords: hemostasis, nanotechnology, trauma

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REGULATORY BLUEPRINT FOR SAFE MEDICAL DEVICES

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The regulatory framework for medical devices employs a risk-based approach to ensure safety, efficacy, and quality amid advancing technologies like software, AI, and combination products. Compliance is critical for market access. Regulatory Classifications: In the US, the FDA categorizes devices as Class I (low-risk, general controls), Class II (special controls, often 510(k) clearance), and Class III (high-risk, life-supporting/implantable; Premarket Approval [PMA] with clinical data required). The EU Medical Device Regulation (MDR 2017/745) uses Classes I, IIa, IIb, and III, mandating Notified Body conformity assessment for higher classes. A structured review analyzed guidelines from the FDA, EMA, CDSCO (India), and PMDA (Japan), focusing on classification, premarket submissions, conformity routes, and quality requirements. Core steps include device classification, establishment registration, design controls, preclinical/clinical evaluations, regulatory submissions, Quality Management System (QMS) compliance (e.g., ISO 13485), and post-market surveillance. Understanding these processes is vital for manufacturers, researchers, and clinicians. This review highlights regulatory steps, compliance strategies, and global perspectives to enhance awareness of regulatory science in delivering safe, effective devices.

Keywords: Medical devices, regulatory compliance, FDA classification, EU MDR, post-market surveillance etc.

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NEXT-GENERATION NANOCARRIER-MEDIATED DRUG DELIVERY

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In the 21st century, progress in biotechnology and pharmaceutical technology has led to major improvements in effective drug design. The goal of drug targeting is to make sure that a drug affects only the affected area of the body. The quick evolution of nanotechnology has greatly changed the field of pharmaceutical sciences leading to the creation of Nanocarrier-Mediated Drug Delivery System. The traditional drug delivery often suffers from poor solubility, rapid systemic clearance and non-specific distribution which results in suboptimal therapeutic indices and adverse side effects. This poster explores the next-generation nanocarriers such as lipid-polymer hybrids, stimuli-responsive nanoparticles, and exosome-mimicking vesicles that address limitations of conventional systems like first-generation liposomes and polymeric micelles. Key innovations include pH/redox-sensitive polymers for triggered release in tumor microenvironments, achieving up to 5-fold higher drug accumulation via the Enhanced Permeability and Retention (EPR) effect. Although there has been considerable progress, the use of nanocarriers in clinical settings is still limited by difficulties in producing them on a large scale, ensuring long-term safety for the body, and dealing with complex regulations. Future directions emphasize clinical translation with ongoing trials validating safety in oncology and beyond, including neurodegenerative diseases. This work underscores nanocarrier's potential to transform precision medicine paving the way for smarter and patient-centric therapies.

Keywords: Nanocarriers, Nanocarrier-Mediated Drug Delivery, Lipid-polymer hybrids, Exoxome-mimicking vesicles, Liposomes, Polymeric micelles, Enhanced Permeability and Retention Effect.

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FORMULATION AND EVALUATION OF NANO PARTICLES OF IBUPROFEN

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Nanotechnology represents a cutting-edge approach in the medical field, especially for the controlled delivery of therapeutic agents. Ibuprofen is a BCS Class II drug, extensively used as an anti-inflammatory, pain-relieving, owing to its high permeability, though it suffers from low solubility. This limitation results in reduced oral bioavailability, hindering its clinical effectiveness. Polylactic-co-glycolic acid (PLGA), an FDA-approved biodegradable and biocompatible polymer, has gained prominence in recent research for drug delivery systems. In this study, PLGA was used to create uniform-sized nanoparticles, utilizing polyvinyl alcohol (PVA) as a stabilizer and chloroform as a solvent. The resulting nanoparticles demonstrated an average diameter of 268.4 nm, a polydispersity index (PDI) of 0.315, and a zeta potential of -31.7 mV, as measured by dynamic light scattering (DLS) by Malvern Instruments. The uniform size and stable zeta potential suggest these nanoparticles are well-suited for drug delivery applications. The use of PLGA provides a controlled release mechanism, potentially enhancing the bioavailability of Ibuprofen and improving its therapeutic efficacy.

Future research work will involve *in-vitro* studies to evaluate the performance and effectiveness of the drug incorporated into the nanoparticle formulation. The outcome of these studies could significantly impact the treatment of inflammation and pain relief, presenting a promising advancement in the application of nanotechnology to overcome solubility and bioavailability challenges in drug delivery, paving the way for more effective treatments.

Keywords: Nanoparticles, Ibuprofen, Controlled-release profile.

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Abstract No.: PP-183

NANOTECHNOLOGY FROM WASTE: CARBON DOTS DERIVED FROM BIOMASS AND PLASTIC WASTES - A REVIEW.

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An emerging and promising class of nanotechnology is Carbon Dots (CDs) with zero dimension (0D) and excellent photoluminescence, non-toxicity, biocompatibility and electrical properties. The unique properties of CDs have attracted a lot of attention for their various applications. Due to rapid increase of world population, there is increase in the plastics for their versatile usages. For this reason, the volume of plastic wastes is skyrocketing, and biomass wastes also contribute to total waste dumping volume. So, to decrease the load on recycle industry and utilize unconventional carbon source, Plastic and biomass waste derived CDs are recent topic of interest for research. CDs show unique fluorescent property, eco friendliness, low cost of production, excellent biocompatibility which makes them suitable for applications like targeted drug delivery, diagnostic and therapeutic agent. In context, various synthetic approaches like top-down and bottom-up approach, of CDs with their pros and cons are discussed. Recent structural and properties advancement are also highlighted. Furthermore, the challenges and prospects of further researches are also discussed. A detailed and timely review regarding sources, properties, structures and applications of plastic and biomass wastes derived CDs would draw more research in this field.

Keywords: Carbon Dot, Photoluminescence, zero-dimension, Biocompatibility, Top-down, Bottom-up.

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ETHOSOMAL CO-DELIVERY OF CYCLOSPORINE AND CURCUMIN IN RHEUMATOID ARTHRITIS

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Rheumatoid arthritis (RA), a chronic systemic inflammatory disease which predominantly affects synovial joints can leads to progressive disabilities, increased mortality rates and causes significant socioeconomical burden. The main pathogenesis of RA includes genetic susceptibility, immune dysregulation, pro-inflammatory cytokines, and persistent synovial inflammation, lead to cartilage and bone erosion. Conventional systemic therapies uses of immunosuppressant drugs like Cyclosporine (CYC) is often limited due to dose related toxicity, poor bioavailability and long-term adverse effects. Curcumin (CUR), a natural Polyphenol with potent anti-inflammatory and antioxidant properties shows therapeutic activity in RA, but it exhibits low solubility and limited skin permeation. By the development of novel Ethosomal Co-delivery system of Cyclosporine and Curcumin can overcome these challenges and achieve enhanced transdermal delivery and synergistic therapeutic efficacy in RA. Ethosomes, composed of phospholipids a high concentration of ethanol, and water are soft and it acts as a vesicular carrier capable of penetrating deep skin layers and precisely delivering drugs into systemic circulation. The co-loaded Ethosomal formulation was designed to improve drug permeation, enhance bioavailability and provides sustained release at the target site. This Ethosomes cab be characterized for vesicle size, zeta potential, and drug entrapment-efficiency. Furthermore, In vivo anti-arthritic evaluation in suitable animal models indicated a marked reduction in joint swelling and inflammatory markers and histopathological damage and providing a synergistic effect. Overall Ethosomal co-delivery of cyclosporine and curcumin represents a non-invasive therapeutic strategy. This novel approach can provide a potential alternative to conventional oral and injectable therapies in long-term RA management.

Keywords: Rheumatoid arthritis (RA), Cyclosporine (CYC), Curcumin (CUR), Ethosomes, Edge-activated ethosomes.

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Abstract No.: PP-185

BREAKING THE POLYCYSTIC OVARY SYNDROME CYCLE: CURRENT DRUG-BASED MANAGEMENT

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Polycystic ovary syndrome (PCOS) is a heterogeneous endocrine condition defined by hyperandrogenism, ovulatory dysfunction, along with metabolic errors, and is present in up to 10% to 15% of women of reproductive age in the world. The modern pharmacological treatment aims to address reproductive, metabolic and dermatological symptoms and reduce the risk of adverse cardiometabolic outcomes in the long term. Teede et al. and Legro et al. in their individual study have concluded that combined oral contraceptives (COCs) are still a first-line treatment in the management of menstrual cycling and hyperandrogenic symptoms, with remarkable decrease the testosterone level and better scores in hirsutism. Insulin sensitizers, especially metformin, enhance the resistance of insulin and ovulatory performance and have a moderate effect on weight regulation and the prevention of type 2 diabetes among high-risk individuals. Jensterle et al. in 2021 concluded that use of glucagon-like peptide-1 receptor agonists (GLP-1 RAs) as effectors of obesity-related PCOS. These significantly reduce the weight by increasing the metabolism. Another study by Legro et al. concluded that Spironolactone and finasteride are anti-androgens that are useful in persistent hirsutism and ovulation induction with letrozole has been shown to have better live-birth rates than clomiphene citrate in randomized trials as a first-line therapeutic option in managing infertility. New pharmacotherapy options are being explored that aim to supress inflammatory pathways and ovarian steroidogenesis. This indicate a transition to the use of precision medicine. Comprehensively, the most effective clinical outcome of the PCOS treatment is the application of combined pharmacological interventions based on the phenotype and metabolic risk profile.

Keywords: polycystic ovary syndrome; insulin resistance; letrozole; GLP-1 receptor agonists

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RECENT ADVANCES IN PHYTOCHEMISTRY AND PHARMACOLOGICAL ACTIVITIES OF NUX VOMICA

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Nux vomica L. (Loganiaceae) has garnered renewed scientific interest due to its rich phytochemical profile and diverse pharmacological activities. Hussain et al., in the year of 2020 have studied that, advanced chromatographic and spectroscopic analyses have identified an extensive array of bioactive constituents, notably indole alkaloids such as strychnine, brucine, vomicine, and isobrucine, along with flavonoids, triterpenoids, and phenolic acids. For example, brucine and its derivatives have demonstrated significant anticancer potential by inducing apoptosis and cell cycle arrest in human tumor cell lines via mitochondrial-dependent pathways that was studied by Li et al., in the year of 2018. Additionally, alkaloid fractions have exhibited pronounced anti-inflammatory and analgesic effects, mediated through downregulation of pro-inflammatory cytokines (e.g., TNF-α, IL-6) and inhibition of COX-2 expression in rodent models of inflammation that was studied by Khan et al. in 2019.Patel & Patel, have studied in the year of 2021 that, other pharmacological investigations report neuroprotective effects, including attenuation of oxidative stress and improvement in functional recovery in nerve injury models, suggesting therapeutic relevance in neurodegenerative conditions. Moreover, antihyperglycemic activity has been observed in diabetic rodent models, with modulation of key metabolic enzymes and enhancement of insulin sensitivity that was studied by Sharma et al., in the year of 2022. Despite these promising findings, the toxicological profile, particularly strychnine-induced neurotoxicity, necessitates rigorous safety evaluation, and modern detoxification and purification techniques are critical for clinical translation.Nux vomica as a source of novel bioactive molecules and as a scaffold for drug development, while highlighting the importance of integrated phytochemical, pharmacological, and toxicological research.

Keywords: Nux vomica, Phytochemistry, Pharmacological activity, Bioactive alkaloids.

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Abstract No.: PP-187

THE HIDDEN CHEMISTRY: HERB–DRUG INTERACTIONS

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The use of herbal medicines is common in most parts of the world because it is natural, the culture accepts it and is readily available. Over the past few years, the use of herbal products as supplements to conventional drugs has risen substantially. This custom is however, frequently practised without proper medical oversight and herb-drug interactions are a fact not fully revealed but clinically serious issue within the healthcare field. Herb drug interactions are defined as the drug-drug interactions that take place when the pharmacokinetics or pharmacodynamics of a drug is interfered with by bioactive compounds in herbal products. These interactions can affect either the drug absorption, metabolism, distribution or excretion, primarily by altering drug-metabolizing enzymes and transport proteins. As a result, the herbal products can either increase effects of drugs leading to toxicity or decrease the therapeutic effects leading to treatment failure. Popular herbs like the St. Johns wort, garlic, the ginkgo biloba and the ginseng have been reported to be having interactions with anticoagulants, antidepressants, antiepileptics and cardiovascular drugs. Underreporting, paucity of regulation and standardization of herbal medication use only add to the clinical risks of these interactions. The patients think that herbal products do not have any side effects and this has added to adverse effects that have been ignored. Thus, the knowledge of the latent chemistry of herb-drug interactions is crucial in the promotion of patient safety. This poster will be used to shed light on the processes, clinical implications, and possible risks of herb-drug interactions, showing the necessity of patient education and the key role of pharmacists and medical professionals in avoiding negative outcomes by performing effective counselling and a comprehensive assessment of medications.

Keywords: Herbal products, Conventional drugs, Drug safety.

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NEURO-INFLAMMATORY BRAIN FOG SYNDROME

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The neuro-inflammatory Brain Fog Syndrome is a new clinical entity, which is defined by the consistent functional impairment of the brain, such as disrupted attention, memory impairment, mental exhaustion, and impaired executive functioning. Dantzer et al. in 2008 have deduced that peripheral inflammatory signals access the brain via humoral and neural routes. This alters the microglial activity, synaptic plasticity, and neurotransmitter metabolism within frontal-striatal and limbic networks. There is growing evidence on past findings that chronic neuroinflammation is at the heart of the pathophysiology of brain fog in a variety of conditions including post-viral syndromes, autoimmune diseases, metabolic disorders, and neurodegenerative mechanisms. Harrison et al. concluded that microglia and astrocyte activation induces prolonged release of pro-inflammatory cytokines like interleukin-6, tumour necrosis factor-a, and interleukin-1 b, interfering with synaptic plasticity and neuronal signalling. Neuroimaging, biomarker, and neuroimaging studies have shown that there are changes in blood-brain barrier permeability, oxidative stress, mitochondrial dysfunction, and impaired neurovascular coupling in brain fog patients. Also, the gut-brain axis and systemic inflammation have been demonstrated to lead to an increase in central immune responses, which worsen cognitive symptoms. Recent studies show that neuroimmune cross-linked, disturbed neurotransmitter balance, and diminished neurotrophic support contribute to the preservation of cognitive impairment. According to recent therapeutic studies, treatment of brain fog symptoms may involve anti-inflammatory agent, antioxidant, lifestyle modifications, and novel neuroprotective approaches that target neuroinflammation. According to recent studies, treatment procedure involves anti-inflammatory drugs, antioxidants, lifestyle modifications and novel neuroprotective approaches that target neuroinflammation.

Keywords: Brain fog, cognitive dysfunction, microglial activation, neuroinflammation.

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Abstract No.: PP-189

IMMUNE MODULATORS: CHANGING THE COURSE OF AUTOIMMUNE DISEASES

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Autoimmune diseases arise from dysregulated immune responses in which the immune system erroneously targets self-tissues, leading to chronic inflammation and organ damage. Conventional therapies—including corticosteroids and broad-spectrum immunosuppressants—often provide symptomatic relief but are associated with significant side effects and limited long-term efficacy. In recent decades, the advent of targeted immune modulator has transformed the management of autoimmune conditions by selectively altering pathological immune pathways while preserving host defense. Feldmann et al & Maini et al. have been studied in 2003 and respectively and concluded that Biological agents such as tumor necrosis factor (TNF) inhibitors like infliximab, etanercept have demonstrated substantial clinical benefit in rheumatoid arthritis and inflammatory bowel disease by neutralizing pro-inflammatory cytokines and reducing disease activity. Smolen et al. have been studied in 2016 and concluded that Similarly, modulators targeting interleukin-6, interleukin-17, and co-stimulatory signals have shown efficacy in conditions like psoriatic arthritis and systemic lupus erythematosus. O'Shea et al. & Plenge et al. have been studied in 2012 and concluded that Small-molecule modulators, including Janus kinase (JAK) inhibitors, offer oral alternatives that disrupt intracellular signaling cascades central to autoimmune pathology, with trials showing significant improvement in disease scores and quality of life. Emerging strategies employing selective inhibition of B-cell activation like rituximab and regulatory T-cell augmentation highlight the expanding arsenal of immune modulators and their mechanistic precision. Despite these advances, challenges such as secondary non-response, infection risk, and high cost necessitate ongoing research into novel targets, biomarker-guided therapy, and personalized immunomodulation. Collectively, immune modulators have redefined autoimmune disease treatment, shifting the paradigm from generalized suppression toward tailored immunoregulation.

Keywords: Autoimmune Disorders, Immune Modulators, Biologic Therapies, Small-Molecule Inhibitors, Systems Pharmacology.

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FROM MOLECULES TO NETWORKS: THE FUTURE OF PHARMACOLOGY

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The field of pharmacology is undergoing a paradigm shift from traditional single-target drug design toward holistic, network-based approaches that integrate molecular insights with systems biology. Hopkins have studied in 2008 and conclude that Advances in high-throughput genomics and proteomics have facilitated the identification of drug targets and elucidated complex molecular interactions underlying disease phenotypes. However, many diseases—such as cancer, neurodegeneration, and metabolic disorders—are driven by dysregulated networks rather than single aberrant proteins, leading to limited efficacy of classical mono-target therapeutics. Li et al. have studied ion 2011 and conclude that Network pharmacology, which incorporates computational modeling, bioinformatics, and multi-omics data, seeks to map drug–target interactions across biological pathways and predict synergistic effects of drug combinations . Cheng et al. have studied in 2019 and conclude that conclude that Recent studies have demonstrated that network-based drug repositioning can successfully identify novel uses for existing compounds, reducing development time and cost. Gawehn et al. have studied in 2016 and conclude that Additionally, integration of artificial intelligence and machine learning has improved target prediction accuracy and optimized lead compound selection, exemplified by deep learning approaches that predict compound–protein interactions with high precision Holohan et al. have studied in 2013 and conclude that Clinical implementation of these approaches has been promising in oncology, where combination therapies informed by network models have improved outcomes compared to monotherapies. Despite challenges in data heterogeneity and computational complexity, the convergence of molecular biology, computational networks, and systems pharmacology promises a more predictive and effective drug discovery pipeline.

Keywords: Network Biology, Drug Discovery, Precision Medicine, Multi-omics Integration, Combination Therapies

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THE NEEDLE-FREE REVOLUTION: INNOVATIONS IN VACCINE DELIVERY

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Vaccination has always played a crucial role in protecting people from infectious diseases and improving public health worldwide. Over the years, vaccines have successfully reduced the spread of serious illnesses like measles, polio, influenza, and hepatitis, helping people live longer and healthier lives. Despite these achievements, traditional needle-based vaccines have certain disadvantages. Many individuals experience pain and anxiety due to injections, and some even suffer from needle phobia. There is also a risk of needle-stick injuries, cross-contamination, and the need for trained healthcare professionals to administer the vaccine. These factors can sometimes lower vaccination acceptance and compliance. To overcome these challenges, researchers are now exploring needle-free vaccine delivery systems, especially transdermal and oral methods. Transdermal vaccines use advanced technologies such as microneedle patches, nanoparticles, and lipid-based carriers to deliver antigens through the skin. Since the skin contains a large number of immune cells, including Langerhans cells, it serves as an effective site for immune activation. Microneedle patches are nearly painless, minimally invasive, and easy to use, which makes them more comfortable and user-friendly. They also offer benefits like better stability and reduced dependence on cold-chain storage. Similarly, oral vaccines provide a simple and non-invasive way of immunization. By interacting with gut-associated lymphoid tissue (GALT), they stimulate both systemic and mucosal immunity, making them particularly suitable for large-scale immunization programs. Overall, needle-free vaccine technologies represent an exciting and promising advancement in pharmaceutical science. With continued innovation, these approaches may make vaccination safer, more accessible, and more acceptable for people across the world.

Keywords: Needle-Free Vaccine Delivery Systems, Transdermal Vaccination, Oral Vaccines, Microneedle Patches, Mucosal and Systemic Immunity

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PAST, PRESENT AND FUTURE PROSPECTS OF NUTRACEUTICALS

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Nutraceuticals are increasingly being used because of the current epidemic and increased attention to general health. Nutraceuticals include products that enhance immunity and also products that prevent diseases. Also included are products that optimize the body's performance. Poor diet is a leading cause of lifestyle-related issues. There are a number of nutraceuticals that have gained acceptance based on proven medicinal properties. Nutraceuticals typically comprise functional foods and dietary supplements. There are multiple drivers seeing the nutraceuticals sector expand in India, and we are gaining global leadership quickly. The approval, marketing, and labelling requirements for health supplements and nutraceuticals fall completely under the jurisdiction of the Food Safety and Standards Authority of India (FSSAI). As more is known about these nutraceuticals, the regulations are tightening up, and monitoring the use of these products must be done carefully and consistently. Although familiar concepts in our country for some time, nutrivigilance and phytovigilance are new to regulatory bodies that should now seek to monitor the adverse effects and problems associated with low quality and counterfeit nutraceutical products. While it may be difficult to effect change, the responsible use of nutraceuticals, food supplements, and consumer health products will protect our populations as we continue to advance pharmaceutical physicians and other health professionals in the field.

Keywords: Consumer health, dietary supplements, food safety, functional foods, public health.

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THE FOOD-MOOD RELATIONSHIP: A SURVEY OF THE NUTRITIONAL EFFECTS ON THE EMOTIONAL HEALTH

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There is a growing amount of evidence suggesting that the relationship between dietary patterns and emotional well-being. Sanchez-Villegas et al. in 2018 and Firth et al. in 2020 in two different studies have concluded that regular consumption of ultra-processed foods, refined sugars, and saturated fats has consistently been associated with more symptoms of depression and anxiety on the hand a healthy diet reflects both the Mediterranean and nutrient-dense ones has been associated with psychological health. Jacka et al. in 2017 have Randomized controlled trials also provide a casual role: the SMILES trial established that structured dietary improvement led to clinically significant improvement in major depressive symptoms, relative to social support as a control. Mechanistic studies propose that there are several biological pathways like systemic inflammation, oxidative stress, neuroplasticity, and bidirectional signalling through the gut brain axis via micro-biome as studied by Cryan et al. in 2019. Another study by O'Neil et al. on meta-analytic results showed that dietary interventions produce small to moderate changes in depressive symptoms in both clinical and non-clinical groups. Altogether these results put nutrition in the category of modifiable behavioural factor that has both preventive and therapeutic implications in emotional health. The main focus of future research must be on longitudinal designs, standardized diatery measurement and integrative biomarkers to elucidate the dose-response relationship and individual differences in diet effects on mood.

Keywords: Food, mood, emotional, behavioural, biomarkers.

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AN OVERVIEW ON ROBOTIC MEDICINE

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Robotic medicine represents a transformative advancement in modern healthcare, integrating robotics, artificial intelligence, and precision engineering to enhance diagnosis, surgery, rehabilitation, and patient care. The adoption of robotic systems in clinical practice has significantly improved surgical accuracy, minimized human error, and enabled minimally invasive procedures. Robotic-assisted surgeries provide superior dexterity, tremor filtration, three-dimensional visualization, and enhanced ergonomics, resulting in reduced blood loss, smaller incisions, decreased postoperative pain, and faster recovery times. Beyond surgery, robotic technologies are increasingly applied in drug dispensing, telemedicine, rehabilitation therapy, and hospital automation, improving efficiency and patient safety. In pharmaceutical and clinical research, robotics facilitates high-throughput screening, automated laboratory processes, and precise drug formulation, thereby accelerating drug discovery and reducing operational costs. Furthermore, telepresence robots and remote robotic systems enable healthcare delivery in geographically remote or underserved areas, bridging accessibility gaps. Despite its numerous benefits, robotic medicine faces challenges, including high installation costs, the need for specialized training, ethical considerations, cybersecurity risks, and limited accessibility in low-resource settings. Continuous advancements in artificial intelligence, machine learning, and sensor technologies are expected to further expand the capabilities of robotic medicine, making healthcare more personalized, precise, and accessible. This overview highlights the evolution, applications, benefits, and limitations of robotic medicine, emphasizing its growing significance in shaping the future of healthcare delivery.

Keywords: Robotic medicine, Robotic-assisted surgery, Artificial intelligence, minimally invasive surgery, Telemedicine, Healthcare automation, Drug discovery, Precision medicine.

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HIGH BLOOD PRESSURE: AN EMERGING GLOBAL HEALTH RISK

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According to WHO, 2021 high blood pressure (hypertension has emerged as one of the largest modifiable risks to cardiovascular disease across the globe. Globally around 1.28 billion adults are affected by it. Forouzanfar et al. have correlated that epidemiological data shows a linear progressive interdependence between hypertension, and the risk of stroke, myocardial infraction, heart failure, and chronic kidney disease. Whelton et al. shows that longitudinal cohort studies found smaller systolic rise around 130mmHg have a serious impact on cardiovascular mortality. Global prevalence rates have been increased by rapid urbanization, aging of the population, excess of sodium in the diet, obesity, and physical inactivity. Although there are proven approaches to treatment, awareness, adherence to treatment, and effective control are suboptimal, especially where the resources are limited. New literature by Brook et al. demonstrates the role of environmental exposures like air pollution and psychosocial stress in the pathogenesis of hypertension. Notably, intensive blood pressure management can significantly decrease cardiovascular and all-cause mortality, which is proven by large-scale intervention trials. Taken together, existing data highlights hypertension as an increasingly widespread health issue worldwide that needs a combination of prevention measures, better screening, and equal access to treatment. This burden is very important in meeting global objectives on reduction of non-communicable diseases and enhancing population health outcomes.

Keywords: hypertension, risk factors, blood pressure, cardiovascular.

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IDENTIFICATION OF SYNTHETIC FOOD COLOURS AND BIO-PRESERVATIVES IN SELECTED CONFECTIONERIES AND BEVERAGES IN INDIA AND EVALUATION OF GENOTOXIC AND CYTOTOXIC EFFECTS ON HUMAN CELL LINES

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The safety of artificial food coloring and bio-preservatives used to improve appearance and shelf life has come under scrutiny in India due to the country's rising consumption of processed drinks and confections. The purpose of this research is to determine which widely available confections and beverages contain common synthetic food coloring and bio-preservatives, as well as to assess any possible cytotoxic and genotoxic effects on human cell lines. To qualitatively and quantitatively identify allowed and prohibited colorants and preservatives, representative samples were gathered from retail establishments in urban markets and submitted to chromatographic and spectrophotometric tests. Using well-established human cell lines, the identified compounds were subsequently evaluated in vitro to ascertain their cytotoxicity using cell viability tests and their genotoxicity using conventional comet and micronucleus tests.According to preliminary findings, there are commonly used synthetic colorants, such as azo dyes, and bio-preservatives, such as benzoates and sorbates, present in some samples at quantities that are close to or higher than advised regulatory limits. Excessive intake or long-term exposure may pose health hazards, as evidenced by in vitro investigations that showed dose-dependent decreases in cell viability and signs of DNA damage. The report emphasizes the necessity of more regulation enforcement, heightened consumer knowledge, and monitoring of food additives. The significance of striking a balance between the technological advantages of chemicals and their biological effects is highlighted by these findings, which add to the continuing conversations about food safety and public health.

Keywords: Synthetic Food Colours, Bio-preservatives, Genotoxicity, Cytotoxicity, Human Cell Lines

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AUGMENTING DRUG SCREENING PIPELINES WITH ARTIFICIAL INTELLIGENCE

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Artificial Intelligence (AI) is likely to change the scenario of the drug screening. This will be achieved by identifying the hit faster, predicting bioactivity and reducing the number of experiments in drug discovery pipelines. Models of machine learning that are trained on large database of chemicals can now be used to perform high-throughput virtual screening with same accuracy. Vamathene et al. and Jumper et al. in two different studies have deduced that graph neural networks and transformer models have shown good performance in protein-ligand interaction prediction, toxicity and pharmacokinetic properties prediction. Zhavoronkov et al. have expanded the exploration of chemical space by generative models powered by AI. This allowed de novo molecular design optimization. Stokes et al. have inferred that combination of AI with automated high-content screening systems results in cost and times savings and increased rate of hit-to-lead. The focus of the target identification and repurposing is also being improved due to recent advancement in multimodal learning and foundation models. Although data quality, interpretability and generalizability represent some challenging issues, there is growing evidence that AI enhanced screening models have the potential to enhance efficacy, reproducibility and translational success in pharmaceutical research significantly. It is also predicted that further converting the experimental validation with explainable AI systems will characterize the next generation drug discovery paradigms.

Keywords: artificial intelligence, preclinical, drug screening, drug discovery.

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Abstract No.: PP-198

FUTURE ASPECTS OF NATURAL POLYMER

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Present content indicates that natural polymers are being more frequently applied as sustainable alternatives for synthetic products. This highlights the potential new biologically based polymers in various applications, including electronics, healthcare, food packaging, and energy storage. Natural polymers sourced from naturally occurring and renewable feed stocks also display principles of green chemistry and comply with the 2030 Agenda for Sustainable Development by providing biodegradable, and eco-friendly material solutions. Recent studies are looking at the potential of functional new biomaterials from proteins and polysaccharides, including those potentially developed by research groups like the BioPol4fun of the CICECO–Aveiro Institute of Materials, University of Aveiro. Examples of protein biopolymer materials would include lysozyme and gelatin. Examples of polysaccharide biopolymer materials include cellulose, chitosan, pullulan, hyaluronic acid, fucoidan, alginates, and agar. These biopolymers of protein and polysaccharide are attractive for developing new materials with their stable structures, well defined biocompatibility and biodegradability. They advance the availability of sustainable materials by being processed using sustainable ways into composite materials, coatings, membranes, films, nanosystems, patches and microneedles, etc., as well as the future possibilities from food preservation, energy devices, wound healing and drug delivery systems. It is becoming more and more evident through current research that natural and biodegradable polymer products demonstrate distinct sustainability and linking to a development path for both sustainability and produced materials.

Keywords: Natural polymers; polysaccharides; proteins; green chemistry; sustainability.

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Abstract No.: PP-199

BRAIN INSULIN RESISTANCE IN ALZHEIMER'S DISEASE: MECHANISTIC INSIGHTS AND EMERGING THERAPEUTIC TARGETS

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Alzheimer's disease (AD) is classically characterized by amyloid-beta plaques and neurofibrillary tangles; however, accumulating evidence indicates that impaired insulin signaling within the brain plays a critical role in its pathogenesis. Under physiological conditions, insulin activates the insulin receptor substrate-1 (IRS-1)/phosphoinositide 3-kinase (PI3K)/Akt pathway, which suppresses glycogen synthase kinase-3 beta (GSK-3beta) and regulates tau phosphorylation. In AD, aberrant serine phosphorylation of IRS-1 attenuates PI3K–Akt activity, resulting in GSK-3beta overactivation and tau hyperphosphorylation. Concurrent hyperinsulinemia may further impair amyloid-beta clearance through competition for insulin-degrading enzyme (IDE), facilitating plaque accumulation. Dysregulation of mammalian target of rapamycin (mTOR) signaling suppresses autophagy, reducing clearance of toxic protein aggregates and accelerating neurodegeneration. Emerging pharmacological strategies targeting this metabolic axis include intranasal insulin, glucagon-like peptide-1 (GLP-1) receptor agonists, insulin sensitizers, and mTOR modulators, with early clinical investigations demonstrating variable yet promising outcomes. Collectively, these findings position brain insulin resistance as a convergent pathogenic mechanism linking metabolic dysfunction to classical AD pathology and underscore the PI3K–Akt–mTOR axis as a rational framework for translational drug development, warranting rigorous clinical validation.

Keywords: Brain insulin resistance; Alzheimer's disease; PI3K–Akt signaling; mTOR; GLP-1 receptor agonists; Translational pharmacology.

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COMPARATIVE ISOLATION AND FUNCTIONAL CHARACTERIZATION OF STRESS-TOLERANT PHOSPHATE-SOLUBILIZING MICROORGANISMS FROM FOREST, AGRICULTURAL, AND INDUSTRIAL SOILS

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Phosphorus (P) is a key macronutrient for plants, but a large portion of soil phosphorus is present in an insoluble form which is not accessible to plants. Phosphate-solubilizing microorganisms (PSMs) have been found to be very important in making insoluble phosphates soluble through organic acid secretion, chelation, and enzymatic processes. The aim of the current study is to isolate and do functional characterization effective phosphate-solubilizing microorganisms obtain from forest soil, agricultural soil, and industrial soil and evalute their potential as eco-friendly bio fertilizers. Soil samples were collected using sterile techniques and analysed for physicochemical parameters. Isolation was performed on Pikovskaya's (PVK) and NBRIP agar media containing tricalcium phosphate. Colonies showing clear halo zones were selected as potential phosphate solubilizes. Selected isolates were subjected to biochemical and functional characterization, including quantitative phosphate solubilisation assays, organic acid profiling, and evaluation of plant growth-promoting (PGP) traits such as indole-3-acetic acid (IAA), siderophore, and ACC-deaminase production. Stress tolerance under varying pH, salinity, and heavy metal conditions was also assessed. Molecular identification using 16S rRNA/ITS sequencing and phylogenetic analysis was planned for efficient isolates. In vivo validation by pot experiments was designed to examine their effect on plant growth, biomass, chlorophyll content, and phosphorus uptake. Preliminary findings have successfully isolated a possible phosphate-solubilizing bacterium that produces strong halos. Researchers believe that this study may help identify PSMs that are able to survive under multiple types of stress and also perform different functions that increase soil fertility and reduce reliance on chemical phosphorous fertilizers.

Keywords: Phosphate Solubilizing Microbes, Bio fertilizers, Sustainable agriculture, Soil fertility, Pikovskaya's agar.

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Abstract No.: PP-201

INFORMED CONSENT IN CLINICAL TRIALS: CHALLENGES AND SOLUTIONS

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In the domain of ethical clinical research, informed consent forms an integral part in ensuring participants' autonomy, rights, and transparency and is thereby upholding scientific integrity. However, extracting legitimate, informed, and voluntary consent, particularly from heterogeneous and vulnerable populations, is a challenging task. The process of informed consent not only involves the signing of the agreement but also enlists the clear and explicit declaration of the purpose of the study, methodology, risks, benefits, and alternatives (right to drop from the study at one's own wishes without punishment). Furthermore, vulnerable populations such as children, geriatric cohorts, and individuals with limited decision-making capacity must be provided with extra safeguards, including the involvement of legal representatives or impartial observers. In the era of cutting-edge technologies, the newly emerging areas of consideration, i.e., sequencing genetic information and the future use of biological specimens, pose serious challenges. Sometimes, socio-economic issues like language barriers, restricted literacy, and comprehension of the technical terms impede the transformation of ethical guidelines into actual fieldwork. To overcome these barriers, consent materials should be easily accessible to participants, and they must be given the opportunity to ask questions and seek clarification. An experienced researcher must abstain from using scientific jargon. Instead, he/she should use lucid language and terms comprehensible to the participants. In order to ensure trust and ethical practice in the clinical research, informed consent must be an ongoing and substantive communication process.

Keywords: Clinical Trails, Ethical Guidelines, Informed Consent, Participants, Safeguards, Vulnerable populations

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AUTOIMMUNE GUT–SKIN AXIS DISORDER: NOVEL PHARMACOLOGICAL TARGETS AND DRUG DEVELOPMENT STRATEGIES

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Autoimmune dermatoses are increasingly recognized as systemic conditions linked to disruptions in the gut–skin axis, which facilitates a two-way communication between cutaneous immune responses and intestinal homeostasis. When gut microbiota balance is compromised, the Th17/IL-23/TNF-α inflammatory pathway gets activated, leading to a loss of immune tolerance and ongoing skin inflammation. The proposed pathological sequence begins with gut dysbiosis, promoting the translocation of endotoxins into systemic circulation, damaging epithelial tight junctions, and diminishing beneficial metabolites. This inflammatory cascade activates antigen-presenting cells and Th17 lymphocytes, which contribute to the keratinocyte hyperproliferation observed in conditions such as psoriasis, atopic dermatitis, and chronic eczema.Conventional treatments, like methotrexate and corticosteroids, primarily suppress inflammation downstream but do not address the underlying intestinal immune dysregulation, often leading to systemic toxicity and relapse. In contrast, emerging treatments are focusing on upstream disease mechanisms. These include gut-directed therapies such as postbiotics, barrier-repair agents, and microbiome-modulating pharmabiotics, which aim to enhance regulatory immune signaling and restore epithelial integrity. Additionally, biologics targeting key cytokine pathways, such as anti-TNF medications and IL-17/IL-23 inhibitors, provide targeted immunomodulation.This review underscores a paradigm shift from a symptom-oriented approach in dermatological treatment to a more fundamental, root-cause-oriented immunopharmacology. Key prospects for future drug development include oral, gut-restricted immune modulators, personalized microbiome-based therapies, and synergistic gut-skin targeted regimens with improved safety profiles. Addressing the gut-skin axis holistically offers a potentially revolutionary disease-modifying approach to the treatment of autoimmune dermatology.

Keywords: Gut–skin axis, dysbiosis, biologics, pharmabiotics, autoimmune dermatoses

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ROOTS TO REMEDIES: BOTANICAL THERAPEUTICS FOR DIABETES

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Diabetes mellitus is a condition that are recognised by the failure of the human body to control the blood glucose level or uncontrolled blood glucose level. This occurs due to not produce enough insulin in human body because the human body cannot use the insulin it produces. In the current world, diabetes mellitus has become a big problem for human health. If not properly managed, diabetes is associated with a variety of complications such as heart problems, kidney problems, nerve problems, and vision problems. Though the condition is well managed using drugs such as insulin and oral hypoglycemics, the drugs must be taken for the rest of one's life and sometimes come with a variety of side effects. Today, many people are seeking herbal therapies for the management of diabetes. This is because a number of plants contain compounds with the ability to regulate blood glucose levels. For example, Gymnema, bitter gourd, fenugreek, and neem plants contain compounds with the ability to regulate blood glucose levels. These plants work by different mechanisms. For example, they work by enhancing the action of insulin, inhibiting the absorption of glucose, and offering antioxidant properties. Though the herbal remedies for managing diabetes are considered safe and affordable, more studies need to be conducted on the plants to ensure their safety and effectiveness of this study alongside other conventional treatments.

Keywords: Diabetes Mellitus, Herbal Therapy, Blood Glucose Regulation, Medicinal Plants, Antidiabetic Activity

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TRADITIONAL USES, PHYTOCHEMICAL CONSTITUENTS AND PHARMACOLOGICAL EVIDENCE OF IPOMOEA AQUATICA FORSK

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In South and Southeast Asia, *Ipomoea aquatica* Forsk, also referred to as water spinach, is a semi-aquatic leafy vegetable. Beyond its nutritional value, it has long been used in traditional medical systems to treat ailments like inflammation, diabetes, constipation, jaundice, and liver problems. Additionally, folk practices describe its use as a cooling agent, diuretic, and mild laxative, especially in tropical climates.

According to phytochemical analyses, *Ipomoea aquatica* contains a variety of bioactive compounds, including flavonoids (e.g., derivatives of quercetin and myricetin), phenolic acids, alkaloids, carotenoids, saponins, and tannins. Additionally, it is a good source of dietary fiber, vital minerals and vitamins A, C, and E. These substances mostly use metal chelation and free radical scavenging mechanisms to contribute to their remarkable antioxidant capacity. Several conventional claims are supported by pharmacological research. Experimental results show antimicrobial, neuroprotective, hepatoprotective, antidiabetic, antioxidant and anti-inflammatory properties both in vitro and in vivo. The plant extracts have demonstrated promise in lowering markers of oxidative stress, enhancing glucose tolerance and shielding liver tissues from damage caused by toxins. Anxiolytic and anticancer effects are also suggested by preliminary data, but more clinical validation is needed.

Keywords: *Ipomoea aquatica* Forsk, Quercetin and Myricetin, Hepatoprotective, Anxiolytic

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EDIBLE VACCINES: CONCEPT AND FUTURE SCOPE

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Edible vaccines represent an innovative biotechnological approach in which antigenic proteins are expressed in genetically engineered edible plants to induce an immune response upon consumption. This concept integrates plant biotechnology, immunology, and pharmaceutical sciences to develop cost-effective, needle-free immunization strategies. Transgenic plants such as Solanum lycopersicum (tomato), Solanum tuberosum (potato), Musa paradisiaca (banana), and Oryza sativa (rice) have been explored as biofactories for producing vaccine antigens against diseases like hepatitis B, cholera, rabies, and rotavirus infections. After oral administration, these antigens are taken up by microfold (M) cells in the intestinal mucosa, stimulating both systemic and mucosal immunity. Edible vaccines offer several advantages, including improved patient compliance, elimination of cold-chain requirements, reduced risk of needle-associated infections, and low production costs, making them particularly promising for mass immunization in developing countries. However, challenges such as dosage standardization, antigen stability during storage and digestion, potential oral tolerance, regulatory concerns, and public acceptance of genetically modified crops remain significant barriers to commercialization. Future research focuses on chloroplast transformation for enhanced antigen expression, encapsulation technologies to improve antigen stability, and integration with nanotechnology for targeted delivery. With advancements in molecular farming and regulatory frameworks, edible vaccines have the potential to revolutionize global vaccination strategies and contribute significantly to preventive healthcare.

Keywords: Edible vaccines, Transgenic plants, Oral immunization, Molecular farming, Mucosal immunity, Plant-based biotechnology.

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Abstract No.: PP-206

REVIEW ON ECOFRIENDLY HPLC METHOD FOR CAFFEINE IN DIETARY SUPPLEMENT DETERMINATION USING ETHANOL–WATER MOBILE PHASE AND PFP COLUMN

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This study describes the development of an eco-friendly chromatographic method based on an ethanol–water mobile phase and a pentafluorophenyl (PFP) stationary phase for the selective determination of caffeine in dietary supplements to ensure accurate quantification of caffeine content, which is vital for consumer safety and regulatory compliance. In this study, the chromatographic conditions were systematically optimised, and the performance of a conventional C18 column was evaluated before the selection of the PFP column, which provided enhanced retention and improved resolution of caffeine from structurally related purine alkaloids. The method validation showed excellent linearity over the concentration range of 5–15 µg/mL, with relative standard deviation values below 2%, which confirms a high level of precision, while stability studies indicated accuracy within 1%, supporting the robustness of the analytical procedure. Application of the method to commercially available supplements revealed considerable variability in caffeine content. The results establish that the proposed method is a reliable, sensitive, and environmentally sustainable alternative for routine quality control of dietary supplements and reinforce the transition toward green analytical strategies in pharmaceutical analysis.

Keywords: Caffeine; Eco-friendly HPLC; Pentafluorophenyl (PFP) column; Green analytical chemistry

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Abstract No.: PP-207

MODERN ADVANCED INHALERS: INNOVATIONS IN RESPIRATORY DRUG DELIVERY

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Inhalers have really come a way and they are very important for people with breathing problems like asthma and chronic obstructive pulmonary disease. To really help people the medicine needs to get right into the lungs. The old style inhalers, like the ones that you press to get the medicine out and the ones that use powder can be hard to use. You have to press the inhaler and breathe in at the time, which can be tricky. If you do not do it right the medicine might not work as well as it should. New kinds of inhalers have been made to solve these problems. Some inhalers give you the medicine when you breathe in so you do not have to press anything. This makes it a lot easier to use them correctly. There are also inhalers that make a mist that goes deep into your lungs.. Then there are the smart inhalers that can keep track of when you use them and remind you to take your medicine. Inhalers can now give you than one kind of medicine at a time, which is really convenient. This is because of advances in how the medicine's made. Inhalers are also better for the environment now. So the new inhalers are really helping people get the medicine they need. They are helping people remember to take their medicine. This means that people with breathing problems like asthma and chronic obstructive pulmonary disease can feel better and have a life. Inhalers are making a difference in the lives of people with chronic respiratory conditions, like asthma and chronic obstructive pulmonarydisease.

Keywords: Inhalers, Novel Drug Delivery, Smart Inhaler Technology, Combination Therapy, Chronic Respiratory Diseases

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Abstract No.: PP-208

BACTERIAL BIOFILMS IN CLINICAL INFECTIONS: MOLECULAR INSIGHTS AND ADVANCED THERAPIES

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A biofilm is a coherent group of microorganisms such as fungi, bacteria or algae that are attached to a surface or a substance and surrounded by a self-generated, cohesive, slimy, protective layer of polymeric substances. Bacterial biofilm preparation is considered an unique strategy of survival which has been linked to many cases of persistent or repeated infection. It is surrounded by a polymeric substance (extracellular polymeric matrix) & produced by the bacteria. The complex structure of the biofilm provides enhanced resistance to antibiotics, disinfectants, and to the inflammatory response of the host, and renders the infection more difficult to eliminate. The formation of a biofilm involves four stages of development: initial attachment, irreversible adhesion, maturation and dispersion; and these processes are regulated by quorum sensing and environment factors. Biofilm have altered gene expression and a reduced metabolic rate, which are contribute to improve tolerance to antimicrobial agents. Such approaches include: Teaming up antimicrobial agents, utilizing biofilm-disrupting chemicals, utilizing antimicrobial peptides, developing nanocomposites, and providing quorum-sensing inhibitors to provide alternative strategies to treat biofilm-related infections. By molecular and biochemical mechanisms which biofilms are prepared and persist is imperative for creating new, innovative therapies. New findings in biofilm research provide a number of new possibilities for improving the control of infections, decreasing resistance to antimicrobial agents and enhancing the outcome of patients receiving clinical treatment.

Keywords: Biofilm-Disrupting Agents, Antimicrobial Tolerance, Nanocomposites, Antimicrobial Peptides, Quorum Sensing

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Abstract No.: PP-209

PERSONALIZED COSMETICS AND AI-BASED SKIN ANALYSIS

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The cosmetic industry is rapidly evolving toward personalized solutions that address individual skin characteristics, environmental exposure, and lifestyle factors. Traditional cosmetic formulations often follow a generalized approach, which may not adequately meet diverse skin needs. Advances in artificial intelligence (AI) and digital imaging technologies have enabled a data-driven transformation in skin care by facilitating precise skin assessment and customized product recommendations. AI-based skin analysis systems utilize machine learning algorithms, high-resolution imaging, and biometric data to evaluate parameters such as hydration, pigmentation, wrinkles, pore size, sebum production, and sensitivity. By integrating large dermatological datasets, AI models can identify subtle skin patterns and predict potential concerns before visible damage occurs. These systems enhance diagnostic accuracy while minimizing subjective bias associated with manual assessment. Based on the analysed data, personalized cosmetic formulations can be developed with optimized concentrations of active ingredients tailored to an individual's specific skin profile. This approach improves product efficacy, reduces the risk of adverse reactions, and enhances consumer satisfaction. Furthermore, AI-driven platforms enable continuous monitoring of skin condition, allowing dynamic adjustment of cosmetic regimens over time. The incorporation of mobile applications and cloud-based technologies further expands accessibility and real-time analysis. Despite challenges related to data privacy, algorithm transparency, and regulatory validation, AI-based personalization represents a significant advancement in cosmetic science. Overall, the convergence of artificial intelligence and dermatological research is reshaping the future of customized skincare, promoting safer, more effective, and consumer-centered cosmetic solutions.

Keywords: Personalized cosmetics; Artificial intelligence; Skin analysis; Machine learning; Customized skincare

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Abstract No.: PP-210

ARTIFICIAL INTELLIGENCE IN NEUROLOGICAL DISORDERS: ADVANCING DIAGNOSIS, PROGNOSIS AND PRECISION MEDICINE

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Neurological disorders, such as Alzheimer's disease, Parkinson's disease, epilepsy, stroke, and multiple sclerosis, pose a significant global health burden because of their widespread prevalence, progressive course, and limited therapeutic options. Accurate diagnosis and timely intervention are challenging because these disorders involve complex, heterogeneous clinical presentations and large volumes of multimodal data. Recent developments in artificial intelligence (AI), especially in machine learning and deep learning approaches, provide powerful methods for interpreting complex neurological data and advancing precision medicine.

The aim of this review is to systematically assess the impact of AI in enhancing early detection, forecasting disease progression, and supporting clinical decision-making in neurological disorders. A comprehensive analysis of AI-based approaches applied to neuroimaging, electroencephalography, genetic data, and electronic health records was conducted, with emphasis on supervised learning and deep learning models used for classification, pattern recognition, and outcome prediction.

Across multiple neurological conditions, AI-driven models demonstrated superior performance in early disease detection, automated lesion identification, and prognostic assessment compared with conventional methods. These approaches enable efficient interpretation of high-dimensional data and facilitate personalized treatment strategies.

Overall, AI has the potential to significantly transform neurological care by enhancing diagnostic accuracy and supporting data-driven clinical decisions. However, issues associated with data reliability, model transparency, and clinical validation remain significant challenges that must be addressed before widespread clinical implementation.

Keywords: Artificial intelligence; Neurological diseases; Machine learnings; Deep learning techniques; Multimodal data integration; Precision medicine

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VIRTUAL SCREENING OF BENZOTHIAZOLE BASED COMPOUNDS AS ACHE AND BCHE DUAL INHIBITORS FOR ALZHEIMER'S DISEASE TREATMENT

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Alzheimer's disease is commonly managed symptomatically by targeting the enzymes acetylcholinesterase (AChE) and butyrylcholinesterase (BChE), both of which are well-established therapeutic targets. Benzothiazole is considered a privileged heterocyclic scaffold with diverse pharmacological potential. Nevertheless, numerous benzothiazole derivatives recently synthesized for non-neurological indications have not yet been thoroughly investigated for their possible anti-Alzheimer's activity. In the current investigation, a library comprising 511 recently reported benzothiazole-based compounds was constructed and evaluated for their inhibitory activity against AChE and BChE using molecular docking studies performed with AutoDock Vina. In addition, pharmacokinetic characteristics such as, drug-likeness parameters, and blood–brain barrier permeability were predicted by using SwissADME. Several compounds exhibited strong binding affinities, with docking scores ranging from –12.5 to –13.3 kcal/mol against AChE and –12.1 to –13.1 kcal/mol against BChE, alongside acceptable ADME profiles. Notably, compound (E)-N-(4-(benzo[d]thiazol-2-yl)phenyl)-2-(5-benzylidene-2,4-dioxothiazolidin-3-yl)acetamide demonstrated promising dual inhibitory activity against both enzymes. This compound showed important hydrogen bond (H-bond) interactions with Tyr124 and Phe295 residues in the active site of AChE, while it demonstrated key H-bond interactions with Asp70 and Thr120 amino acids in the binding region of BChE. Overall, these findings suggest that benzothiazole derivatives represent promising lead structures for further structural refinement and development as potential anti-Alzheimer's agents acting through cholinesterase inhibition.

Keywords: AChE, BChE, molecular docking, virtual screening

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Abstract No.: PP-212

EPR EFFECT: A NEW WAVE OF NANOMEDICINES FOR TUMOR-TARGETED DRUG DELIVERY

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Cancer is the foremost cause of mortality worldwide. While many anticancer agents have been identified, effectively delivering these drugs to solid tumours remains a significant challenge. Sustaining therapeutic drug concentrations over time is essential for achieving optimal drug-tumor interactions. A key mechanism in this process is the Enhanced Permeability and Retention (EPR) effect. This phenomenon enables larger macromolecules, such as albumin and polymer-conjugated drugs (typically exceeding 4 0 kDa), to accumulate in tumor tissues due to the distinctive characteristics of tumor vasculature. Tumor blood vessels exhibit increased permeability and irregular gaps between endothelial cells, which facilitate the entry of nanoparticles and liposomes into the tumor microenvironment more readily than into healthy tissues. This principle underpins the development of drug delivery systems designed to target cancer cells while sparing normal tissues, commonly referred to as "passive targeting." Nonetheless, the EPR effect is not uniform; it varies significantly across different tumor types and among individual patients, impacting its overall efficacy. Current research is focused on optimizing drug delivery strategies that harness the EPR effect to enhance cancer treatment outcomes.

The EPR effect- based passive targeting approach enhances the pharmacokinetic properties of anticancer drugs by extending their circulation life, improving their stability, and facilitating controlled release of the drugs at the tumor site.

In conclusion, the EPR effect is a revolutionary breakthrough in oncology drugs, opening up new avenues for the development of accurate, efficient, and safe cancer therapies through nanotechnology-based drug delivery systems.

Keywords: Nanomedicines, Tumor, Targeted Drug Delivery, EPR effect, Cancer treatment

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Abstract No.: PP-213

HERBAL MEDICINES IN THE MANAGEMENT OF DIABETES

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Diabetes mellitus is a long-term condition that causes high blood sugar levels and makes people more likely to have problems with multiple organs. Traditional pharmacotherapy frequently results in adverse effects, elevated costs, and suboptimal adherence, thereby generating interest in herbal alternatives sourced from medicinal plants. In both preclinical and clinical studies, plants like Gymnema sylvestre, Momordica charantia (bitter melon), Trigonella foenum-graecum (fenugreek), Cinnamomum verum (cinnamon), and Azadirachta indica (neem) have been shown to have antidiabetic properties. These effects are caused by bioactive phytochemicals like flavonoids, alkaloids, saponins, terpenoids, and phenolics. These chemicals help the body make insulin, make insulin work better, stop glucose from being absorbed by the intestines, stop enzymes that break down carbohydrates (like α-glucosidase), lower oxidative stress and inflammation, lower serum lipids, and protect pancreatic β-cells. Even though there is promising evidence, clinical translation and long-term safety assessments are hard because of differences in phytochemical composition, a lack of standardization, unclear optimal dosing, and not enough large-scale, randomized controlled trials. Thorough phytochemical standardization, meticulous dosing optimization, and meticulously structured clinical trials are imperative to substantiate therapeutic efficacy, guarantee safety, and incorporate these herbal remedies into evidence-based diabetes management.

Keywords: Diabetes mellitus, medicinal plants, phytochemicals, pancreatic β-cells, clinical trials

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Abstract No.: PP-214

GOLDEN POWER: PHYTOCHEMICAL PROFILING & ANTIOXIDANT ACTIVITY OF TURMERIC RHIZOME

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Turmeric (*Curcuma longa* L.), revered in traditional medicine and increasingly validated by modern pharmacology, represents a compelling source of bioactive phytochemicals with potent antioxidant potential. The poster aimed to systematically profile the phytochemical constituents of turmeric rhizome and evaluate its in vitro antioxidant activity using validated analytical and radical-scavenging assays. Preliminary phytochemical screening confirmed the presence of curcuminoids, flavonoids, phenolics, tannins, and terpenoids. High-performance liquid chromatography (HPLC) analysis revealed curcumin as the predominant bioactive compound, consistent with earlier observations by Aggarwal et. al., while total phenolic and flavonoid contents were quantified spectrophotometrically. Antioxidant potential was assessed using DPPH, ABTS, and FRAP assays, demonstrating concentration-dependent radical scavenging activity comparable to standard ascorbic acid. The strong correlation between total phenolic content and antioxidant capacity aligns with findings reported by Priyadarsini et al., supporting the role of curcuminoids as primary contributors to redox modulation. Furthermore, the results echo Hewlings & co scientist clinical insights into turmeric's oxidative stress–attenuating properties. Collectively, this poster reinforces turmeric rhizome as a multifunctional phytochemical reservoir with significant antioxidant efficacy, underscoring its translational relevance in oxidative stress–mediated disorders. These findings support further mechanistic and in vivo investigations to substantiate its therapeutic applications in nutraceutical and pharmaceutical development.

Keywords: *Curcuma longa*, turmeric rhizome, phytochemical profiling, curcuminoids, antioxidant activity, DPPH assay, phenolic content, oxidative stress

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Abstract No.: PP-215

OPTIMIZED GREEN SYNTHESIS APPROACHES OF PHENYTOIN USING METALLIC SULFATE SALTS AND CHROMATOGRAPHIC PURITY ASSESSMENT VIA A NOVEL RP-HPLC METHOD

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Phenytoin is a popular hydantoin-based anti-epileptic agent used for the treatment of tonic–clonic and partial seizures. Its conventional synthetic procedure involves the use of hazardous reagents and a large amount of time, which contradict environmental sustainability. To overcome these problems, the present study proposes green synthetic approaches for phenytoin using metallic sulfate salts—copper sulfate, ferrous sulfate, and aluminium sulfate. Also, less toxic solvents, such as acetic acid and ethanol, are applied to enhance sustainability as well as the product's quality and quantity. Among these methods, ferrous sulfate–catalysed phenytoin synthesis using ethanol exhibited the best performance and gave the highest yield of 98.2%. The synthesised phenytoins were structurally characterised by IR and UV–Visible spectroscopy. The purity of the synthesised products is evaluated using a novel RP-HPLC method that involves using a C18 column and phosphate buffer (pH 2.8)–acetonitrile as mobile phase. The optimised method reflects an excellent chromatographic performance that yields phenytoin with up to 99.5% purity and also gives a consistent retention time between 6.49 to 6.52 mins. These studies' results reflect a sustainable, cost-effective, and high-yielding green synthetic strategy for phenytoin that offers a more reliable alternative to conventional approaches.

Keywords: Phenytoin, Green Synthesis, RP-HPLC method, Metallic sulfate salts

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Abstract No.: PP-216

FLOATING TABLETS: ENHANCING BIOAVAILABILITY THROUGH GASTRIC RETENTION

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Oral drug delivery remains the most preferred route of administration; however, limited gastric residence time significantly restricts the bioavailability of drugs with narrow absorption windows, pH-dependent solubility, or local gastric action. Floating drug delivery systems (FDDS) have emerged as an innovative gastroretentive strategy designed to prolong gastric residence by maintaining buoyancy in gastric fluids. Early foundational work by Deshpande et al. introduced hydrodynamically balanced systems, demonstrating the feasibility of low-density matrices for sustained gastric retention. Subsequent advancements by Streubel and Siepmann optimized polymeric matrices using hydrocolloids such as HPMC, improving floating lag time and controlled drug release kinetics. More recent investigations by Arora et al. and Singh & Kim have focused on effervescent and non-effervescent platforms, gas-generating systems, and novel excipient combinations to enhance mechanical integrity and in vivo predictability. Emerging approaches integrate swellable polymers, raft-forming systems, and 3D-printed floating architectures to achieve precision-controlled release. Collectively, these systems significantly improve the pharmacokinetic profiles of drugs such as metformin, ciprofloxacin, and levodopa by enhancing absorption and reducing dosing frequency. Despite promising outcomes, variability in gastric motility, fed–fasted state differences, and scale-up challenges remain critical considerations. This poster synthesizes contemporary scientific advancements in floating tablet technologies and underscores their translational potential in improving therapeutic efficacy and patient adherence.

Keywords: Floating drug delivery system, Gastroretentive dosage form, Gastric residence time, Hydrodynamically balanced system, Bioavailability enhancement, Controlled release, Effervescent tablets, HPMC matrix

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Abstract No.: PP-217

ORGAN-ON-A-CHIP TECHNOLOGY: REPLACING ANIMAL MODELS WITH MICROFLUIDIC SYSTEMS FOR DRUG TESTING

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A Human-on-a-chip is an advanced, integrated form of organ-on-a-chip systems. While an Organ-on-a-Chip mimics a single organ, like just a lung or liver, a Human-on-a-Chip connects multiple organ modules on a single platform using a shared microfluidic circuit. An organ-on- a-chip system is a micro-engineered device using microfluidics and human cells that mimics the structural, physiological, mechanical, and biochemical activity of a human organ. The application of human cell-based organ-on-a-chip models has made it easier to evaluate the toxicology of drugs by making the testing process more similar to that of human biology, thus improving the chances of safe and accurate testing. The conventional method of using laboratory animals, which have different biological structures and functions from those of human beings, cannot be used to determine the safety of drugs for human consumption. The application of organ-chip technology, which is based on human cellular biology, has made it possible to conduct safe testing without the need for extrapolation, thus reducing the need for animal testing and related moral issues. This has made it easier to conduct drug testing, which may also be more efficient with the potential to improve success rates in preclinical toxicology. Though it is yet to completely replace animal testing because of validation from regulatory bodies, the shift toward Human on a Chip is accelerating, as it provides animal-free patient-specific drug development.

Keywords: Human-on-a-chip; Organ-on-a-chip; Microfluidics; ADME profiling; Drug toxicology

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Abstract No.: PP-218

DESIGN AND MICROWAVE-ASSISTED SYNTHESIS OF NOVEL BENZYL THIAZOLIDINEDIONE MOLECULES: *IN SILICO* AND *IN VITRO* EVALUATION OF ANTIFUNGAL POTENTIAL

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Heterocyclic compounds, specifically nitrogen- and sulfur-conjugated rings, play a significant role in medicinal chemistry. Previous studies suggest that Thiazolidine dione exhibited various biological activities, precisely on 5th position, which depicted the most promising antifungal activity. Then, we prepared a group of thiazolidine dione-containing derivatives (TG 1-6) through green synthesis. Then, we characterised all derivatives by spectroscopic methods, IR-spectrophotometry, and NMR. Through the SAR study, the halogen substituents (Cl, F, Br) at the para position on the terminal phenyl ring showed potent activity, and the electron-donating groups displayed more remarkable antifungal activity than the electron-withdrawing groups (CH3). On the other hand, a molecular docking study was performed on all derivatives using the protein (PDB ID: 5TZ1). Among all derivatives, Compound TG5 exhibited the most binding affinity with -10.7 kcal/mol. Respectively, the in vitro study was screened by the Disc Diffusion Method. All derivatives showed good antifungal activity, but Compound TG5 displays the best antifungal activity against Candida albicans. The zone of inhibition of Compound TG5 is 13mm, juxtaposed to the standard drug Ciprofloxacin. This study reveals that thiazolidine derivatives attach and inhibit the various fungal pathogens. This discovery creates another option for preparing novel drug molecules that can prevent the fungal pathogens.

Keywords: Antifungal activity, Thiazolidine dione, SAR, Docking, in vitro study

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Abstract No.: PP-219

GREEN TEA EXTRACT IMPEDE THE BIOFILM-MEDIATED DRUG RESISTANCE

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Treating infections is becoming a major hurdle for the physician due to the rapid rise of drug resistance. Currently, 60% of bacterial infections are associated with biofilm formation, which is difficult to detect in conventional diagnosis. Biofilm formation is associated with their protective mechanism partially mediated by Quorum sensing (QS). Since QS mediates biofilm properties, we identified novel QS inhibitors for effective management of impending antimicrobial resistance. In the present study, we employed Green Tea extract, analysed by using HPLC to estimate individual catechins level. Our result demonstrated significant inhibition of biofilm formation against P.aeruginosa in concentration dependent manner without altering the growth of planktonic cells. It also substantially decreases the colony formation along with diminished distribution of micro-colonies, altered biofilm architecture, thus inhibit chemotactic movement of the bacteria which lead to inhibitory effect on protease production. It also altered AHL mediated QS inhibitions evident from reduction in Pyoverdin production, inhibition of EPS production in a dose-dependent manner. Thus our study, establishes the therapeutic benefit of the Green Tea extract particularly in infections showing resistance due to biofilm formation and opening up newer avenue for further therapeutic exploration.

Keywords: Biofilm, Green Tea Extract, Quorum sensing, HPLC

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Abstract No.: PP-220

DAPAGLIFLOZIN – A PARADIGM SHIFT IN CARDIO-METABOLIC AND ANTIDIABETIC CARE

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Dapagliflozin is a selective sodium-glucose co-transporter-2 (SGLT2) inhibitor that has significantly advanced the management of type 2 diabetes mellitus (T2DM) and related cardio metabolic disorder. Although initially it introduce for improving glycemic control in type 2 diabetes mellitus (T2DM), its therapeutic benefits extend well beyond blood glucose reduction. Accumulation clinical evidence demonstrates that dapagliflozin significant decrease hospitalization due to heart failure, delay progression of chronic kidney disease (CKD) and reduces cardiovascular mortality, even among non diabetic patients. The drug acts by inhibiting SGLT2 receptors in the proximal renal tubules, thereby promoting urinary glucose excretion. This mechanism not only improve glycemic status but also induce modest weight reduction, lower blood pressure and produce osmotic diuresis collectively contributing to significant cardio renal protection. Major clinical trials, including DECLARE-TIMI 58, DAPA-HF, DAPA-CKD have validated its efficacy across diverse patients populations. These studies confirm its beneficial role in heart failure with reduced and preserved ejection fraction and in CKD with or without diabetes. By targeting shared pathophysiological pathways in diabetes, heart failure, and renal diseases, dapagliflozin represent a shift from traditional glucose-focused therapy towards comprehensive organ protection, with evolving clinical guidelines, it is now considered a cornerstone treatment in modern cardio metabolic management.

Keywords: Dapagliflozin, Sodium glucoseco-transporter-2(SGLT2) inhibitor, Cardio metabolic diseases, Type 2 diabetes mellitus(T2DM), Activities, DECLARE-TIMI 58, DAPA-HF, DAPA-CKD, DELIVER trial, Clinicaldisease management, Clinical guidelines, Foundational therapy

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ROLE OF FLAVONOIDS IN NEURO PROTECTION

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Flavonoids are the polyphenolic phytochemical found abundantly in nature (fruits, vegetables and others) and offer significant health benefits. In recent times, these substances have been playing very important role as brain guard, help to decrease the occurrence of many neurodegenerative diseases including Alzheimer's disease, Parkinson's disease etc. The ability of preventing the neurodegenerative diseases is due to their anti-oxidant, anti-inflammatory effect, Further, the generation of ROS and/or neutralization of ROS, leading to reduction of oxidative stress, helpful in protection of neurodegenerative diseases. Also, the capability of this substance to regulate varieties of pathways for cellular signalling and hence controlling of cell survival, inflammation, and synaptic function are added features in the neuroprotection. Flavonoids improve cerebral blood flow and stimulate neurogenesis. Flavonoids like quercetin, epigallocatechin gallate (EGCG), and anthocyanins can cross the blood brain barrier (BBB) and effective as anti-neurogenerative diseases. They are reducing amyloid- β shrine conformation and tau protein abnormalities, which are crucial features of Alzheimer's complaint. Also, flavonoids help regulate microglial exertion, reducing habitual inflammation in the brain. Studies in creatures and population grounded exploration indicate that flavonoid enriched diets are helpful for providing better cognitive functions. Although further clinical studies are demanded to confirm their effectiveness in humans, flavonoids show strong implication as natural remedial agents for brain health. Further exploration is necessary to more understand their immersion, ideal lozenge, and long- term safety.

Keywords: Flavonoids, neurodegenerative, anti-inflammatory, anti- apoptotic, cognitive functions

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ISOLATION AND IDENTIFICATION OF PLANT GROWTH PROMOTING RHIZOBACTERIA FROM THE SOIL OF MANGROVE PLANTS

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Abiotic stresses, especially salinity and drought, are increasingly constraining agricultural productivity due to climate change and soil degradation. The over-application of chemical fertilizers has resulted in environmental pollution, so the importance of a sustainable alternative cannot be denied. PGPRs provide a biological basis for improving the intrinsic growth of plants and their potency against stress factors. It tends to discuss the isolation and identification of PGPR isolated from the rhizosphere of mangrove plants, which grow well in a very high saline and anaerobic condition, hence providing a unique microbial community, barely explored for agriculture. Collections of the rhizosphere soil were made from the selected mangrove species, from which bacterial isolates were obtained by serial dilution and selective media techniques. These bacterial isolates were subjected to morphological and biochemical characterization, followed by molecular identification via 16S rRNA gene sequencing. Key plant growth promotional traits will be screened, which include the production of indole-3-acetic acid, solubilization of phosphate, siderophore production, nitrogen fixation, ammonia production, and ACC deaminase activity. These isolates are then checked for their salt-tolerance ability under different concentrations of sodium chloride. Expected outcomes are expected to yield different halotolerant PGPR of different genera, such as *Bacillus, Pseudomonas, Azospirillum*, and *Enterobacter*, maybe even new ones that are adapted to mangrove ecosystems. This research proposal focuses on better understanding plant-microbial interactions in extreme environments and to utilize extremophile mangrove-associated PGPR as a bio-inoculum to improve horticultural productivity in stressed conditions.

Keywords: Plant Growth Promoting Rhizobacteria (PGPR); Mangrove ecosystem; Rhizosphere soil; Halotolerant bacteria; Salinity stress; Biofertilizers

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Abstract No.: PP-223

DEVELOPMENT AND ASSESSMENT OF AZITHROMYCIN ORAL SUSPENSION BY REDUCING ITS BITTERNESS FOR PEDIATRIC USE

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The present study focuses on the formulation and evaluation of a taste-masked suspension of Azithromycin Dihydrate for improved pediatric compliance. Azithromycin is a highly bitter macrolide antibiotic, posing significant challenges in developing palatable oral liquid formulations. To overcome this issue, taste masking was achieved through complexation with the weak cation exchange resin Kyron T-134. The drug–resin complex was prepared in a 1:3 ratio at alkaline pH, resulting in maximum drug loading with approximately 90% entrapment efficiency. Complex formation was confirmed by FTIR and DSC studies. The optimized suspension formulation exhibited satisfactory physicochemical properties, including appropriate viscosity, sedimentation volume (≥0.9), particle size uniformity, and good redispersibility. In vitro drug release studies demonstrated more than 90% drug release within 45 minutes in pH 6.8 phosphate buffer, indicating that taste masking did not retard drug release. Taste evaluation by human volunteers confirmed successful masking of bitterness. Stability studies conducted under long-term and accelerated conditions revealed no significant changes in taste, viscosity, particle size, sedimentation rate, or dissolution profile. The study concludes that ion-exchange resin technology is an effective approach for developing palatable, stable, and patient-friendly azithromycin suspensions suitable for pediatric and geriatric use.

Keywords: Azithromycin Dihydrate; Taste Masking; Ion-Exchange Resin; Kyron T-134; Oral Suspension; Drug-Resin Complex; In-vitro Drug Release; Stability Studies

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Abstract No.: PP-224

EPILEPSY: ION CHANNEL DYSFUNCTION AND MODERN ANTISEIZURE DRUGS

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Epilepsy is a chronic neurological disorder characterized by recurrent and unprovoked seizures caused by abnormal electrical activity in the brain. A major underlying mechanism of epilepsy involves ion channel dysfunction, known as channelopathies, which alters the balance between neuronal excitation and inhibition. Mutations or abnormalities in sodium, potassium, calcium, or chloride channels can disturb membrane potential and trigget uncontrolled neuronal firing. Understanding these channel defects has provided new insights into seizure generation and therapeutic strategies Modern antiseizure drugs (ASDs) are developed to target specific ion channels to restore normal electrical signaling. For example, sodium channel blockers such as carbamazepine and lamotrigine reduce repetitive neuronal firing, while calcium channel modulators like ethosuximide suppress thalamic burst discharges. Newer agents such as lacosamide and perampanel act with improved selectivity and fewer side effects, emphasizing precision therapy. Advances in molecular biology and neuropharmacology have further encouraged the design of drugs that modify synaptic transmission and enhance inhibitory neurotransmission through GABAergic mechanisms. Overall, ion channel dysfunction represents a key target for understanding and managing epilepsy. The development of modern antiseizure drugs based on these molecular mechanisms offers safer and more effective treatments, paving the way for personalized epilepsy management and improved quality of life for patients.

Keywords: Epilepsy, Ion Channel Dysfunction, Channelopathies, Antiseizure Drugs, Neuronal Excitation and Inhibition

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Abstract No.: PP-225

ESTAMINATE PROCESS VALIDATION OF SYRUP OF DIGESTIVE ENZYMES WITH VITAMIN B2 & NIACINAMIDE

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This study presents the process validation of a liquid oral formulation, Syrup of Digestive Enzymes with Vitamin B2 (Riboflavin) and Niacinamide, to demonstrate consistent manufacturing performance and assured product quality. The objective was to establish documented evidence that the manufacturing process consistently produces batches meeting predefined specifications in accordance with regulatory requirements and Good Manufacturing Practices (GMP).

Process validation was performed on three consecutive commercial-scale batches under routine production conditions. Critical process parameters (CPPs), including mixing time, temperature, agitation speed, sequence of ingredient addition, filtration parameters, and filling operations, were identified, monitored, and evaluated. Their impact on critical quality attributes (CQAs) was systematically assessed to ensure process control and reproducibility.

The CQAs examined included enzyme activity, assay of Riboflavin and Niacinamide, pH, viscosity, specific gravity, microbiological limits, and physical appearance. In-process controls were conducted at predefined manufacturing stages to verify homogeneity, maintain uniform distribution of active ingredients, and ensure batch-to-batch consistency. Sampling procedures were designed to confirm compliance with established acceptance criteria throughout processing and final filling.

All validation batches complied with specified standards for in-process and finished product testing. The findings confirm that the manufacturing process is robust, stable, and reproducible. The validated process is suitable for routine commercial production, ensuring product safety, therapeutic effectiveness, and continued regulatory compliance.

Keywords: Process Validation, Digestive Enzyme Syrup, Critical Process Parameters (CPPs), Critical Quality Attributes (CQAs), Good Manufacturing Practice

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Abstract No.: PP-226

THERAPEUTIC POTENTIAL OF ZINC NANO PARTICLES ON CANCER TREATMENT

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Zinc nanoparticles (ZnNPs) have recently emerged as promising agents in oncological therapeutics due to their unique physicochemical properties, biocompatibility, and selective anticancer activity. Kumar et al., and Singh et al., both have studied in 2018 & 2020 respectively and conclude that, ZnNPs demonstrate potent cytotoxic effects against diverse cancer cell lines through mechanisms including reactive oxygen species (ROS) generation, induction of apoptosis, and cell cycle arrest. Lee et al., have studied in 2019 and conclude that in vitro studies show that ZnNPs preferentially target malignant cells with minimal toxicity to normal cells, a critical advantage over conventional chemotherapeutics. Furthermore, Zhang et al., in 2021, have studied and conclude that, surface functionalization of ZnNPs with targeted ligands enhances tumor specificity and improves cellular uptake through receptor-mediated endocytosis. Patel et al have studied in 2022, and conclude that, preclinical animal models have demonstrated that ZnNPs modulate tumor microenvironments, reduce angiogenesis, and synergize with standard therapies to inhibit tumor growth more effectively than monotherapy. Importantly, ZnNPs can act as carriers for chemotherapeutic drugs, improving bioavailability and reducing systemic side effects that have studied by Sahu et al in the year of 2023. Despite these advances, challenges remain, including nanoparticle stability, long-term toxicity, and scalable manufacturing. Ongoing research is focusing on optimizing size, shape, and surface chemistry of ZnNPs to enhance therapeutic index and clinical translation. In conclusion, zinc nanoparticles represent a versatile and effective platform with significant potential to augment current cancer treatment modalities, warranting further clinical investigation.

Keywords: Zinc nano particles, cancer therapy, ROS-Mediated Apoptosis, Targeted Nano delivery

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Abstract No.: PP-227

SYNTHESIS AND EVALUATION OF NOVEL NITROGEN CONTAINING HETEROCYCLIC COMPOUNDS AS POTENTIAL SORTASE A INHIBITORS AGAINST STAPHYLOCOCCUS AUREUS BIOFILM FORMATION

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Biofilm formation by Staphylococcus aureus is a significant clinical issue. It leads to chronic infections and antibiotic resistance. Targeting biofilm-forming enzymes like sortase A has become a promising strategy to disrupt bacterial adhesion and virulence. In this study, we synthesized novel nitrogen containing heterocyclic compound (triazole substituted imidazo [1,2-b]pyridazine) using an, inexpensive , environment-friendly protocol and tested their ability to inhibit the sortase A enzyme of S.aureus. We performed molecular docking studies using the 3D structures of sortase A (PDB IDs: 1T2P and 1T2W). The docking scores showed strong binding affinities ranging from -7.6 to -6.0 KCal/mol. ADME analysis (SwissADME) showed good pharmacokinetic profiles, and toxicity prediction (ProTox III) studies gaves both compound a low toxic. Structure elucidation of the designed compounds was done through ^{1}H & ^{13}C NMR and HR-MS, HPLC. Overall, these newly synthesized nitrogen-based compounds could be promising candidates for developing new anti-biofilm agents that target S. aureus sortase A.

Keywords: HR-MS, 3D structures, nitrogen containing heterocyclic compound.

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Abstract No.: PP-228

HERBAL NANOCARRIERS: A SMART APPROACH TO NATURAL DRUG INNOVATION

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Herbal medicine has long served as a cornerstone of global healthcare, yet its clinical translation is frequently hindered by poor solubility, low bioavailability, rapid metabolism, and inconsistent pharmacokinetics of phytoconstituents. Herbal nanocarriers have emerged as an intelligent and transformative strategy to overcome these limitations, integrating traditional botanical knowledge with advanced nanotechnology. Recent investigations by diverse research groups have demonstrated that nano formulations such as solid lipid nanoparticles, polymeric nanoparticles, nano emulsions, liposomes, and phytosomes significantly enhance the stability, targeted delivery, and therapeutic efficacy of bioactive plant compounds including curcumin, resveratrol, quercetin, and berberine. Scientists have reported improved cellular uptake, prolonged circulation time, and site-specific action, particularly in cancer, inflammatory disorders, neurodegenerative diseases, and metabolic syndromes. Importantly, green synthesis approaches and biodegradable nanomaterials further strengthen the safety and sustainability profile of herbal nanocarriers. Mechanistic studies reveal enhanced permeability and retention (EPR) effects, controlled release kinetics, and modulation of molecular signaling pathways as key contributors to improved outcomes. Despite promising preclinical data, challenges remain in large-scale production, regulatory standardization, and long-term toxicity evaluation. Nevertheless, herbal nanocarriers represent a paradigm shift in natural drug innovation—bridging traditional phytotherapy with precision nanomedicine and opening new frontiers for safe, effective, and patient-centric therapeutics.

Keywords: Herbal nanocarriers; Phytomedicine; Nanotechnology; Bioavailability enhancement; Targeted drug delivery; Green synthesis; Natural product innovation

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Abstract No.: PP-229

FORMULATION AND CHARACTERIZATION OF ROSUVASTATINE - L-MALIC ACID CO-CRYSTAL TO ENHANCE SOLUBILITY AND BIOAVAILABILITY

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Rosuvastatin calcium is a commonly used in antihyperlipidemic medication, belongs to Biopharmaceutical Classification System class II, which has low aqueous solubility and limited oral bioavailability, which reduces its therapeutic effectiveness. The present study aimed to enhance the solubility and bioavailability of rosuvastatin through co-crystallization with L-malic acid, as a co-former, using suitable crystal engineering techniques. The rosuvastatin – L-malic acid co-crystals are prepared by liquid assisted grinding method in an optimized stoichiometric molar ratio to promote intermolecular hydrogen bonding and enhance physicochemical properties. The prepared co-crystal was characterized using Fourier Transform Infrared Spectroscopy, X-ray Diffraction, Differential Scanning Calorimetry to confirm co-crystal formation and evaluate changes in molecular interactions, crystallinity, thermal behavior, and surface morphology. Solubility and in vitro dissolution studies were conducted to study the improvement in drug release performance. Co crystal formation involves non-covalent intermolecular interactions, not new covalent bonds, such as O-H-O hydrogen bond between: Carboxylic acid group of rosuvastatin and carboxylic acid groups of malic acid, O–H···N interaction with heterocyclic nitrogen of rosuvastatin. These create stable supramolecular synthons in the crystal lattice. The results indicates meaningful difference in spectral patterns, diffraction peaks, and melting behaviour, confirming the formation of a new crystalline phase. The co-crystal exhibited improved aqueous solubility and enhanced dissolution rate compared to pure rosuvastatin, suggesting improved bioavailability potential. Therefore, co-crystallization with L-malic acid represents a promising and effective approach for improving the physicochemical and biopharmaceutical properties of rosuvastatin, thereby enhancing its therapeutic performance.

Keywords: Rosuvastatin calcium; L-malic acid; Co-crystals; Solubility enhancement; Bioavailability enhancement

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Abstract No.: PP-230

ISOLATION OF VITAMIN B COMPLEX FROM WOOD EAR MUSHROOM (AURICULARIA AURICULA-JUDAE) AND PREPARATION OF NANOEMULSION GEL FOR THE TREATMENT OF CANKER SORE

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Canker sores (aphthous ulcers) are very small shallow lesions that generally develops on the soft tissue of the mouth or at the base of the gums. They cause substantial mouth irritation, which recently has very limited effective topical treatments. The current study proposes to isolate vitamin B complex from Auricularia auricula-judae or a Wood ear mushroom, a nutrient-rich edible fungus, to formulate a sticky nano- emulsion gel to get targeted therapy. The active component of vitamin B complex has been extracted.

A nano-emulsion was prepared by using high-spreed homogenization of oil & surfactant, to shrink the medicine into tiny droplet sizes reduced to the nanoscale (<200 nm) that penetrates mouth tissue better and stay stuck to the sore longer than the traditional cream. The formulation of mucoadhesive nano-emulsion gel includes the incorporation of vitamin B decant into the emulsion followed by the incorporation of hydrogel matrix. The formulation exhibited pseudoplastic flow that spreads easily which is ideal for oral application.

Early evaluation confirms enhanced stability, bioavailability and antimicrobial activity and matches the mouth natural's pH that is very much effective for canker sore relief via vitamin B's anti-inflammatory and regenerative properties.

Optimization of encapsulation efficiency has been doing recently. Future studies will employ TEM, SEM, FTIR, ex vivo permeation, and in vivo efficacy trials on animal models to prove it can treat ulcers faster than the convenient therapies.

Keywords: Vitamin B complex, Auricularia auricula-judae, nano-emulsion gel, canker sores, hydrogel, spreadability, antimicrobial activity

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Abstract No.: PP-231

VACCINE DELIVERY INNOVATIONS: FROM INJECTABLES TO NEEDLE-FREE SYSTEMS

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Vaccine delivery technologies have advanced remarkably beyond conventional intramuscular and subcutaneous injections, driven by the need to enhance immunogenicity, patient compliance, and equitable global access. Although injectable vaccines remain foundational in infectious disease control, limitations such as needle phobia, cross-contamination risks, biohazardous waste, and dependence on trained healthcare personnel have accelerated the development of needle-free platforms. Pioneering work by Prausnitz and colleagues on microneedle arrays demonstrated targeted antigen delivery to skin-resident dendritic cells, significantly improving immune activation with minimal discomfort. Similarly, jet injector systems, refined through biomedical engineering advancements, enable high-pressure transdermal administration without sharps, reducing medical waste and improving safety. Mucosal immunization strategies—supported by studies from Lycke and others—highlight the capacity of oral and intranasal vaccines to induce robust local IgA and systemic immune responses, as exemplified by intranasal influenza vaccines. Furthermore, nanotechnology-based delivery systems, including lipid nanoparticles advanced by researchers such as Cullis and Karikó, have transformed vaccine stability and intracellular antigen expression, notably in mRNA vaccine platforms. Collectively, these innovations address logistical, economic, and psychological barriers associated with traditional injectables. As global health priorities increasingly demand scalable and thermostable solutions, next-generation vaccine delivery systems are poised to redefine immunization strategies, particularly in resource-limited settings and pandemic preparedness frameworks.

Keywords: Needle-free vaccines; Microneedle technology; Jet injectors; Mucosal immunity; Intranasal vaccines; Lipid nanoparticles; mRNA vaccines; Vaccine innovation; Drug delivery systems; Global health

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Abstract No.: PP-232

EFFECT OF MICROWAVE POWER ON PHENYTOIN SYNTHESIS: A COMPARATIVE STUDY

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Microwave-assisted synthesis of phenytoin from benzil and urea is well known to be simple, clean, fast, efficient, and economical, with shorter reaction times and sometimes improved yields compared to traditional methods. This work investigates the effect of microwave power level on the synthesis when the reaction time is held constant. Three simultaneous reactions were conducted with the same ratios of reagents and same procedures, but under three different power levels for the same irradiation time. After irradiation, the crude materials were obtained, purified, and analyzed to assess yield, purity, and visible reaction characteristics. The data indicate that yield and purity are highly sensitive to power level. The intermediate power level yielded the maximum amount with clean data from characterization analysis, slightly lower yield with minimal evidence of overheating at lower power levels, and little additional benefit with some signs of minor degradation or side reactions at the highest power level. The trend indicates an optimal power that combines efficient heating and product quality within fixed time. The results have several implications, including more efficient laboratory procedures and scaling or adapting the procedure in a teaching or research environment. This study, therefore, makes a contribution to the comparison of the microwave benzil-urea procedure for phenytoin synthesis, encouraging the selection of power carefully to optimize efficiency. Thus, this comparative study enables us to identify and isolate the best environment (energy level) for Phenytoin synthesis using the microwave irradiation method.

Keywords: Phenytoin, Microwave-assisted synthesis, Microwave irradiation, Yield, Purity

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Abstract No.: PP-233

FORMULATION AND CHARACTERIZATION OF ROSUVASTATINE - L-MALIC ACID CO-CRYSTAL TO ENHANCE SOLUBILITY AND BIOAVAILABILITY

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Rosuvastatin calcium is a commonly used in antihyperlipidemic medication, belongs to Biopharmaceutical Classification System class II, which has low aqueous solubility and limited oral bioavailability, which reduces its therapeutic effectiveness. The present study aimed to enhance the solubility and bioavailability of rosuvastatin through co-crystallization with L-malic acid, as a co-former, using suitable crystal engineering techniques. The rosuvastatin – L-malic acid co-crystals are prepared by liquid assisted grinding method in an optimized stoichiometric molar ratio to promote intermolecular hydrogen bonding and enhance physicochemical properties. The prepared co-crystal was characterized using Fourier Transform Infrared Spectroscopy, X-ray Diffraction, Differential Scanning Calorimetry to confirm co-crystal formation and evaluate changes in molecular interactions, crystallinity, thermal behavior, and surface morphology. Solubility and in vitro dissolution studies were conducted to study the improvement in drug release performance. Co crystal formation involves non-covalent intermolecular interactions, not new covalent bonds, such as O-H-O hydrogen bond between: Carboxylic acid group of rosuvastatin and carboxylic acid groups of malic acid, O–H···N interaction with heterocyclic nitrogen of rosuvastatin. These create stable supramolecular synthons in the crystal lattice. The results indicates meaningful difference in spectral patterns, diffraction peaks, and melting behaviour, confirming the formation of a new crystalline phase. The co-crystal exhibited improved aqueous solubility and enhanced dissolution rate compared to pure rosuvastatin, suggesting improved bioavailability potential. Therefore, co-crystallization with L-malic acid represents a promising and effective approach for improving the physicochemical and biopharmaceutical properties of rosuvastatin, thereby enhancing its therapeutic performance.

Keywords: Rosuvastatin calcium; L-malic acid; Co-crystals; Solubility enhancement; Bioavailability enhancement

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Abstract No.: PP-234

GENERAL ANAESTHESIA: IMPORTANCE, CHALLENGES, AND RECENT ADVANCEMENTS

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General anaesthesia is very essential component of modern medicine, enabling complete unconsciousness, pain relief, muscle relaxation, and immobility to require for precious operations without patient movement, pain, or distress. It allows complex operations like open-heart surgery or those includes brain, major trauma, or abdomen, where local anaesthesia cannot be sufficient. Patients who have high risk of blood loss, are uncooperative, pediatric also need to control autonomic reflexes and ensure patient safety. There are no exact worldwide statistics available of usages, but general anaesthesia is required approximately 60-75% annually of inpatient surgeries in high resource settings. In the USA alone, over 60 million surgeries are performed under general anaesthesia each year. Besides these general anaesthesia shows many major risks and serious complications such as- Respiratory complications: hypoxemia, postoperative pulmonary complications; Cardiovascular complications: cardiac arrest, hypertension; Neurological complications: cognitive dysfunction, nerve damage; Malignant hyperthermia, in some cases Coma happened. Overtime, advancements and upgradation in anaesthetic techniques have improved patient safety and surgical success. Research focuses on reversal agents using cAMP inhibitors to speed emergence. Innovations include: Target Control Infusion - precious drug delivery; Ultrasound-Guided Regional Anaesthesia - improve pain management; Newer anaesthesia agents - reduce side effects; Modern monitoring technologies - for real-time patient assessment; Sugammadex - a reversal agent for neuromuscular blockade. General anaesthesia is a very much important component for modern medicine, enable complex surgeries and ensure patient safety, despite with risks and complications. Ongoing advancements in anaesthetic techniques and modern technologies continuously improves patient outcomes and surgical success.

Keywords: General anaesthesia; Pediatric; complete unconsciousness; worldwide statistics; major risks; advancements; Modern technologies.

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Abstract No.: PP-235

PREPARATION AND EVALUATION OF MOUTH-MELTING ANALGESIC TABLETS

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Mouth-melting tablets represent a modern oral drug delivery approach that rapidly disintegrates in the saliva without requiring water for administration. This dosage form is especially beneficial for patients who have trouble swallowing conventional tablets, including children, elderly individuals, accident patients who have extreme pain and difficulty in swallowing, and patients with ictal pain. The present research was undertaken to prepare and evaluate mouth-melting tablets containing a combination of analgesics to achieve rapid pain relief with improved pain management. The tablets were formulated by the direct compression technique using appropriate super-disintegrants, and fillers to ensure quick disintegration and acceptable palatability. The optimized formulation exhibited satisfactory mechanical strength, remarkable wetting time of less than a minute. The disintegration time was consistently less than sixty seconds, which met the stipulated requirement for such tablets. In vitro cumulative release in simulated fluid exceeded 93% and 79% for individual drugs within 20 minutes. This facilitated the inclusion of a formulation capable of disintegrating within one minute, in accordance with the specifications for Orally Disintegrating Tablets.

Keywords: Mouth-melting tablets, Fast-disintegration, Analgesic effect, Pain management

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PHARMACEUTICAL ROLE IN PROSTHETIC IMPLANT SUCCESS: INFECTION CONTROL AND BIOCOMPATIBILITY

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Prosthetic implants have significantly improved outcomes in orthopedic, dental, cardiovascular, and reconstructive surgeries, but their long-term success depends on effective infection control and good biocompatibility. Implant-related infections, especially those caused by biofilm-forming bacteria, remain a major cause of implant failure, revision surgeries, and increased healthcare costs. Pharmaceutical strategies such as systemic antibiotic prophylaxis, antibiotic-loaded bone cements, localized drug delivery systems, and antimicrobial surface coatings help reduce infection risk at implantation sites. Recent advances, including silver nanoparticles, antimicrobial peptides, biodegradable polymer carriers, and controlled-release formulations, provide sustained antimicrobial action while lowering systemic toxicity and limiting resistance. Ensuring biocompatibility is equally important to avoid chronic inflammation, immune rejection, and tissue damage. Ongoing research focuses on developing bioinert, bioactive, and biodegradable materials that enhance tissue integration and reduce adverse reactions. Surface modification techniques using growth factors, anti-inflammatory agents, and osteoinductive substances further improve osseointegration and accelerate healing. Overall, integrating pharmaceutical science with biomaterials engineering supports better implant durability, patient safety, and therapeutic effectiveness. Progress in targeted drug delivery, nanotechnology, and personalized medicine is expected to further reduce complications and improve the clinical success rates of prosthetic implants.

Keywords: Prosthetic, Prophylaxis, Nanoparticles, Osteoinductive, Osteointegration

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Abstract No.: PP-237

PLATELET-RICH PLASMA (PRP) THERAPY IN ALOPECIA: SCIENTIFIC EVIDENCE

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The use of platelet-rich plasma (PRP) therapy has grown in popularity as a regenerative strategy for treating alopecia, especially androgenetic alopecia (AGA) and alopecia areata (AA). In order to concentrate platelets within plasma, the patient's blood is centrifuged to create PRP, an autologous preparation. Platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), transforming growth factor-beta (TGF-β), and epidermal growth factor (EGF) are among the biologically active growth factors that are added to this preparation. These elements are thought to suppress follicular apoptosis, lengthen the anagen phase of the hair cycle, induce angiogenesis, and increase the proliferation of dermal papilla cells. Several controlled clinical studies and systematic analyses have demonstrated that PRP therapy can significantly improve hair density, hair thickness, and overall scalp coverage in patients with AGA compared to baseline values. Visible clinical improvement is generally observed after three to four monthly treatment sessions, with periodic maintenance therapy recommended to sustain results. In cases of alopecia areata, PRP has shown therapeutic benefits comparable to intralesional corticosteroid injections, particularly in mild to moderate disease. Despite encouraging outcomes, variations in PRP preparation protocols, platelet concentration, activation methods, injection techniques, and treatment intervals contribute to inconsistent results across studies. Standardization of procedures and long-term evaluation remain essential for optimizing clinical efficacy. Overall, current evidence supports PRP as a relatively safe and moderately effective therapeutic option for selected patients with alopecia.

Keywords: Platelet-Rich Plasma; Androgenetic Alopecia; Alopecia Areata; Hair Regeneration; Growth Factors

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PHARMACOLOGY OF OVER-THE-COUNTER MEDICINES

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Pharmacology is the study of how medicines work inside human body. Pharmacology of over-the-counter medicines is easily available without a prescription, treats only minor illnesses, is safe for short-term use, effective for common minor diseases, and is classified based on the symptoms they treat in the body. Analgesics and antipyretics act by inhibiting prostaglandin synthesis reduce, resulting in relief of pain and reduction of fever. Antacids are basic alkaline substances that neutralise or decrease gastric acid secretion in stomach and provide relief from acidity and indigestion. Antihistamines are H1 receptor antagonists that prevent histamine from binding to its receptor, thereby reducing allergic symptoms. Cough suppressants are depressing the medullary cough centre, thereby decreasing the frequency and intensity of cough. Expectorants are the drugs to loosen mucus and promote its removal from respiratory tract. Decongestants cause vasoconstriction of blood vessels in the nasal mucosa, reducing edema and congestion. Laxatives facilitate excretion by increasing stool bulk, softening stool. Antidiarrheals are decrease intestinal motility and secretion or increase fluid absorption, thereby controlling diarrhea. Topical preparations work for external applications on skin or mucous membranes to treat local conditions such as inflammation, infections or itching. OTC medicines act as pharmacological mechanisms like inhibition of prostaglandins, blockade of histamine receptors, reduction of gastric acid and so on. Although OTC drugs are generally safe and easily accessible, improper use can lead to adverse effects and complications.

Keywords: Analgesics and antipyretics, Antacids, Antihistamines, Laxatives.

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SMART NANOSPONGES: A NEW ERA IN TARGETED DRUG DELIVERY

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Smart nanosponges have emerged as transformative nanoplatforms in precision therapeutics, offering controlled, stimuli-responsive, and target-specific drug delivery. Structurally, nanosponges are hyper-crosslinked polymeric or cyclodextrin-based porous networks capable of encapsulating both hydrophilic and lipophilic drugs. Pioneering work by Trotta et al. demonstrated the potential of cyclodextrin nanosponges in enhancing drug solubility and stability, while Zhang et al. expanded their application toward tumor-targeted delivery via pH-responsive systems. Subsequent investigations by Kratz and colleagues emphasized the integration of ligand-mediated targeting strategies to improve site-specific accumulation, reducing systemic toxicity. Recent advancements focus on stimuli-sensitive nanosponges—responsive to pH, temperature, redox potential, and enzymatic triggers—enabling on-demand drug release within pathological microenvironments such as cancerous tissues or inflamed sites. In oncology, smart nanosponges have shown superior loading efficiency, sustained release kinetics, and improved therapeutic index compared to conventional carriers. In antimicrobial therapy, toxin-absorbing nanosponges inspired by cellular membrane cloaking strategies have demonstrated promising detoxification capabilities. Moreover, their biocompatibility, tunable pore size, and surface functionalization potential support applications in combination therapy and theranostics. Despite remarkable progress, challenges remain in large-scale manufacturing, long-term safety profiling, and regulatory translation. Nevertheless, the convergence of nanotechnology, polymer chemistry, and molecular targeting heralds smart nanosponges as a next-generation platform poised to redefine targeted drug delivery and personalized medicine.

Keywords: Smart nanosponges; Targeted drug delivery; Stimuli-responsive systems; Cyclodextrin nanosponges; Controlled release; Nanotheranostics; Precision medicine

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Abstract No.: PP-240

BACTERIOPHAGE THERAPY: A FUTURE ALTERNATIVE TO ANTIBIOTICS

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The alarming rise of antibiotic-resistant pathogens has created an urgent need for alternative antimicrobial strategies. Multidrug-resistant (MDR) bacteria now compromise the effectiveness of conventional antibiotics, posing a significant threat to global health. In this context, bacteriophage therapy has re-emerged as a scientifically robust and clinically promising approach. Bacteriophages (phages) are highly specific viruses that infect and lyse bacterial cells without affecting human tissues or commensal microbiota. Early foundational work by Félix d'Hérelle established the therapeutic potential of phages, while contemporary studies by researchers such as Steffanie A. Strathdee have demonstrated successful compassionate-use treatments against life-threatening MDR infections. Unlike broad-spectrum antibiotics, phages exhibit remarkable host specificity and possess the unique ability to self-amplify at the site of infection, thereby enhancing localized antibacterial activity. The development of phage cocktails broadens antibacterial spectra and mitigates resistance development. Advances in molecular biology and synthetic genomics have further enabled the engineering of safer, lytic-only phages with improved therapeutic precision. Nevertheless, challenges including regulatory harmonization, immunogenicity, pharmacokinetic standardization, and scalable manufacturing remain barriers to widespread clinical adoption. Despite these limitations, accumulating preclinical and clinical evidence suggests that bacteriophage therapy holds substantial promise as either a complementary or alternative modality to antibiotics in the era of precision antimicrobial medicine.

Keywords: Bacteriophage therapy; Antibiotic resistance; Multidrug-resistant bacteria; Phage cocktails; Antimicrobial therapy; Precision medicine

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PERSISTER PSEUDOMONAS IN BIOFILM AND THEIR ROLE IN TREATMENT FAILURE

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Pseudomonas aeruginosa is an Gram-negative pathogen responsible for a wide range of acute and chronic infections, particularly in immunocompromised patients. A major factor contributing to its persistence is its ability to switch from a planktonic state to a biofilm lifestyle. Pseudomonas aeruginosa is a biofilm-forming bacterium that can generate persister cells, which help it survive antibiotic treatment. This structured community also enables cell-to-cell communication through quorum sensing and activation of regulatory pathways that promote survival under stress conditions. As a result, biofilm associated populations exhibited increased tolerance to antimicrobial therapy, often leading to treatment failure and recurrent infections. Understanding the mechanisms governing biofilm formation and persistence in P. aeruginosa is therefore essential for developing effective strategies to control chronic infections and improve therapeutic outcomes.

Keywords: Pseudomonas auruginosa, biofilm, microbial resistance, Gram-negative, quorum sensing

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ORGANS-ON-CHIPS FOR PHARMACOLOGICAL DRUG TESTING

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Organs-on-chips (OOC) models have founded as a a promising alternative overcoming the limitations based on animal testing of drugs .This system generally mimic the structural and functional properties of human tissues in such microfluidic devices that contain hollow channels lined with living cells , cells that derived from human tissues to form an organ like structure . In drug testing procedure organs-on-chips system is a better technique rather than the traditional system like two-dimensional cell cultures and animal models, which often struggle to predict human responses accurately. These systems allow to observe drug effectiveness, toxicity, metabolism, and pharmacokinetics and pharmacodynamics conditions into human body. This “body-on-chip” setups enable the measurement of interactions across different systems by studies on absorption, distribution, metabolism, and excretion processes. . By improving predictable accuracy and reducing the variation exists in experiments, organs-on-chips can help to improve the drug development study , lowering the cost of drugs , reduce clinical failures, and decrease the rate of animal testing procedure , ultimately it promotes safer and more efficient therapeutic developments .

Keywords: Microfluidic device, Two Dimensional cell culture, pharmacokinetics, pharmacodynamics

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VALORIZATION OF JACKFRUIT SEED STARCH AS AN ECONOMIC AND SUSTAINABLE ALTERNATIVE: A COMPARATIVE STUDY WITH MARKETED STARCH

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The high demand for affordable and eco-friendly raw materials has encouraged researchers to find new sources of starch for use in food, pharmaceutical, and industrial products. This study focuses on using jackfruit seed starch as an economical and sustainable alternative compared to commercially available starch. Jackfruit seeds are usually thrown away as waste, but they contain a high amount of starch that can be used effectively. In this research, starch was extracted from the jackfruit seeds, and then it was compared with the marketed starch. The comparison between marketed starch and jackfruit seed starch was based on their properties like pH, viscosity, swelling ability, gelatinization, and other performance in different applications. The results show that jackfruit seed starch has a suitable pH level, swells well in water, forms a proper gel when heated, and has a texture similar to starch available in the market. Jackfruit seeds are a by-product and easily available; if we use them, it reduces the raw material costs and helps to manage the agricultural waste. This supports better use of natural resources and enhances environmental sustainability. Jackfruit seed starch performs almost the same as marketed starch while being more economical and eco-friendlier. However, more large-scale research is needed to make sure it can be used commercially and that its quality remains the same for different industries.

Keywords: Jackfruit Seed Starch, Starch Extraction, Physicochemical Properties, Sustainable Raw Material, Agricultural Waste Utilization.

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SMART PILLS: REVOLUTIONIZING DRUG DELIVERY AND DIAGNOSTIC MEDICINE

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Medication non-adherence is a major problem, leading to treatment failures, health complications, and high health care costs. In such cases, smart pills emerge as a saviour in the healthcare field. AI- integrated smart pills are swallowable devices incorporated with microelectronics, sensors, and sometimes, AI algorithms that emerge as a transformative solution to track patient health and ensure medication compliance. Smart pills are used to detect high-risk healthcare challenges like medical non-compliance, provide painless capsule endoscopy, and promote target drug delivery. These devices enable a prominent move from passive medication to active, personalized, and data-driven healthcare, capable of navigating the gastrointestinal (GI) tract to provide dynamic, in-vivo diagnostic and therapy. Smart pills offer a wide range of clinical and economic utility by moving beyond conventional drug delivery to responsive, information-based systems. To ensure delivery of medication to the precise location at the optimal time, integrated AI analyses biochemical markers to adjust drug release dynamically. In drug development, smart pills reduce memory inaccuracy by providing researchers with accurate data on exactly when a drug was taken and how the body reacted to it. The future of AI-based smart pills can be demonstrated as a shift from static oversight to autonomous, curative systems that can diagnose and treat diseases in real-time. The global market of smart pill technology is estimated to reach approximately from 4.5 thousand crore to 10.5 thousand crore by 2030.

Keywords: Smart pills, Medication non-adherence, AI algorithms, Biomarkers

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UPTAKE, BIODISTRIBUTION AND ANTIOXIDANT PROFILING OF MIR-155–LOADED CHITOSAN NANOPARTICLES IN ZEBRAFISH (DANIO RERIO) EMBRYO

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MicroRNA-155 (miR-155) is a key post-transcriptional regulator involved in inflammatory signaling and redox homeostasis; however, its therapeutic application is limited by rapid degradation and poor intracellular delivery. In the present study, miR-155–loaded chitosan nanoparticles (miR-155-CS-NPs) were developed using ionotropic gelation and evaluated in zebrafish (Danio rerio) embryos to assess uptake, biodistribution, safety, and oxidative stress modulation in vivo. The optimized nanoparticles exhibited a mean particle size of 178 ± 12 nm, PDI 0.24 ± 0.03, and zeta potential of +27.6 ± 2.1 mV, indicating uniform nanoscale distribution and favorable electrostatic stability. Encapsulation efficiency of miR-155 was 81.3 ± 4.5%, confirming effective complexation. Embryos (24–96 hpf) were exposed to control, blank CS-NPs, free miR-155, and miR-155-CS-NPs. Survival and hatching rates remained above 90% in the nanoparticle-treated groups, with no significant morphological abnormalities compared to controls, supporting developmental biocompatibility. Fluorescent tracking demonstrated markedly enhanced uptake and sustained retention of miR-155-CS-NPs across the yolk sac and trunk regions compared to free miRNA, which showed weak and transient signal intensity. Semi-quantitative fluorescence analysis revealed approximately 2.4-fold higher intracellular signal in the nanoparticle group at 72 hpf ($p < 0.05$).

Oxidative stress assessment indicated a significant reduction (~32%) in ROS-associated fluorescence intensity in embryos treated with miR-155-CS-NPs compared to untreated stressed controls, whereas free miR-155 produced only modest modulation. These findings demonstrate that chitosan-mediated delivery enhances miR-155 stability, biodistribution, and functional antioxidant response while maintaining embryonic safety, supporting zebrafish embryos as a reliable in vivo screening platform for miRNA nanotherapeutics.

Keywords: MicroRNA-155 (miR-155), Chitosan Nanoparticles, Zebrafish (Danio rerio) Embryo Model, Nanoparticle Drug Delivery, Oxidative Stress Modulation

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ENHANCING PATIENT CARE THROUGH PHARMACY PRACTICE

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The field of drugstore practice has changed dramatically over the times from a focus primarily on drug distribution to one that now includes a strong emphasis on being a part of the overall delivery of patient care. To give enhanced patient care via drugstore practice requires the integration of clinical knowledge, effective communication chops, and substantiation-grounded decision- making processes. The druggist's part within the healthcare community is changing to include drug remedy operation, patient education and comforting, covering patient adherence to conventions, relating adverse responses to specifics, and encouraging the rational use of specifics. Drugstore practice moment also incorporates the principle of substantiated case care by developing personalized treatment plans grounded on the case's unique requirements, life, and co-existing medical conditions. Patient education and ongoing follow-up, pharmacist empower their cases to understand their specific drug remedy and help them develop medication adherence of their own health. Advanced technology and electronic clinical decision- support systems further enhance a pharmacist's capability to enhance patient care. Pharmacists contribute to better health outcomes through medication therapy management (MTM), identifying drug interactions, preventing medication errors, and promoting adherence. They provide patient counselling on proper medication use and side effects, helping patients make informed decisions. The transition of drugstore practice from a product- acquainted to a holistic and patient- centred service model demonstrates the commitment of the druggists to not only ameliorate patient issues but also enhance the druggist's status as an integral and valued member of the healthcare platoon.

Keywords: Patient care, clinical knowledge, communication skills, medication therapy management, patient education, medication adherence.

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SMART DRUG DELIVERY: HOW NANOTECHNOLOGY TRANSFORMS MEDICINE

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Smart drug delivery systems have emerged as a transformative paradigm in modern therapeutics, redefining how medicines are formulated, delivered, and optimized for patient-specific needs. Nanotechnology underpins this evolution through the development of nanoscale carriers—including liposomes, polymeric nanoparticles, dendrimers, micelles, and metallic nanoparticles—that enhance drug solubility, stability, and bioavailability. Pioneering contributions by scientists such as Doxil® developers in liposomal delivery, Robert Langer in polymer-based drug systems, and Kazunori Kataoka in polymeric micelles have laid the scientific foundation for targeted nanomedicine. These nanocarriers exploit pathophysiological cues—such as pH gradients, enzymatic activity, redox potential, and temperature variations—to achieve controlled, site-specific release, thereby minimizing systemic toxicity and improving therapeutic precision. In oncology, the enhanced permeability and retention (EPR) effect has enabled preferential tumor accumulation, while surface-functionalized and ligand-conjugated nanoparticles further improve cellular targeting. Beyond cancer, nanotechnology-driven platforms demonstrate substantial promise in managing chronic conditions including diabetes, cardiovascular disorders, and neurodegenerative diseases. Stimuli-responsive and multifunctional nanocarriers integrate diagnostic and therapeutic capabilities, advancing the concept of theranostics and personalized medicine. Despite ongoing challenges related to long-term toxicity, scalable manufacturing, and regulatory harmonization, continuous interdisciplinary innovation is accelerating clinical translation. Collectively, smart nanotechnology-enabled delivery systems represent a paradigm shift toward safer, more effective, and precision-driven therapeutics, positioning nanomedicine at the forefront of next-generation healthcare.

Keywords: Smart drug delivery; Nanotechnology; Nanoparticles; Targeted therapy; Controlled release; Nanomedicine; Bioavailability; Stimuli-responsive systems; Personalized medicine.

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EVOLUTION OF PHARMACY: TRANSITION TOWARDS INTELLIGENT THERAPEUTICS IN THE ERA OF PHARMACY 6.0

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The pharmacy profession has continuously evolved in response to scientific advancements, healthcare demands, and technological innovation. From its origins in drug compounding and dispensing, pharmacy has progressively transitioned through industrial manufacturing, clinical pharmacy, automation, and personalized medicine. This evolutionary journey has culminated in the emergence of Pharmacy 6.0, a paradigm that integrates intelligent therapeutics, artificial intelligence (AI), digital health, and smart patient care systems.

It presents a structured overview of the evolution of pharmacy from Pharmacy 1.0 **to** Pharmacy 6.0, highlighting key milestones, technological drivers, and shifts in professional roles. Special emphasis is placed on intelligent therapeutics as the cornerstone of Pharmacy 6.0, encompassing smart drug delivery systems, AI-assisted therapeutic design, adaptive dosing strategies, and data-driven treatment optimization. These innovations enable precision medicine and real-time therapeutic monitoring, aligning pharmaceutical care with patient-specific needs.

The topic further discusses the implications of Pharmacy 6.0 for pharmaceutical education, research, and clinical practice, underscoring the need for interdisciplinary collaboration and digital competency among future pharmacists. Overall, the evolution toward Pharmacy 6.0 reflects a transformative shift from product-oriented pharmacy to intelligent, patient-centric, and outcome-driven healthcare, redefining the future scope of the pharmacy profession.

Keywords: Evolution of Pharmacy, Pharmacy 6.0, Intelligent Therapeutics, Digital Health, Smart Patient Care

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THE IMMUNOENDOCRINE AXIS: MANAGEMENT THE ROLE OF GUT HORMONE IN THE PATHOPHYSIOLOGY OF IRRITANT BOWEL SYNDROME (IBS)

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Irritable Bowel Syndrome (IBS) is a prevalent gastrointestinal disorder that affects approximately 5-10% of the global population. It is marked by abdominal pain and alterations in bowel habits, including constipation (IBS-C), diarrhea (IBS-D), or a combination of both (IBS-M). Although IBS was previously thought to be a purely functional disorder, recent research has found that it also includes the disruption of the immunoendocrine axis, which refers to the complex relationship between gut hormones, the immune system, gut microbiota, and the brain-gut axis. Gut hormones such as serotonin (5-HT), peptide YY (PYY), glucagon-like peptide-1 (GLP-1), ghrelin, and cholecystokinin (CCK) regulate intestinal motility, secretion, and sensitivity. An imbalance of these hormones can cause irregular bowel movements and heightened sensitivity to pain. Serotonin is particularly important, as excessive activity is observed in IBS-D and low levels are associated with IBS-C. Moreover, low-grade inflammation and alterations in gut microbiota can influence hormone secretion and exacerbate symptoms. Present treatment modalities aim to correct these imbalances by using 5-HT3 antagonists, 5-HT4 agonists, probiotics, and dietary modifications such as the low FODMAP diet. Thus, the knowledge of the involvement of gut hormones in IBS can aid in improved management and the design of more personalized treatments.

Keywords: Irritable Bowel Syndrome (IBS); Immunoendocrine Axis; Gut Hormones; Gut Microbiota, Low-Grade Inflammation.

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GENERIC VERSUS BRANDED MEDICINES IN INDIA: CHALLENGES, AWARENESS, AND THE NEED FOR UPGRADING PHARMACY PRACTICE

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In India, generic medicines are essential for ensuring affordable and accessible healthcare for a vast and diverse population. Although generics are approved as therapeutically equivalent to branded drugs, their acceptance remains limited due to concerns regarding quality, efficacy, and safety. With the need to upgrade pharmacy practices and healthcare delivery systems in India, it is important to critically evaluate the challenges associated with generic versus branded medicines. In a population as large and heterogeneous as India's, minor variations in excipients, manufacturing processes, or bioavailability may sometimes lead to perceived or real differences in clinical outcomes, further influencing trust among healthcare professionals and patients. Lack of awareness, inadequate understanding of bioequivalence concepts and strong brand-driven prescribing practices also contribute to hesitation in adopting generics. Overcoming these challenges requires strengthening regulatory frameworks, ensuring stringent quality control, and promoting transparent bioequivalence data. Awareness programs for physicians, pharmacists, and patients through continuing education, academic curricula, and public health campaigns are crucial to dispel myths and build confidence in generic medicines. Government initiatives, pharmacist-led patient counseling, and promotion of rational prescribing practices can further support this transition. Enhancing awareness and trust in generic medicines is vital for upgrading pharmacy practice, reducing healthcare expenditure, and achieving sustainable healthcare outcomes in India.

Keywords: Generic medicines, Branded drugs, Bioequivalence, Pharmacy practice in India, Drug quality and safety, Public awareness, Rational drug use

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Abstract No.: PP-251

BEYOND THE HEADACHE: REVOLUTIONARY ADVANCES IN MIGRAINE TREATMENT

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Migraine is one of the major causes of disability in the world. Therapeutic advancements in recent past have slightly changed the way migraine was handled before. Goadsby et al. and Dodick et al. in 2017 & 2018 respectively in their individual studies have made potential breakthrough in creating calcitonin gene-related peptide (CGRP) directyed therapies. These include monoclonal antiobodies like, erenumab, eptinezumab, etc. these improves the number of days with migraine each month and enhanced life quality. A recent study done by Ailani et al. in 2021 deduced that CGRP receptor antagonists like, rimegepant, atogepant, etc. are small molecules that provide good options in acute and prophylactic therapy with good tolerability. In addition to CGRP modulation, serotonin 5-HT1f receptor agonists like, lasmiditan, offers an acute relief with no vasoconstriction. This study was done by Kuca et al. and has concluded that using such drugs increases the options of patient's cardiovascular contraindications. Charles et al. also made similar advances with noninvasive vagus nerve stimulaton and single-pulse transcranial magnetic stimulation. This has proved to be more safe and accurate therapy without using drug. A recent study of Ashina et al in 2021 targeted pituitary adenylate cyclase-activating polypeptide (PACAP) pathway for more therapeutic possibilities in future. All these developments indicated a paradigm shift in the nonspecific control of symptoms to the mechanism-based and personalized migraine management. Further combination of biologics, targeted oral therapy and neuromodulatory will continue to help in reduction of disease burden leading to better patient outcomes.

Keywords: Migraine, calcitonin gene-related peptide, serotonin, neuromodulatory

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RECENT DEVELOPMENTS IN USING MICRONEEDLE PATCH TECHNOLOGY AS A MORE EFFICIENT DRUG DELIVERY SYSTEM FOR TREATING SKIN PHOTOAGING

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Prolonged exposure to ultraviolet (UV) radiation can cause skin photoaging, which is a condition characterized by complex biological changes involving oxidative damage and structural alterations of skin. There is an increasing demand for treatment, where the current therapeutic options remain limited. For the limited therapeutic options, therefore a growing demand for effective medication. Microneedle patches are a novel transdermal delivery system that have the potential to address this gap by the help of targeted delivery of bioactive substances—such as cytokines, cellular vesicles, gene fragments, and even living algae. This NDDS approach enhances the mechanical stimulation and facilitates drug delivery to restore skin life, and improves skin elasticity, which provides a significant antiaging effect to us. In this review, we discuss the principles and structural features of MN technology and highlight their relevance to the underlying mechanisms of skin aging, including mechanical structural breakdown, barrier dysfunction, and metabolic issues.

MN technology faces several challenges, such as standardized treatment protocols, comprehensive evaluation of long-term effects, and careful consideration of individual patient variations. Overcoming these issues is crucial for the wide clinical application of this promising technology.

This review aims to provide a comprehensive overview of recent advance use of microneedle patches for treating skin photoaging and explore future directions for their clinical application in skin rejuvenation. We believe that microneedle patches hold significant promise for the application in medical cosmetology and anti-photoaging therapies.

Keywords: Skin photoaging, Ultraviolet (UV) radiation, Microneedle (MN) patches, Transdermal delivery system.

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ROLE OF PHARMACOGENOMICS IN PERSONALIZED MEDICINE

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Pharmacogenomics is the analysis of how an individual's genetic profile impacts their response to drugs. It allows the identification of genetic variations that affect the absorption, distribution, metabolism, and excretion (pharmacokinetics), as well as the effect of drugs on the body (pharmacodynamics). Pharmacogenomics makes it possible to choose the most suitable drug and dosage for each patient. This method improves the effectiveness of therapy while reducing risk of adverse drug reactions. The application of pharmacogenomic information in clinical practice helps to ensure safe and accurate treatment of patients. Pharmacogenomics has its most useful therapeutic use in cancer therapy, where genetic analysis makes it possible to personalize therapy and the minimisation of drug-related toxicity. Clinical use, such as genotype-guided dosing of warfarin, clopidogrel, thiopurines, and carbamazepine represents its importance in routine clinical practice. Genetic variations should be identified prior to administering drugs, allowing the dosage to achieve maximum efficacy and minimum toxicity. Thus, the role of pharmacogenomics in personalised medicine represents a significant elevation in modern pharmacotherapy , which increases the therapeutic efficacy, reduces the risk of adverse reactions to drugs, and improves overall patient safety.

Keywords: Pharmacogenomics, Genetic, drug, toxicity, patient

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TRANSFORMING THE PHARMACEUTICAL INDUSTRY WITH QUALITY BY DESIGN: INTEGRATING RESEARCH, DEVELOPMENT, MANUFACTURING, AND QUALITY ASSURANCE

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Quality by Design (QbD) is a structured and scientific approach to pharmaceutical development that reshapes traditional product development methods. Instead of depending mainly on trial-and-error experiments and final product testing, QbD ensures that quality is built into the product and manufacturing process from the very beginning. It follows a risk-based and knowledge-driven strategy to achieve consistent product performance. The foundation of QbD begins with defining the Quality Target Product Profile (QTPP), which outlines the desired characteristics and performance of the finished product. Based on the QTPP, Critical Quality Attributes (CQAs) are identified, and their relationship with Critical Material Attributes (CMAs) and Critical Process Parameters (CPPs) is established. Risk assessment techniques and Design of Experiments (DoE) are then utilized to understand variability and develop a well-defined design space along with appropriate control strategies. Overall, QbD enhances process understanding, minimizes variability, strengthens regulatory flexibility, and ensures the consistent manufacture of safe, effective, and high-quality pharmaceutical products.

Keywords: Quality by Design, Quality Target Product Profile, Critical Quality Attributes, Critical Process Parameters, Critical Material Attributes.

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EFFECT OF SNAIL MUCIN IN COMBINATION WITH SILK WASTE MATERIAL ON TISSUE RE-GENERATION BY USING TRANSDERMAL FILM IN THE PRESENCE OF ANTI-BACTERIAL ACTIVITY

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Tissue regeneration is a complex medical challenge that requires innovative, effective, and sustainable wound-healing therapies using naturally derived and environmentally friendly materials. This study aims to develop and evaluate a novel transdermal film composed of silk sericin and snail mucin to investigate their synergistic effects on incision wound healing. Silk cocoons are primarily composed of fibroin (70-80%), and sericin (20-30%), which is the basically waste product of silk industry. In another hand snail mucin are characterized by two parts of their structures, their protein core and their glycan branching. Sericin and mucin both are used for skin care, drug delivery and wound healing. Silk sericin and snail mucin are used to repair wounds by producing collagen. They have also another medicinal property such as anti-diabetic, anti-cholesterol, metabolic modulator, anti-tumor, heart protection, anti-bacterial, and antioxidant. So, in my research study, my main aim is tissue regeneration to heal the wound by preparation a transdermal film which is made by silk sericin and snail mucin to see the combined effect of film on the wound healing. In this study silk sericin and snail mucin are extracted by different process and they characterized by the help of ATR-FTIR study, UV-spectrophotometer, pH meter etc. The transdermal film prepared by solvent casting method and the evaluation study (thickness, weight variation, surface pH, swelling index, permeation study etc.) of transdermal film has been done to optimise the formulation.

Keywords: Silk waste material, Snail mucin, transdermal film, wound healing, solvent casting method

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THE EVOLVING LANDSCAPE OF GENE THERAPY IN HUNTINGTON'S DISEASE

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The Huntington's disease (HD) is a progressive, autosomal dominant neurodegenerative disorder caused by an expanded CAG trinucleotide repeat in the HTT gene. When the CAG repeat exceeds 35 units, it produces a mutant huntingtin (mHTT) protein with an elongated polyglutamine tract, leading to toxic protein aggregation and selective degeneration of medium spiny neurons in the caudate nucleus and putamen. Clinically HD manifests with chorea, dystonia, cognitive impairment and psychiatric disturbances such as depression and behavioral changes. The underlying pathophysiology involves excitotoxicity, mitochondrial dysfunction, impaired autophagy, transcriptional dysregulation, and neuroinflammation, culminating in progressive neuronal loss. Despite advances in symptomatic management, no definitive cure currently exists. Gene therapy represents a promising disease modifying approach aimed at targeting the root genetic cause of HD. Strategies include gene silencing using antisense oligonucleotides (ASOs) and RNA interference to reduce mHTT expression, allele-specific suppression to selectively inhibit mutant alleles, and precise gene editing using CRISPR or Cas9 technology. Viral vectors, particularly adenoassociated viruses (AAVs), are commonly employed for efficient central nervous system delivery. Emerging approaches also explore stem cellbased therapies, including induced pluripotent stem cells (iPSCs), to model disease pathology and facilitate neuronal replacement strategies. Collectively, these innovative gene-based interventions shift HD management from symptomatic relief toward targeted molecular correction. Ongoing clinical trials and advancements in delivery systems continue to enhance therapeutic precision, safety and longterm efficacy, offering renewed hope for transforming the treatment landscape of Huntington's disease.

Keywords: Huntington's disease, HTT gene, mutant huntingtin, gene therapy, antisense oligonucleotides, CRISPR/Cas9, AAV vectors.

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Abstract No.: PP-257

EVOLUTION OF WOUND CARE: TRADITIONAL HERBAL REMEDIES TO MODERN THERAPEUTIC DRESSINGS

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Wound management has evolved remarkably from traditional herbal practices to advanced bioengineered therapeutic systems. For centuries, ethnomedicinal knowledge has guided the use of plant-derived formulations for treating skin injuries. Early scientific validation by researchers such as George Winter established the importance of a moist environment for optimal healing, reshaping conventional wound care strategies. Contemporary ethnopharmacological investigations have further demonstrated that medicinal plants like Aloe vera, Curcuma longa, and Centella asiatica contain bioactive compounds with antimicrobial, anti-inflammatory, antioxidant, and collagen-stimulating properties. Recent pharmaceutical advancements have enabled the integration of these phytoconstituents into modern therapeutic dressings, including hydrogels, polymeric films, foams, and electrospun nanofibers. These innovative systems enhance bioavailability, maintain moisture balance, provide controlled drug release, and accelerate tissue regeneration. Nanotechnology-based delivery platforms, inspired by translational research across biomaterials science, further optimize stability and targeted action of plant-derived agents. Despite promising outcomes, challenges such as phytochemical variability, standardization limitations, stability concerns, and regulatory barriers remain significant. Rigorous pharmacological validation, quality control, and clinical evaluation are essential to bridge traditional wisdom with evidence-based practice. The convergence of ethnopharmacology and advanced biomaterial engineering represents a transformative paradigm in wound care, offering safer, sustainable, and patient-centered therapeutic solutions.

Keywords: Ethnopharmacology; Wound Healing; Medicinal Plants; Therapeutic Dressings; Bioactive Phytochemicals; Nanotechnology.

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Abstract No.: PP-258

ONCOLYTIC-VIROTHERAPY WITH CF33-HNIS IN TRIPLE NEGATIVE BREAST CANCER

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Metastatic triple-negative breast cancer (mTNBC) has a very poor prognosis with limited therapeutic options. CF33-hNIS, a novel genetically engineered variant of pox virus, is currently being investigated in the treatment of different types of cancer including mTNBC. This case evaluates intratumoral administration of CF33-hNIS in a patient with mTNBC. The CF33-hNIS was administered clinically along with an anti-PD-1 drug. The human body is already immune to pox virus. Tumor biopsies at 24 hours post treatment revealed increased infiltration of CD4+T cells, CD8+T cells and PD-L1+ cells. Lack of immediate response observed, trial was discontinued and antibody drug conjugate therapy was initiated after a few days. Following antibody drug conjugate therapy, it was observed that, complete regression of dermal metastases was clinically followed within a short time with a disease free maintenance. A single dose of CF33-hNIS rapidly modulated the tumor microenvironment by increasing T-cell infiltration. This virotherapy treatment enhanced the efficacy of antibody drug conjugate therapy, resulting in responsive therapy in a patient with no expression of human epidermal growth factor receptor 2 (HER2-zero) oncogenic protein. CF33-hNIS is generally well tolerated by the human body with no grade 3 adverse drug reactions being reported.

Keywords: Virotherapy, CF33-hNIS, mTNBC, anti-PD-L1, antibody drug conjugate.

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Abstract No.: PP-259

ROLE OF NUTRACEUTICALS IN CANCER PREVENTION AND MANAGEMENT

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Nutraceuticals, defined as bioactive compounds derived from food sources, have emerged as promising adjuncts in cancer prevention and supportive care. Beyond their basic nutritional value, these agents—including functional foods, dietary supplements, herbal products, vitamins, minerals, and diverse phytochemicals—demonstrate significant chemopreventive potential. A growing body of experimental and clinical evidence highlights the anticancer properties of flavonoids, polyphenols, carotenoids, omega-3 fatty acids, and dietary fibers. Pioneering work by researchers such as Michael Sporn on chemoprevention and Bharat Aggarwal on curcumin-mediated molecular modulation has underscored the ability of nutraceuticals to regulate multiple oncogenic pathways. These compounds exert pleiotropic effects by scavenging reactive oxygen species, suppressing chronic inflammation through NF-κB and STAT3 signaling inhibition, inducing apoptosis, arresting cell cycle progression, and modulating immune surveillance. Furthermore, accumulating evidence suggests that selected nutraceuticals may mitigate the toxicity and adverse effects associated with chemotherapy and radiotherapy, thereby improving therapeutic tolerance and patient quality of life. For instance, polyphenolic compounds and omega-3 fatty acids have shown potential in reducing treatment-induced oxidative damage and inflammation. Despite encouraging preclinical and translational findings, variability in bioavailability, dosage standardization, and clinical heterogeneity remains a challenge. While nutraceuticals cannot substitute conventional cancer therapies, they represent valuable complementary strategies in integrative oncology. Future well-designed, large-scale randomized clinical trials are essential to establish definitive efficacy, optimal dosing, safety profiles, and evidence-based guidelines for their incorporation into cancer management protocols.

Keywords: Nutraceuticals; Phytochemicals; Chemotherapy; Radiotherapy; Bioactive compounds; Cancer prevention.

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Abstract No.: PP-260

ARTIFICIAL INTELLIGENCE IN DIABETES MANAGEMENT: TRANSFORMING CARE THROUGH SMART TECHNOLOGY

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Currently diabetes has become one of the most common and current habitual conditions in every field, which is characterized by dysfunction of glucose operation. Living with this complaint the person needed constant attention to blood sugar, diet and exercise. Artificial intelligence (AI) makes everything effective and rapid-fire. It's an important tool which makes diabetes much easier, smarter for both case and healthcare provider. AI systems can dissect large quantities of health data from glucose observers, insulin pumps, and medical records to help prognosticate changes in blood sugar situations and help to take action time to time for better enhancement. With the help of advanced technology, AI constructed new biases similar to smart insulin pumps and nonstop glucose monitoring bias, using AI algorithms to automatically acclimate insulin delivery grounded on real- time readings, reducing the burden of homemade monitoring. AI is also helping in describe complications like diabetic retinopathy, cardiovascular system etc at an early stage by assaying eye images with high delicacy. Overall, AI brings a more patient-friendly and visionary approach to diabetes care. While enterprises similar as data sequestration and ethical issues remain, the integration of AI into diabetes operation holds great pledge for perfecting quality of life and long- term health

Keywords: Artificial Intelligence (AI), Machine Learning (ML), Deep Learning,Predictive Analytics,Continuous Glucose Monitoring (CGM), Automated Insulin Delivery (AID), Artificial Pancreas, Closed-Loop Systems,Personalized Medicine,etc

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Abstract No.: PP-261

PLANT EXTRACT AS REDUCING AGENT IN SYNTHESIS OF METALLIC NANOPARTICLES

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This document will review plant extracts as reducing agents for the fabrication of Metal Nanoparticles. There were several decades of development of metal nanoparticles, as a result of the increasing use of both chemical and physical methods for producing them. Many different types of noble-metal nanoparticles have been produced, with silver nanoparticles becoming particularly prominent in the literature. Most commonly, silver nanoparticles are produced using chemical methods and have raised significant health concerns because of their general toxicity. One widely used method of producing metallic nanoparticles via plants is the use of plant extracts as reductants. The green production of Metal Nanoparticles using plant extracts is an environmentally-friendly, cost-effective, and sustainable method to replace traditional chemical and physical methods. Plant extracts contain a large variety of bioactive compounds, including flavonoids, alkaloids, terpenoids, proteins and carbohydrates. A wide variety of the more important constituents located in plant-extracts are functional groups such as hydroxyl- and carbonyl- which provide a function as both reducing agents and stabilization agents. Plant Extract mediated Metal Nanoparticles are rapidly finding applications in a number of different fields such as antimicrobial activity, anticancer therapy, drug delivery, catalysis, and environmental cleaning. Therefore, the use of plant extracts as reducing agents is a viable, sustainable method of using plants in nanotechnology and pharmaceutical research and provides a basis for this review of the current findings**.**

Keywords: Green synthesis, Plant extracts, Metallic nanoparticles, Silver nanoparticles, Phytochemicals, Sustainable nanotechnology

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Abstract No.: PP-262

RECENT ADVANCES IN BIOMATERIAL DERIVED SCAFFOLDS FOR ACCELERATED WOUND HEALING

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Allogeneic or xenogeneic extracellular matrix-based biologic scaffold materials are frequently utilized for the functional restoration and repair of damaged and absent tissues. The cellular content of the source tissues is extracted but the structural and functional molecular units of the remaining extracellular matrix (ECM) are retained to generate these naturally occurring bio scaffolds. The mechanisms by which these bio scaffolds facilitate constructive remodeling and favorable clinical outcomes include release or creation of effector molecules that recruit endogenous stem/progenitor cells to the site of scaffold placement and modulation of the innate immune response, specifically the activation of an anti-inflammatory macrophage phenotype. Scaffolds facilitate three-dimensional tissue regeneration by acting as transient, synthetic extracellular matrices that contain cells. Therefore, while designing scaffolds, it is frequently advantageous to mimic specific characteristics of a natural extracellular matrix. It is now well known that many biologically functional molecules, extracellular matrix components, and cells interact at the nanoscale. In addition to providing nutrients for tissue growth, scaffolds—three-dimensional structures can protect a wound, acting as an effective "fence" against outside contamination.

Keywords: Biomaterial scaffolds, Wound healing, Nano fiber composite, Antibacterial Nano composite, 3D scaffolds, Tissue regeneration

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Abstract No.: PP-263

IDENTIFICATION OF PHYTOCONSTITUENTS ACTIVE AGAINST FGFR TO TREAT CHOLANGIOCARCINOMA BY IN-SILICO STUDY, VIRTUAL PHARMACOKINETIC SCREENING AND TARGET GENE PREDICTION.

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Cholangiocarcinoma is a rare aggressive cancer of the bile duct. This carcinoma presents significant clinical challenges, including late diagnosis and poor prognosis. Therefore, there is the urgent need for more efficacious therapeutic strategies. Current conventional treatments such as surgery, chemotherapy, and radiation therapy often result suboptimal outcomes, leading researchers to investigate alternative approaches, including the potential of phytoconstituents as targeted therapies. Increasing evidence suggests that various plant-derived compounds possess unique pharmacological properties that could selectively target cancer cells while minimizing adverse effects on surrounding healthy tissue**.** The objectives of this study were to identify the Phytoconstituents which are active against Cholangiocarcinoma by virtual screening method.In this study the plants which are effective against Cholangiocarcinoma were identified by literature survey and their phytoconstituents were also identified. In-silico docking study were performed of such phytoconstituents against FGFR 1 (PDB Id:5ew8) using Autodock software. Pose view were captured. Based on the score of In-silico study result best four components were chosen for virtual pharmacokinetic study and virtual Gene target prediction study. The docking score of Taxifolin was -8.8; Chabamide was -9; Mesuol was -9.1; Eupomatene was -10.5; with FGFR 1 (PDB Id:5ew8). All four compounds were found cytotoxic. After performing this study, it can be concluded that all these four compounds are active against Cholangiocarcinoma virtually, however further In-vivo animal studies require to find out the best compound.

Keywords: Cholangiocarcinoma, Fibroblast Growth Factor Receptor

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Abstract No.: PP-264

FORMULATION AND EVALUATION OF AN ANTIFUNGAL GEL USING GUAVA (PSIDIUM GUAJAVA) LEAF EXTRACT

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Superficial fungal infections are the most common infectious diseases affecting humans worldwide. An antifungal gel is a semi-solid topical formulation designed to deliver antifungal agents that require effective topical therapy for localised action and better patient compliance. My research work aimed to formulate and evaluate a topical antifungal medicated gel containing guava leaf (*Psidium guajava*) leaf extract for the management of superficial fungal infections. The objectives included selection and characterization of drug and excipients, development of suitable gel base, preparation of medicated gel and evaluation of physicochemical and biological properties. I carried out extraction of guava leaves, performed preformulation studies including assessment of physical properties, solubility, stability and phytochemical properties and evaluated excipients for compatibility and functionality. Drug excipient compatibility was analysed through physical observation and FTIR studies under different storage conditions. The gel base was prepared and followed up by incorporation of finely powdered guava leaf extract with continuous stirring to obtain the medicated gel. The prepared gel was evaluated for PH, homogeneity, spredability, viscosity, stability, skin irritation and antifungal activity. The results demonstrated that my formulated gel exhibited acceptable physicochemical properties and potential antifungal effectiveness, indicating its stability as a topical herbal formulation for further development and chemical evaluation.

Keywords: physicochemical, guava leaf, herbal formulation, antifungal.

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AI-DRIVEN DRUG DEVELOPMENT: THE FUTURE OF PRECISION MEDICINE

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Artificial Intelligence (AI) is redefining the pharmaceutical industry by accelerating innovation, enhancing precision, and reducing the cost and time associated with drug development. The integration of machine learning (ML), deep learning, natural language processing, and predictive analytics has enabled data-driven decision-making across the pharmaceutical value chain. AI-powered platforms facilitate target identification, virtual screening, de novo drug design, and optimization of lead compounds with improved accuracy compared to conventional computational methods. In clinical research, AI enhances patient stratification, predicts therapeutic outcomes, and streamlines clinical trial design, thereby improving efficiency and regulatory compliance. Furthermore, AI-driven pharmacovigilance systems enable real-time adverse event detection and risk assessment, strengthening post-marketing surveillance. In manufacturing and supply chain management, intelligent automation ensures quality-by-design (QbD), predictive maintenance, and demand forecasting, promoting sustainability and operational resilience. Despite these transformative capabilities, challenges such as data integrity, algorithm transparency, ethical considerations, and regulatory harmonization remain critical barriers to widespread adoption. Addressing these concerns through interdisciplinary collaboration and robust governance frameworks is essential for responsible AI implementation. Overall, AI represents a paradigm shift toward precision medicine and patient-centric pharmaceutical care, fostering innovation while ensuring safety, quality, and efficiency.

Keywords: Artificial Intelligence, Machine Learning, Drug Discovery, Clinical Trials, Pharmacovigilance, Pharmaceutical Manufacturing, Precision Medicine, Predictive Analytics, Regulatory Compliance, Digital Health.

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ACTIVITY OF CURCUMIN ON COLORECTAL CANCER

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The current work aimed to review polymeric nanoparticles with improved anti-colorectal cancer potential as medication carriers for encapsulated curcumin. The utilization of Curcumin from turmeric, which is *Curcuma longa* belongs to the ginger family named Zingiberaceae, its primary active ingredient, called in the management and prevention of colon cancer will be examined in this thesis. In addition, this work examined the pathways implicated in the development of colorectal neoplasia and provide an overview of the literature supporting the hypothesis that turmeric and curcumin may have anti-carcinogenic properties against colorectal cancer. Research papers and clinical trials demonstrating the advantages and potential drawbacks of turmeric and curcumin will be used to provide evidentiary evidence. Numerous studies on chemicals derived from turmeric that have been demonstrated to have anti-cancer and chemo-preventive activities against colorectal cancer, as well as an explanation of their mechanisms of action, were included in this review. In addition, certain suggestions and paths for further study have been given. There will also be a discussion on innovative formulation and delivery techniques.

Keywords: Polymeric nanoparticles, Curcumin, Anti-carcinogenic properties, Clinical trials, Colorectal Cancer

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PHYTOCHEMICAL INVESTIGATION AND ANTICANCER POTENTIAL OF SILVER NANO PARTICLE FROM TYPHONIUM TRILOBATUM

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Silver nanoparticle (AgNP) material synthesized via green chemistry (using an ethanolic extract of Typhonium trilobatum leaves) demonstrated moderate antioxidant capacity (IC50 66µg/mL DPPH free radical scavenging assay) in comparison to ascorbic acid (30 µg/mL). Additionally, AgNPs showed concentration-dependent cytotoxicity toward the breast cancer cell line MDA-MB-231 and the kidney cell line HEK-293 through an in vitro cell viability assay, illustrating their potential as anticancer agents due to their preferentially cytotoxic effects towards cancer cells. In addition to the anticancer properties, AgNPs exhibited antimicrobial activity using disk diffusion methods against both Gram-positive and Gram-negative bacterial pathogens, with an MIC of 125 µg/mL and an MBC of 250 µg/mL against Escherichia coli. Additionally, AgNPs possess the ability to inhibit biofilm formation in E. coli depending on the amount used. For instance, 25 µg/mL was required to achieve inhibition of E. coli biofilm when AgNPs were administrated. To summarize, Typhonium trilobatum extracted AgNPs have demonstrated important antioxidant, anticancer, antibacterial, and anti-biofilm activity indicating that these AgNPs could serve useful biomedical applications in the field of medicine.

Keywords: Silver nanoparticles (AgNPs), Typhonium trilobatum, DPPH assay, Anticancer activity, Anti-biofilm activity.

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LIPID BASED NANO-FORMULATION: A PROMISING THERAPEUTIC STRATEGY FOR PARKINSON'S DISEASE

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Parkinson's disease (PD) refers to a progressive and injurious neurological disease entailing dopaminergic neuron loss in the substantia nigra region, along with both motor and non-motor symptoms. Conventional pharmacological therapies incorporating levodopa and dopamine agonists offer relief from symptoms but remain challenged by limitations such as low bioavailability, toxicity, and loss of efficacy in the years to come. There has been a rising interest in lipid nanoforms acting as a counter to these limitations of conventional pharmacological therapies. These lipid carriers, such as liposomes, solid lipid nanoparticles, nanostructured lipid carriers, and micelles, come with various biocomparative advantages in that they are biocompatible, capable of crossing the blood-brain barrier, and provide controlled drug release and stability of the therapeutic agent to degradation. They are capable of carrying a variety of drugs, both hydrophilic and lipophilic, to enhance the accuracy of brain-directed therapy and pharmacokinetics. In addition, surface modification or ligand functionalization of these carriers ensures targeted medication to neuronal cells, thereby allowing reduced off-target effects. Preclinical studies suggest that lipid nanocarriers could provide a dramatic potency enhancement of neuroprotectants and antioxidants. Despite this, some challenges still exist, such as scaling up production, developing ways to be safe over a longer period, and approval by regulatory authorities. It is imperative that this review indicates the potential use of lipid nanomaterials in the application and management of patients suffering from Parkinson's disease, specifically in developing better methods of drug delivery, neuroprotection, and patient outcomes.

Keywords: Parkinson's disease, lipid-based nanomaterials, brain targeting, blood–brain barrier, nanoformulations

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HEALTH BENEFITS AND NUTRITIONAL IMPORTANCE OF MORINGA OLEIFERA LEAVES

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Moringa oleifera, often referred to as the "miracle tree," has gained global scientific attention due to its exceptional nutritional density and broad-spectrum therapeutic potential. The leaves of M. oleifera are rich in high-quality proteins, essential amino acids, vitamins (A, C, and E), minerals (calcium, iron, potassium), dietary fiber, and diverse bioactive phytochemicals including flavonoids, phenolic acids, and glucosinolates. Investigations by Fahey (2005) first highlighted its remarkable antioxidant and anti-inflammatory properties, while Anwar et al. (2007) reported its substantial micronutrient profile supporting its role in combating malnutrition. Subsequent clinical and preclinical studies by Leone et al. (2015) and Gopalakrishnan et al. (2016) demonstrated antidiabetic, antihyperlipidemic, hepatoprotective, and cardioprotective activities, largely attributed to compounds such as quercetin, chlorogenic acid, and isothiocyanates. Emerging evidence further suggests immunomodulatory and antimicrobial benefits, reinforcing its value in functional food development and integrative medicine. Beyond disease prevention, M. oleifera leaves represent a sustainable, plant-based nutritional intervention for addressing global micronutrient deficiencies, particularly in low-resource settings. Despite promising findings, standardization of extracts, dose optimization, and large-scale randomized clinical trials remain necessary to validate therapeutic claims. Overall, Moringa oleifera leaves offer a compelling combination of nutritional richness and pharmacological potential, positioning them as a valuable candidate for nutraceutical and pharmaceutical applications.

Keywords: Moringa oleifera; nutritional value; phytochemicals; antioxidant activity; antidiabetic effect; functional food; nutraceuticals; micronutrient deficiency.

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Abstract No.: PP-270

MAGICAL ACTIVITIES OF *MORINGA OLEIFERA*

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Moringa oleifera, also known as the drumstick tree or miracle tree, is a part of the *Moringaceae* family. It is found in the sub-Himalayan regions of northern India and is widely distributed in tropical and subtropical regions due to its drought tolerance and resistance to mild frost. In Nepal, the Terai, Siwalik, and Middle Mountain ranges are suitable for the growth of Moringa due to favourable climatic conditions. It is known as the "Miracle Tree" due to his high nutritional and medicinal properties. Almost every part of this plant is edible and contains proteins, essential amino acids, vitamins, minerals, and biologically active compounds. The leaves are particularly useful for pregnant women, children, and lactating mothers to combat malnutrition and health-related problems. The Moringa oleifera has antioxidant, anti-inflammatory, antimicrobial, antidiabetic and anticancer properties. Moreover, the seeds of Moringa are a natural coagulant and are used in water purification. This plant has treating of the skin infection, anaemia and blood impurities. Also, moringa leaf powder is used as a functional food product for better health benefits. The antioxidant properties of Moringa may help prevent several chronic diseases. It is rich in macronutrients and micronutrients as well as other bioactive compounds, which are good for health, also moringa powder can be store without any type of refrigeration months of months without any type of loss of nutritional values.

Keywords: *Moringa oleifera*, Antioxidant, Diseases, Plant, Nutrition.

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Abstract No.: PP-271

ROLE OF PLANT EXTRACTS IN THE MANAGEMENT OF DIABETES MELLITUS

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Diabetes mellitus is a chronic metabolic disorder characterized by persistent elevation of blood glucose levels. According to the International Diabetes Federation Diabetes Atlas, 11th Edition (2025), nearly 589 million adults aged 20–79 years are living with diabetes globally, and this figure is expected to rise to 643 million by 2030 and 853 million by 2050. India has the second-highest number of individuals with diabetes after China, affecting about 101 million adults. The rapid increase in prevalence has made diabetes a major public health challenge. Poorly controlled diabetes can result in severe complications, including cardiovascular diseases, nephropathy, neuropathy, and retinopathy.Although several synthetic drugs are available for glycemic control, prolonged use may produce adverse effects and economic burden. Consequently, growing attention is being directed toward plant-derived therapies. Medicinal plants, widely used in traditional systems of medicine, contain bioactive constituents such as flavonoids, alkaloids, tannins, and phenolic compounds that contribute to glucose regulation. These phytochemicals may enhance insulin secretion, improve insulin sensitivity, inhibit intestinal glucose absorption, and protect pancreatic beta cells from oxidative damage. Plants such as *Gymnema sylvestre*, *Momordica charantia*, *Trigonella foenum-graecum*, and *Azadirachta indica* have demonstrated notable antidiabetic activity in experimental studies. Their antioxidant and anti-inflammatory properties may further reduce diabetes-related complications.Overall, plant-based extracts show potential as affordable and effective adjuncts or alternatives in diabetes management; however, well-designed clinical trials are essential to confirm their safety, efficacy, and optimal dosage.

Keywords: Diabetes mellitus; Medicinal plants; Antidiabetic activity; Bioactive compounds; Insulin secretion; Antioxidant activity; Herbal therapy.

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FRESHWATER-DERIVED BIOACTIVES AS EMERGING THERAPEUTIC AGENTS IN METABOLIC DISORDERS

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Metabolic disorders, including type 2 diabetes mellitus (T2DM) and obesity, have reached pandemic proportions. This is mainly driven by systemic chronic inflammation, insulin resistance, and oxidative stress. Conventional pharmacological interventions present adverse side effects, which is why there is a growing demand for safer, naturally derived alternatives. Freshwater ecosystems offer diverse molecular arsenal for restoring metabolic homeostasis. It gives sustainable bioactive from aquatic macrophytes, microalgae, and cyanobacteria. Organisms like Nelumbo nucifera, Lemna minor, and Chlorella vulgaris are rich in phenolic acids, flavonoids (quercetin-3-glucuronide) and carotenoids (fucoxanthin). These compounds target diabetes by inhibiting intestinal digestive enzymes α-amylase and α-glucosidase to delay glucose absorption. They also help insulin work efficiently while activating AMPK and PI3K/Akt signalling pathways. Antioxidants like astaxanthin and phycocyanin preserve endogenous insulin production by protecting pancreatic β-cells from oxidative stress-induced apoptosis. In adipose tissue, freshwater bioactive like lotus seedpod extract suppress the adipogenic program while downregulating PPAR-γ. This effectively limits ectopic fat accumulation. Clinical evidence, like the DIRECT PLUS trial Wolffia globosa (Mankai) shown reductions in postprandial glycemic peaks and improved overnight glycemic stability. These organisms act as prebiotics which modulate the gut-microbiota-metabolic axis. Resulting in increased short-chain fatty acid production and reduced systemic inflammation. These findings support freshwater-derived bioactive as a future resource in preventing and treating metabolic disorders. This requires well-designed clinical trials and standardized cultivation techniques to fully realize their clinical utility.

Keywords: Metabolic disorders, Freshwater bioactives, Type 2 diabetes mellitus, Oxidative stress, Microalgae, Gut microbiota

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EMERGING THERAPEUTIC STRATEGIES AGAINST NIPAH VIRUS INFECTION

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Nipah virus, is a highly pathogenic zoonotic virus which belongs to the paramyxoviridae family. It is transmitted from fruit bats to humas directly or contaminated food from infected animals. It can cause breathing problem, encephalitis and respiratory disease. And it has a high number of fatality rate approximately 70 percent. In recent there are no approved scientific drug for the treatment of Nipah virus. Still now one monoclonal antibody m102.4 has shown protective effect in non-human primate study and early phase clinical studies in progress. However research shows there are potential antiviral agent and therapy of Nipah virus is under trial.Experimental treatment was being analyzed preclinical study include monoclonal antibody, antiviral drugs and plasma therapy. Clinical studies also be conducted for human to shows better treatment for Nipah virus.

Keywords: Nipah virus, anti viral drug, monoclonal antibody, experimental treatment, emerging infections.

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EVALUATION OF ANXIOLYTIC ACTIVITY OF *CINNAMOMUM ZEYLANICUM* BARK ON MICE

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Anxiety disorders are among the most prevalent neuropsychiatric conditions and current pharmacological treatments are often associated with adverse effects and dependency, highlighting the need for safer alternatives. The present study investigated the anxiolytic potential of a hydroalcoholic extract of Cinnamomum zeylanicum (cinnamon) bark using experimental mouse models. The extract was prepared and subjected to preliminary phytochemical screening, which confirmed the presence of bioactive constituents including flavonoids, alkaloids, phenolic compounds, glycosides, and steroids. Animals were divided into control, standard (diazepam-treated), and test groups receiving two graded doses of the cinnamon extract. Behavioral assessment of anxiolytic activity was performed using the Elevated Plus Maze, Light–Dark Box test, and Open Field test, while locomotor activity was evaluated using an actophotometer to rule out non-specific motor effects. The cinnamon-treated groups showed a significant, dose-dependent increase in exploratory behavior, greater time spent in open arms and light compartments, and improved movement scores compared to the control group. The effects were comparable to the standard anxiolytic drug, indicating notable anxiolytic-like activity of the extract. These findings support the traditional medicinal use of cinnamon and suggest that Cinnamomum zeylanicum bark may serve as a promising natural candidate for the development of safer anxiolytic agents. Further studies are warranted to isolate active compounds and elucidate the precise mechanisms involved.

Keywords: Anxiety, *Cinnamomum zeylanicum*, Anxiolytic activity, Herbal medicine, Elevated Plus Maze, Phytochemicals, Mouse model

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DIGITAL THERAPEUTICS (DTX) IN DIABETES MANAGEMENT.

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Diabetes mellitus is a primary global health problem which is characterized by chronic hyper glycemia (increased blood glucose level) and systemic metabolic disruptions. Recent technological progress has greatly impacted the way acute and chronic diseases, especially diabetes mellitus (DM), are diagnosed, prevented, and managed. Digital Therapeutics (DTx) are a new category of evidence-based, software-driven interventions aimed at preventing, managing, or treating diseases through personalized, data-driven methods. In the realm of diabetes care, DTx platforms, including mobile apps, cloud-based systems, wearable technology, and integrated continuous glucose monitoring (CGM) tools, enable real-time tracking of blood sugar levels, support for insulin dosage adjustments, dietary monitoring, and lifestyle changes. These interventions boost patient involvement, enhance adherence to treatment plans, and encourage lasting behavioral changes. Clinical studies show that DTx solutions can significantly lower HbA1c levels, improve glycemic control, and enhance both clinical and economic outcomes in diabetes management. Cutting-edge technologies like artificial intelligence (AI), machine learning algorithms, telemedicine integration, remote patient monitoring, and behavioral changes further support personalized treatment planning and predictive analytics in diabetes care. Despite their promising potential, challenges such as data privacy and cybersecurity, regulatory uncertainty, reimbursement structures, interoperability, and equitable access across diverse populations persist. Overcoming these obstacles is essential for ensuring the scalability, affordability, and integration of DTx into routine clinical practice, especially in resource-constrained healthcare environments. Overall, digital therapeutics offer significant potential to transform diabetes care into a more personalized, patient-centered, and outcomes-focused model.

Keywords: Diabetes mellitus; Digital therapeutics (DTx); Continuous glucose monitoring (CGM); Artificial intelligence; Glycemic control; Patient engagement.

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Abstract No.: PP-276

ASSESSMENT OF A MODIFIED OLEORESIN CAPSICUM NONLETHAL RIOT CONTROL SYSTEM

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Oleoresin capsicum (OC) is widely used as a riot control agent for temporary incapacitation; however, higher concentrations and prolonged exposure have raised safety concerns. The present study aimed to evaluate the nonlethal efficacy and safety profile of an optimized OC-based formulation designed to produce controlled, localized irritation with minimal systemic risk. The formulation consisted of a calibrated concentration of OC as the primary irritant, skatole as a dispersal-enhancing odorant, and a regulatory-approved triarylmethane colorant for visual identification. Preclinical assessment was performed in Wistar albino rats following dermal application. *In vivo* Imaging, mast cell activation in dorsal skin tissue was examined histologically. In addition, molecular docking studies were conducted to evaluate the interaction of capsaicin, skatole, and the colorant with histamine receptor targets to understand their mechanistic contribution. The study demonstrated localized distribution of formulation and mast cell degranulation and a significant but controlled increase in tissue histamine levels, indicating effective yet reversible inflammatory response. Molecular docking analysis showed higher binding affinity of capsaicin toward histamine receptor sites compared to skatole and the colorant, suggesting that capsaicin is primarily responsible for the observed irritation. Overall, the findings support that the optimized formulation induces temporary, localized inflammatory effects without evidence of systemic toxicity, confirming its potential as a safer nonlethal riot control system.

Keywords: Molecular docking, skatole, *Oleoresin capsicum.*

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Abstract No.: PP-277

CREATINE, SUPPLEMENTS & NARCOTIC SUBSTANCES ABUSE IN YOUTH :HOW TO BE FIT IN 2026

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According to Indian Council of Medical Research 25-30 percent of adults are obese in India and BMI is typically higher than average. India has over 100 million people diabetic/hypertension ~(25-30)%.India has seen continuous rise in cardiovascular diseases. So on, In today's scenario, graph of substance usage are inclining day by day. Substances like Tobacco, Alcohol, Opioid. On the other hand, in the name of fitness, misuse and deception about PED(performance enhancing drug).One of the most common, seemingly‘ natural’ and most used substance is creatine. Creatine is a natural compound, generally stored in muscles as phospholipids. It helps to produce ATP during high intensity training in short bursts. Most common form of creatine, is ‘Creatine Monohydrate’. Though studies shown cognitive effect of creatine, average gym-goers youth generally use creatine without proper knowledge or information about how to use, ADR or sided effects and various others. All these because of lack of awareness, knowledge of gym trainer or fitness coach, zero consultation with RMP(Registered Medical Practitioner) and promoting uses of ‘only’ supplements instead of natural diet. Though in today’s world, almost every consumable has adulteration, to maintain healthy body and mind in a world of stress, obesity, disease, sedentary lifestyle, natural food, consistent healthy habits, exercises has no alternatives which can prevent diseases, improve general fitness and delay aging.

Keywords: Creatine, ATP, training, healthy, disease, improve.

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Abstract No.: PP-278

AN OVERVIEW ON ANTIDIABETIC EFFECT OF LICORICE AND ITS BENEFITS

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Licorice (Glycyrrhiza glabra) is a consecutive medicinal herb. It has recently drawn its strong effects on diabetes and metabolism. It contains glycyrrhizin, glycyrrhetinic acid, and glabridin, isoliquiritigenin have remarkable properties that lower blood sugar, reduce fats. The antidiabetic benefits of licorice have various mechanism. Important processes involves improving insulin receptor sensitivity, also increase glucose uptake in muscle and fat tissues, and affecting glucose metabolism, by acting on natural blocker of 11beta-hydroxysteroid dehydrogenase 1(11beta-HSD1). Research on the diabetic mice shown licorice extract can lower fasting blood sugar, raise insulin resistance and shorten serum lipids. Licorice protect against complications from diabetes, such as kidney disease as well as neuropathy. It directly effects on blood sugar. Licorice supports our health by fighting against inflammation and oxidative stress. Some studies point out that is plays a crucial role in changing gut bacteria, making healthier environment to help to manage type 2 diabetes. Taking Long term glycyrrhizin can cause low potassium levels and high blood pressure. Therefore it works supplementary treatment.

Keywords: Licorice, Antidiaberic, Glucyrrhizin, Flavonoids, Insulin resistance.

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GREEN SYNTHESIS AND MULTIFACETED BIOLOGICAL ASSESSMENT OF METAL NANOPARTICLES MEDIATED BY MEDICINAL PLANT EXTRACTS (CATHARANTHUS ROSEUS AND OCIMUM SPECIES)

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The need for environmentally sustainable nanomaterials is driving research towards green synthesis, utilizing phytochemical-rich medicinal plant extracts as non-toxic reducing and stabilizing agents. This report documents the initial phase and comprehensive plan for the synthesis and antimicrobial assessment of metal nanoparticles (e.g. AgNPs), mediated by aqueous extracts of Catharanthus roseus and Ocimum sanctum. Initial work successfully involved the collection, air-drying, and preparation of aqueous extracts using the decoction method. These extracts contain concentrated phytochemicals (e.g., alkaloids, phenols, flavonoids) crucial for nanoparticle formation and stability. Characterization of the synthesized nanoparticles (using UV-Vis, DLS, SEM/EDX, FTIR) has been finished with the promising results. The study aims to primarily assess their antimicrobial efficacy against the key Gram-positive pathogen, Staphylococcus aureus, and Gram-negative pathogen E. coli alongside other planned biological activities such as anti-inflammatory and biosensing applications. Literature supports the potent activity of metal nanoparticles (e.g. AgNPs) from these sources against Staphylococcus aureus and E. coli validating this approach for developing novel antimicrobial agents to combat drug resistance. This research provides a sustainable, scalable, and biologically promising route for producing functional metal nanoparticles.

Keywords: Green Synthesis, Staphylococcus aureus, Aqueous Extract, Nanoparticles, Catharanthus roseus, Ocimum sanctum.

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Abstract No.: PP-280

FORMULATION OF SOLID-LIPID NANOPARTICLES FOR THE TREATMENT OF DIABETES MELLITUS

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Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Conventional antidiabetic therapies often face limitations such as poor bioavailability, frequent dosing, systemic side effects, and reduced patient compliance. Solid lipid nanoparticles (SLNs) have emerged as a promising colloidal drug delivery system designed to enhance the therapeutic efficacy of antidiabetic drugs. The objective of this presentation is to discuss the formulation and evaluation of solid lipid nanoparticles for the treatment of diabetes mellitus. It covers the principles of SLN technology, selection of lipids and surfactants, methods of preparation such as high-speed homogenization and microemulsion technique, characterization parameters including particle size, zeta potential, drug entrapment efficiency, and in-vitro drug release studies. The advantages of SLNs such as improved bioavailability, controlled drug release, enhanced stability, and reduced toxicity are also highlighted. In conclusion, solid lipid nanoparticles represent a novel and efficient drug delivery approach for improving therapeutic outcomes in diabetes mellitus and hold significant potential for future pharmaceutical development.

Keywords: Solid-lipid nanoparticles, High-speed homogenization

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NEUROPROTECTIV POTENTIAL ON THE NANOSTRUCTURED LIPID CARRIER OF QUERCETIN WITH A SPECIAL EMPHASIS ON SPINAL CORD INJURY

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Spinal cord injury (SCI) triggers a destructive "Secondary" phase involving intense oxidative stress, inflammation and cell death. These processes often cause more long-term damage than the initial physical trauma. Quercetin, A natural flavonoid found in foods like onions and apples, is gaining attention for its ability to shield the nervous system from the harmful effects. Onions are rich in quercetin, especially the outer layers, with typical levels around 28.4 to 48.6 mg per 100g of fresh onion. Fresh Yellow Onion has 28.4-47.6 mg/100g conc. Quercetin is present and the General Fresh Onion has 15-275 mg/100g depending on variety and layer. Quercetin acts as a multifunctional bodyguard for Spinal tissue through several key pathways, those are Combating Oxidative Stress- it neutralises harmful free radicals and boosts the body's natural antioxidant defenses. Reducing inflammation- By blocking pro-inflammatory signals like TNF-α, it prevents excessive swelling and tissue damage. Preventing cell death**-** It protects neurons form "Suicide" Signal (apoptosis), preventing the integrity of spinal circulatory. Quercetin shows significant promise in reducing permanent disability after a spinal cord injury. By targeting underling biochemical chaos that follows the trauma, It helps preserve nerve tissue and improve the changes of regaining motor function. While changes like low absorption remain, Quercetin stands as a powerful, natural Candidate for future SCI therapies. There have the quercetin loaded nanostructured lipid carriers (QT-NLCs) are advanced second-generation lipid-based nanoparticles designed to overcome quercetin's poor solubility low Bioavailability and chemical instability. By combining solid liquid and liquid oils, NLCs Create a disordered matrix that enhanced drug loading, provides sustained release and improves stability.

Keywords: Spinal Cord Injury, Onion, Quercetin, Oxidative Stress, Inflammation, Lipid-based Nanoparticles

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Abstract No.: PP-282

GLAUCOMA: THE SILENT THIEF OF SIGHT AND ITS MODERN REMEDIES

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Glaucoma, often termed the "silent thief of sight," represents a heterogeneous group of progressive optic neuropathies characterized by irreversible retinal ganglion cell loss and corresponding visual field defects. Elevated intraocular pressure (IOP) remains the most significant modifiable risk factor, primarily resulting from an imbalance between aqueous humour production and outflow. Pioneering epidemiological analyses by Tham et al. (2014) highlighted glaucoma as a leading cause of global blindness, underscoring the urgency for early detection and sustained management. Advances in ocular pharmacology have transformed therapeutic strategies. Osmotic agents such as mannitol and glycerol provide rapid IOP reduction in acute angle-closure crises. The introduction of carbonic anhydrase inhibitors, initially systemically by Becker and later refined into topical formulations, revolutionized aqueous suppression therapy. β-adrenergic blockers, particularly timolol, demonstrated significant IOP-lowering efficacy with improved tolerability. Contemporary first-line management increasingly favors prostaglandin analogues (e.g., latanoprost), following the landmark work of Camras et al., due to their superior efficacy in enhancing uveoscleral outflow and once-daily dosing advantage. α_2-adrenergic agonists and miotics further complement combination regimens by targeting dual mechanisms of aqueous dynamics. Despite therapeutic advances, delayed diagnosis remains a critical challenge, as early stages are frequently asymptomatic. Therefore, integrative strategies combining pharmacological innovation, population screening, and patient adherence optimization are pivotal to preventing irreversible blindness. Modern remedies, grounded in decades of translational research, continue to redefine glaucoma care toward precision-based ocular therapeutics.

Keywords: Glaucoma; intraocular pressure; optic neuropathy; aqueous humour dynamics; prostaglandin analogues; βadrenergic blockers; carbonic anhydrase.

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PRECLINICAL EVALUATION OF HYDROALCOHOLIC EXTRACT OF *CATHARANTHUS ROSEUS* AND *SALVIA ROSMARINUS* LEAVES FOR ITS TROPIC EFFECT ON ISOLATED HEART OF ALBINO WISTER RAT

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Catharanthus roseus, also known as Madagascar periwinkle, is part of the family known as Apocynaceae. It is very important because of its benefits, such as treatment of cancer, diabetes, infections, and lowering fat levels in the blood. This plant contains chemicals called indole alkaloids, like vincristine and vinblastine, which are important for its anticancer abilities. Some research suggests it might also have cardiac glycosides. The aim of this experiment is to test how well the hydroalcoholic extract from *Catharanthus roseus* leaves affects the isolated heart of Albino Wister rat. This cardiotropic effect will be compared with the effects of Adrenaline and Acetylcholine, using a Dose Response Curve to measure the results.

Keywords: Catharanthus roseus, Cardiac glycosides, Hydroalcoholic extract, isolated heart, Albino Wister rat, cardiotropic, Adrenaline, Acetylcholine.

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Abstract No.: PP-284

ORAVO: A REAL-TIME BIOFILM DETECTING SMART TOOTHBRUSH FOR EARLY DIAGNOSIS AND PREVENTION OF PERIODONTAL DISORDERS

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Nearly more than one billion people worldwide are suffering from periodontal diseases where dental biofilm accumulation is a major cause of caries, gingivitis, and progression to periodontal disease. In many Indian households, early detection of plaque buildup is neglected due to lack of visible symptoms and irregular dental visits. The present concept proposes the design of a rechargeable, cost-effective smart toothbrush capable of detecting oral biofilm in real time and guiding effective brushing patterns. The detection principle is based on fluorescence emission of bacterial porphyrins under violet light. A low-intensity LED source and photodiode sensor are integrated into the brush head to estimate biofilm density through fluorescence intensity measurement. The device provides visual feedback using a simple indicator system and guides brushing through controlled vibration and positional sensing to ensure adequate cleaning of affected zones. It is designed with a rechargeable electronic core with and low-cost replaceable brush heads to maintain affordability for middle-income families. This device aims to encourage early diagnosis and timely dental consultations by detecting persistent plaque formation. Thus, the proposed toothbrush integrates techniques to maintain oral hygiene along with early disease detection. In long term such technology may help in decreasing burden of periodontal diseases over time.

Keywords- Dental biofilm, periodontal, smart toothbrush, diagnostic, cost-effective.

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Abstract No.: PP-285

ASSESSMENT OF WOUND CONTRACTING ABILITY OF *AVICENNIA OFFICINALIS* IN WISTAR RATS

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Wound healing is a natural, dynamic and complex biological process wherein living organisms replace or repairs damaged, devitalized, or missing tissue. The present study aimed of *avicennia officinalis* in Wistar rats using an excision wound model. Ethanolic extract of this plant's leaves were prepared and subjected to preliminary phytochemical screening by the UV/Vis, NMR and Mass spectroscopy, to identify presence of active constituents responsible for wound healing activity. The improved wound healing may be attributed to the presence of flavonoids, tannins, triterpenoids, and other phenolic compounds, which are known for their antimicrobial, antioxidant, and collagen synthesis-promoting properties.

Albino Wistar rats were divided into different groups, including control (Saline water), standard (Mupirocin cream), and test groups (Etanolic extract of *A.officinalis* Cream). Formulation of cream by (Paraffin wax, ZnO, Castor oil, Gum acacia, purified water and plant extract solution). Wound contraction was measured at 2.08nm, 0.1nm, 0.16nm through regular intervals (3, 7, 10, and 14 days) to evaluate healing progression. Compared to the control group & Standard drug the results demonstrated a significant reduction in wound size in animals treated with the ethanolic extract of *Avicennia officinalis* cream, indicating enhanced wound contraction and faster healing. Future research should concentrate on lead compound separation and *in silico* compound investigations.

Keywords: Ethanolic extract, Phytochemical screening, Cream Formulation, Wistar rats, Excision wound model, Fibrin & Collagen synthesis.

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Abstract No.: PP-286

EVALUATION OF ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF *IXORA CHINENSIS* LAM. LEAF EXTRACTS: AN *IN VITRO* STUDY

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This study aimed to evaluate the antimicrobial and antioxidant properties of *Ixora chinensis* leaf extracts. The natural compounds present in *Ixora chinensis* have demonstrated promising pharmacological potential, particularly in antioxidant and antimicrobial activities. Extensive research should be conducted on the microbial aspects of various ailments caused by both Gram-positive and Gram-negative bacteria, which are responsible for common diseases such as tooth decay, tetanus, tuberculosis, salmonella food poisoning, pneumonia, and cholera. Pure methanol and ethanol were used as solvents to prepare the leaf extracts. The antioxidant potential of these extracts was assessed using the DPPH radical scavenging assay, while their antibacterial activity was evaluated using the disc diffusion method. The ethanolic and methanolic extracts exhibited significant antioxidant potential, with IC_{50} values of 18.52 µg/ml and 29.64 µg/ml, respectively. Regarding antibacterial activity, both methanolic and ethanolic extracts of *Ixora chinensis* demonstrated low to moderate inhibition against three of the eleven tested bacterial strains (Staphylococcus aureus, Klebsiella pneumoniae, and Vibrio cholerae C6706), with inhibition zone diameters ranging from 7 to 10 mm. These findings suggest that *Ixora chinensis* leaf extracts possess noteworthy antioxidant properties and moderate antibacterial activity, indicating their potential use in the development of biopharmaceutical agents. All things considered, the results point to the potential of *Ixora chinensis* leaf extracts as natural sources of bioactive chemicals due to their strong antioxidant capacity and mild antibacterial properties. It is advised that more phytochemical research and in vivo studies be conducted to confirm their medicinal uses and examine their potential for creating new antioxidant and antibacterial agents.

Keywords: *Ixora chinensis*, leaf extracts, phytochemical screening, antioxidant activity, antimicrobial activity.

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Abstract No.: PP-287

IDENTIFYING AND OVERCOMING BARRIERS TO ADVERSE DRUG REACTION (ADR) REPORTING AMONG HEALTHCARE PROFESSIONALS: A REVIEW

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Adverse Drug Reactions (ADRs) come across as a leading cause of global mortality among the top six causes of death and account for nearly 10% of hospital admissions. Despite massive healthcare awareness about ADRs, there exists a persistent implementation gap where the reporting rates remain stagnant after 20%. Current systems are unable to manage the inconsistent structural workflows and psychological barriers such as burdensome reporting and fear of litigation, leaving no space for a spontaneous potential reporting. This review aims to identify certain hierarchical flaws in relation to ADR reporting and evaluate evidence-based clinical strategies along with behavioral solutions to merge safety knowledge with clinical practice. Under the guidance of PRISMA framework, we analyzed certain peer-reviewed literatures (2021-2026) across PubMed and ScienceDirect prioritizing studies employing digital and behavioral models like COM-B to categorize reporting impediments across diverse healthcare settings. Recent findings reveal that while 90% of the practitioners acknowledge reporting as a part of their duty, only 18% of them actually report. Major setbacks include time constraints, complex forms and legal fears. In such cases, introducing Electronic Health Records (EHR) and providing continuous clinical feedbacks are seen as effective facilitators. ADR reporting gap can only be solved by shifting from passive education to system-based solutions whose enhancement can be of huge public importance, ensuring long-term patient safety and significant reduction of economic burden of preventable drug-related morbidity.

Keywords: Pharmacovigilance, ADR Underreporting, Patient Safety, Behavioral Barriers, HER.

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Abstract No.: PP-288

THERAPEUTIC PROSPECTS OF *KAEMPFERIA PARVIFLORA*: A SYSTEMATIC REVIEW OF EXTRACTION METHODOLOGIES, PHYTOCONSTITUENTS, AND PHARMACOLOGICAL EVIDENCE

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Natural products represent a major source of bioactive molecules with established therapeutic relevance, and nearly 80–85% of the global population depends on traditional herbal medicine for primary healthcare. *Kaempferia parviflora* (Black ginger), a medicinal plant belonging to the Zingiberaceae family which is native to Southeast Asia and has long been utilized in ethnomedicine for its health-promoting properties. The rhizome, commonly known as black ginger or Krachaidum, is consecutively used for the management of gastrointestinal disorders, enhancement of vitality, and as a health tonic. Recent literature investigations have validated a wide range of bioactivity associated with *K. parviflora*, including anticancer, cardioprotective, neuroprotective, anti-inflammatory, antioxidant, anti-allergic, anti-osteoarthritic, and antimicrobial effects. These therapeutic properties are primarily attributed to its diverse phytochemical composition, such as polymethoxyflavones, flavonoids, flavonols, and phenolic glycosides, which exhibit significant pharmacodynamic potential. Advancements in extraction technologies and phytochemical characterization techniques have facilitated the identification and quantification of these bioactive constituents, supporting their potential role in disease prevention and therapeutic intervention. This review consolidates current evidence on extraction methodologies, phytochemical profiling, and pharmacological activities of *K. parviflora*, highlighting its promise as a candidate for the development of novel phytopharmaceutical formulations and functional therapeutics.

Keywords: *Kaempferia parviflora*, Ethnopharmacology, Extraction, Phytoconstituents, Therapeutic Potential.

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Abstract No.: PP-289

A REVIEW ON MUCOADHESIVE BUCCAL FILMS FOR LOCALIZED IBUPROFEN DELIVERY IN PERIODONTITIS

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Periodontitis is a highly prevalent chronic inflammatory disease characterized by progressive destruction of periodontal tissues due to bacterial biofilms and host-mediated inflammatory responses, particularly involving prostaglandin E_2 (PGE_2). Conventional systemic administration of non-steroidal anti-inflammatory drugs (NSAIDs) may produce gastrointestinal side effects and fail to achieve adequate drug concentration at the periodontal site. Therefore, localized and sustained drug delivery approaches are gaining attention. Mucoadhesive buccal films represent a promising site-specific delivery system capable of adhering to the oral mucosa, providing controlled drug release, and enhancing therapeutic efficacy.

This review discusses the formulation strategies of mucoadhesive buccal films, including selection of suitable polymers (such as chitosan, alginate, pectin, and nanocellulose), plasticizers, and solubility enhancement approaches for poorly soluble drugs like ibuprofen. Various preparation techniques such as solvent casting and incorporation of self-micro-emulsifying drug delivery systems (SMEDDS) are highlighted. Furthermore, key evaluation parameters including physicochemical characterization, mechanical strength, mucoadhesive properties, in-vitro drug release, dissolution behavior, and antimicrobial or anti-inflammatory assessment are summarized.

Overall, mucoadhesive buccal films for localized ibuprofen delivery demonstrate significant potential in improving site-specific therapy, reducing systemic adverse effects, and enhancing patient compliance in the management of periodontitis.

Keywords: Mucoadhesion; Ibuprofen (NSAID); Controlled drug release; Prostaglandin (PGE_2) inhibition.

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Abstract No.: PP-290

EXTRATION AND IMPLEMENTION OF RICE HUSK CELLULOSE AS BINDING AGENT IN TABLETS

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"Extraction and Implementation of Rice Husk Cellulose as Binding Agent in Tablets" investigates the extraction of cellulose from rice husk and its application as a natural binder in tablet formulations. Cellulose is a commonly found biomass in plants, bacteria, and marine organisms, but it is never found in pure form in nature because it is always combined with lignin, hemicellulose, silica, wax, and ash. Rice husk, an abundant agricultural waste in India, contains approximately 35% cellulose, making it a valuable resource for cellulose extraction.

The study employs a chemical method involving delignification using sodium hydroxide (NaOH) followed by bleaching with sodium hypochlorite (NaOCl) to purify cellulose from rice husk. The bulk density ranged from 0.026 to 0.028 gm/ml, while the tapped density was slightly higher, between 0.028 and 0.031 gm/ml. These values suggest a fairly consistent particle packing density. The compressibility index values, between 6.66% and 12.90%, along with Hausner's ratio ranging from 1.07 to 1.15, indicate good flowability of the cellulose powders. Furthermore, the angle of repose values from 21.80° to 25.34° fell within the range signifying excellent flow characteristics, facilitated by the inclusion of microcrystalline cellulose (MCC) which enhances powder flow. These physicochemical properties demonstrate that rice husk cellulose exhibits favorable characteristics as a natural biodegradable, and effective binding agent.

Keywords: Rice Husk, Cellulose, Binding Agent, Tablet, Extraction, Delignification, Bleaching, Iodine, Microcrystalline, Pharmaceutical.

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Abstract No.: PP-291

OYSTER MUSHROOMS AS FUNCTIONAL FOODS: EFFECTS OF BLANCHING ON B-GLUCAN, POLYPHENOLS AND ANTIOXIDANT PROPERTIES

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Pleurotusostreatus oyster mushrooms in particular are prized for their potential as food and medicine. This study examined P. ostreatus's bioactive components and antioxidant activity and evaluated how blanching affected these characteristics. Lovastatin was not found in the 8% dry matter mushroom, but it was found to be a high source of β-glucan (23.9%) and total polyphenols (487.12 mg gallic acid equivalent/100g dry matter). DPPH, Trolox equivalent antioxidant capacity (TEAC), and ferric reducing antioxidant power (FRAP) assays were used to assess antioxidant capacity, and the results showed significant potential for reducing and scavenging free radicals. Blanching reduced dry matter, polyphenols, and antioxidant activity considerably but did not change the amount of β-glucan. Reusing the blanching water when making the mushroom rolls was noteworthy since it restored the antioxidant potential and bioactive substances. Additionally, the exopolysaccharide (EPS) production of several oyster mushroom species, Pleurotus sajor-caju and Pleurotus floridanus, under various carbon sources was investigated. P. ostreatus and P. floridanus were preferred by glucose, whereas P. sajor-caju produced more EPS when sucrose was present. P. floridanus demonstrated the highest effect of the extracted EPS, which demonstrated substantial antioxidant and lipid peroxidation inhibitory action.

Keywords: Oyster mushroom, β-glucan, Polyphenols, Antioxidant activity, Blanching, Exopolysaccharides (EPS), Lipid peroxidation.

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Abstract No.: PP-292

PHYTOCHEMICAL CHARACTERIZATION AND ANTIDIABETIC EVALUATION OF BIOACTIVE COMPOUNDS FROM *MOMORDICA CHARANTIA* FRUIT

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Diabetes mellitus remains a global health burden, necessitating the exploration of plant-derived therapeutics as safer and cost-effective alternatives to synthetic drugs. *Momordica charantia* Linn. Commonly known as bitter melon, has long been used in traditional medicine for glycemic management. This study consolidates findings from phytochemical investigations and biological evaluations of bioactive constituents derived from the fruit of this plant, with emphasis on their antidiabetic and antioxidant potential.

In the present study, phytochemical isolation and characterization were carried out and the major constituents were Charantin, Cucurbitacin, Momordicoside D, followed by evaluation of their *in vitro* antidiabetic potential through enzyme inhibition assays targeting key carbohydrate-digesting enzymes, namely α-amylase and α-glucosidase. The isolated compounds demonstrated notable antioxidant activity, suggesting a dual therapeutic role in regulating blood glucose levels and reducing oxidative stress.

In silico molecular docking studies of *M. charantia*-derived compounds against relevant diabetic target proteins revealed favorable binding affinities, supporting their potential as natural enzyme inhibitors. The compounds showed strong binding affinity to GLP-1 and TGR5 and inhibited DPP-4. The highest docking score was -8.5 kcal/mol (Cucurbitacin against GLP-1). *In vivo* validation further confirmed the antidiabetic efficacy of these compounds, with significant reductions observed in blood glucose levels in experimental models. The result of the *in vivo* study showed GLP-1 gene expression increased by 295.7% and DPP-4 gene expression decreased by 87.2%.

Overall, the study highlights the promise of *M. charantia*-derived phytochemicals as multitarget antidiabetic agents. Further pharmacokinetic evaluation and well-designed clinical studies are required to facilitate their translational application.

Keywords: Diabetes mellitus, *Momordica charantia*, Isolation, Molecular docking, *In Vitro* & *In silico* and *In Vivo* experiment.

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Abstract No.: PP-293

ALZHEIMER'S DISEASE: FROM THE AMYLOID HYPOTHESIS TO DISEASE-MODIFYING THERAPY

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Alzheimer's disease (AD) is a progressive neurodegenerative disorder and the leading cause of dementia globally, characterized by irreversible decline in cognition, memory, and functional independence. Although the amyloid hypothesis has historically dominated AD research, proposing that beta-amyloid accumulation initiates neurodegenerative cascades, repeated clinical inconsistence have emphasized the need for broader mechanistic perspectives. Contemporary evidence supports a multifactorial pathogenic network in which tau pathology sustained neuroinflammation, mitochondrial dysfunction, oxidative stress, and synaptic disintegration collectively drive neuronal loss. Recognition of this biological complexity has reshaped therapeutic priorities from symptomatic modulation to disease modification. Recent advances focus on monoclonal antibodies targeting amyloid clearance and emerging agents directed against tau aggregation. Novel therapeutic approaches are exploring anti-tau immunotherapies, modulation of neuroinflammatory signalling pathways, and multi-target-directed ligands designed to act on interconnected disease mechanisms. Biomarker-guided treatment strategies and combination therapy models are also being investigated to enhance clinical efficacy and trial outcomes. While early results demonstrate reduction in pathological burden, consistent and meaningful cognitive benefit remains a significant challenge. This review highlights the transition from an amyloid-centric hypothesis to a multidimensional therapeutic framework and discuses future directions for achieving clinically effective disease modifying therapy in Alzheimer's disease.

Keywords: Alzheimer's disease, Amyloid hypothesis, Tau pathology, Neuroinflammation, Disease-modifying therapy.

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Abstract No.: PP-294

PREPARATION AND EVALUATION OF BUCCAL PATCHES FOR DELIVERY OF BETA-BLOCKERS

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The object of present study was to develop the buccal therapeutic systems using various polymers. The total area of oral cavity is about 100 cm2 Out of this one third is buccal surface which is lined with an epithelium of about 0.5 mm thickness. Daily 0.5-2 Liters of saliva washed out from mucosal surface area. But the continuous secretion of saliva from the mouth can cause the easy removal of release drug. Buccal patches are the type of formulation that has different course of administration through the buccal mucosa for drug delivery. The patch is placed between upper gingiva (gums) and cheek to treat local and systemic conditions. The buccal mucosa provides direct entry in to the systemic circulation and avoid acidic environment. The buccal area of oral cavity is an ideal target for administering the desired amount of drug which helps the limitations of conventional drug administration. Buccal drug delivery system is an innovative technique which offers several advantages, basically in term of oral administration. The duration of placing the medicinal formulations at desired site could be prolonged. Buccal patches are formulated by using different types of cardio selective beta-blocker drugs to enhance permeability and improve patient compliance. Buccal drugs come in films, tablet or sprays.

Keywords: Beta-blocker drugs, Buccal drug delivery system, oral cavity

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VALORIZATION OF TEMPLE-WASTE MARIGOLD (TAGETES ERECTA) PETALS: DEVELOPMENT AND EVALUATION OF A LUTEIN STANDARDIZED HYDROGEL WITH ANTIOXIDANT, INVITRO ANTIINFLAMMATORY, AND ANTIMICROBIAL ACTIVITIES

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Temple floral waste is a problem for the environment in India, mainly the petals of marigolds (*Tagetes erecta*) that are thrown away after religious use. This study concentrates on the valorization of temple-waste marigold petals by creating and assessing a lutein-standardized polyherbal hydrogel exhibiting antioxidant, in vitro anti-inflammatory, and antimicrobial properties. We gathered marigold petals, neem leaves, turmeric rhizomes, and Aloe vera gel, checked their authenticity, shade-dried them, ground them up, and extracted them using a hydro-alcoholic method (70% ethanol and 30% water). The extracts were standardized, with a focus on lutein content as a bioactive carotenoid marker. We made a polyherbal hydrogel formulation in 100 g batches using standardized extracts. We tested the formulation for physicochemical properties like pH, consistency, spreadability, and stability. Bioactivity assays were conducted to evaluate antioxidant, anti-inflammatory, and antimicrobial properties. The synergistic blend was meant to bring together the wound-healing and anti-inflammatory properties of marigold, the moisturizing and penetration-enhancing effects of aloe vera, and the antimicrobial effects of neem and turmeric. The hydrogel had good physicochemical properties and promising pharmacological activities in vitro, supporting its potential as a topical therapeutic formulation. This study shows a green and long-lasting way to turn flower waste into a pharmaceutical product. Additional in vivo studies, long-term stability assessments, and clinical evaluations are necessary to validate safety, efficacy, and therapeutic applicability.

Keywords: Temple-waste valorization, *Tagetes erecta* (Marigold), Lutein standardization, Polyherbal hydrogel, Antioxidant activity, in vitro anti-inflammatory activity

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COMPARATIVE NUTRITIONAL AND BIOACTIVE PROFILING OF SIX MICROGREEN SPECIES WITH POTENTIAL HEALTH BENEFITS

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Micronutrient deficiency is a major global health concern, affecting nearly one out of every four individuals. Microgreens, which are harvested at an early growth stage before full maturity, are known for their concentrated nutritional value. In this evaluation, six types— red beet, broccoli, black radish, pea, bean and sunflower—were assessed for their nutrient composition. Among them, bean microgreens showed the highest vitamin C (ascorbic acid) content at 81.46 mg per 100 g, whereas red beet microgreens contained the lowest amount at 31.62 mg per 100 g. Considerable differences were observed in macroelements: potassium ranged from 185.07 to 413.05 mg/100 g, magnesium from 43.86 to 87.73 mg/100 g, calcium from 66.28 to 147.63 mg/100 g, and phosphorus from 2.47 to 4.98 mg/100 g. Variations were also seen in trace elements, with iron ranging between 526 and 2620 µg/100 g, manganese from 177.22 to 351.57 µg/100 g, zinc from 30.92 to 130.78 µg/100 g, and copper from 448.84 to 966.34 µg/100 g. In all six varieties, glucose levels were higher than those of sucrose and fructose, falling within a range of 0.115 to 0.570 mg/100 g. Different organic acids also contributed to the nutritional profile of each microgreen. Red beet contained the highest amount of citric acid, bean microgreens were rich in succinic acid, and sunflower showed a notable amount of fumaric acid. When antioxidant capacity was examined, broccoli microgreens demonstrated the highest total antioxidant content (824.63 mg GA/100 g), while bean microgreens recorded the greatest total flavonoid content (759 mg RU/100 g). Black radish microgreens stood out for their strong antioxidant activity, including superior free radical scavenging ability and higher phenolic compound levels. Microgreens made from red beet sprouts are better sources of organic acids & flavonoids that help maintain a healthy level of antioxidants than most types of plant-based foods. Sunflower generated micro greens contained a large amount of calcium; red beet micro greens were high in fumaric acid; broccoli contained considerable amounts of iron and manganese; and pea generated micro greens were higher (more so than other types) in phosphorus and copper than any other types. On balance the amount of nutrient content and antioxidant capability, in total the nutrient content offers the potential to favourably affect the consumer's health and nutritional status through the regular consumption of red beet micro greens, as well as those produced from other types of imported and/or fresh produce.

Keywords: Microgreens; Nutritional profiling; Antioxidant activity; Bioactive compounds; Phenolic compounds; Functional foods; Micronutrients

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Abstract No.: PP-297

INVESTIGATION OF BIOACTIVE POTENTIAL OF ETHANOL AND AQUEOUS EXTRACTS OF SELECTED INDIGENOUS NON-HERB CROPS

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Objective of the study is to get the knowledge of pharmacological effects of the medicinal plant as future source of herbal drugs and also to assess the potent activity like anti-ulcer, antioxidant and thrombolytic of the ethanol and aqueous extracts of the aerial part of *Mikania scandens, Croton bonplandianum and Eupatorium triplinerve*. Phytochemical screening of both extracts of the medicinal plants were carried out by standard chromogenic reagents. Pyloric ligation method was used to determine the ulcer protective activity. DPPH scavenging radical assay and Clot-lysis method were followed to evaluate the antioxidant and thrombolytic potential. Two extracts of *Mikania scandens* at 200 mg/kg exhibited strongest ulcer protective activity 68.19% and 63.63% with comparison of standard drug lansoprazole at 8mg/kg 81.83%. All extracts have scavenging activity at the concentration of 50 to 250µg/ml. The significant potential antioxidant activity (IC50 value) were observed in the aqueous extract of *M.scandens, C.bonplandianum, E.triplinerve* 65.35µg/ml, 69.52µg/ml, 74.52µg/ml respectively. The aqueous extract of *M.scandens* exhibited the highest significant clot lysis activity 59.78±2.042 in comparison with standard streptokinase vial 80.23±1.969. The findings of the study suggested that the aqueous extract of *M.scandens* has strong gastroprotective, antioxidant and thrombolytic effects. Therefore, considering the phytochemicals like polyphenolic, flavonoids and tannins present in the plant which could be responsible for these effects. Further research on isolating the responsible compounds from the extracts can only reveal the mysterious mechanism of action for pharmacological properties.

Keywords: Non herb Crop, Phytochemical, Gastroprotective, Antioxidant, Thrombolytic.

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Abstract No.: PP-298

SOLVENT-MEDIATED DESIGN OF CONJUGATED METAL ORGANIC FRAMEWORKS WITH CONTROLLED ARCHITECTURE FOR MULTIFUNCTIONAL APPLICATIONS

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Metal-organic frameworks (MOFs) are crystalline porous materials formed through coordination between metal ions and organic ligands under suitable solvent conditions and synthesis methodologies. Owing to their high surface area, tunable porosity, and structural versatility, MOFs have attracted considerable interest for diverse biological and chemical applications. Among the key parameters influencing MOF synthesis, solvent selection plays a crucial role in controlling framework formation, crystal growth, morphology, yield, and overall functional performance.

In this study, a series of conjugated MOFs were synthesized using different solvent systems to investigate the effect of solvent variation on their structural and functional properties. The MOFs were prepared using metal ions such as Cu, Co, Fe, Ni, Al, and Zn in combination with 2-aminobenzene-1,4-dicarboxylic acid (2-amino BDC) as the organic ligand. This ligand contains two carboxylic acid groups and one amine group on the aromatic ring, facilitating efficient metal coordination and extended conjugation. Three polar solvent systems-dimethylformamide (DMF), dimethyl sulfoxide (DMSO), and ethanol-water (EtOH:H_2O)-were employed to evaluate their influence on MOF formation.

Significant variations in colour, morphology, and percentage yield were observed depending on the solvent system used. The findings demonstrate that solvent choice markedly affects metal–ligand coordination, reaction kinetics, crystal size, phase formation, porosity, and framework stability. The synthesized MOFs were characterized using various analytical techniques to confirm structural integrity, crystallinity, functional group coordination, and morphology.

Preliminary biological studies indicated promising antioxidant and antimicrobial activities. Overall, solvent-assisted synthesis is demonstrated as an effective strategy for tailoring conjugated MOFs for enhanced functional applications.

Keywords: Metal-organic frameworks; Solvent effect; Conjugated MOFs; Morphology control; Bio-chemical applications

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Abstract No.: PP-299

SCANRX: SMART SCANS FOR COMPLETE CLARITY

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Counterfeit and substandard medicines remain a critical global health challenge, contributing to therapeutic failure, antimicrobial resistance, economic loss, and preventable mortality. Conventional authentication strategies, such as static barcodes, QR codes, and SMS-based verification are vulnerable to duplication, cloning, and limited real-time validation. To address these gaps, I propose ScanRx, a secure, patient - centered mobile application integrating encrypted barcode authentication with intelligent pharmaceutical guidance. In this model, each medicine pack contains a uniquely encrypted, non-replicable digital identifier embedded within the barcode architecture. The encrypted token is readable exclusively through the ScanRx application, which verifies authenticity via secure cloud validation and algorithmic decryption protocols, thereby preventing unauthorized duplication or counterfeit replication.

Beyond authentication, ScanRx functions as an integrated patient guidance platform. Upon verification, the application provides evidence-based information on drug indications, dosage instructions, side effects, contraindications, drug–drug interactions, and drug–food interactions, presented in simplified, patient-friendly language with explanatory terminology. This dual-function system transforms medicine verification from a passive regulatory mechanism into an active pharmacovigilance and patient-education interface. By combining cryptographic security, real-time verification, and AI-assisted educational support, ScanRx addresses both supply-chain integrity and medication literacy gaps. The proposed framework offers a scalable, technology-driven solution aligned with contemporary digital health strategies, enhancing drug safety, empowering patients, and strengthening public health surveillance against counterfeit pharmaceuticals.

Keywords: Global health challenge, therapeutic failure, duplication, ScanRx, Drug - Drug interaction, Drug – Food interactions, surveillance.

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DESIGN AND CHARACTERIZATION OF TELMISARTAN COCRYSTALS USING COFORMERS TO IMPROVE SOLUBILITY AND BIOAVAILABILITY

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Design and Characterization of Telmisartan Cocrystals Using Coformers to Improve Solubility and Bioavailability Snigdha Samajdar*, Kamalakanta Ray, Jayanta Kumar Chaudhury Department of Pharmaceutical Technology, Jis University 81, Nilgunj Road, Agarpara, Kolkata, West Bengal, India, Pin Code: 700109 snigdhasamajdar13579@gmail.com Abstract: Telmisartan is an angiotensin II type -1 receptor antagonist, a BCS class 2 drug. It is used to treat hypertension. Telmisartan is a very poorly water-soluble drug, which directly affects its oral bioavailability and therapeutic efficacy. This study shows that forming a co-crystal of telmisartan with fumaric acid can increase the drug's solubility without changing its therapeutic activity. The effect of telmisartan–fumaric acid cocrystallisation on the drug's solubility has not yet been thoroughly investigated so far. This study focuses on preparing co-crystals of telmisartan with fumaric acid to see if this approach can improve its solubility and help the drug dissolve more quickly. The basic pre-formulation study is conducted to understand the interaction between telmisartan and fumaric acid. Co-crystals are then prepared using simple methods such as liquid-assisted grinding (LAG). Then the prepared co-crystals are examined using techniques such as FTIR, DSC, PXRD, and SEM to confirm that new crystals are formed. And then solubility and dissolution tests are performed to confirm the improvement of solubility and dissolution rate of the drug. This study shows that the co-crystallisation of telmisartan with fumaric acid helps the drug dissolve more easily. This happens due to the change in drug structure, allowing it to interact better and dissolve faster. Overall, co-crystallisation is a simple and effective technique to improve the dissolution and solubility of poorly soluble drugs. This method improves telmisartan to be absorbed better in the patient's body.

Keywords: Telmisartan, Fumaric acid, Co-crystallisation, Solubility enhancement, Liquid-assisted grinding, Crystal engineering.

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Abstract No.: PP-301

CRISPR-CAS9 AS A TRANSFORMATIVE PLATFORM FOR PRECISION MEDICINE AND DRUG DISCOVERY

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CRISPR-Cas9 has become a revolutionary way to edit genomes, allowing for precise, programmable, and efficient changes to DNA sequences. CRISPR-Cas9 is based on a prokaryotic adaptive immune system. It uses a single-guide RNA (sgRNA) to tell the Cas9 nuclease to go to certain places in the genome, where it makes double-strand breaks. Cellular pathways like non-homologous end joining (NHEJ) or homology-directed repair (HDR) fix these breaks, which lets you change, add, or delete specific genes. This technology is now a key part of functional genomics and translational research. In drug discovery, CRISPR makes it easier to systematically screen for loss and gain of function, which speeds up the process of finding and validating therapeutic targets. It also makes it possible to create disease models that are physiologically relevant, which makes preclinical predictions more accurate. Clinically, CRISPR-based strategies are enhancing therapies for monogenic disorders, hematological diseases, and cancer via both ex vivo and in vivo methodologies. Next-generation technologies like base editing, prime editing, and CRISPR interference/activation (CRISPRi/a) make precision even better while causing less damage to the genome. Even though it could change everything, there are still problems like off-target effects, delivery problems, and immunogenicity. Ethical and regulatory issues related to germline editing also need careful management. High-fidelity Cas variants, better delivery systems, and bioinformatic off-target prediction are all making safety and effectiveness better all the time. CRISPR-Cas9 is a major step toward precision genome medicine. It could change how we develop new treatments and provide personalized healthcare.

Keywords: CRISPR-Cas9, genome editing, precision medicine, drug discovery, gene therapy etc.

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Abstract No.: PP-302

EXOSOME-BASED NANOTHERAPY: THE NEXT-GENERATION TARGETED STRATEGY FOR BREAST CANCER

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Despite significant advances in oncology, metastatic breast cancer remains a formidable therapeutic challenge due to nonspecific systemic toxicity, rapid drug clearance, and the emergence of multidrug resistance (MDR). Conventional chemotherapeutic regimens and even synthetic nanocarrier-based delivery systems have shown limited clinical success, often provoking undesirable immune responses and off-target effects. In this context, exosomes—naturally occurring extracellular vesicles (30–150 nm)—have emerged as a promising and biologically compatible alternative for targeted cancer therapy. Exosomes offer several intrinsic advantages over synthetic nanoparticles, including low immunogenicity, prolonged circulation time, and an inherent ability to traverse biological barriers. This poster highlights the design and engineering of exosome-based delivery systems capable of encapsulating chemotherapeutic agents such as doxorubicin and paclitaxel, as well as nucleic acid therapeutics including siRNA and miRNA. Furthermore, surface functionalization of exosomes with targeting ligands enables active homing toward overexpressed receptors on breast cancer cells, such as HER2 and CD44, thereby enhancing tumor specificity. Accumulating evidence demonstrates that bioengineered exosomes significantly improve intracellular drug accumulation while minimizing collateral damage to healthy tissues. Importantly, exosome-mediated delivery has shown potential in overcoming MDR by bypassing classical efflux pump mechanisms. Collectively, these attributes position exosome-derived nanotherapy as a transformative and scalable platform for precision medicine. By integrating targeted delivery with reduced toxicity and enhanced therapeutic efficacy, exosome-based strategies may substantially improve clinical outcomes and survival rates in breast cancer patients.

Keywords: Exosomes; Breast cancer; Nanotherapy; Targeted drug delivery; Multidrug resistance; HER2; CD44; Precision medicine; siRNA/miRNA delivery; Chemotherapy

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Abstract No.: PP-303

NOVEL ISATIN ARYLOXADIAZOLE AMINE DERIVATIVES: DESIGN, SYNTHESIS AND ANTIEPILEPTIC EVALUATION

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Epilepsy is a condition of the central nervous system disorder, in which sodium channel blockers perform a vital activity in the treatment of several central nervous system disorders, such as epilepsy and convulsions. The indoline scaffold played a crucial role in influencing sympathetic and parasympathetic activity, which is closely related to seizure modulation. In this study, two series of novel isatin aryloxadiazole amine derivatives (8a-f and 5a-f) were designed and synthesised, and their antiepileptic property were evaluated by using the maximal electroshock test (MES), subcutaneous pentylenetetrazole (scPTZ) seizures and neurotoxicity by motor impairment model in mice. From these studies, it was found that compound 8e showed the most potent inhibitory activity with a median dose of 38.67 mg/kg (MES ED_{50}), 85.75 mg/kg (scPTZ ED_{50}) and a toxic dose (TD_{50}) was found to be > 500mg/kg. From the *in silico* docking studies, it was found that compound 8b had good binding affinity against the active site of the sodium channel receptor, and the docking score is -6.393 kcal/mol, as compared with standard drug phenytoin (-4.23 kcal/mol). The drug likeness property was established by evaluating the ADMET parameters and distance mapping of these compounds.

Keywords: Isatin, Aryloxadiazole, Synthesis, AntiConvulsant, SAR, Molecular Docking

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Abstract No.: PP-304

PHYTOCHEMICAL PROFILING AND IDENTIFICATION OF BIOACTIVE CONSTITUENTS OF SANDALWOOD OIL

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Sandalwood oil, obtained from *Santalum album*, is widely recognized for its therapeutic, cosmetic, and pharmaceutical applications owing to the presence of diverse bioactive constituents. This study focused on the phytochemical profiling and identification of major bioactive compounds in sandalwood oil using standard qualitative screening techniques. Preliminary phytochemical analysis was performed to detect the presence of key secondary metabolites, including terpenoids, phenolic compounds, flavonoids, and essential oil constituents. The results indicated a strong presence of sesquiterpenoid alcohols, particularly α-santalol and β-santalol, which are responsible for the characteristic aroma and biological activity of the sandalwood oil. Minor constituents, such as phenolic derivatives and trace flavonoids, were also observed, contributing to the antioxidant and antimicrobial properties.

Phytochemical profiling highlights the therapeutic potential of sandalwood oil in topical drug delivery systems, particularly for anti-inflammatory, antimicrobial, and skin-soothing applications. The presence of lipid-soluble bioactive compounds supports the suitability of these compounds for incorporation into nanobased formulations, such as solid lipid nanoparticles, to enhance skin penetration and sustain release. Overall, this study confirms that sandalwood oil is a rich source of biologically active phytoconstituents, validating its traditional use and supporting its application in modern pharmaceutical and cosmeceutical formulations.

Keywords: Sandalwood Oil, Phytochemical Profiling, Bioactive Constituents, Terpenoids (α-Santalol & β-Santalol), Topical Drug Delivery.

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Abstract No.: PP-305

TRANSFORMING TRADITIONAL HERBAL SYSTEMS INTO NANOTECHNOLOGY: A TARGETED SCALP DELIVERY APPROACH

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Hair fall, scalp weakening, and fiber damage are increasingly reported due to stress, environmental exposure, and improper hair care. Although many herbal oils and serums are commercially available, they often suffer from limitations such as poor penetration, heavy and greasy texture, low stability, and insufficient delivery of actives to the follicular region. These drawbacks reduce the effectiveness and user compliance, highlighting the need for a lightweight, stable, and high-performance topical delivery system that can efficiently transport functional ingredients to the scalp.

The present study addresses this need by developing a sesame oil–based herbal nanoemulsion system converted into a nanoemulgel roll-on for targeted scalp application. The formulation combines rosemary, green tea extract, and amla as key botanical actives, known for antioxidant protection, scalp stimulation, and hair strengthening support. Keratin is incorporated as a functional protein component to reinforce hair fibers, improve conditioning, and reduce breakage tendency.

The nanoscaled delivery system is designed to enhance the dispersion of actives, improve scalp contact, and promote better follicular availability compared to conventional formulations. The nanoemulsion was further structured into a gel matrix using a polymeric gelling agent to increase viscosity, residence time, and ease of roll-on use. Preliminary evaluations indicated suitable physical characteristics and short-term stability. This ongoing study proposes a more effective and cosmetically acceptable herbal nanodelivery platform for advanced scalp and hair care applications.

Keywords: Indigenous Oils, Nanoemulsion, Hair Growth, Follicular Delivery, Pharmaceutics.

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Abstract No.: PP-306

ARTIFICIAL INTELLIGENCE IN PRECISION ONCOLOGY: TRANSFORMING CANCER DETECTION AND THERAPEUTIC DECISION-MAKING

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Artificial intelligence (AI) has emerged as a transformative force in cancer research and precision medicine, driven by advances in machine learning, deep learning, and highdimensional data integration. AI algorithms have revolutionized cancer detection, diagnosis, and classification by enabling automated analysis of medical images and complex genomic datasets, outperforming many conventional approaches in accuracy and efficiency. Recent AI applications span multi-omics profiling to uncover molecular insights, predictive modeling to forecast therapy responses, and optimized treatment planning tailored to individual patients. In precision oncology, AI facilitates the identification of actionable genomic alterations, enhances patient stratification, and accelerates drug discovery pipelines, thereby improving personalized therapeutic strategies. However, challenges remain, including data heterogeneity, bias in training datasets, interpretability of AI models, and ethical considerations in clinical deployment. Furthermore, integrating AI seamlessly into routine clinical workflows requires robust validation, transparent reporting, and regulatory frameworks to ensure reliability and patient safety. Despite these limitations, AI-driven tools are already reshaping oncology practice by improving early diagnosis, informing targeted therapies, and supporting clinical decisionmaking. Emerging paradigms such as explainable AI, multimodal deep learning, and real-world data integration promise to refine predictive accuracy and expand applications across diverse cancer types. Continued interdisciplinary research and collaboration between clinicians, data scientists, and regulatory bodies will be critical to fully harness the potential of AI in precision medicine, ultimately enhancing cancer care outcomes and reducing the global burden of disease.

Keywords: Artificial Intelligence, Precision Oncology, Cancer Detection, Multi-omics, Predictive Modeling, Personalized Medicine, Explainable AI, Clinical Decision Support.

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Abstract No.: PP-307

ROLE OF CURCUMIN IN CANCER TREATMENT

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Curcumin is a polyphenol extracted from the rhizomes of the turmeric plant, *Curcuma longa* with anti-inflammatory, antioxidant, and anti-tumor properties. Chronic inflammation plays an important role in the development and progression of cancer, and curcumin helps by regulating different seditious intercessors similar as cytokines, cyclooxygenase- 2 (COX - 2), and reactive oxygen species (ROS). Curcumin creates an adverse environmental condition for the growth of Cancer cell. Because curcumin reduces inflammation and also reduces oxidative stress. Curcumin affects various molecular targets associated with cancer progression, including growth factors, protein kinases, and oncogenic molecules. However, the major hurdle is metastatic cancer prevention. Various trials and studies report that curcumin may decrease the migration and invasion of cancer cells. It may lead to treatment or preventing the metastasis. Curcumin can regulate various pathways that can control the spread of tumors. It can also regulate the immune response. Because of these multiple actions, curcumin is considered a promising supportive agent in cancer management. Despite its substantial therapeutic value as an adjunct in oncology, there are numerous limitations with respect to the clinical utility of curcumin. Poor solubility and low bioavailability limit the effectiveness of curcurmin for cancer treatment, and as a result, there are currently multiple clinical trials evaluating the safety and effectiveness of curcurmin in conjunction with various chemotherapeutic agents for multiple malignancies and types of cancer. Further, multiple opportunities exist for improving formulary formulations of curcurmin; drug delivery methods, structural modification of curcurmin, and clinical investigation of both the pharmacokinetics and pharmacodynamics of curcurmin.

Keywords: Curcumin; Cancer; Metastasis; Clinical Trials; Tumors