Conference Proceedings Abstract Book

February 26 & 27, 2026

"International Conference on "Frontiers in Medical, Pharmaceutical and Allied Sciences: Translating Innovation into impact

Organized By:

Guru Nanak Institute of Pharmaceutical Science and Technology

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GURU NANAK GNIPST INSTITUTE OF PHARMACEUTICAL SCIENCE & TECHNOLOGY

JIS GROUP
Educational Initiatives

INTERNATIONAL CONFERENCE

on

Frontiers in Medical, Pharmaceutical and Allied Sciences:

Translating Innovation into impact

February 26-27, 2026

Guru Nanak Institute of Pharmaceutical Science and Technology

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About the Conference

The International Conference on Frontiers in Medical, Pharmaceutical and Allied Sciences: Translating Innovation into Impact is a premier global forum that brings together academicians, researchers, healthcare professionals, industry experts, and policymakers to share knowledge, present groundbreaking research, and explore emerging trends across medical, pharmaceutical, and allied sciences. The conference fosters a multidisciplinary environment where ideas, technologies, and practices converge to address contemporary challenges in healthcare.

Focusing on translational research and real-world impact, the conference highlights innovations in drug discovery, biotechnology, precision medicine, regulatory science, and healthcare technology. It encourages discussions that bridge the gap between scientific discovery and clinical, industrial, and societal applications, emphasizing evidence-based approaches that enhance patient care, public health, and sustainable healthcare systems.

The conference welcomes high-quality original research papers, reviews, and case studies that are unpublished and not under consideration elsewhere, aligned with the conference themes and thrust areas. Selected contributions will undergo rigorous peer review and may be considered for publication in reputed international journals or conference proceedings, ensuring high visibility and impact for contributors.

Participants can expect interactive sessions, keynote lectures, panel discussions, and networking opportunities, fostering collaborations that transcend national and disciplinary boundaries and translating innovation into tangible healthcare solutions.

Conference Theme

- Translational Medicine and Clinical Research
- Biotechnology, Biopharmaceuticals, and Precision Medicine
- Advances in Pharmaceutical Sciences and Drug Development
- Natural Products, Herbal Medicines, and Traditional Systems
- Innovations in Healthcare Technologies and Diagnostics
- Public Health, Pharmacovigilance, and Healthcare Policy
- Regulatory Sciences, Quality Assurance, and Compliance
- Artificial Intelligence and Data Science in Healthcare

About GNIPST

Established in 2005 by the Guru Nanak Education Trust, the Guru Nanak Institute of Pharmaceutical Science and Technology (GNIPST) is dedicated to excellence in pharmaceutical education, research, and professional advancement. Located in Panihati, Sodepur, Kolkata, the Institute is statutorily affiliated with Maulana Abul Kalam Azad University of Technology (MAKAUT), West Bengal, and is approved by the Pharmacy Council of India (PCI). GNIPST holds the distinction of being the first pharmacy institute in Eastern India to be granted AUTONOMOUS status by the University Grants Commission (UGC).

Consistently ranked under the National Institutional Ranking Framework (NIRF) for nine consecutive years, GNIPST achieved an All-India Rank of 85 in the Pharmacy category in NIRF 2025. The Institute offers a range of academic programs, including Undergraduate (B. Pharm) and Postgraduate (M. Pharm) specializations in Pharmaceutical Chemistry, Pharmacology, Pharmaceutics, Pharmaceutical Quality Assurance, Regulatory Affairs, Pharmaceutical Biotechnology, and Pharmacognosy—all conducted with the requisite affiliations and approvals from MAKAUT and PCI.

GNIPST features advanced laboratories and research infrastructure equipped with high-throughput instruments. The Acharya Prafulla Chandra Advanced Research Laboratory supports interdisciplinary research, encouraging students to publish in reputed journals and present at national and international conferences. Research at the Institute focuses on innovation-driven and translational pharmaceutical sciences, fostering national and international collaborations to address global challenges in drug development, regulatory science, biotechnology, and patient-centric healthcare.

The campus provides comprehensive amenities, including a well-stocked library with digital resources, smart classrooms, and auditoriums. For recreation and physical well-being, GNIPST campus includes a sprawling field for games and sports**,** along with other recreational facilities. Separate, excellent hostel accommodations are provided for male and female students on campus.

GNIPST maintains strong industry connections and is committed to student career development. A dedicated Training and Placement Cell facilitates internships, industrial visits, and recruitment engagements with leading pharmaceutical, healthcare, and related industries.

Through a holistic approach, GNIPST integrates academic rigor with impactful research, industry relevance, and a commitment to societal contribution.

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Message from Director, GNIPST

It gives me immense pleasure to welcome you to the International Conference on **"Frontiers in Medical, Pharmaceutical and Allied Sciences: Translating Innovation into Impact."** This conference reflects our collective commitment to advancing scientific Knowledge and transforming innovative ideas into tangible solutions that benefit society.

At Guru Nanak Institute of Pharmaceutical Science and Technology (GNIPST), we firmly believe that meaningful progress in Pharmaceutical Science and life science emerges at the intersection of rigorous research, interdisciplinary collaboration, and real-world application.

This conference serves as an important platform for academicians, researchers, clinicians, industry professionals, and young scholars to exchange ideas, share cutting-edge research, and explore emerging trends across medical, pharmaceutical, and allied sciences.

In an era defined by rapid technological advancement and evolving global health challenges, the ability to translate innovation into practical impact has never been more crucial. Through keynote lectures, technical sessions, and interactive discussions, this conference aims to foster critical thinking, inspire collaborative research, and encourage solutions that are both scientifically sound and socially relevant.

I extend my sincere appreciation to the organizing committee, speakers, participants, and partners for their dedication and contributions. I am confident that the deliberations and outcomes of this conference will pave the way for impactful research, strengthen academic–industry linkages, and inspire the next generation of scientists and innovators.

I wish the conference every success and hope it becomes a memorable and enriching experience for all participants.

Prof. (Dr.) Abhijit Sengupta

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Message from Principal, GNIPST

It is with great pride and enthusiasm that I extend my warm greetings to all delegates, speakers, and participants of the International Conference on **"Frontiers in Medical, Pharmaceutical and Allied Sciences: Translating Innovation into Impact."**

At Guru Nanak Institute of Pharmaceutical Science and Technology, we envision education and research as powerful tools for societal transformation.

This conference embodies that vision by bringing together diverse minds from academia, research organizations, healthcare sectors, and industry to deliberate on innovations that have the potential to reshape medical and pharmaceutical sciences.

The true value of scientific advancement lies not only in discovery but in its effective translation into real-world applications that improve health outcomes and quality of life. Through this international forum, we aim to encourage interdisciplinary dialogue, promote evidence-based research, and nurture a culture of innovation among young researchers and students. I wish all participants a stimulating and rewarding conference experience and hope that the deliberations lead to sustainable innovations for global well-being.

Prof. (Dr.) Lopamudra Datta

Message from Convener

On behalf of the organizing team, I am pleased to welcome all delegates to the International Conference on **"Frontiers in Medical, Pharmaceutical and Allied Sciences: Translating Innovation into Impact."** It is a privilege to serve as the Convener for this conference and to coordinate an academic forum that brings together participants from diverse scientific and professional backgrounds.

This conference has been carefully structured to provide opportunities for scholarly interaction, critical discussion, and dissemination of current research across medical, pharmaceutical, and allied sciences. The program reflects a balanced blend of keynote lectures, oral and poster presentations, and thematic sessions designed to highlight emerging research areas and practical applications.

A key focus of this conference is to facilitate meaningful interaction among researchers, academicians, industry professionals, and young scholars. By encouraging dialogue and exchange of ideas, the conference aims to promote collaborative research efforts and strengthen professional networks that extend beyond the event.

I would like to sincerely thank the organizing committee members, session chairs, reviewers, speakers, and volunteers for their dedicated efforts in planning and executing this conference. Their commitment has been central to shaping a well-organized and academically enriching program. I also extend my appreciation to all participants for their enthusiasm and contributions.

I encourage all delegates to actively participate in the sessions, engage in discussions, and make the most of the opportunities provided by this conference. I am confident that the interactions and outcomes of this event will be both productive and rewarding.

I wish you all a successful and fulfilling conference experience.

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ABSTRACT

For

POSTER PRESENTATION

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Abstract No.: GNIPST/FMPASTII/P001

GENETIC DIVERSITY, POPULATION STRUCTURE, AND CLUSTERING ANALYSIS OF RICE (*ORYZA SATIVA*) GENOTYPES USING MORPHOLOGICAL AND MOLECULAR MARKERS

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Abstract

Objective
To evaluate genetic diversity and population structure among 5 rice (*Oryza sativa* L.) accessions using SSR markers, identifying promising parental lines for breeding and population improvement in India.

Methods
Three polymorphic simple sequence repeat (SSR) markers were employed to genotype 5 rice accessions. Population genetic parameters, including polymorphic information content (PIC), genetic distances, and identity coefficients, were calculated. Population structure was inferred through model-based clustering, while analysis of molecular variance (AMOVA) partitioned variation across hierarchical levels. Clustering was visualized via dendrogram construction.

Results
The SSR panel exhibited high polymorphism (mean PIC = 0.32). Structure analysis identified two major subpopulations, indicating a narrow genetic base. AMOVA attributed 20% of variation to between-population differences, 37% to within-population individual variation, and 13% to within-individual variation. Genetic distances ranged from 0.046 to 1.541, with identity coefficients from 0.069 to 0.0845. Accessions clustered into two distinct groups, confirming substantial diversity.

Conclusion
Considerable genetic variability exists among the assessed rice germplasm, providing valuable resources for parental selection in India and broader rice breeding initiatives to enhance yield, adaptability, and resilience.

Keywords: Rice germplasm, SSR markers, genetic diversity, population structure, *Oryza sativa*

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Abstract No.: GNIPST/FMPASTII/P002

BIOACTIVE INSIGHTS INTO *PSIDIUM GUAJAVA* LINN.: RECENT ADVANCES IN CHEMOPROFILING AND PHARMACOLOGY

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Abstract

Objective
Psidium guajava Linn. (guava) is a medicinal plant widely used in traditional medicine. This systematic review aims to summarize recent research on its chemical composition and pharmacological activities.

Methods
A literature search was conducted in PubMed, Scopus, ScienceDirect, and Google Scholar for studies published in the past decade. Studies reporting phytochemical profiling and pharmacological evaluations, including *in vitro*, *in vivo*, and clinical investigations, were included. Data on plant parts, bioactive compounds, experimental models, and biological effects were extracted and analyzed.

Results
Guava contains diverse bioactive compounds, including flavonoids, phenolic acids, essential oils, carotenoids, and vitamins, present in leaves, bark, roots, and fruit. These compounds are linked to multiple pharmacological activities such as antidiarrhoeal, antimicrobial, antioxidant, anti-inflammatory, antidiabetic, anticancer, antiviral, gastroprotective, and analgesic effects. Experimental studies confirm its efficacy against gastrointestinal disorders, oxidative stress, metabolic dysfunction, and inflammatory conditions. Guava also demonstrates activity against drug-resistant microorganisms, mainly by targeting virulence factors rather than direct microbial killing. Specific plant parts show distinct activity profiles, which aligns with their traditional therapeutic applications.

Conclusion
The accumulated evidence validates the traditional use of *Psidium guajava Linn* and highlights its potential as a source of bioactive compounds for drug development. While preclinical results are promising, further clinical trials and mechanistic studies are required to establish its safety, effective doses, and practical pharmaceutical applications.

Keywords: *Psidium guajava Linn*, Phytochemicals, Pharmacological activities, Antioxidant, Antimicrobial, Bioactive compounds

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Abstract No.: GNIPST/FMPASTII/P003

ARTIFICIAL INTELLIGENCE IN IMPROVING PATIENT SAFETY AND RATIONAL DRUG USE

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Abstract

Objective
This study explores how artificial intelligence (AI) can transform healthcare by improving patient safety and promoting the safe and effective use of medications. It highlights AI's potential to reduce medication errors and support pharmacists in making informed, evidence-based decisions.

Methods
A structured review of the published literature was performed, analysing peer-reviewed studies on artificial intelligence applications in pharmacy and clinical practice, focusing on machine learning and NLP systems that demonstrated real-world impacts on medication safety and rational drug use.

Results
AI-based systems improved patient safety. Prescribing and dispensing errors were significantly reduced. Early detection of adverse drug reactions increased by up to 65%. Overall medication errors dropped by 70–75%. AI tools enhanced medication adherence by nearly 40%. Inappropriate antibiotic use decreased, supporting rational therapy. Drug safety surveillance improved through clinical data analysis.

Conclusion
AI plays a key role in improving patient safety and promoting rational drug use. It strengthens pharmacovigilance and enhances prescribing accuracy. Despite challenges with data quality and regulation, responsible AI use can advance patient-centred pharmaceutical care.

Keywords: Artificial intelligence (AI), Patient safety, Rational drug use, Medication error, Pharmacovigilance, Prescribing accuracy, Machine learning, Natural language processing (NLP), Evidence-based pharmacy

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Abstract No.: GNIPST/FMPASTII/P004

FLAVONOID-ENRICHED FRACTIONS OF TRADITIONAL EDIBLE FLOWERS: POTENT SOURCE OF HERBAL FORMULATIONS

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Abstract

Objective
Edible flowers are traditionally consumed in West Bengal for their dietary and medicinal value. Among the diverse phytochemicals, flavonoids are one of the important classes of secondary metabolites for their wide distribution and importance in herbal formulations. This review aims to explore traditionally consumed edible flowers as natural sources of flavonoid-enriched fractions for herbal formulations.

Methods
This review data was collected from online databases including PubMed, Google Scholar using keywords such as “Edible flowers”, “Flavonoid enriched fraction”, “Herbal formulations”. This article summarizes the origin, traditional applications, phytochemical profile, extraction methods, qualitative and quantitative estimation of various flavonoids in edible flowers of West Bengal.

Result
Various types of flavonoids *viz*. Kaempferol, Quercetin, Rutin, Apigenin, Hesperidin are found to be present in the edible flowers of Asteraceae, Lamiaceae, Oleaceae, Fabaceae, Myrtaceae family. Total Flavonoid Content (TFC) is rich in Asteraceae and Fabaceae family. In comparison to the edible flower extracts (20-45 mg QE/g), TFC is found to be more concentrated in the fractions of ethyl acetate (100-120 mg QE/g) and butanol (60-80 mg QE/g), indicating effective flavonoid enrichment in polarity-based fractionation.

Conclusion
Traditionally consumed edible flowers, like Drumstick tree (Sojne), Agasti (Bok phul), Mustard, are valuable sources of flavonoids. Ethyl acetate and n-butanol fractions are found to be the enriched fraction for the edible flower extracts. Flavonoid enriched fraction(s) of these edible flowers can further be taken forward for preparation of herbal formulations for management of different diseases.

Keywords: Edible flowers, Flavonoid enriched fraction, Herbal formulations.

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Abstract No.: GNIPST/FMPASTII/P005

COMPARATIVE STUDY OF DRUG REGULATORY AUTHORITIES USFDA VS CDSCO VS EMA

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Abstract

Objective
Innovative drug development and market entry depend on a clear understanding of global regulatory systems. This comparative analysis reviews the drug regulatory requirements of the European Medicines Agency (EMA), Central Drugs Standard Control Organization (CDSCO), and United States Food and Drug Administration (USFDA). Key regulatory aspects, including drug testing authorization, certification, quality control, and post-marketing surveillance, are examined. The study also suggests measures to strengthen regulatory practices and improve alignment with international standards.

Methods
Regulatory guidelines, government publications, and internationally recognized documents issued by USFDA, CDSCO, and EMA were systematically reviewed. Key regulatory parameters, including approval processes, clinical trial requirements, GMP standards, pharmacovigilance systems, and regulatory timelines, were compared to identify similarities, differences, and regulatory strengths.

Results
USFDA, CDSCO, and EMA share a common commitment to drug safety, efficacy, and quality. USFDA follows a stringent, innovation-oriented regulatory model, EMA ensures harmonized approvals across the EU, and CDSCO aligns with ICH standards while adapting to local needs. Differences in enforcement, documentation, and approval timelines make regulatory comparison both complex and informative.

Conclusion
In conclusion, regional interests influence USFDA, CDSCO, and EMA's regulation strategies even though they all aim to protect public health. Global pharmaceutical development, quicker approvals, and patient safety can all be improved by harmonizing regulatory standards and fostering cross-agency learning.

Keywords: USFDA; CDSCO; EMA; Drug Regulatory Framework; Clinical Trials; Pharmacovigilance; Global Harmonization

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Abstract No.: GNIPST/FMPASTII/P006

A REVIEW ON DESIGN OF PUNCH IN TABLET COMPRESSION MACHINE IN SCALE-UP BATCHES FROM PILOT TO PRODUCTION

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Abstract

Objective
Design of punch is very effective in tablet shape and size during compression therefore the review intense to highlight the effect of punch design in tablet compression while shifting from scale up pilot to production batches. The aim of this study is to assess the importance of punch type in the scaling up of tablet compression from pilot to production scale and its impact on process performance and tablet quality parameters.

Methods
A thorough search of literature was conducted using the following databases ScienceDirect, SpringerLink, Scopus, Elsevier. The search utilizes the key words Tablet Compression, Punch Type, Scale -Up, Tablet Quality. The papers were selected as per their alignment with the topic and indexing.

Results
Punch type significantly affects tablet compression during batch manufacturing. Improper punch selection can lead to batch failures such as weight variation, content non-uniformity, capping, lamination, and sticking or picking. At higher speeds, unsuitable punch geometry may also cause die wear and reduced batch consistency. Hence, correct punch selection is essential to ensure uniform tablet quality during batch production.

Conclusion
Therefore, the review paves the way for future researchers to select appropriate punch in tablet manufacturing to overcome the manufacturing issues. Punch type is a critical tooling factor in the successful scale-up of tablet compression. Appropriate selection and consistency of punch design, along with optimization of compression parameters, are essential to minimize manufacturing issues and ensure reproducible, high-quality tablet production at the commercial scale.

Keywords: Tablet Compression, Punch Type, Scale-Up, Pilot to Production, Tablet Quality, Capping, Lamination.

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Abstract No.: GNIPST/FMPASTII/P007

IMPACT OF POLYUNSATURATED FATTY ACIDS ON HEART FUNCTION AND DISEASE PREVENTION

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Abstract

Objective
Cardiovascular diseases (CVDs) remain the leading cause of global mortality despite the availability of multiple pharmacological therapies. Several adverse effects have been observed with these therapies. This review aims to explore the role of polyunsaturated fatty acids (PUFAs) as an alternative source to maintain cardiovascular health and prevent CVDs by examining their molecular mechanisms.

Methods
A comprehensive narrative review of published experimental, clinical, and epidemiological studies was conducted. The metabolized derivatives of omega-3 and omega-6 PUFAs and their effects on heart endothelial function were analyzed. Evidence from meta-analyses, randomized controlled trials, and mechanistic studies was included to assess both preventive and therapeutic outcomes.

Results
The findings demonstrate that omega-3 PUFAs like eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) provide cardioprotective effects through multiple pathways. These include anti-inflammatory actions via specialized pro-resolving mediators and the inhibitory action on cholesterol crystal formation in diabetic patients. Some studies also suggest that EPA and DHA show triglyceride-lowering effects through modulation of hepatic transcription factors, inhibition of thrombi formation, and modification of the endothelial nitric oxide synthase (eNOS) enzyme activity. Dietary intake of EPA and DHA from marine sources was shown to be more effective than reliance on only plant-derived alpha-linolenic acid due to limited endogenous conversion.

Conclusion
Omega-3 PUFAs represent a safe, multifactorial, and evidence-based nutritional strategy. These are helpful for the prevention and management of cardiovascular diseases. Their incorporation into dietary and therapeutic guidelines offers a great potential to reduce cardiovascular risk and improve long-term heart health in different populations.

Keywords: Omega-3 PUFAs; Cardiovascular disease; Anti-inflammatory; Triglycerides; EPA; DHA; Cholesterol crystal; Thrombi; eNOS.

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Abstract No.: GNIPST/FMPASTII/P008

GREEN SYNTHESIS AND PRELIMINARY CHARACTERIZATION OF ZINC OXIDE NANOPARTICLES USING *ZIZIPHUS MAURITIANA*

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Abstract

Objective
This research project sought to synthesize zinc oxide (ZnO) nanoparticles through one of the green/plant-assisted processes by utilizing the *Ziziphus mauritiana* plant and preliminary physicochemical characterization of the produced nanoparticles.

Methods
The production of ZnO nanoparticles was done through an alkaline precipitation method and common metal precursor used was the zinc sulphate, with the alkaline pH maintained by the use of Sodium hydroxide. The natural stabilizing agent was *Ziziphus mauritiana* powder. The combustion mixture was stirred, centrifuged, and heated to get a ZnO-rich powder of nanoparticle. Primary characterization was carried on the basis of UV-Visible spectroscopy, Fourier Transform Infrared (FTIR) spectroscopy and Dynamic Light Scattering (DLS).

Results
The UV-Visible spectroscopy indicated that there was a typical peak absorption at around 360 nm, which indicated that ZnO nanoparticle was formed with band gap energy of 3.44 eV according to the calculation. The analysis using FTIR showed Zn-O stretching vibrations and other functional groups of *Ziziphus mauritiana* which showed that the phytochemical has been successfully green-synthesized and the system maintained. DLS showed that nanoparticles were formed; result showed a prevailing number based particle size distribution at 44 nm whereas greater values of hydrodynamic size were indicative of aggregation in aqueous conditions.

Conclusion
The research paper has been able to illustrate an easy, environment friendly and cheaper way of preparing ZnO nanoparticles through *Ziziphus mauritiana*. Prelude characterization assured the development of nanoscale of ZnO particles, which would form a solid basis on further optimization and incorporating into further environmental and bioremediation-based methods.

Keywords: Zinc oxide nanoparticles, Green synthesis, *Ziziphus mauritiana*, UV–Visible spectroscopy, FTIR, DLS

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Abstract No.: GNIPST/FMPASTII/P009

BIOFORTIFIED FOODS FROM INDIGENOUS SOURCES FOR MENSTRUAL WELLNESS OF ADOLESCENT GIRLS FROM RURAL INDIA: A QA- GUIDED STRATEGY FOR NUTRIENT RETENTION AND FUNCTIONAL EFFICACY

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Abstract

Objective
This research approaches a scientifically validated and culturally appropriate strategy to cure menstrual health through Biofortified Functional Food Product derived from Indigenous sources particularly, *Eleusine coracana, Amaranthus caudatus, Trigonella foenum- graecum, Sesbenia grandiflora, Hibiscus sabdariffa*.

Methods
Indigenous grains and medicinal plants (*Eleusine coracana, Amaranthus caudatus, Trigonella foenum-graecum, Sesbania grandiflora* and *Hibiscus sabdariffa*) were processed into powders using low-temperature methods to preserve nutrient integrity. The composite formulation was evaluated under Pharmaceutical Quality Assurance Parameters, including Physical Characteristics, pH, Moisture Content, Flow Properties (angle of repose) and qualitative assessment of key micronutrients relevant to menstrual health.

Results
The developed biofortified formulation exhibited uniform brown colour, odourless nature and slightly bitter taste with acceptable powder appearance. The pH (6.69) was within a physiologically acceptable range, indicating suitability for oral consumption. Low moisture content (9.09%) suggested enhanced shelf stability, while satisfactory flow property (33.69°) supported ease of handling and processing. Qualitative micronutrient screening confirmed the presence of Iron, Zinc, Calcium, Magnesium along with bioactive phytonutrients, indicating potential efficacy in addressing Anaemia-related Fatigue, Dysmenorrhea, Oligomenorrhea and other menstrual irregularities commonly observed among adolescent girls.

Conclusion
The biofortified indigenous formulation demonstrated acceptable quality, stability, and micronutrient richness, supporting its potential as a culturally relevant functional food for improving menstrual health in adolescent girls.

Keywords: Menstrual Health, Nutritional deficiency, Biofortified functional food, QA- Validated formulation

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Abstract No.: GNIPST/FMPASTII/P010

PHYTOCHEMICAL SCREENING AND PHARMACOLOGICAL EVALUATION OF MARKETED AYURVEDIC ANTIDIABETIC FORMULATIONS

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Abstract

Objective
This study aims to identify the primary plant sources of popular marketed Ayurvedic antidiabetic drugs and compare their secondary metabolite profiles. Additionally, this review evaluates the correlation between *in vitro* enzymatic inhibition and *in vivo* biological activity for the determination of the pharmacological consistency of these herbal products.

Methods
High-demand Ayurvedic antidiabetic formulations are selected from the commercial market. Standard phytochemical screening is used for the presence of secondary metabolites (such as alkaloids, flavonoids, and saponins). The antidiabetic activity is assessed *in vitro* through alpha-amylase and alpha-glucosidase inhibition assays, while *in vivo* efficacy is reviewed using animal models to observe blood glucose regulation and metabolic impact.

Results
The data shows a strong correlation between the amount of certain secondary metabolites found in plants and their ability to inhibit alpha-glucosidase and sucrase enzymes. The study also shows differences between results obtained *in vitro* (test tube) and *in vivo* (live animals).

Conclusion
This review demonstrates that although Ayurvedic anti-diabetic medicines have a strong phyto-chemical component and their effectiveness is directly related to the levels of secondary metabolites. Likewise, this study suggests that standardizing the testing of these products will help bridge the gap between laboratory testing and actual living systems, thereby increasing confidence in the efficacy of herbal medicine for controlling diabetes.

Keywords: Ayurveda, Antidiabetic, Secondary Metabolites, *In vivo, In vitro*, Phytochemicals, Herbal Market.

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Abstract No.: GNIPST/FMPASTII/P011

REAL-WORLD EVIDENCE (RWE) IN DRUG SAFETY MONITORING

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Abstract

Objective
This review focuses on the role of Real-World Evidence (RWE) in improving drug safety monitoring. Pre-approval clinical trials, though essential, are limited by controlled conditions and selective populations, which may hinder the detection of rare or delayed adverse effects. Real-World Data (RWD) obtained from routine healthcare settings provide insights from broader patient populations, enabling the generation of RWE that strengthens post-marketing surveillance and informs benefit–risk decision-making.

Methods
The review is based on published literature and global pharmacovigilance practices. Various Real-World Data (RWD) sources were analysed for post-marketing safety signal detection. Modern analytical methods, including data mining, longitudinal safety profiling, and real-time adverse event reporting, were considered. The role of RWE in regulatory decision-making was highlighted as a key aspect of drug safety evaluation.

Results
RWE enhances traditional pharmacovigilance by enabling early detection of emerging safety signals. Some adverse events are missed in randomized trials and are only detected later during post-marketing use, such as delayed liver toxicity.

Conclusion
RWE is a key component of modern pharmacovigilance. This review shows that Real-World Evidence works alongside traditional pharmacovigilance by helping identify safety signals earlier in a wider range of patients.

Keywords: Real-World Evidence (RWE), Real-World Data (RWD), Pharmacovigilance, Drug Safety Monitoring, Post-Marketing Surveillance, Adverse Drug Reactions (ADRs), Safety Signal Detection.

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Abstract No.: GNIPST/FMPASTII/P012

RECENT ADVANCES IN EXTRACTION, PURIFICATION, AND PHARMACOLOGICAL ACTIVITIES OF PLANT-DERIVED POLYSACCHARIDES FROM BARK FOR NOVEL DRUG DELIVERY SYSTEMS

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Abstract

Objective
This review aims to consolidate recent advancements in the extraction, purification, and pharmacological profiling of bark-derived polysaccharides, emphasizing their potential as biocompatible carriers in novel drug delivery systems for enhanced bioavailability and targeted therapy.

Methods
A systematic review and experimental synthesis of current literature were conducted, focusing on "green" extraction methods such as Ultrasound-Assisted Extraction (UAE), Microwave-Assisted Extraction (MAE), and Enzyme-Assisted Coupled Extraction (EUCE), hot water extraction, enzyme-assisted extraction, microwave- and ultrasound-assisted methods, as well as purification strategies including precipitation, dialysis, ion-exchange chromatography, and gel filtration. Studies evaluating physicochemical properties, biological activities, and formulation-based applications in advanced drug delivery systems were critically reviewed.

Results
Bark-derived polysaccharides demonstrated favourable characteristics such as high biocompatibility, biodegradability, aqueous solubility, swelling behaviour, and minimal toxicity. Advanced extraction and purification methods significantly improved yield, purity, and bioactivity of these polymers. Pharmacological evaluations revealed diverse biological activities, including antioxidant, anti-inflammatory, immunomodulatory, antimicrobial, and anticancer effects. These functional and biological properties enabled their successful application as natural excipients and carriers in novel drug delivery systems such as nanoparticles, microparticles, hydrogels, films, sustained-release matrices, and mucoadhesive formulations.

Conclusion
Plant polysaccharides isolated from bark represent promising natural biomaterials for novel drug delivery applications. Continued optimization of extraction and purification techniques, along with deeper pharmacological and formulation-based investigations, may further enhance their therapeutic potential and support their translation into safe, sustainable, and effective pharmaceutical products.

Keywords: Plant-derived polysaccharides; Bark polysaccharides; Extraction and purification; Pharmacological activity; Novel drug delivery systems

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Abstract No.: GNIPST/FMPASTII/P013

GUT MICROBIOME AND ITS EFFECT ON CARDIOVASCULAR DISEASE

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Abstract

Objective
Cardiovascular diseases are increasingly linked to gut microbiome dysbiosis, influencing disease progression through metabolic, inflammatory, and gut–heart axis mechanisms. The objective of the present study was to explore how alterations in gut microbiome composition (dysbiosis) influence the risk and progression of cardiovascular diseases (CVD), including atherosclerosis, coronary artery disease, myocardial infarction and preventive strategies using probiotics.

Methods
The present work analyses clinical studies and research work on gut microbiome involvement in cardiovascular disease, focusing on microbial composition, key metabolites (TMAO, SCFAs, bile acids), associated inflammatory and metabolic signalling pathways. Microbiome-targeted mediation, like probiotics, were also evaluated for cardiovascular benefits.

Results
Specific patterns of gut microbial dysbiosis are found to be associated with major cardiovascular disorders and are modulated by targeted probiotic therapies. Coronary artery disease shows increased *Lactobacillus/Streptococcus* with reduced *Bacteroidetes*, while heart failure exhibits enrichment of *Actinobacteria*, *Proteobacteria*, *Streptococcus*, and *Veillonella*, alongside depletion of *Bacteroidetes*. Chronic heart failure demonstrates increased *Ruminococcus gnavus* and reduced *Faecalibacterium prausnitzii*. Hypertension is characterized by elevated *Actinobacteria* and reduced *Lactobacillus* and *Bacteroidetes*, whereas spontaneous hypertension shows an increased *Firmicutes/Bacteroidetes* ratio. Probiotic supplementation (e.g., *Lactobacillus*, *Bifidobacterium*, *Clostridium butyricum*, *Saccharomyces boulardii*) improves SCFA production, reduces TMAO and inflammation, inhibits ACE/RAAS pathways, enhances endothelial function, and significantly lowers blood pressure, cholesterol levels, and cardiac dysfunction markers.

Conclusion
The gut microbiome is a critical mediator of CVD through metabolic and inflammatory signaling. Targeting this axis with probiotics offers a promising preventative and management strategy, though further clinical trials are needed to standardize these microbiome-based therapies.

Keywords: Gut microbiome, Cardiovascular disease, Dysbiosis, Probiotics, Trimethylamine-N-oxide (TMAO), Short-chain fatty acids (SCFAs).

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Abstract No.: GNIPST/FMPASTII/P014

TRANSLATIONAL PHARMACOGENOMICS: BRIDGING THE GAP BETWEEN GENETIC VARIABILITY AND PRECISION CLINICAL OUTCOMES

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Abstract

Objective
Conventional "one-size-fits-all" pharmacotherapy often leads to therapeutic failure or adverse drug reactions (ADRs) due to inter-individual variability. This study critically evaluates Pharmacogenomics (PGx) as a transformative tool in translational medicine. The primary objective is to demonstrate how integrating genetic profiling into clinical workflows optimizes drug efficacy, mitigates toxicity, and advances the paradigm of personalized healthcare.

Methods
A comprehensive review was conducted utilizing PubMed and Scopus databases, focusing on FDA-approved pharmacogenomic biomarkers and Clinical Pharmacogenetics Implementation Consortium guidelines. The study analysed the clinical utility of genotyping for drug-metabolizing enzymes (CYP450), drug transporters, and human leukocyte antigen (HLA) variants across oncology, cardiology, and neurology.

Results
Data indicates that genetic polymorphisms significantly alter pharmacokinetic and pharmacodynamic profiles. Implementing genotype-guided dosing for narrow therapeutic index drugs (Warfarin, Clopidogrel) showed a marked reduction in ADR-related hospitalizations. Furthermore, pre-emptive screening for HLA alleles successfully prevented severe immune-mediated reactions in high-risk populations. Integrating PGx data into electronic health records with clinical decision support is key to clinical adoption.

Conclusion
Pharmacogenomics has become a practical necessity for patient safety. It is the cornerstone of precision medicine, translating genetic innovation into clinical impact. Despite economic challenges, the long-term benefits of reducing morbidity and healthcare costs establish pharmacogenomics as a vital component of modern pharmaceutical sciences.

Keywords: Pharmacogenomics, Precision Medicine, Adverse Drug Reactions, Translational Research, Clinical Decision Support.

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Abstract No.: GNIPST/FMPASTII/P015

INFLUENCE OF EDAPHIC AND ABIOTIC STRESS FACTORS ON ALKALOID BIOSYNTHESIS AND ACCUMULATION IN MEDICINAL PLANTS: A SYSTEMATIC REVIEW

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Abstract

Objective
Soil is a fundamental component of plant growth, providing anchorage, essential nutrients, water, oxygen, and a biologically active environment that collectively regulate plant metabolism. In addition to supporting primary metabolism, edaphic and abiotic stress factors strongly influence the synthesis of secondary metabolites, particularly alkaloids that contribute to the therapeutic value of medicinal plants. This systematic review aims to evaluate the effects of soil-related parameters and abiotic stresses on alkaloid biosynthesis and accumulation in medicinal plants.

Methods
A systematic literature search was conducted using Google Scholar, covering peer-reviewed studies published during the last 10 years (2015–2025). Keywords included alkaloid, secondary metabolites, edaphic factors, soil pH, water availability, salinity, nutrient availability, abiotic stress, oxidative stress, and altitude. Studies assessing physical (soil texture, porosity, water-holding capacity), chemical (pH, nutrient status, cation exchange capacity), and biological (microbial population and biomass) soil parameters were analyzed, with emphasis on medicinal plants such as *Lupinus angustifolius, Datura stramonium, Ephedra sinica, and Camellia sinensis*.

Results
Slightly acidic soils favored higher alkaloid accumulation due to improved nitrogen availability and rhizosphere interactions, whereas higher soil pH significantly reduced alkaloid content.Abiotic stresses including salinity, heavy metals, high altitude, temperature extremes, ultraviolet radiation, hypoxia, and oxidative stress stimulated alkaloid biosynthesis through stress-induced defensive pathways.

Conclusion
Edaphic and abiotic stress factors play a pivotal role in regulating alkaloid biosynthesis in medicinal plants. Mild to moderate stress enhances alkaloid accumulation, whereas severe stress adversely affects plant growth and metabolic efficiency.

Keywords: Edaphic factors; Abiotic stress; Alkaloid biosynthesis; Medicinal plants; Soil pH; Water availability; Nutrient availability; Oxidative stress; Secondary metabolites; Stress physiology

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Abstract No.: GNIPST/FMPASTII/P016

ANTHELMINTIC STUDY OF HYDROALCOHOLIC EXTRACTION OF *ANANAS COMOSUS* LEAVES ON *TUBIFEX TUBIFEX*

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Abstract

Objective
The objective of the present study was to evaluate the anthelmintic activity of the hydroalcoholic extract of *Ananas comosus* leaves. Although other parts of the plant have shown anthelmintic potential, scientific evidence on leaf extract activity is lacking. This study aimed to scientifically validate its traditional use and explore its potential as a natural anthelmintic agent.

Methods
Fresh leaves of *Ananas comosus* were collected, shade-dried, and powdered. A hydroalcoholic extract was prepared using the maceration method. The extract was administered at a dose of 550 mg/kg. Anthelmintic activity was evaluated *in vitro* using *Tubifex tubifex* as the test organism. Albendazole oral suspension IP was used as the standard reference drug. The time taken for paralysis and death of worms was recorded and compared between control, standard, and test groups.

Results
The hydroalcoholic leaf extract exhibited significant anthelmintic activity, as evidenced by a marked reduction in paralysis and mortality time of *Tubifex tubifex*. The activity was found to be comparable to the standard drug albendazole, indicating strong anthelmintic potential of the extract.

Conclusion
The study demonstrates that the hydroalcoholic extract of *Ananas comosus* leaves possesses significant anthelmintic activity. These findings support its traditional use and suggest that the leaves may serve as a promising natural anthelmintic agent, especially in the context of increasing drug resistance and the need for alternative therapies.

Keywords: *Ananas comosus*, phytochemical, anthelmintic activity, *tubifex tubifex,* hydroalcoholic extract, paralysis time, death time, Albendazole oral suspension IP.

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Abstract No.: GNIPST/FMPASTII/P017

DEVELOPMENT OF A POLYHERBAL ANTI-ACNE FACE WASH FORMULATION AND EVALUATION OF ITS ANTI-MICROBIAL EFFICACY

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Abstract

Objective
The present study was to develop a polyherbal anti-acne face wash formulation using selected medicinal plant extracts and to evaluate its antimicrobial efficacy against acne-causing microorganisms. The study aimed to provide a safe, effective, and herbal alternative to conventional products associated with skin irritation.

Methods
Aqueous and ethanolic extracts of *Cuminum cyminum, Manilkara zapota, Aloe barbadensis,* and *Carica papaya* were prepared using standard extraction the fruit part only aloe vera use the leaves part techniques. Flaxseed polysaccharide (mucilage) was extracted, followed by drying, grinding, and sieving. Preliminary phytochemical screening was performed using qualitative chemical tests to identify bioactive constituents. Thin-layer chromatography (TLC) was carried out to confirm marker compounds such as gallic acid, catechin, aloin, and linoleic acid using suitable solvent systems. The extracts were incorporated into a suitable face wash base to formulate a polyherbal anti-acne face wash. The formulated product was evaluated for physicochemical parameters such as appearance, pH, viscosity, foaming ability, spreadability, and stability. Antimicrobial activity was assessed *in vitro* against acne-causing microorganisms using standard microbiological methods and compared with marketed formulations.

Results
The developed polyherbal face wash showed acceptable physicochemical properties with skin-friendly pH and good stability. TLC analysis confirmed the presence of key phytoconstituents. The formulation exhibited significant antimicrobial activity against acne-causing bacteria, indicating enhanced efficacy due to the synergistic action of multiple herbal ingredients.

Conclusion
The study concludes that the developed polyherbal anti-acne face wash is a safe, effective, and promising herbal formulation for acne management. Its antimicrobial efficacy and favorable physicochemical characteristics support its potential for regular topical use and further clinical evaluation.

Keywords: Herbal plants, Antimicrobial activity, Antioxidant activity, Skin care formulations, Natural cosmetics

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Abstract No.: GNIPST/FMPASTII/P018

COMPARATIVE STUDY OF SELECTED HEAVY METALS IN EDIBLE VEGETABLE OILS

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Abstract

Objective
The objective of this study was to comparatively evaluate the concentration of selected heavy metals—lead (Pb), cadmium (Cd), chromium (Cr), calcium (Ca), and zinc (Zn)—in commonly consumed edible vegetable oils, namely olive oil, sunflower oil, and coconut oil. The study aimed to assess their safety, ensure compliance with regulatory standards, and evaluate potential risks to consumer health arising from heavy metal contamination.

Methods
Representative samples of olive oil, sunflower oil, and coconut oil were subjected to wet digestion using concentrated nitric acid and perchloric acid to achieve complete decomposition of the organic matrix and effective release of metal ions. The digested samples were diluted appropriately and analyzed using Atomic Absorption Spectroscopy (AAS). AAS was selected due to its high sensitivity, specificity, accuracy, and suitability for trace-level heavy metal determination in complex matrices.

Results
The analysis revealed that lead levels ranged from 0.369–0.544 mg/L, cadmium from 0.014–0.036 mg/L, chromium from 0.088–0.209 mg/L, zinc from 0.033–1.204 mg/L, while calcium was present in comparatively higher but acceptable concentrations across the samples. All detected heavy metals were found to be within the permissible limits specified by international regulatory agencies such as the World Health Organization (WHO) and the Food and Drug Administration (FDA).

Conclusion
The study confirms that the analyzed edible vegetable oils are safe for consumption with respect to heavy metal content. The findings highlight the effectiveness of wet digestion combined with Atomic Absorption Spectroscopy as a reliable analytical approach for routine quality control and safety assessment of edible oils, supporting regulatory compliance and consumer protection.

Keywords: Heavy metals, Edible vegetable oils, Atomic Absorption Spectroscopy (AAS), Wet digestion method, Food safety, Quality assurance.

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Abstract No.: GNIPST/FMPASTII/P019

EVALUATION OF TABLET DEFECTS AS A FUNCTION OF PUNCH DESIGN

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Abstract

Objective
The objective of this study was to evaluate the influence of tablet punch design on the occurrence of common tablet defects such as capping, lamination, sticking, picking, and edge chipping during tablet compression.

Methods
Tablets were manufactured with special emphasis on critical tooling attributes viz. punching tip geometry, land and cup depth, embossing configuration, surface finish, coating and clearance between punch and die, using a rotary tablet press fitted with different punch designs, including flat-faced, concave, and deep concave punches, alongside B-type, D-type, BB-type and DB-type bisects, as per TSM standards. A standardized formulation containing necessary excipients and API was used to eliminate formulation variability. Compression parameters were kept constant to bypass variance and physical parameters of formulated tablets were assessed. Statistical comparison was performed to assess the relationship between punch geometry and defect frequency.

Results
The study demonstrated that punch design significantly affected tablet quality and defect formation. Flat-faced punches showed a higher tendency for edge chipping and lamination, whereas deep concave punches were more prone to capping due to increased stress concentration. Shallow concave punches produced tablets with minimal defects and acceptable mechanical strength. Optimised punch tooling minimized mechanical stress, improved powder flow, and tablet integrity, thereby enhancing robustness and reproducible tablet manufacturing.

Conclusion
Punch design plays a critical role in minimizing tablet defects during compression. Selection of appropriate punch geometry can enhance tablet integrity, reduce manufacturing losses, and improve overall product quality. Optimized punch design should be considered a key parameter during tablet formulation and process development.

Keywords: Tablet defects, Punch design, Tablet compression, Capping, Lamination, Tablet quality

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Abstract No.: GNIPST/FMPASTII/P020

RECENT PROGRESS IN CHEMOPROFILING AND METABOLOMICS OF *NIGELLA SATIVA* L. AND THEIR PHARMACOLOGICAL IMPLICATIONS: A SYSTEMATIC REVIEW

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Abstract

Objective
Nigella sativa L., an annual herb of the Ranunculaceae family, commonly known as black cumin or black seed, is extensively used as a medicinal spice in traditional systems of medicine such as Ayurveda, Unani, and Siddha. The present systematic review aims to critically evaluate recent advances in the chemoprofiling, metabolomic characterization, and pharmacological significance of *Nigella sativa* L. seeds.

Methods
A structured and comprehensive literature search was conducted using major scientific databases, including PubMed, Scopus, Web of Science, and Google Scholar. Relevant peer-reviewed articles published between 2014 and 2025 were retrieved using keywords such as *Nigella sativa*, "black cumin," "chemoprofiling," "metabolomics," "pharmacological activity," "antioxidant," and "immunomodulatory." Experimental, clinical, and review studies focusing on phytochemical composition and biological activities were included.

Results
The analysis revealed substantial evidence demonstrating that *Nigella sativa* L. seeds are rich in nutritionally and pharmacologically important constituents, including proteins (16–19%), oils (17–40%), carbohydrates, essential fatty acids, and diverse secondary metabolites. Metabolomic and chemical profiling studies identified thymoquinone as the principal bioactive compound, constituting approximately 30–48% of the volatile oil. Thymoquinone and related constituents were associated with potent antioxidant, anti-inflammatory, antimicrobial, antidiabetic, neuroprotective, hepatoprotective, cardioprotective, gastroprotective, immunomodulatory, and anticancer activities, thereby corroborating its traditional medicinal use.

Conclusion
The diverse phytochemical composition and broad-spectrum pharmacological activities of *Nigella sativa* L. underscore its significance as a functional food, nutraceutical, and immune-supportive herbal medicine. Continued integration of metabolomics with pharmacological research may further facilitate its therapeutic development and promote its role in disease prevention and health promotion.

Keywords: *Nigella sativa*, black cumin, metabolomics, antioxidant, pharmacological activity, immunomodulatory.

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Abstract No.: GNIPST/FMPASTII/P021

MICROGREEN AND THE GUT BRAIN AXIS: A NOVEL NUTRITIONAL STRATEGY FOR NEUROLOGICAL HEALTH

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Abstract

Objective
Microgreens are a novel nutritional strategy for maintaining gut microbiota homeostasis and preventing neurological damage. The aim of this review is to highlight emerging evidence on microgreens as modulators of the gut–brain axis, emphasizing their role in gut microbiota regulation and neurological health.

Methods
A narrative study of peer-reviewed research and review articles published in recent years was performed. Major scientific databases i.e., PubMed, Scopus (2015–2025) were searched in order to collect information.

Results
Microgreens are rich sources of bioactive constituents, including sulforaphane, flavonoids, dietary fibers, vitamins, and amino acids. These components exert prebiotic effects by selectively promoting Lactobacillus and Bifidobacterium, enhancing short-chain fatty acid production (SCFA), particularly butyrate, thereby improving intestinal barrier integrity, attenuating systemic inflammation, and supporting blood–brain barrier function. Sulforaphane activates Nrf2 antioxidant pathway and suppresses NF-κB mediated neuroinflammatory signaling, alongside epigenetic modulation through histone deacetylase inhibition. Polyphenols inhibit microglial activation modulating MAPK & NF-κB pathways while increasing SCFA - producing bacteria. In the presence of amino acid precursors gut microbes convert tryptophan into indoles, activating the aryl hydrocarbon receptor that regulates neuroimmune responses.

Conclusion
Microgreens show promise as dietary interventions modulating the gut-brain axis for neurological health; robust clinical and *in vivo* studies are essential for evidence-based recommendations.

Keywords: Microgreens; Gut–Brain Axis; Neurological Health; Gut Microbiota.

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Abstract No.: GNIPST/FMPASTII/P022

COMPARATIVE ANALYSIS OF MARINE AND TERRESTRIAL RHIZOMES: DIVERSITY, CHEMISTRY, AND BIOLOGICAL ACTIVITIES

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Abstract

Objective
Nutrients and bioactive metabolites are stored in the rhizomes and they are effective for the management of different types of diseases. There are several types of rhizomes, among them terrestrial rhizomes and marine rhizomes both are rich in secondary metabolite. Due to presence of bio active compounds, these rhizomes show different types of biological activities. The aim of this review is to compare the chemical composition, biological activities of marine and terrestrial rhizomes, highlighting how environmental conditions influence their chemistry and bioactivities.

Methods
For this work, different online databases were used, such as PubMed, SpringerLink, Google Scholar, ScienceDirect etc from 2021-2024. Keywords like "Rhizome," "secondary metabolite," "marine," "biological activity," and "comparative analysis" were used in searches.

Results
Present study analyses the characteristics of terrestrial rhizomes in comparison with rhizomes found in marine sources, specifically the differences based on their chemical composition and properties. Marine rhizomes (*Hydrocharitaceae*) have to survive under high salinity, low light, variable oxygen, and high microbial competition, they produced highly potent secondary metabolites like sulphated and halogenated phenolic compounds (Thalassiolin A, B, and C); these often display antimicrobial and antioxidant activities. But terrestrial rhizomes (*Zingiberaceae*) survive pathogens, and climate stress; therefore, they mainly synthesize phenolics, alkaloids, and terpenoids, in these phenolic compounds—especially curcuminoids are the most potent anti-inflammatory constituents.

Conclusion
Marine and terrestrial rhizomes are different towards their chemical and biological activities, because of the environments they grow in. Both types of rhizomes could be sustainable sources of new bioactive compounds in the future.

Keywords: Marine rhizome, terrestrial rhizome, secondary metabolites, antioxidant, antimicrobial, anti-inflammatory, bioactive compounds.

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Abstract No.: GNIPST/FMPASTII/P023

AI AND DATA SCIENCE DRIVEN ADVANCED DIAGNOSTICS AND THERAPEUTICS IN HEALTHCARE SYSTEM

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Abstract

Objective
Medical errors are a leading cause of patient harm and healthcare inefficiency worldwide. This study aims to highlight the potential of artificial intelligence (AI) and data science techniques in reducing diagnostic, medication, and clinical decision-making errors in healthcare systems.

Methods
A narrative analytical approach was adopted to evaluate recent advancements in AI-driven healthcare applications. Machine learning, deep learning, natural language processing, and predictive analytics models used in clinical decision support systems, electronic health records, and medication safety platforms were examined based on published literature and real-world implementations.

Results
AI-based systems demonstrated improved accuracy in detecting diagnostic inconsistencies, predicting high-risk clinical events, and preventing medication-related errors such as incorrect dosing and adverse drug interactions. Automated analysis of clinical data reduced human dependency and enhanced real-time decision support. Data-driven insights contributed to improved patient safety and workflow efficiency.

Conclusion
The integration of AI and data science into healthcare practice shows significant promise in minimizing medical errors and improving clinical outcomes. Despite challenges related to data quality, transparency, and ethical considerations, the responsible adoption of AI-supported systems can strengthen patient safety frameworks. Continued validation and regulatory alignment are essential to ensure safe and effective clinical implementation.

Keywords: Artificial Intelligence; Medical Errors; Data Science; Patient Safety; Clinical Decision Support

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Abstract No.: GNIPST/FMPASTII/P024

RISK-BASED DOCUMENTATION CONTROL IN PHARMACEUTICAL QUALITY SYSTEMS: REGULATORY EXPECTATIONS AND QUALITY ASSURANCE PRACTICES

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Abstract

Objective
In pharmaceutical Quality Assurance (QA) systems, documentation is fundamental to ensuring compliance, traceability, and product quality. Growing regulatory expectations and increased inspection focus have highlighted the limitations of traditional documentation practices, driving the need for a risk-based approach. Therefore, this review aims to evaluate the role of risk-based documentation control within pharmaceutical quality systems and to assess how QA practices aligned with regulatory expectations can strengthen data integrity, GMP compliance, and inspection readiness.

Methods
A structured review of regulatory guidelines issued by the USFDA, WHO, GMP, and PIC/S, along with relevant peer-reviewed literature, was conducted. The review focused on Good Documentation Practices; Attributable, Legible, Contemporaneous, Original and Accurate (ALCOA+) principles; Quality Risk Management (ICH Q9); and regulatory inspection observations. Documentation systems were evaluated and classified according to their impact on product quality, data integrity, and patient safety.

Results
Critical documentation such as batch manufacturing records, analytical raw data, deviation and Corrective Action and Preventive Action (CAPA) records, and computerized system data were identified as high-risk areas requiring enhanced QA oversight. Common deficiencies included incomplete documentation, retrospective entries, poor audit trail control, and inadequate QA review. A risk-based documentation control approach enabled better prioritization of critical records, targeted QA controls, and more efficient use of quality resources while maintaining compliance for lower-risk documentation.

Conclusion
Risk-based documentation control strengthens pharmaceutical quality systems by improving data integrity, inspection readiness, and sustainable GMP compliance, supporting the consistent manufacture of safe and high-quality pharmaceutical products.

Keywords: Risk-Based Documentation Control, Good Documentation Practices, Data Integrity, GMP, Quality Risk Management (ICH Q9), ALCOA+ principles

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Abstract No.: GNIPST/FMPASTII/P025

DIGITAL PHARMACEUTICS: INTEGRATION OF ARTIFICIAL INTELLIGENCE (AI) WITH DRUG DEVELOPMENT AND QUALITY BY DESIGN (QBD)

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Abstract

Objective
Digital pharmaceutics integrates artificial intelligence (AI) with Quality by Design (QbD) principles to enable a predictive and data-driven approach to pharmaceutical development. This review aims to critically assess the application of AI in drug development, formulation optimization, and pharmaceutical manufacturing within a QbD framework, with emphasis on improving product quality, process understanding, and development efficiency.

Methods
A systematic literature review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Reviewed studies were retrieved from PubMed, Scopus, ScienceDirect and Google Scholar. Relevant articles focusing on AI-assisted formulation development, process optimization and QbD-based pharmaceutical systems were included. Duplicate records were removed, followed by screening of titles and abstracts and full-text assessment for eligibility. Key information was extracted regarding AI techniques, pharmaceutical applications, and essential QbD elements, including Quality Target Product Profile, Critical Quality Attributes, and Critical Process Parameters.

Results
The reviewed literature indicates that AI-driven approaches, particularly machine learning, deep learning, and digital twin technologies, enhance QbD-based pharmaceutical development by enabling accurate prediction of quality attributes, efficient optimization of formulation and process variables, and reduced experimental workload. These tools support robust process design, accelerated design space development, and real-time quality monitoring across multiple dosage forms and continuous manufacturing systems. However, challenges related to data reliability, model transparency, and regulatory acceptance remain.

Conclusion
AI-enabled digital pharmaceutics represents a significant advancement in QbD-oriented drug development, promoting a shift from empirical experimentation toward predictive and knowledge-based strategies with strong potential to improve pharmaceutical quality and patient-centered outcomes.

Keywords: Digital pharmaceutics; Artificial intelligence; Quality by Design; Machine learning; Drug development; Formulation optimization; Digital twin; Pharmaceutical manufacturing

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Abstract No.: GNIPST/FMPASTII/P026

THERAPEUTIC APPLICATIONS OF CHEMICALLY MODIFIED POLYSACCHARIDES IN CANCER THERAPY

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Abstract

Objective

Despite major advances in cancer diagnosis, treatment, and immunotherapy-based research, cancer remains a leading cause of death worldwide due to drug resistance, systemic toxicity, and poor tumor targeting, which limit chemotherapy effectiveness. Although polysaccharides possess biocompatibility and biodegradability, their clinical use is restricted due to poor solubility, stability, and targeting-effective which can be improved by its chemical modification. Therefore, the present review highlights the antitumor potential of chemically modified polysaccharides.

Methods

A comprehensive review examined peer-reviewed literature from scientific databases including Web of Science, Scopus, PubMed, and Google Scholar from 2010 to 2024 using keywords such as “chemically modified polysaccharides,” “polysaccharide-based drug delivery,” “cancer therapy,” and “biopolymer modification”, including both research and clinical data. The articles were selected based on their relevance and indexing.

Results

Chemical modification markedly improved the physicochemical and biological properties of polysaccharides, enhancing solubility, stability, bioavailability, and tumor targeting through receptor-mediated pathways. Chemically modified chitosan, hyaluronic acid, and dextran improved tumor targeting via receptor-mediated uptake. They induced apoptosis in cancer cells, suppressed angiogenesis, and enhanced drug delivery efficiency, which resulted in lower systemic toxicity and improved therapeutic outcome.

Conclusion

The review elaborates and compares the various chemical modification strategies of the natural polysaccharides, their associated physicochemical improvement, therapeutic potency and effective approach for cancer treatment by improving drug delivery, targeting efficiency, and therapeutic response. The polysaccharide’s safety, versatility, and ability to reduce treatment-related toxicity highlight their strong potential for future clinical development in advanced cancer therapies, drawing the need for tailored polysaccharides in pharmaceutical industry.

Keywords: Chemically modified polysaccharides, Cancer therapy, Drug delivery, Tumor targeting, Biocompatible polymers

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MICROGREENS AS A MULTI-TARGET SOURCE OF NEUROPROTECTIVE PHYTOCHEMICALS FOR ALZHEIMER'S DISEASE DRUG DISCOVERY

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Abstract

Objective
Alzheimer's disease (AD) is a progressive neurodegenerative disorder for which current therapies provide only symptomatic relief. This study aims to evaluate microgreens as a novel source of bioactive compounds and the discovery of newer drug molecules for the prevention of AD, focusing on their multi-target neuroprotective potential.

Methods
A comprehensive literature survey was conducted using major scientific databases, including PubMed, Scopus and Google Scholar, to identify studies related to AD. The search strategy focused on publications reporting the phytochemical composition of microgreens, such as polyphenols, flavonoids, glucosinolates, carotenoids, and vitamins, and their relevance to AD. Studies focusing on precursor glucosinolates from microgreens and their subsequent conversion into bioactive isothiocyanates were reviewed. The role of glucosinolate-derived isothiocyanates acting on AD-related mechanisms, including amyloid-β (Aβ) production and aggregation, tau hyperphosphorylation, cholinergic dysfunction through acetylcholinesterase (AChE) inhibition, neuroinflammation, and mitochondrial dysfunction, was explored. Some reported articles in silico approaches, including molecular docking, as well as *in vitro* and *in vivo* studies, were reviewed to assess interactions between microgreen phytochemicals andAD-associated molecular targets.

Results
Microgreens were found to be rich in polyphenols, flavonoids, glucosinolates, carotenoids, and vitamins with significant neuroprotective properties. Experimental studies indicate that these phytochemicals, especially glucosinolate can attenuate oxidative stress, suppress neuroinflammation, inhibit aggregation, modulate tau hyperphosphorylation, and regulate cholinergic dysfunction.

Conclusion
The evidence suggests that microgreens represent a promising, safe, and sustainable source of bioactive compounds with multi-target therapeutic potential for the prevention of Alzheimer's disease. The findings support the potential of microgreen-derived compounds as multi-target-directed ligands capable of interacting with AD-associated proteins.

Keywords: Microgreens, Alzheimer's disease, Neuroprotection, Glucosinolates, Multi-target-directed ligand.

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Abstract No.: GNIPST/FMPASTII/P028

DEVELOPMENT OF SILVER NANOPARTICLE LOADED HYDROGEL FOR TARGETED DELIVERY IN PERIODONTAL DISEASE

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Abstract

Objective

Periodontitis and other chronic oral infections continue to pose a major global health burden. Advances in nanomedicine, particularly silver nanoparticles (AgNPs) have introduced innovative strategies for controlling pathogenic biofilms and enhancing dental performance. This review highlights recent progress in AgNP-based dental formulations, including their incorporation into hydrogels, emphasizing their antimicrobial efficacy.

Methods

Green synthesis approach was preferred for preparing AgNPs to overcome toxicity issues. Aqueous extraction from fresh rhizome of *Curcuma longa* was used for green synthesis of AgNPs, along with its chemical synthesis. The analysis of the formulations underwent: UV–Visible spectroscopy, FTIR analysis and Dynamic light scattering (DLS) to confirm plasmon resonance, functional capping and particle size. The stability study was carried for a period of 3 months and compared with the chemically synthesized AgNPs. Compatibility of phytochemicals with AgNPs was verified by spectral shifts, while antimicrobial efficacy was evaluated on *S.mutans*.

Results

The UV spectrophotometric analysis revealed SPR (Surface Plasmon Resonance) Peak at 489nm for green synthesized AgNPs and 402nm for chemically synthesized nanoparticles. The particles size of AgNP was found to be 4-9nm (PDI 0.168) for green synthesized and 42 nm (PDI 0.487) for chemically synthesized AgNPs. FTIR analysis showed no interaction between the AgNPs and polysaccharides further revealing the presence of functional groups in the formulation justifying the integration of polysaccharide in the nanoparticle.

Conclusion

Green-synthesized AgNPs showed superior stability/physicochemical properties vs. chemical counterparts. The resulting hydrogels exhibited potent antibacterial activity and stability for periodontal applications on affected teeth, advancing sustainable polysaccharide-based treatments.

Keywords: Silver Nanoparticles, Polysaccharides, Dental applications, Antimicrobial, Green Synthesis.

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Abstract No.: GNIPST/FMPASTII/P029

FABACEAE FAMILY MICROGREENS AS FUNCTIONAL FOODS: PHYTOCHEMICAL PROFILING AND *in vitro* ANTI DIABETIC AND ANTI-INFLAMMATORY ACTIVITIES

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Abstract

Objective
This study is the phytochemical components and anti-diabetic and anti-inflammatory potential of these Fabaceae microgreens, Green Moong (*Vigna radiata*), Urad Whole (*Vigna mungo*), and Moth (*Vigna aconitifolia*).

Methods
The microgreens were grown under controlled lab conditions and harvested at the cotyledonary stage (7-10 days after germination). Then washed, shade-dried, and powdered the harvested microgreens. Then determined the Total Phenolic Content using the Folin-Ciocalteu method, expressed as gallic acid equivalents, Total Flavonoid Content. anti-diabetic potential by α-amylase assays and anti-inflammatory activity through the inhibition of protein denaturation method.

Results
The quantitative analysis showed that *Vigna acentifolia* has a higher amount of phenolic compounds 0.1597±0.207 mg GAE/g, while *Vigna radiata* showed a higher amount of flavonoids 0.1622±0.21 mg QE/g. The microgreens demonstrated strong α-amylase inhibitory activity, with an IC_{50} value of 81.4906 µg/mL for *Vigna mungo*. The IC_{50} value for anti-inflammatory potential was 79.76 µg/mL for *Vigna aconitifolia*.

Conclusion
Fabaceae family microgreens, including green moong, urad whole, and moth, showed a rich profile of phytochemicals. They had high levels of phenolics and flavonoids, which may enhance their functional potential. In-vitro tests revealed strong antidiabetic effects by effectively blocking carbohydrate-digesting enzymes and showed notable anti-inflammatory benefits. Among the microgreens studied, differences in bioactivity were linked to variations in phytochemical composition.

Keywords: Phenolic compounds, Microgreens, *Vigna mungo*, *Vigna aconitifolia*, *Vigna radiata*, Anti-diabetic activity, α-amylase inhibition, Anti-inflammatory activity.

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Abstract No.: GNIPST/FMPASTII/P030

STILBENOIDS AS MULTIFUNCTIONAL POLYPHENOLS: AN INTEGRATED SYSTEMATIC REVIEW FOR NEXT-GENERATION THERAPEUTICS

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Abstract

Objective
Stilbenoids are a structurally diverse class of plant-derived polyphenols synthesized primarily as phytoalexins in response to biotic and abiotic stress. Owing to their broad spectrum of biological activities, they have emerged as promising candidates for next-generation therapeutics. This systematic review aims to synthesize and critically evaluate current evidence on stilbenoids by integrating advances in their chemistry, metabolomic profiling, pharmacological mechanisms, and clinical validation.

Methods
A comprehensive systematic literature search was conducted across PubMed, Scopus, Web of Science, Google Scholar, and ClinicalTrials.gov, covering publications from 2011 to 2026. Studies addressing stilbenoid biosynthesis, chemical diversity, analytical and metabolomic approaches, pharmacokinetics, pharmacological activities, and human clinical trials were included. Key stilbenoids such as resveratrol, pterostilbene, piceatannol, and oligomeric viniferins were critically analyzed.

Results
Stilbenoids exhibit multifaceted pharmacological activities, including antioxidant, anti-inflammatory, cardioprotective, neuroprotective, antidiabetic, anti-obesity, and anticancer effects, mediated through modulation of NF-κB, MAPK, Nrf2, and metabolic signaling pathways. Metabolomic and pharmacokinetic studies reveal extensive *in vivo* biotransformation, with glucuronide and sulfate conjugates predominating in circulation, while gut microbiota contribute to inter-individual variability in response. Oligomeric and methoxylated stilbenoids often demonstrate enhanced bioactivity compared to monomers, though bioavailability remains a major limitation. Clinical evidence, particularly for resveratrol, supports benefits in metabolic, cardiovascular, and inflammatory conditions, with Phase III trials confirming reductions in oxidative and inflammatory biomarkers.

Conclusion
Collectively, current evidence positions stilbenoids as multifunctional polyphenols with strong translational promise. Advancement toward next-generation therapeutics demands metabolomics-guided pharmacology, optimized delivery systems, structural refinement, and robust long-term clinical trials to bridge mechanistic insights with effective clinical application.

Keywords: Stilbenoids; Polyphenols; Resveratrol; Metabolomics; Pharmacology; Bioavailability; Clinical evidence; Antioxidant activity; Anti-inflammatory activity; Translational therapeutics

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Abstract No.: GNIPST/FMPASTII/P031

CASE STUDY ON THE POTENTIAL OF CONTINUOUS MANUFACTURING APPROACH IN PHARMACEUTICAL INDUSTRY

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Abstract

Objective
The objective of this study was to evaluate the potential of continuous manufacturing (CM) in improving pharmaceutical product quality by comparing it with traditional batch manufacturing, analysing industrial case studies, and examining regulatory perspectives and future adoption strategies.

Methods
A case study–based analytical approach was employed, supported by a systematic review of published literature on continuous pharmaceutical manufacturing. Comparative evaluation between batch and continuous manufacturing was performed using quality and operational performance indicators such as production timeline, waste generation, material handling, and manufacturing/testing cycle time. The FDA-approved PREZISTA® (darunavir 600 mg) continuous manufacturing process implemented by Janssen Supply Chain, Gurabo, Puerto Rico, was used as the primary industrial case study.

Results
Continuous manufacturing demonstrated substantial improvements over batch processing. The overall production timeline was reduced from 14 days to 1 day, indicating enhanced operational speed. Manufacturing and testing cycle time decreased by approximately 80% due to real-time monitoring and integrated quality control enabled by Process Analytical Technology (PAT). Waste generation was reduced by nearly 33%, reflecting improved material utilization and process efficiency. Additionally, reduced material handling and intermediate storage minimized contamination risks and contributed to more consistent product quality.

Conclusion
The findings confirm that continuous manufacturing significantly enhances pharmaceutical product quality and operational efficiency compared to traditional batch manufacturing. Real-time process control, reduced variability, faster production, and lower waste generation position CM as a transformative manufacturing paradigm. Increased regulatory support from agencies such as the US-FDA further reinforces CM as a sustainable and future-ready approach for pharmaceutical production, with strong potential for wider global and Indian industry adoption.

Keywords: Continuous manufacturing; Batch manufacturing; Process Analytical Technology; PREZISTA; Janssen Supply Chain

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Abstract No.: GNIPST/FMPASTII/P032

IMPLEMENTING GOOD WAREHOUSE PRACTICES: STRATEGIES FOR OPERATIONAL EXCELLENCE

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Abstract

Objectives
To investigate the application of good warehouse practices and quality enhancement strategies that improve operational excellence in logistics and supply chain entities, emphasizing process organization, quality assurance and performance results. This research seeks to determine crucial elements that enhance warehouse performance and provide a competitive advantage.

Methods
A qualitative research methodology was employed, which included an in-depth examination of scientific literature regarding warehouse management principles, operational standards and quality assurance frameworks. The investigation focused on the systematic arrangement of warehouse procedures, execution of quality assurance frameworks and management practices based on processes to identify opportunities for enhancement and operational efficiency.

Results
Results show that clearly defined effective warehouse practices, incorporating standardized process controls, quality assurance systems and ongoing process monitoring, greatly enhance warehouse performance metrics like order accuracy, inventory management, resource efficiency and customer satisfaction. The analysis highlighted that companies focusing on quality improvement strategies obtain improved cost efficiency, fewer operational mistakes and better supply chain responsiveness.

Conclusion
Adopting effective warehouse practices is essential for attaining operational excellence in contemporary supply chain settings. Quality-centered warehouse management methods not only improve process efficiency and competitive advantage but also promote ongoing advancement and sustainability in logistics activities.

Keywords: Good Warehouse Practices, Operational Excellence, Quality Assurance, Warehouse Performance, Process Standardization, Inventory Management, Supply Chain Efficiency, Continuous Improvement.

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Abstract No.: GNIPST/FMPASTII/P033

DEVELOPMENT OF A NOVEL AYURVEDIC ORAL FORMULATION CONTAINING BIOACTIVE ENRICHED FRACTIONS WITH IMMUNOMODULATORY AND ANTIOXIDANT ACTIVITIES

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Abstract

Objective
To evaluate the immunomodulatory and antioxidant potential of a novel Ayurvedic polyherbal oral suspension containing bioactive herbal extracts.

Methods
Three formulations (SF1, SF2, and SF3) were prepared using different concentrations of sodium carboxymethyl cellulose (0.1–0.2% w/v) as a suspending agent along with standardized polyherbal extracts. The formulations were initially tested *in vitro* for pH, viscosity, sedimentation volume, and particle size. An overall desirability (OD) score was calculated using weighted parameters related to stability and ease of use to select the best formulation.

Results
SF2 showed the highest OD score (18.0) due to its optimal viscosity (1.22 cPs) and good stability, and was selected for further testing. *In vitro* studies revealed that SF2 significantly increased reduced glutathione levels by 40% ($p < 0.01$), showed strong DPPH radical scavenging activity (IC_{50} = 28.5 µg/mL), and reduced lipid peroxidation by 62% in TBARS assays. These results indicate strong antioxidant and immune-modulating activity.

Conclusion
The optimized Ayurvedic polyherbal formulation exhibits strong antioxidant and immunomodulatory effects, suggesting its potential as a safe therapeutic option for managing oxidative stress–related conditions across different age groups, while integrating traditional medicine with modern scientific evaluation.

Keywords: Ayurvedic, antioxidant, immunomodulatory, polyherbal, oral formulation.

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Abstract No.: GNIPST/FMPASTII/P034

COMPUTATIONAL INVESTIGATION ON NEWER ANTI DIABETIC DRUGS – TARGET INTERACTION: A COMPARATIVE STUDY OF DAPAGLIFLOZIN, TIRZEPATIDE, TEPLIZUMAB, SEMAGLUTIDE

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Abstract

Objective
In silico screening methods helps to identify potential antidiabetic agents by analyzing the interactions between molecules and their targets.
In this study, 4 new anti-diabetic drugs—Dapagliflozin, Tirzepatide, Teplizumab, and Semaglutide—were looked at to see how well they bind to certain common targets. These targets include the Insulin Receptors (PDB IDs: 1BOM, 1BON, 5TQ1, 4F7V, 1PID, 4M4F), Sulfonylurea (PDB IDs: 6DEN, 5H22, 7D1V, 7D22, 7D24), and Dipeptidyl Peptidase (PDB IDs: 2AJC, 1ORV, 3HGN, 1EPT, 3PSG).

Methods
The receptor protein 3D structures were downloaded from the Protein Data Bank, and the molecular docking was performed using Auto Dock Vina tool, 2D interactions were predicted using PyRx. ADME properties were predicted using SWISS-ADME software.

Results
Among the drugs screened, Tirzepatide showed good binding efficiency with the insulin receptors. Dapagliflozin had strong binding with the sulfonyl urea receptor. It also worked well in docking tests with the peroxisome proliferated activated gamma and dipeptidyl peptidase enzymes. Coulombic interactions and the creation of hydrogen bonds, Vander Walls interactions played significant role in the binding interactions.

Conclusion:
This investigated the potential of in silico docking studies in identifying novel anti-diabetic drugs targeting key proteins involved in diabetes pathology. Our results demonstrate the potential of computational methods in identifying novel inhibitors.
Protein ligand or protein-protein docking plays an important role in estimating the ligands direction as it is bound to a protein receptor or enzyme using shaped and electrostatic interactions.

Keywords: In silico Screening Method, Protein Data Bank, AutoDock Vina Tools, Molecular Docking, Combination Therapy, Insulin Receptor.

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Abstract No.: GNIPST/FMPASTII/P035

SMART NANOCARRIERS: REDEFINING PRECISION IN DRUG THERAPY

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Abstract

Objective
The primary objective of this study is to highlight the role of smart nanocarrier systems in enhancing precision drug therapy by improving targeted drug delivery, therapeutic efficacy, and patient compliance while minimizing systemic toxicity. The study also aims to evaluate recent advancements in stimuli-responsive nanocarriers and their potential clinical applications.

Methods
A comprehensive literature analysis was conducted using peer-reviewed scientific journals, textbooks, and authoritative pharmaceutical databases focusing on nanotechnology-based drug delivery systems. Various smart nanocarriers—including liposomes, polymeric nanoparticles, dendrimers, solid lipid nanoparticles, and inorganic nanocarriers—were analyzed based on their design, drug-loading capacity, targeting strategies, and responsiveness to internal (pH, enzymes, redox conditions) and external (temperature, light, magnetic field) stimuli.

Results
Smart nanocarriers demonstrated significant improvements in site-specific drug delivery, controlled and sustained release profiles, and enhanced bioavailability of both hydrophilic and hydrophobic drugs. Stimuli-responsive systems showed superior precision in releasing therapeutic agents at the target site, particularly in cancer, neurological disorders, and infectious diseases. Additionally, surface functionalization with ligands enabled active targeting, reducing off-target effects and improving therapeutic indices. These systems also exhibited potential in overcoming biological barriers and drug resistance.

Conclusion
Smart nanocarriers represent a transformative approach in modern drug therapy by integrating nanotechnology with targeted and controlled drug delivery mechanisms. Their ability to respond to specific physiological or external triggers offers a promising pathway toward personalized and precision medicine. Continued research, optimization, and clinical validation of these systems can significantly advance therapeutic outcomes and redefine the future of pharmaceutical drug delivery.

Keywords: Smart nanocarriers; Targeted drug delivery; Stimuli-responsive systems; Precision medicine; Controlled drug release; Nanotechnology-based therapeutics

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Abstract No.: GNIPST/FMPASTII/P036

DESIGN, EVALUATION, AND OPTIMIZATION OF CHITOSAN–FLAXSEED POLYSACCHARIDE BASED MUCOADHESIVE GASTRORETENTIVE MICROSPHERES FOR LOCALIZED ANTIULCER DRUG DELIVERY

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Abstract

Objective
Mucoadhesive formulation offers an effective release of drug from formulation at a controlled rate; however it poses challenge due to mucous cell clearance. Therefore the current research aims to design mucoadhesive, gastroretentive formulation of an antiulcer drug (Pantoprazole sodium), using a natural polysaccharide such that the drug can be slowly released from the formulation at controlled rate enhancing the gastric residence time and oral bioavailability of Pantoprazole sodium.

Methods
Polysaccharide from flaxseed was extracted, isolated & tailored to achieve its carboxymethyl derivative for improving the solubility and mucoadhesive properties of the polysaccharide. Carboxymethylation of chitosan was done to make it hydrophilic. Further blend of tailored flaxseed polysaccharide, tailored chitosan was done to prepare mucoadhesive microsphere by ionotropic gelation technique. The compatibility of polymers & drugs were evaluated by Fourier Transform Infrared (FTIR) analysis. The prepared formulations were designed & optimized using Design expert software. The optimized formulation was characterized for swelling studies, particle size analysis, mucoadhesive properties, Scanning Electron Microscopy (SEM), Drug encapsulation efficiency (DEE), *in vitro* drug dissolution and release study.

Results
The prepared microspheres were spherical and uniform. Effective polymer blending resulted in high entrapment efficiency of pantoprazole sodium. *In vitro* release studies confirmed the gastroretentive property and controlled drug release, ensuring mucoadhesive property of the formulation. FTIR analysis showed drug–polymer compatibility, while SEM revealed smooth, rounded, and compact microspheres.

Conclusion
The research work effectively incorporated natural polysaccharide to formulate Pantoprazole loaded mucoadhesive gastroretentive microsphere, thus exploring the underutilized polymers from bench to market.

Keywords: Mucoadhesive, gastroretentive microspheres, Pantoprazole sodium, Chitosan–polysaccharide blend, Ionotropic gelation.

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Abstract No.: GNIPST/FMPASTII/P037

STEM CELL-DERIVED AND MICROPHYSIOLOGICAL *IN VITRO* MODELS IN DRUG-INDUCED NEPHROTOXICITY TESTING

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Abstract

Objective
To evaluate the limitations of current *in vitro* nephrotoxicity screening models and highlight emerging advanced *in vitro* platforms that improve the prediction of human drug-induced nephrotoxicity.

Methods
This review examines recent advances in *in vitro* nephrotoxicity screening approaches, including the guided differentiation of pluripotent stem cells into renal cell types and the development of microfluidic and three-dimensional (3D) culture systems. Emphasis is placed on the expression and functionality of renal transporters, enzymes, and other proteins associated with drug-induced kidney injury.

Results
Conventional *in vitro* cellular models often fail to replicate kidney tubular morphology, function, and injury responses observed *in vivo*. In contrast, newer *in vitro* platforms demonstrate improved functional maturity, express key renal transporters and enzymes, and exhibit molecular biomarkers relevant to nephrotoxicity. These advanced models better simulate renal physiology and enable the study of injury in renal cell types that were previously underrepresented.

Conclusion
Physiologically relevant *in vitro* nephrotoxicity screening platforms show significant promise for improving the prediction of human kidney toxicity. Their continued development and adoption may contribute to safer drug development and enhanced clinical management of nephrotoxic effects.

Keywords: Nephrotoxicity screening, *In vitro* models, Drug-induced kidney injury, Renal cell differentiation, Pluripotent stem cells, Microfluidic systems, Three-dimensional (3D) culture, Renal transporters, Molecular biomarkers.

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Abstract No.: GNIPST/FMPASTII/P038

IDENTIFICATION OF IMMUNODOMINANT EPITOPES FROM ORF6 AND PP1A OF SARS-CoV2

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Abstract

Objective
Immunoinformatics applies computational biology to decode immune system mechanisms. It focuses on rational design of vaccines by analysing antigens, predicting B-cell and T-cell epitopes and simulating host-pathogen immune responses. Severe combined immunodeficiency syndrome (SARS-CoV2) is still a global health issue as few cases are reported all across the world every now and then. Our objective is to focus on proteins encoded by SARS-CoV2 genome that are not prioritised as vaccine candidate, conserved among strains and identify immunodominant epitopes to design an epitope based vaccination regimen. To this end we selected two proteins, ORF6 and PP1a of SARS-CoV2 and applied immunoinformatics tools to predict B cell and T cell epitopes that are stable, non allergenic and antigenic.

Methods
Stability of the selected proteins and peptides derived from the them were analyzed by Expasy Portparam tool. Antigenicity was scored by Vaxijen (v2.0) and allergenicity was scored by AllerTOP (v2.1). B cell, $CD8^+$ T cell and $CD4^+$ T cell epitopes were identified from immune epitope database (IEDB). We selected HLA-A*02:01 and HLA-DRB1*07:01 alleles as they are frequent in multiple global groups, improving real-world relevance of the epitopes as vaccine.

Results
We identified some stable, highly antigenic and non-allergenic B cell and T cell epitopes that can be combined into a multi-epitope format with wide population coverage and targeting multiple strains of SARS-CoV2 to prevent its re-emergence and control sporadic infections.

Conclusion
Using the identified epitopes we endeavor to design a multiepitope vaccine based on ORF6 and PP1a protein of SARS-CoV2.

Keywords: Immunoinformatics, SARS-CoV2, multi-epitope, HLA, IEDB

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Abstract No.: GNIPST/FMPASTII/P039

LANDSCAPE OF IMMUNO-ONCOLOGY

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Abstract

Objective
The primary objective of this overview is to synthesize advancements in immuno-oncology as of 2026, focusing on the shift from PD-1 monotherapies to personalized, multi-modality strategies. This research evaluates the efficacy of next-generation platforms-including mRNA-based neoantigen vaccines, bispecific T-cell engagers (BiTEs), and Al-driven biomarker selection—in overcoming resistance in solid tumors.

Methods
A comprehensive analysis was conducted on clinical trial data from 2025 conferences (American Society of Clinical Oncology (ASCO), European Society for Medical Oncology (ESMO)) and early 2026 regulatory filings. The study reviewed Phase II/III results of "off-the-shelf" allogeneic CAR-T therapies, the integration of Al-ready datasets for patient stratification, and the performance of novel antibody-drug conjugate (ADC) and immuno-oncology combinations.

Results
Key findings indicate breakthroughs in neoadjuvant settings; pembrolizumab combinations doubled event-free survival in head and neck squamous cell carcinoma. mRNA-4157 combined with checkpoint inhibitors reduced melanoma recurrence risk by 44%. Furthermore, pluripotent stem cells (PSCs) are finally overcoming the hurdles of mass production, making it easier to manufacture these therapies at a larger scale. The use of AI has boosted the accuracy of identifying "HER2-low" cases by 15%. This improvement means a significantly wider range of patients can now qualify for targeted treatments that were previously unavailable to them.

Conclusion
By 2026, immuno-oncology has become the cornerstone of precision medicine. The integration of spatial biology and AI-driven diagnostics is essential for navigating the tumor microenvironment. Future research must prioritize managing long-term toxicities and ensuring global equity in access to these breakthroughs.

Keywords: Precision Medicine, Solid Tumors, Neoantigen Vaccines, Pluripotent Stem Cells.

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Abstract No.: GNIPST/FMPASTII/P040

A REVIEW: HSP90ALPHA UNREGULATED STRESS PATHWAYS AND INFLAMMATION IN HDM-INDUCED ALLERGIC INFLAMMATION

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Abstract

Objective
House dust mite (HDM)–induced allergic airway inflammation is a major cause of asthma and is associated with epithelial stress and immune dysregulation. Heat shock protein 90 alpha (Hsp90α) is a molecular chaperone involved in protein folding, inflammatory signaling, and cellular stress responses. Recent studies suggest that Hsp90α plays a key role in regulating endoplasmic reticulum (ER) stress pathways during allergic inflammation. This review aims to evaluate the involvement of Hsp90α-regulated ER stress pathways in HDM-induced allergic airway inflammation.

Methods
Relevant preclinical and *in vitro* studies were reviewed to examine the relationship between HDM exposure, Hsp90α expression, ER stress activation, and inflammatory responses. To comprehend the molecular mechanisms connecting Hsp90α, ER stress markers, and inflammation, literature on airway epithelial cells in allergic asthma was examined.

Results
The reviewed studies demonstrated that HDM exposure increases Hsp90α expression in airway epithelial cells, leading to activation of ER stress pathways and activating transcription factor. This activation contributes to epithelial barrier dysfunction and enhances inflammatory signaling pathways, resulting in elevated production of pro-inflammatory. Inhibition of Hsp90α was found to reduce ER stress markers and attenuate allergic airway inflammation.

Conclusion:
Hsp90α-regulated endoplasmic reticulum (ER) stress pathways play a critical role in HDM-induced allergic airway inflammation by promoting epithelial dysfunction and inflammatory signaling. Future studies focusing on the mechanistic interactions between Hsp90α and ER stress sensors, as well as translational validation using selective Hsp90α inhibitors, are essential to advance these findings toward clinical application.

Keywords: Hsp90α; Endoplasmic Reticulum Stress; House Dust Mite; Allergic Airway Inflammation; Asthma

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Abstract No.: GNIPST/FMPASTII/P041

MICROBIAL DYSBIOSIS AND LOSS OF PROTECTIVE BACTERIAL METABOLITES IN PATHOGENESIS OF ULCERATIVE COLITIS

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Abstract

Objective

Ulcerative colitis (UC) is a long-term inflammatory bowel disease that happens when the interactions between the host and the microbiota are not working adequately. While microbial dysbiosis is extensively studied, a critical gap persists in elucidating the way targeted reductions of microbial secondary metabolites—distinct from mere diversity reduction— precipitate pathogenesis. This study systematically examines microbiota dysfunction, focusing on deficits in specific microbial metabolic products as drivers of chronic mucosal inflammation.

Methods

A comprehensive metabolic pathway evaluation was performed, showing declines in Firmicutes-produced short-chain fatty acids (SCFAs; notably butyrate), as well as disturbances in bile acid and tryptophan catabolism. The multi-omics integration (metabolomics and metagenomics) associated these shifts with epithelial tight junction disruption, elevated permeation, and lowered regulatory T-cell responses, thus developing a mechanistic protective mechanism for UC progression.

Results

Marked reduction of anti-inflammatory SCFAs linked to increased gut permeability (for instance, through diminished ZO-1 gene expression) and Th17-mediated inflammatory reactions. Therapeutic strategies, that involve fecal microbiota transplantation (FMT) and precision postbiotics (butyrate-producing strains), have shown effective abilities to restore metabolic homeostasis and attenuate disease severity in preclinical models Protective strategies, such as targeted prebiotic supplement intake (e.g., inulin) and dietary fiber inhibition, effectively blocked NF-κB signaling and pro-inflammatory cytokines release.

Conclusion

Identifying microbiota-specific metabolic deficiencies unveils effective therapeutic targets for UC. These systemic changes from arbitrary broad-spectrum therapies to metabolite-based procedures—which include postbiotics, FMT, and dietary therapies—that provide a scientific basis for novel therapy and prophylaxis.

Keywords: Inflammation, Ulcerative Colitis, Gut Micribiota, Dysbiosis, Short chain fatty acids (SCFAs), Microbiota-dysfunction.

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Abstract No.: GNIPST/FMPASTII/P042

ANTI-DIABETIC POTENTIAL OF MICROGREEN DERIVED PHYTOCHEMICALS: A COMPREHENSIVE REVIEW

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Abstract

Objective
This review aims to evaluate the anti-diabetic potential of microgreen derived phytochemicals based on evidence from in-vitro and in-vivo studies. Microgreens are emerging functional foods rich in bioactive compounds such as flavonoids, phenolic acids, and glucosinolates, which have shown promising effects in regulating glucose metabolism and improving insulin sensitivity. The review also incorporates available in-silico studies to support mechanistic insights into phytochemical interactions with diabetes-related molecular targets.

Methods
Experimental studies involving in-vitro, in-silico and in-vivo models were reviewed to evaluate the effects of microgreen derived bioactive compounds on glucose metabolism, insulin sensitivity and enzyme inhibition.

Results
Across multiple studies, microgreen derived phytochemicals demonstrated significant anti-diabetic activity through inhibition of carbohydrate hydrolysing enzymes, improvement of insulin sensitivity, and modulation of glucose metabolism. Flavonoids and phenolic compounds consistently exhibited strong inhibitory effects against key enzymes such as α- amylase and α-glucosidase in in-vitro models, while in-vivo studies reported improvements in glycaemic control, antioxidant status, and metabolic parameters. Supporting computational studies provided mechanistic insights into phytochemical target interactions, reinforcing the observed experimental outcomes.

Conclusion
Microgreen derived phytochemicals exhibit promising anti-diabetic potential, supported by substantial in-vitro and in-vivo evidence demonstrating enzyme inhibition and improved glucose regulation. In-silico studies provide supportive mechanistic insights, highlighting the relevance of microgreens as functional foods and potential sources of anti-diabetic bioactive compounds.

Keywords: Microgreens, Anti-diabetic, in-vivo, in-vitro, in-silico.

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Abstract No.: GNIPST/FMPASTII/P043

NATURAL DEFENSE AGAINST INSECTS: FORMULATION AND EVALUATION OF A POLYHERBAL INSECT REPELLENT

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Abstract

Objective

The objective of the present study was to develop and evaluate an effective, safe, and eco-friendly herbal insect repellent using selected insect-repellent plants. Phytochemical extracts of *Lantana camara* (flower), *Azadirachta indica* (neem leaves), *Tagetes erecta* (marigold), *Allium sativum* (garlic), *Cinnamomum zeylanicum* (cinnamon), *Ageratum conyzoides*, *Parthenium hysterophorus*, and *Carica papaya* (papaya leaf) were utilized for formulation and evaluation.

Methods

The selected plant materials were washed, shade-dried, and powdered. Each plant powder (2 g) was separately macerated with 30 mL ethanol for seven days with intermittent stirring. The extracts were filtered, concentrated using a water bath, and stored in airtight containers. The formulated herbal insect repellent was evaluated for physical appearance, pH, skin irritation, and phytochemical characteristics using qualitative tests, thin-layer chromatography (TLC), and UV–Visible spectroscopy.

Results

Phytochemical screening revealed the presence of alkaloids, flavonoids, phenols, and tannins, while saponins, glycosides, terpenes, carbohydrates, proteins, and amino acids were absent. TLC analysis showed distinct spots with Rf values ranging from 0.32 to 0.78, indicating multiple bioactive phytoconstituents. UV–Visible spectroscopy exhibited absorption peaks in the ranges of 220–280 nm and 300–380 nm, confirming the presence of alkaloids, phenolic compounds, and flavonoids. These conjugated phytochemicals are associated with insect-repellent activity.

Conclusion

The study demonstrates that selected plant extracts can be successfully formulated into a stable, safe, and eco-friendly herbal insect repellent, offering a promising natural alternative to synthetic repellents.

Keywords: Herbal insect repellent, Phytochemical screening, Eco-friendly formulation, Thin-layer chromatography (TLC), UV–Visible spectroscopy

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Abstract No.: GNIPST/FMPASTII/P044

MECHANISMS AND THERAPEUTIC CHALLENGES OF IMMUNOMODULATORY MONOCLONAL ANTIBODIES IN TREATMENT OF CANCER AND AUTOIMMUNE DISORDERS.

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Abstract

Objective
Immunomodulatory monoclonal antibodies (mAbs) are targeted biological therapies that regulate immune system activity. They have significantly advanced the treatment of cancer and autoimmune diseases by interacting with immune checkpoints, cytokines, receptors, or immune effector pathways. These antibodies enhance anti-tumor immunity or suppress harmful inflammatory responses, providing precision-based treatment.
To describe the mechanisms of action of immunomodulatory monoclonal antibodies, evaluate their clinical effectiveness in cancer and autoimmune disorders, and identify major therapeutic challenges.

Methods
This study is based on a systematic review of literature on approved and emerging immunomodulatory monoclonal antibodies, focusing on mechanisms, efficacy, resistance, adverse effects, and recent innovations.

Results
From my Review of Literature on Mechanisms and Therapeutic Challenges of Immunomodulatory Monoclonal Antibodies in Treatment of Cancer and Autoimmune Disorders, I have gathered that Monoclonal antibodies targeting immune checkpoints (PD-1, CTLA-4), cytokines (TNF-α, IL-6), and immune cell markers (CD20) have demonstrated improved disease control, prolonged survival, and better quality of life. However, resistance, immune-related toxicities, patient variability, immunogenic reactions, high costs, and complex immune microenvironments limit long-term efficacy.

Conclusion
Immunomodulatory monoclonal antibodies have transformed immune-mediated disease treatment. Future strategies such as combination therapies, antibody engineering, biomarker-guided patient selection, and next-generation antibody formats may further improve outcomes.

Keywords: Immunomodulatory monoclonal antibodies; Immune checkpoint inhibition; Cancer immunotherapy; Autoimmune diseases; Therapeutic resistance and toxicity

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Abstract No.: GNIPST/FMPASTII/P045

ADVANCES IN NANOSTRUCTURED LIPID CARRIERS FOR TOPICAL AND TRANSDERMAL DRUG DELIVERY

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Abstract

Objectives

The topical and transdermal drug delivery systems are often limited by poor drug loading, low encapsulation efficiency, and drug destabilization during storage. Nanostructured Lipid Carriers (NLC), address the challenges by creating a disordered matrix of liquid and solid lipids that facilitates enhanced drug loading, controlled release, and improved penetration across stratum corneum for both local and systemic delivery

The primary objective is to demonstrate recent innovations in NLCs that overcome limitations of traditional systems by enhancing drug penetrability, retention, and bioavailability, for more effective and safer therapeutic applications while minimizing adverse effects

Methods

NLCs are prepared using a combination of solid and liquid lipids, along with surfactants (0.5%–5%), employing solvent diffusion. The formulation parameters were optimized to obtain nano sized particles in the range of (95–150 nm) with high drug encapsulation and physical stability. Lipid constituents interact with stratum corneum or skin lipids, while surfactants act as permeation enhancers, ensuring greater drug accumulation and prolonged residence time

Results

NLCs improve bioavailability by forming an occlusive film, which enhances skin hydration and disrupts the lipid bilayer. Recent advancements include surface functionalization with cell-penetrating peptides and the development of nanoemulgels, exhibits superior targeted delivery in various dermatological conditions.

Conclusion

NLCs represent a highly promising platform for advanced topical and transdermal drug delivery due to their enhanced stability, drug loading capacity, and improved therapeutic efficacy. Their ability to deliver both lipophilic and hydrophilic drugs effectively, with restricted systemic escape holds potential for clinical dermatological application

Keywords: Nanostructured lipid carriers, disordered matrix, controlled release, stratum corneum, lipophilic, lipid bilayer, controlled release, permeation enhancer, nanoemulgels

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Abstract No.: GNIPST/FMPASTII/P046

FULL ARTICLE: A COMPREHENSIVE STUDY OF CASHEW GUM AND HUPU GUM ON MUCOADHESIVE DRUG DELIVERY

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Abstract

Objective
Natural gums are increasingly preferred as biodegradable and nontoxic biopolymeric excipients in pharmaceutical applications. This study aims to investigate the mucoadhesive potential of two plant-derived exudates: Hupu gum (HG) and Cashew gum (CG) and conduct a comparative evaluation of their efficacy as natural polymeric matrices in designing mucoadhesive gels and mucoadhesive buccal films for better drug delivery using a model drug, Metronidazole.

Methods
The gels were produced by the aqueous dispersion method whereas the films were formulated by adding a plasticizer into the gel. The physicomechanical evaluation parameters included weight variation, folding endurance, thickness, surface pH, drug content, swelling studies, mucoadhesive strength, force of adhesion and *in vitro*/ex vivo drug release profiles.

Results
Comparative analysis revealed distinct differences in the mucoadhesive potential of the two native gums. Evaluation of the formulations showed that HG-based gels provided better consistency and adhesive force compared to CG gels. Similarly, the HG buccal films demonstrated enhanced mucoadhesive action and longer residence times on the mucosal surface than CG buccal discs.

Conclusion
The study concludes that native Hupu gum possesses superior natural mucoadhesive properties compared to native Cashew gum. HG is a more effective biopolymer for the development of mucoadhesive gels and buccal film formulations, providing stronger attachment and prolonged drug delivery.

Keywords: Cashew gum, Hupu gum, Sustained release, gel-based films, Natural polymers, mucoadhesives

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Abstract No.: GNIPST/FMPASTII/P047

INVESTIGATION OF ALGINATE-XANTHUM GUM BLENDS AS A MATRIX FOR THE CONCLUSION DELIVERY OF NORFLOXACIN

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Abstract

Objective
The purpose of these study is to develop and explore a novel mucoadhesive drug delivery system utilizing blended microbeads of alginate-xanthan gum (AL-XG). The primary goal was to increase the therapeutic window and overcome the short biological half-life of the antibacterial drug Norfloxacin by achieving its controlled and sustained release.

Method
Norfloxacin-loaded microbeads were fabricated using the ionotropic gelation technique. After mixing Sodium alginate with different concentrations of xanthan gum, the mixture was extruded into a Calcium chloride cross-linking solution. The drug entrapment efficiency (EE) of the produced beads was evaluated. *In vitro* dissolution studies were conducted in simulated gastric (pH 1.2) and intestinal (pH 6.8) fluids to assess the release behaviour over a 12-hour period.

Result
The incorporation of xanthan gum significantly enhanced the viscosity of the polymer matrix, resulting in spherical beads with entrapment efficiencies exceeding 85%. The findings showed that increasing the xanthan gum ratio slowed the overall diffusion rate of Norfloxacin and reduced the initial burst release. The beads exhibited significant swelling at intestinal pH, with drug release following a steady release profile for over 10 hours.

Conclusion
The investigation confirms that alginate-xanthan gum blends are superior to pure alginate matrices for controlled delivery. The synergistic interaction between the two polymers creates a robust barrier for drug diffusion, making these microbeads a viable platform for extending the efficacy of Norfloxacin in treating systemic infections.

Keywords: Norfloxacin, Alginate, Xanthan Gum, Microbeads, Controlled Release, Ionotropic Gelation, Drug Delivery Systems.

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Abstract No.: GNIPST/FMPASTII/P048

PHYTOCHEMICAL-STANDARDIZED POLYHERBAL NANOGEL OF GUAVA LEAF, CURRY LEAF & TURMERIC RHIZOME FOR ANTIBACTERIAL AND ANTI-INFLAMMATORY SKIN APPLICATIONS

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Abstract

Objectives
The present study aimed to develop and standardize a polyherbal chitosan-based nanogel incorporating ethanolic extracts of guava leaf (*Psidium guajava*), curry leaf (*Murraya koenigii*), and turmeric rhizome (*Curcuma longa*) for enhanced antibacterial and anti-inflammatory topical skin applications, with improved stability and skin permeation of phytoconstituents.

Methods
Authenticated plant materials were extracted by ethanolic maceration (1:5 ratio for 8 days). Phytochemical screening confirmed the presence of flavonoids, phenolics, tannins, alkaloids, and terpenoids. Chemical profiling was performed using TLC and UV–Visible spectrophotometry. Chitosan nanogels were formulated by ionic gelation using $CaCl_2$, followed by sonication. The formulation was evaluated for particle size, zeta potential, pH, viscosity, and stability. Antibacterial activity was assessed using the agar well diffusion method, and anti-inflammatory activity was evaluated by *in vitro* protein denaturation assay.

Results
TLC analysis showed distinct Rf values for guava leaf (0.63, 0.75), curry leaf (0.48, 0.53), and turmeric rhizome (0.49, 0.57, 0.68), indicating effective phytochemical separation. UV–Visible spectroscopy revealed characteristic absorption peaks at 300–350 nm (flavonoids) and 260–280 nm (phenolic compounds). The optimized nanogel exhibited a mean particle size of 145 ± 12 nm, zeta potential of +32.4 mV, pH of 6.8 ± 0.2, and suitable viscosity for topical use. The formulation demonstrated significant antibacterial activity with zones of inhibition of 18–24 mm and showed 68–72% inhibition of protein denaturation.

Conclusion
The polyherbal chitosan nanogel demonstrated desirable physicochemical properties, nanoscale stability, and promising antibacterial and anti-inflammatory activity, suggesting its potential as a safe and effective natural topical delivery system for skin infections and inflammation.

Keywords: Polyherbal nanogel, Chitosan, Antibacterial activity, Anti-inflammatory activity, Topical drug delivery

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INFRARED LIGHT-RESPONSIVE BIOMATERIAL FOR WOUND HEALING

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Abstract

Objective
Wound healing restores damaged skin. NIR light-responsive dressings enable controlled drug release, antibacterial action, and improved cellular responses, forming adaptable, protective wound coverings that enhance healing efficiency and skin regeneration. Aim of the present study was to infrared-responsive biomaterials for enhanced wound care outcomes by facilitating regulated drug delivery, boosting cellular activity, and encouraging tissue regeneration through non-invasive photothermal and photodynamic light-based methods.

Methods
Using a few PRISMA 2020 guidelines, a narrative literature review was carried out. English-language, peer-reviewed research published between 2010, and June 2025 was found by searching PubMed and Google Scholar. This technique involves the sequential deposition of alternating layers of polyelectrolyte or other materials onto a substrate or template. Additive manufacturing techniques, such as 3D printing, can be used to fabricate complex biomaterial scaffolds with precise control over composition and structure. Nanoparticles such as gold nanoparticles, carbon nanotubes, and up conversion nanoparticles can be incorporated into biomaterials to confer infrared responsiveness.

Results
Through regulated medication release, increased cellular activity, antimicrobial effects, and rapid tissue regeneration, infrared light-responsive biomaterials demonstrated improved wound healing, indicating their potential as efficient and non-invasive smart wound dressings.

Conclusion
Infrared light-responsive biomaterials enable targeted, noninvasive therapy with controlled drug delivery and enhanced cellular activity, showing strong potential to improve wound healing and tissue regeneration despite penetration and regulatory challenges.

Keywords: Wound dressing, Near-infrared lights, Biomaterials.

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Abstract No.: GNIPST/FMPASTII/P050

GREEN SYNTHESIS OF METALLIC NANOPARTICLES: A COMPREHENSIVE REVIEW

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Abstract

Objective
Nanotechnology has emerged as a revolutionary domain with broad applications in pharmaceuticals, health, agriculture, and environmental sciences. This review seeks to present a comprehensive overview of the green synthesis of metallic nanoparticles, emphasising various biological sources, synthesis mechanisms, influencing factors, and their wide-ranging pharmaceutical applications.

Methods
A thorough and systematic examination of peer-reviewed literature was conducted utilising scientific databases including ScienceDirect, PubMed, Web of Science, Google Scholar, and Scopus from 2010 to 2025. The articles were selected based on their relevance to the topic, indexing, CiteScore and their authenticity.

Results
This review highlights that green synthesis techniques using plants, bacteria, fungi, and algae provide numerous benefits compared to conventional methods, such as being non-toxic, cost-effective, environmentally friendly, biocompatible, and scalable. Phytochemicals and biomolecules present in these biological sources are crucial, as they function as reducing and stabilising agents, influencing the size, shape, and stability of nanoparticles. Metallic nanoparticles such as Silver, Gold, Zinc Oxide, and Copper Oxide, produced through green synthesis, show potential applications in antimicrobial treatments, drug delivery systems, agriculture, catalysis, and environmental remediation.

Conclusion
The current review focuses on the preparation strategies of metallic nanoparticles, where green manufacturing technologies, its application, scope and therapeutic potential of the green nanoparticles are compared to the chemical synthesizing techniques, paving the way for future researchers to utilize the novel green strategies for preparing potent, therapeutic metallic nanoparticles with reduced toxicity in the pharmaceutical sector.

Keywords: Green synthesis, Metallic nanoparticles, biological sources, Phytochemicals, Nanotechnology, Biomedical applications

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Abstract No.: GNIPST/FMPASTII/P051

IOACTIVITY GUIDED FRACTIONATION OF EDIBLE PLANT OF FABACEAE FAMILY: AN APPROACH OF NATURAL PRODUCT BASED THERAPEUTIC FOR DIABETES

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Abstract

Objective
Diabetes mellitus is a chronic metabolic disorder characterized by high blood glucose level and associated complications, demands novel therapeutic agents with minimal side effects. Flavonoids and phenols boost antioxidant ability, which is indicated by Total phenolic content (TPC) and Total flavonoid content (TFC). Antioxidants reduce oxidative stress, which damages pancreatic β-cells and impairs insulin signalling. The present study aims to explore the bioactivity-guided fractionation for the antidiabetic constituents from edible plants of the Fabaceae family.

Methods
Relevant literature was systematically searched in PubMed, Scopus, ScienceDirect, and Web of Science using keywords such as “Fabaceae”, “bioactivity-guided fractionation”, “solvent fractions”, “antidiabetic activity” “α-amylase inhibition", and antioxidant activity”.

Results
Antioxidant and antidiabetic activities are reported more in medium-to-high polarity fractions than non-polar fractions of the edible plant extracts, which correlated with phenolic and flavonoid concentrations. Comparison of various Fabaceae family plants shows that ethyl acetate fraction with highest TPC, TFC value has more antioxidant potential and potent antidiabetic effect. Ethyl acetate fraction of *Mimosa pudica* [Fabaceae] having rich TPC (78.767 ± 0.262 mg GAE/g) and TFC (10.64 ± 0.32 mg QE/g), exhibit potent antioxidant activity and maximum antidiabetic activity by α-amylase inhibition (IC_{50} value =110.90 ± 1.61µg/mL)

Conclusion
Bioactivity-guided fractionation shows that phenolic and flavonoid-rich fractions from edible plants of Fabaceae family are promising sources of natural antidiabetic agents. Further such bioactive fractions of the Fabaceae family plants can be taken for the preparation of herbal antidiabetic formulation.

Keywords: Bioactivity guided fractionation, Antidiabetic, Fabaceae, α- amylase inhibitory assay

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Abstract No.: GNIPST/FMPASTII/P052

UTILIZING AI AND BAYESIAN INTELLIGENCE FOR PERSONALIZED PRECISION DRUG OPTIMIZATION FOR CRITICALLY Ill PATIENTS ADMITTED IN ICU

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Abstract

Objective
To review the impact of AI-based predictive pharmacokinetics and dynamics on personalized drug therapy in critically ill patients, with an emphasis on minimizing dosing error while maximizing therapeutic response and patient safety of patient admitted in ICU.

Methods
The following AI-based pharmacotherapy platforms like AutoKinetics, DoseMeRx Probabilistic Adjuster, PrecisePK and InsightRX are already used in Critical Care. These Databases incorporate real-time electronic health record (EHR) data, therapeutic drug monitoring, and patient-specific covariates with machine learning, Bayesian inference, two-compartment pharmacokinetic modeling, and reinforcement learning. These were validated using their capacity to dynamic predict pharmacokinetic profiles, estimation of AUC using sparse sampling, and dose adjustment guidelines taking into account changing organ function.

Results
AI-driven clinical decision support systems (CDSS) have shown superiority over conventional population-based dosing methods by responding effectively to rapid physiological changes. These include augmented renal clearance and acute organ dysfunction encountered in ICU patient. These predictive systems provide accurate pharmacokinetic predictions, enhancing AUC estimation using sparse data allowing near–real-time dose optimization. These systems help minimize the risk of underexposure and drug-induced toxicity like acute kidney injury (AKI). This improves dosing accuracy and clinical workflow efficiency.

Conclusion
AI-enabled pharmacotherapy marks a transformative change in ICU medication management. This is moving away from static, uniform dosing towards continuously adaptive and individualized treatment strategies. The integration of multimodal clinical data and sophisticated learning algorithms help these systems to enhance medication safety, therapeutic effectiveness, and resource efficiency. This helps to drive critical care to a fully personalized medicine approach.

Keywords: Personalized precision drug optimization**,** AI-based predictive pharmacokinetics and dynamics, clinical decision support systems.

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Abstract No.: GNIPST/FMPASTII/P053

DESIGN AND DEVELOPMENT OF PH-RESPONSIVE SODIUM ALGINATE–*LINUM USITATISSIMUM* POLYSACCHARIDE MICROSPHERES FOR TARGETED ORAL DELIVERY OF INSULIN

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Abstract

Objective
Delivery of insulin orally is the need of the hour due to high patient compliance; however, the enzymatic breakdown of insulin in the gastric environment limits the research work in this field. Therefore, the current research aims to deliver insulin orally, encapsulated in Linum polysaccharides, such that insulin remains protected in the gastric environment and gets released at a controlled rate in the intestine in response to the pH changes.

Methods
Polysaccharide from *Linum usitatissimum* was extracted, isolated, and further chemically modified to increase its aqueous solubility. Insulin was loaded in the polysaccharide–alginate matrix in the form of microspheres via ionotropic gelation method. The ratio of polymers and drug was varied to prepare different formulations. Design-Expert software was used to design and optimize the formulation. Further, the formulations were evaluated for particle size, Fourier Transform Infrared Spectroscopy (FTIR), drug entrapment efficiency, UV spectrophotometric analysis, Scanning Electron Microscopy (SEM) analysis, dissolution profile, and release study.

Results
The microspheres were prepared as spherical, discrete, and uniform. Blending of polymers was effective, leading to high entrapment efficiency. The pH-responsive property was confirmed by the release study, which further indicated controlled release of insulin from the formulation at intestinal pH. FTIR analysis confirmed the compatibility of drug with polymer. SEM analysis displayed rounded and compact beads.

Conclusion
The insulin-loaded microspheres developed could be described as a promising biocompatible carrier system that can be used in delivering insulin orally in a targeted manner, which provides a potential replacement to insulin injectable therapy.

Keywords: oral insulin delivery, natural polysaccharides, stimuli-responsive microspheres, bioavailability

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Abstract No.: GNIPST/FMPASTII/P054

EMERGENCY USE AUTHORIZATION (EUA) VS FULL APPROVAL OF VACCINES -A COMPARATIVE STUDY

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Abstract

Objective
To provide a comparison of Emergency Use Authorization (EUA) and full regulatory approval pathways for vaccines and assess their scientific, regulatory, and public health implications across global regulatory systems.

Methods
A structured comparative review of regulatory frameworks and policy guidance from major authorities, including the U.S. Food and Drug Administration, European Medicines Agency, and World Health Organization, was conducted. The analysis evaluated legal bases, clinical evidence requirements, risk–benefit assessment approaches, and post-authorization obligations. Selected vaccine case studies were reviewed to illustrate practical application and transition from EUA to full approval.

Results
EUA facilitates rapid vaccine availability during public health emergencies such as COVID-19, H1N1 influenza, and Ebola, relying on interim clinical data demonstrating that expected benefits outweigh potential risks when approved alternatives are unavailable. In contrast, full regulatory approval requires comprehensive Phase I–III clinical trial evidence, validated manufacturing and quality systems, extended safety follow-up, and robust post-marketing surveillance. Case studies indicate that EUA can effectively support emergency response while continued data generation enables progression to full approval. Nevertheless, challenges persist, including variability in regulatory standards, transparency limitations, data-sharing barriers, and concerns related to public trust and equitable access.

Conclusion
EUA and full regulatory approval function as complementary mechanisms within vaccine regulation. Developing transparent, adaptive, and harmonized regulatory frameworks that integrate ongoing safety monitoring and clear communication is critical to balancing rapid access with scientific rigor and strengthening preparedness for future public health emergencies.

Keywords: Emergency Use Authorization; Full Vaccine Approval; Biologics License Application; Vaccine Regulation; Risk–Benefit Assessment; Pharmacovigilance; Regulatory Harmonization; Public Trust

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Abstract No.: GNIPST/FMPASTII/P055

CATALYST-DRIVEN SYNTHESIS FOR DRUG DESIGN AND DISCOVERY

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Abstract

Objective
In the current scenario, the discovery and synthesis of new drug molecules is a more versatile and complex process; therefore, Catalyst-driven synthesis can provide a crucial role in facilitating the synthesis by enabling the selective, efficient and sustainable production of complex pharmaceutical compounds and develop a new drug molecule.

Methods
This review systematically examines on the various catalyst driven synthesis associated with Transition-metal catalysis, Biocatalyst, Organo catalysis, Photo-catalysis, Electrocatalysis based on their synthesis protocol, asymmetric transforming, and multicomponent reaction.

Results
Transition-metal catalysis enables scalable C-C and C-heteroatom cross-couplings for APIs like atorvastatin intermediates and marine drug scaffolds, with Pd/Cu systems achieving high yields in industrial purposes. Biocatalysis supports stereoselective synthesis, such as ketoreductases for atorvastatin, transaminases for sitagliptin, and Fe/αKG hydroxylases for belzutifan, reaching gram-scale production. Organo-catalysis serves metal-free asymmetric transformations, including Ugi multicomponent reactions for β-amino acids and chiral azahelicenes. In addition, it provides metal-free access to chiral heterocycles, like spirooxindoles and pyrrolidines via cinchona alkaloid catalysts, streamlining synthesis of antiviral and anticancer candidates. Photocatalysis facilitates late-stage functionalization and peptide bioconjugation under mild conditions, enhancing selectivity for drug conjugates. Electrocatalysis drives enantioselective hydrocyanation of alkenes via dual Co/Cu systems, providing chiral precursors for novel low-cost drugs.

Conclusion
For design and development of a new drug molecule, catalysis play has importance roles in transforming this process to make possible the efficient construction of bioactive compounds and pharmaceuticals. Future integration of automation, biocatalysis promises unprecedented acceleration, though challenges in scalability and prediction accuracy persist.

Keywords: Catalyst, Biocatalyst, Cross-couplings, Asymmetric transformation, Organo-catalyst, Efficient production.

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Abstract No.: GNIPST/FMPASTII/P056

COMPARATIVE EVALUATION OF BIO-BURDEN TESTING TECHNIQUES FOR PARENTERAL PRODUCTS

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Abstract

Objective
The objective of this study was to comparatively evaluate conventional and rapid bio-burden testing techniques used for parenteral products, with emphasis on their sensitivity, reliability, time efficiency, and suitability for routine quality control in compliance with regulatory requirements.

Methods
A comparative assessment was conducted on commonly employed bio-burden testing methods, including membrane filtration, plate count methods (pour plate and spread plate), and selected rapid microbiological methods (RMMs) such as ATP bioluminescence and fluorescence-based detection. Parenteral product samples and simulated aqueous matrices were subjected to controlled microbial challenges using standard compendia microorganisms. Parameters evaluated included recovery efficiency, limit of detection, time to result, method precision, and compliance with pharmacopeia standards (USP, EP, and IP). Method validation attributes such as accuracy, robustness, and reproducibility were also reviewed.

Results
Conventional membrane filtration demonstrated high recovery and regulatory acceptability for low-bio-burden parenteral products but required longer incubation periods. Plate count methods showed acceptable performance for higher bio-burden levels but were less suitable for sterile and low-volume products. Rapid microbiological methods provided significantly reduced time to results and enhanced process monitoring capabilities; however, they required extensive validation and higher initial investment. Overall, RMMs showed comparable sensitivity to traditional methods when properly validated.

Conclusion
The study concludes that while conventional bio-burden testing remains the regulatory benchmark for parenteral products, rapid microbiological methods offer valuable advantages in terms of speed and process control.

Keywords: Catalyst, Biocatalyst, Cross-couplings, Asymmetric transformation, Organo-catalyst, Efficient production.

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Abstract No.: GNIPST/FMPASTII/P057

SMART STIMULI-RESPONSIVE DRUG DELIVERY SYSTEMS: CURRENT TRENDS AND CLINICAL TRANSLATION

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Abstract

Objective
This review aims at critically assessing the current developments in smart stimuli-responsive drug delivery systems (SRDDS), including their modalities of responsiveness, formulation protocols, and clinical translation. The review will also seek to establish the major challenges that restrict commercialization and also to bring out future prospects of commercializing these systems based on laboratory research to patient-centric therapies.

Methods
The literature review was conducted based on the peer-reviewed international journals that were released since 2019 and up to 2025. Keywords such as stimuli-responsive polymers, nanocarriers, and clinical applications were filtered in databases containing Scopus-indexed journals as well as Elsevier journals. The studies about pH, temperature, redox, enzyme, and externally triggered delivery systems were examined. Accentuation was made on formulations that are advanced to preclinical or clinical testing.

Results
It is shown in the review that site-specific and controlled release of drugs by stimulus-responsive systems can enhance therapeutic outcomes and reduce the systemic toxicity, whereas localized therapy can be developed using temperature- and enzyme-responsive carriers. Although their preclinical results were good, the complexity of scale-up, lack of reproducibility, and regulatory uncertainty are significant barriers to translational.

Conclusion
Smart drug delivery systems stimuli-responsive, one of the revolutionary change directions in contemporary pharmaceutics. The critical steps to enhancing clinical translation and commercialization are strategic incorporation of biocompatible polymers, scalable fabrication methods, and regulatory-driven formulation design.

Keywords: Smart polymers, Clinical translation, Controlled release, Stimuli-responsive drug delivery, Targeted therapy.

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Abstract No.: GNIPST/FMPASTII/P058

TRANSFERSOMES VS ETHOSOMES IN TRANSDERMAL DRUG DELIVERY: EMERGING VESICULAR CARRIERS FOR ENHANCED SKIN PERMEATION

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Abstract

Objective
The present abstract aims to comparatively evaluate transfersomes and ethosomes as advanced vesicular carriers for transdermal drug delivery, focusing on their potential to overcome the stratum corneum barrier and enhance skin permeation of both hydrophilic and lipophilic drugs.

Methods
A critical review of recent formulation-based and experimental studies was conducted to analyze the composition, mechanism of penetration, and performance of transfersomes and ethosomes. Key parameters such as vesicle deformability, particle size, entrapment efficiency, and skin permeation behaviour were examined using reported *in vitro* and ex vivo skin delivery models. Comparative assessment was made to understand how formulation variables influence drug transport across the skin.

Results
Transfersomes, composed of phospholipids and edge activators, exhibit high elasticity, enabling them to squeeze through narrow intercellular pathways of the stratum corneum under hydration gradients. Ethosomes, characterized by a high ethanol content, enhance skin permeation by fluidizing skin lipids and improving vesicle flexibility. Reported studies demonstrate that ethosomes generally provide deeper skin penetration and higher drug flux, while transfersomes offer controlled and sustained drug delivery with improved skin retention. The choice between these carriers largely depends on drug physicochemical properties and therapeutic objectives.

Conclusion
Both transfersomes and ethosomes represent promising vesicular systems for enhancing transdermal drug delivery. Their distinct penetration mechanisms offer formulation scientists flexibility in designing targeted and efficient transdermal therapies. Continued optimization and comparative studies may support their successful translation into clinically effective transdermal products.

Keywords: Transfersomes, Ethosomes, Transdermal Drug Delivery, Vesicular Carriers, Skin Permeation, Ultra deformable Vesicles.

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Abstract No.: GNIPST/FMPASTII/P059

ARTIFICIAL INTELLIGENCE IN DIABETIC RETINOPATHY AND DIABETIC MACULAR EDEMA

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Abstract

Objective
Among working-age adults, diabetic retinopathy (DR) and diabetic macular edema (DME) are the main causes of avoidable visual loss. The purpose of this study was to provide an overview of recent developments in artificial intelligence (AI), namely deep learning, for the use of retinal imaging in the diagnosis, staging, prognosis, and treatment of DR and DME.

Methods
Using a few PRISMA 2020 guidelines, a narrative literature review was carried out. English-language, peer-reviewed research published between 2010, and June 2025 was found by searching PubMed and Google Scholar. Included were studies assessing AI-based algorithms used for DR or DME detection, categorization, progression prediction, or therapy monitoring in fundus photography or optical coherence tomography (OCT). sixty studies out of three hundred examined records satisfied the requirements for inclusion.

Results
Research shows AI systems excel in DR diagnosis, detecting referable DR via fundus imaging with up to 96% sensitivity and 98% specificity. OCT-based models achieve AUCs of 0.90 for DME. AI also predicts fluid recurrence, anti-VEGF response, and disease progression.

Conclusion
AI effectiveness for diabetic imaging varies depending on image quality, device type, and patient group. It will be widely used in real-world screening programs for DR and DME after receiving regulatory approval. AI shows significant promise for enhancing individualized treatment planning, diagnostic consistency for diabetic retinopathy and macular edema screening.

Keywords: Diabetic retinopathy, diabetic macular edema, artificial intelligence

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Abstract No.: GNIPST/FMPASTII/P060

A SYSTEMATIC REVIEW ON ETHNOBOTANICAL, METABOLOMIC STUDY AND PHARMACOLOGICAL ACTIVITIES OF *ARTOCARPUS HETEROPHYLLUS* LAM AERIAL PARTS

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Abstract

Objective

"*Artocarpus heterophyllus* Lam" locally referred to as jackfruit, belonging to the Moraceae family. The main objective of the work is to the recent ethnobotanical documentation, metabolomic analysis, and pharmacological importance of Jackfruit and its bark.

Methods

A structured literature search was carried out using scientific databases including PubMed, Scopus, Web of Science and Google scholar. Keywords such as "*Artocarpus heterophyllus* Lam", "Bark", "Fruit", "Ethnobotanical", "Metabolomics", "Pharmacological activity" were used to retrieve relevant peer-reviewed articles published between 2020 to 2026.

Results

The database searches revealed the presence of an extensive experimental and review studies showing the Metabolomic analysis that shows the plant had phenolics, flavonoids, tannins, and bioactive glycosides, which matched what the ethnomedicinal claims said. Extracts showed a lot of antioxidant potential by getting rid of free radicals effectively. It showed strong antimicrobial activity against pathogenic bacterial strains, which means it worked well across a wide range of bacteria. The unripe fruit extract had an antihyperglycemic effect that depended on dose and time. Higher doses had glucose-lowering effects that were similar to those seen in standard diabetes drugs.

Conclusion

The study gives strong scientific proof that *Artocarpus heterophyllus* Lam can be used in traditional medicine for more than one purpose. Its wide range of metabolites helps with antimicrobial, antioxidant, and antihyperglycemic effects, which shows that it could be used as a natural medicine.

Keywords: *Artocarpus heterophyllus* Lam, Bark, Fruit, Ethnobotanical, Metabolomics, Pharmacological activity.

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Abstract No.: GNIPST/FMPASTII/P061

VALIDATION OF ANALYTICAL METHODS FOR THE CHARACTERIZATION OF ANTIFUNGAL LOADED HYDROGEL

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Abstract

Objective

The present study aimed to validate analytical methods for the characterization of ketoconazole-loaded hydrogel formulated using sodium alginate and calcium chloride as a cross-linking agent, with emphasis on pH. Analytical method validation is essential to ensure accurate quantification of ketoconazole and reliable evaluation of hydrogel performance. Hydrogels are three-dimensional, hydrophilic polymeric networks capable of absorbing large amounts of water while maintaining structural integrity, making them ideal carriers for controlled drug delivery.

Methods

In this work, an antibiotic-loaded hydrogel was formulated using sodium alginate, a natural anionic polysaccharide, cross-linked with calcium chloride ($CaCl_2$) via ionic gelation to entrap ketoconazole as the model antifungal agent. The hydrogel was prepared by dispersing 2% ketoconazole in a 2% sodium alginate solution, followed by dropwise addition into a 0.1M $CaCl_2$ solution to form a cross-linked network.

Results

The analytical method was validated using USP guidelines for linearity, precision, and accuracy. Precision studies showed intraday RSD values of 0.5% for Interval 1 (n=5), 0.4% for Interval 2 (n=3), and 0.4% for Interval 3 (n=2), while interday precision yielded RSDs of 0.8% (Interval 1), 0.9% (Interval 2), and 1.0% (Interval 3). Accuracy was confirmed by recovery rates of 98.6% (RSD 1.5%) for Interval 1, 99.1% (RSD 1.7%) for Interval 2, and 98.0% (RSD 1.9%) for Interval 3, all within acceptable limits.

Conclusion

The validated methods proved to be reliable, reproducible, and suitable for routine quality control and stability studies of antibiotic-loaded hydrogels, ensuring consistent product performance and patient safety.

Keywords: Ketoconazole; Hydrogel; Sodium alginate; Calcium chloride; Method validation; pH study.

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Abstract No.: GNIPST/FMPASTII/P062

SMART ALGORITHMS, SMARTER MEDICINES: AI IN PHARMA

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Abstract

Objective

This research critically evaluates how AI is employed across the pharmaceutical product lifecycle and how well it meets worldwide regulatory norms. The goal is to assess how AI- driven technologies improve drug discovery, clinical development, manufacturing, and pharmacovigilance while adhering to ICH guidelines (Q8–Q12, E6(R3)) and EMA and FDA regulations.

Methods

Comprehensive narrative evaluations using peer-reviewed scientific literature and FDA, EMA, and ICH regulatory discussion papers. AI in pharmaceutical research, post-marketing surveillance, clinical trials, and manufacturing was explored. Machine learning, deep learning, predictive analytics, and natural language processing were used. The inquiry focused on algorithm validation, lifecycle management, and auditability regulatory issues.

Results

AI-enabled pharmaceutical systems have improved pharmacovigilance, manufacturing, medication development, and clinical trial design. These technologies enable risk-based decision-making and real-time process monitoring, aligning with ICH Q8–Q11 Quality by Design (QbD). AI-supported clinical trials improved patient selection and process efficiency, supporting ICH E6(R3) data quality and trial efficiency guidelines. AI improved post-marketing monitoring, production adverse event detection, and predictive quality management, meeting FDA and EMA data integrity, traceability, and continuous improvement requirements.

Conclusion

Artificial intelligence is transforming pharmaceutical innovation by enabling better, faster, and more patient-centred medication production while preserving regulatory compliance. When carefully analysed and controlled, AI technologies boost risk-based quality management and regulatory decision-making.

Keywords: Artificial intelligence, Pharmaceutical industry, ICH guidelines, FDA, EMA, Machine learning.

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Abstract No.: GNIPST/FMPASTII/P063

A REVIEW ON CHRONOPHARMACOLOGICAL APPROACHES IN THE MANAGEMENT OF ANTIPSYCHOTIC INDUCED METABOLIC DISORDERS

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Abstract

Objective

Antipsychotics, especially second-generation antipsychotics, have been noted to have side effects in regards to metabolism. Recent innovations in research have pointed out the interaction between circadian rhythm with pharmacological response and metabolism. This review aims to explore whether chronopharmacological approaches can help reduce antipsychotic-induced metabolic disturbances.

Methods

Relevant preclinical and clinical studies were reviewed to examine the relationship between circadian rhythms, antipsychotic drug administration, and metabolic outcomes. Literature focusing on time-dependent dosing, circadian regulation of glucose and lipid metabolism, and metabolic adverse effects associated with antipsychotic treatment was analyzed to assess the potential benefits of chronotherapy.

Results

The findings showed that antipsychotic medication disrupts circadian systems that control metabolic function. Experimental studies revealed that timing of drug delivery affected weight gain and glucose tolerance. Clinical observations suggested that dosing antipsychotics according to the circadian time may promote better metabolic profiles, including lipid profiles and insulin sensitivity, compared to traditional dosing schedules.

Conclusion

Chronopharmacological strategies present a promising and useful method to mitigate metabolic complications linked to antipsychotic treatment. Changing when drugs are given based on circadian biology may make them safer for the body while still being effective. However, further well-designed clinical studies are needed to establish clear chronotherapy guidelines for routine clinical practice.

Keywords: Chronopharmacology; Antipsychotic Drugs; Metabolic Disorders; Circadian Rhythm; Chronotherapy

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Abstract No.: GNIPST/FMPASTII/P064

ADVANCED MRNA THERAPEUTICS: BIOTECHNOLOGICAL INNOVATIONS DRIVING NEXT-GENERATION BIOPHARMACEUTICALS

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Abstract

Objective
To highlight recent advancements in mRNA-based therapeutic approaches and vaccines, emphasizing their potential to address previously untreatable disease. Therapeutics based on mRNA have the potential to completely modify the pharmaceutical sector.

Methods
Study the recent developments in biotechnology have made it possible to produce functional proteins, antibodies, and peptides using mRNA, offering quick and flexible solutions for therapeutic involvements and vaccine development, focusing on advances in mRNA design and structural elements (5′ cap, untranslated regions, and poly-A tail).

Results
Because of mRNA's great potency, safety, and efficiency, as well as its capacity for quick clinical development, scalability, and cost-effective manufacture, mRNA vaccines are a potent substitute for conventional vaccines. A new biotechnology platform for vaccination against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was introduced with the quick design and development of COVID-19 mRNA vaccines. mRNA therapies have shown great commitment in a diversity of clinical applications, their general success will ultimately depend on working out several important issues, including improving delivery routes, increasing stability and increasing output.

Conclusion
In this abstract, we study the latest advancements in mRNA-based approaches for disease treatment, highlighting their potential beyond conventional medicine-based therapies. This work offers the special qualities of mRNA vaccination strategies, examine the results of mRNA vaccines against infectious diseases, the difficulties including remodelling in design, delivery.

Keywords: mRNA therapeutics, Precision medicine, Lipid nanoparticle delivery, Immune modulation.

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Abstract No.: GNIPST/FMPASTII/P065

IOTECHNOLOGICAL APPROACHES FOR ENHANCED PRODUCTION OF PLANT SECONDARY METABOLITES

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Abstract

Objective
Secondary metabolites such as alkaloids, flavonoids, terpenoids and phenolic compounds are indispensable bioactive molecules widely used in pharmaceuticals, agriculture and biotechnology due to their antimicrobial, antioxidant, anticancer and anti-inflammatory properties. However, conventional extraction from natural sources is limited by low yield, seasonal variation and environmental constraints. This study aims to highlight advanced biotechnological strategies for enhancing the production and expanding the applications of secondary metabolites.

Methods
Following PRISMA 2020 guidelines, a narrative literature review is conducted using English Language, peer-reviewed studies Published between 2020-2025, retrieved from PubMed and Google scholar. The Studies Include Biotechnological approaches like Plant tissue culture (callus, cell suspension, hairy root), elicitors, metabolic engineering, microbial fermentation which enhance secondary metabolite production and also applications.

Results
Biotechnological interventions result in significantly higher and more consistent yields of secondary metabolites compared to traditional cultivation methods. Elicitation and genetic manipulation enhance metabolic flux toward desired compounds, while controlled *in-vitro* culture enabled scalable and sustainable production. These approaches also improve compound purity, stability and mainly the enhancement of the Production. Reserpine Content of Rauwolfia serpentina is increased through Hairy Root Culture by 67%.

Conclusion
The integration of biotechnology with plant and microbial systems provides a powerful platform for sustainable and high-yield production of secondary metabolites. These advancements will play a crucial role in accelerating drug discovery and meeting the growing global demand for natural bioactive compounds. However, it may pose ecological risks like elicitor residues and culture waste discharge can pollute water systems and disturb surrounding microbial ecosystems.

Keywords: Secondary metabolites, Plant tissue culture, Elicitors, Metabolic engineering, Biotransformation, Pharmaceutical biotechnology**.**

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Abstract No.: GNIPST/FMPASTII/P066

RECENT ADVANCE IN CHEMOPROFILING, METABOLOMICS, AND PHARMACOLOGY OF *ALPINIA GALANGA (L.) WILD.*: A SYSTEMATIC REVIEW

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Abstract

Objective
Alpinia galanga (L.) Willd., commonly known as greater galangal, is a medicinal plant of the Zingiberaceae family used in traditional medicine for treating inflammation, digestive disorders, and metabolic diseases. This systematic review aims to evaluate advances in chemoprofiling, metabolomics, and pharmacological studies of *Alpinia galanga*, highlighting experimentally validated therapeutic applications and identifying research gaps to guide future investigations.

Methods
A comprehensive literature search of PubMed, Google Scholar, and ScienceDirect yielded a total of 7,150 records. Peer-reviewed original research articles published in English between 2000 and 2025 reporting chemoprofiling, metabolomic analysis, or pharmacological evaluation of *Alpinia galanga* were included. Studies involving other *Alpinia* species, review articles, duplicate records, non-peer-reviewed publications, conference abstracts, and articles lacking adequate experimental or analytical details were excluded. After title and abstract screening, 6,950 records were excluded due to irrelevance, duplication, or insufficient data, and following full-text evaluation, 200 studies were included for qualitative synthesis.

Results
The review demonstrates progress in chemoprofiling and metabolomics using TLC, HPLC, GC–MS, and LC–MS platforms, enabling identification of phenylpropanoids, flavonoids, and essential oil constituents. The reviewed studies support anti-inflammatory, antimicrobial, antioxidant, gastroprotective, and anticancer activities mainly demonstrated through *in vitro* and *in vivo* models.

Conclusion
This review confirms supported anti-inflammatory, antimicrobial, and antioxidant applications of *A. galanga*. Major gaps include lack of standardized extracts, limited mechanistic studies, and absence of clinical validation, emphasizing the need for metabolomics-guided translational research.

Keywords: Alpinia galanga; Zingiberaceae; Chemoprofiling; Metabolomics; Pharmacological activities; GC–MS; Bioactive compounds; Antioxidant activity; Antimicrobial activity; Anticancer activity.

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Abstract No.: GNIPST/FMPASTII/P067

FORMULATION AND EVALUATION OF ANTIBIOTIC LOADED HYDROGEL OBTAINED FROM NATURAL POLYMER

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Abstract

Objective
The present study deals with the formulation and evaluation of an antibiotic-loaded hydrogel prepared from a natural polymer for topical wound healing applications. Hydrogels are three-dimensional, hydrophilic polymeric networks capable of absorbing large amounts of water while maintaining structural integrity, making them ideal carriers for controlled drug delivery.

Methods
In this work, an antibiotic-loaded hydrogel was formulated using sodium alginate, a natural anionic polysaccharide, cross-linked with calcium chloride ($CaCl_2$) via ionic gelation to entrap ketoconazole as the model antifungal agent. The hydrogel was prepared by dispersing 2% ketoconazole in a 2% sodium alginate solution, followed by dropwise addition into a 0.1M $CaCl_2$ solution to form a cross-linked network. The formulation was optimized by varying polymer and cross-linker concentrations to achieve desired mechanical and release properties.

Results
The pH was measured on the hydrogel surface using a digital pH meter, where the results were 7.36 at 15 min, 7.33 at 30 min, 7.32 at 45 min, 7.38 at 60 min, 7.29 at 75 min, 7.23 at 90 min, 7.39 at 105 min, and 7.34 at 120 min. The pH fluctuated minimally between 7.23 and 7.39, supporting biocompatibility for skin applications. The swelling index of the hydrogel showed progressive water uptake over time. The dry hydrogel weight was 0.58 g. At 30 min, the wet weight reached 0.65 g with a swelling ratio of 11%. Subsequent measurements showed weights of 0.64 g (16%), 0.66 g (20%), 0.68 g (23%), 0.69 g (25.63%), 0.73 g (34.52%), and 0.74 g (34.72%) at 45, 60, 75, 90, 105, and 120 min, respectively. Swelling increased steadily, stabilizing around 34-35% after 90 min.

Conclusion
Overall, the study concluded that sodium alginate–calcium chloride-based hydrogels are suitable carriers for ketoconazole, providing desirable pH characteristics and swelling behavior. These properties suggest the potential of the formulated hydrogel as an effective and patient-friendly system for topical antifungal drug delivery.

Keywords: Ketoconazole; Hydrogel; Sodium alginate; Calcium chloride; Ionic gelation; pH study; Swelling behavior; Topical drug delivery

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Abstract No.: GNIPST/FMPASTII/P068

PHARMACEUTICAL AUDITS AND INSPECTIONS: ROLES OF QUALITY ASSURANCE

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Abstract

Objective

The objective of this study is to highlight the significance of pharmaceutical audits and inspections and to emphasize the critical role of Quality Assurance (QA) in ensuring compliance with global regulatory requirements. The study focuses on the application of GMP, cGMP, WHO-GMP, ICH guidelines, Quality by Design (QbD), and effective control of active pharmaceutical ingredient (API) impurities to ensure product quality, safety, and efficacy.

Methods

A systematic evaluation of pharmaceutical auditing practices was conducted, covering both internal audits (self-inspections) and external audits of suppliers and contract manufacturers. The role of QA in audit planning, execution, documentation, and follow-up was assessed in line with guidelines issued by the International Council for Harmonisation and recommendations of the World Health Organization. The study also considered the integration of QbD and risk-based approaches in auditing processes. Special emphasis was placed on reviewing impurity control strategies for APIs and the adequacy of analytical testing methods.

Results

The findings indicate that robust internal and external auditing systems significantly improve regulatory compliance and quality system effectiveness. QA-led audits help identify gaps in GMP, cGMP, and WHO-GMP implementation and support continuous improvement. Audits also confirm effective control of API impurities, including process-related impurities, degradation products, residual solvents, and elemental impurities. Analytical techniques such as High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC), Liquid Chromatography–Mass Spectrometry (LC–MS), and Inductively Coupled Plasma–Mass Spectrometry (ICP–MS) were found to be essential for impurity evaluation.

Conclusion

Pharmaceutical audits and inspections, driven by Quality Assurance, are vital tools for ensuring regulatory compliance, patient safety, and continuous quality improvement. The integration of ICH guidelines, GMP principles, and QbD strengthens pharmaceutical quality systems and enhances global confidence in medicinal products.

Keywords: Pharmaceutical Audits, Regulatory Inspections, Quality Assurance Systems, Internal and External Auditing, Regulatory Compliance.

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Abstract No.: GNIPST/FMPASTII/P069

COMBATING MICRONUTRIENT DEFICIENCY IN TRIBAL WOMEN FROM NORTH EAST INDIA THROUGH HERBAL NUTRACEUTICALS: STANDARDIZATION, STABILITY, BIOAVAILABILITY AND QA STRATEGIES

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Abstract

Objective
Micronutrient deficiencies, particularly iron, calcium, and zinc, are highly prevalent among tribal women in Northeast India, contributing to anemia, poor bone health, and impaired immunity. The objective of this study was to develop and validate a standardized, quality-assured herbal nutraceutical formulation using traditionally consumed micronutrient-rich plants to combat these deficiencies.

Methods
Ethnobotanically validated herbs—*Moringa oleifera, Hibiscus sabdariffa, Piper nigrum, Diplazium esculentum, and Amaranthus viridis*—were collected, cleaned, air-dried, and powdered. The formulation was developed as a combined herbal powder intended for further optimization into a shelf-stable nutraceutical using lyophilization or spray-drying techniques. Physical and nutritional evaluations were performed, including organoleptic assessment, moisture content determination, flow property analysis, pH estimation, and qualitative confirmatory tests for iron, calcium, and zinc. Stability studies were initiated in accordance with ICH Q1A guidelines, with planned *in vitro* bioavailability and quality assurance evaluations.

Results
The formulated herbal powder exhibited acceptable physical characteristics, including a reddish-brown color, neutral odor and taste, and fair flow properties (angle of repose: 38.88°). Moisture content was found to be low (0.21%), indicating good stability potential. The pH of the formulation was mildly acidic (5.62), suitable for oral consumption. Qualitative chemical tests confirmed the presence of iron (Fe^{3+}), calcium (Ca^{2+}), and zinc (Zn^{2+}), validating the micronutrient content of the formulation.

Conclusion
The study demonstrates the successful preliminary development of a traditional herbal nutraceutical enriched with essential micronutrients. The formulation shows promising physicochemical properties, stability potential, and confirmed mineral content. With further bioavailability, safety, and quality assurance evaluations, this nutraceutical may serve as a culturally acceptable, locally sourced, and sustainable intervention to address micronutrient deficiencies among tribal women in Northeast India.

Keywords: Herbal nutraceuticals; Micronutrient deficiency; Tribal women; Iron deficiency anemia; Quality assurance; Northeast India

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Abstract No.: GNIPST/FMPASTII/P070

TRANSFORMING MEDICINE THROUGH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE: ETHICAL BOUNDARIES, OPPORTUNITIES AND OBSTACLES

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Abstract

Objective
The rapid and intense convergence of artificial intelligence (AI) and data science is radically changing the landscape of modern medicine. Technologies like artificial intelligence and data science were once limited to the experimental stage, they have now become a major part of critical clinical decision-making. The purpose of this study is to discuss the changes and evolution of AI in healthcare over the past thirty years. Specifically highlighting the potential of refining big medical data using machine learning (ML) and multimodal frameworks.

Methods
The study analyzes current research on the combined use of medical imaging data, electronic health records (EHR), and AI-based documentation systems to assess how accurately these technologies are diagnosing diseases , and making public health care better, healthier and more efficient.

Results
This research suggests that AI offers great potential for reducing disparities in rural health services and medical care, but there are still many obstacles to its implementation. These barriers are mainly the quality issues of medical and health-related data, the "Black Box" nature of complex algorithms, and inequities in the health system due to data or algorithmic biases. In this context, the birth of Explainable Artificial Intelligence (Explainable AI or XAI) has been shown as a major way to increase the confidence, clarity, and acceptance of physicians.

Conclusion
Finally, the conclusion from this discussion is that an “open science” mindset is necessary for the effective application of AI in healthcare, where rapid technological advances are accompanied by clear ethical rules . Looking ahead, it is clear that prioritizing health equity, clean and credible research methods based on data, and AI-driven developments will lead to improved patient care and affordable healthcare for people of many nations and countries.

Keywords: Artificial Intelligence , Data Science , Medical Big Data , Explainable AI (XAI) , Machine Learning , Electronic health records (EHR) , Black Box.

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Abstract No.: GNIPST/FMPASTII/P071

HALOPHILIC BACTERIAL ENZYMES POTENTIAL BIOTHERAPEUTIC AGENTS AGAINST COLORECTAL CANCER.

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Abstract

Objective
Colorectal cancer (CRC) is among the leading causes of cancer-related deaths worldwide. Increasing evidence indicates that gut microbiota and their enzymes play a key role in CRC development through inflammation, genotoxic effects, and disruption of intestinal balance. Halophilic bacteria, which thrive in high-salt environments, produce enzymes with remarkable stability and unique catalytic features, making them attractive candidates for biotherapeutic use. This study aimed to investigate the potential of halophilic bacterial enzymes as biotherapeutic agents against colorectal cancer by assessing their anticancer, antimicrobial, and gut-modulatory properties.

Methods
Halophilic and halotolerant bacteria were isolated from saline soil, salt lakes, and marine environments using selective media. The isolates were identified by phenotypic characterization and 16S rRNA gene sequencing. Extracellular enzymes such as L-glutaminase and L-asparaginase were screened using quantitative assays. Enzyme production was optimized by modifying pH, temperature, salinity, and nutrient conditions. Partially purified enzymes were evaluated for stability, activity, and *in vitro* anticancer efficacy against colorectal cancer cell lines using cytotoxicity assays.

Results
The enzymes showed high stability under simulated gastrointestinal conditions and significantly inhibited CRC cell proliferation *in vitro*. Additionally, they exhibited antimicrobial activity against genotoxic bacteria and demonstrated the ability to reduce oxidative stress and modulate inflammatory responses.

Conclusion
Halophilic bacterial enzymes represent promising novel biotherapeutic agents for colorectal cancer. Their stability, antimicrobial potential, and anticancer activity highlight their suitability for future translational research and therapeutic development in CRC prevention and treatment.

Keywords: DNA (Deoxyribonucleic Acid), genotoxicity, (CRC) colorectal cancer, halophilic bacteria, gastrointestinal tract, apoptosis.

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Abstract No.: GNIPST/FMPASTII/P072

UNRAVELING THE BIOACTIVE POTENTIAL OF LICORICE: PHYTOCHEMISTRY, METABOLOMICS, AND PHARMACOLOGY

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Abstract

Objective
To systematically review the chemoprofiling, metabolomics, and pharmacological activities of *Glycyrrhiza glabra* L. (licorice), linking its bioactive compounds to observed therapeutic effects.

Methods
A systematic literature search was performed using Google Scholar and PubMed for studies published between 2000 and 2024. Keywords included *Glycyrrhiza glabra*, licorice, phytochemistry, metabolomics, ethnobotany, and pharmacological activities. Studies reporting chemical profiling, metabolomic characterization, and *in vitro*, *in vivo*, or clinical pharmacological evaluations were included.

Results
Licorice roots contain diverse bioactive compounds, primarily triterpenoid saponins (glycyrrhizin, glycyrrhetinic acid) and flavonoids (liquiritin, isoliquiritigenin, glabridin). These constituents exhibit antioxidant, anti-inflammatory, antimicrobial, antiviral, hepatoprotective, gastroprotective, and immunomodulatory effects. Experimental studies confirm licorice's efficacy against respiratory disorders, gastric ulcers, liver ailments, infections, and inflammatory conditions. Glycyrrhizin demonstrates notable antiviral activity, while flavonoids contribute to antioxidant and enzyme-modulating effects. Excessive intake may cause hypertension and hypokalemia, emphasizing the need for controlled use.

Conclusion
Licorice is a well-documented medicinal plant where traditional knowledge aligns with modern chemical and pharmacological evidence. Its diverse bioactive compounds offer potential for therapeutic applications and drug development, but further clinical and mechanistic studies are needed to establish safe dosages and optimize efficacy.

Keywords: *Glycyrrhiza glabra,* licorice, metabolomics, ethnopharmacology, biological activity, phytochemistry

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Abstract No.: GNIPST/FMPASTII/P073

SMART THERANOSTIC QUANTUM DOTS INTEGRATED WITH AL FOR PERSONALIZED THERAPY IN ORAL SQUAMOUS CELL CARCINOMA

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Abstract

Objective
Quantum dot–based theranostics with artificial intelligence, is a smart approach for early and precise diagnosis as well as personalised treatment strategies for oral squamous cell carcinoma by enhancing targeting accuracy and enabling real-time treatment. Therefore, the study aims to highlight the development strategies of AI-integrated quantum dot-theranostics and their comparative analysis for targeting, diagnosis and personalised treatment of oral squamous cell carcinoma (OSCC).

Methods
The review paper examined peer-reviewed literature from multiple databases, including Google Scholar, Scopus and PubMed from 2012 to 2025. The review utilised key search phrases like U-Net, OSCC, and Image-guided therapy.

Results
The quantum dots of size, 10-20 nm, makes them a good fit for combined diagnosis and treatment (theranostics). The quantum dots could effectively hold and deliver medicine, detecting and treating disease consecutively. On attaching Folic Acid to their surface, the quantum dots are taken up more by OSCC cells compared to unmodified quantum dots, as revealed by measuring stronger fluorescence inside the cancer cells. Therefore, the engineered quantum dots glow brightly and can find and stick to cancer cells, making them a strong choice for use in diagnosing and treating oral squamous cell carcinoma.

Conclusion
The current review shows that a combination of nanotheranostics-based quantum dots and artificial intelligence reduces systemic toxicity and enhances treatment efficacy through real-time fluorescence imaging, tumour-specific drug delivery, and AI-driven image analysis. This review will pave the way for researchers to get information on image-guided and patient-specific treatment strategies. U-Net is used to detect the tumour to find what kind of tumour it is.

Keywords: Oral squamous cell carcinoma; Quantum dots, Artificial intelligence, Deep learning; Convolutional neural networks; Machine learning; Personalised medicine; Image-guided therapy.

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Abstract No.: GNIPST/FMPASTII/P074

REGULATORY SCIENCE IN THE ERA OF ADVANCED THERAPY MEDICINAL PRODUCTS

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Abstract

Objectives
The advances in disease biology and cellular technologies enable cell and gene therapies, requiring specialized regulatory frameworks addressing complexity and challenges. The regulatory science in the age of Advanced Therapy Medicinal Products (ATMPs) is discussed here, with special attention to the Indian regulatory framework and the obstacles and potential paths forward for the development of safe and efficient cell-based and broad-spectrum therapeutic approaches in India.

Methods
To monitor and direct the growth of Cell and Gene Therapy Products (CGTP) and ATMPs, government agencies and regulatory bodies around the world have set up specific rules, guidelines, and supervision procedures. A strong multi-agency oversight mechanism combining the CDSCO, Department of Biotechnology (DBT), specialist committees like the Review Committee on Genetic Manipulation (RCGM), the Gene Therapy Advisory and Evaluation Committee has helped India's regulatory environment grow.

Results
The European Medicines Agency (EMA) classifies these goods as ATMPs, while the US-FDA classify them as CGTPs. The New Drugs and Clinical Trials Rules, 2019, classify CGTPs as "New Drugs," guaranteeing strict, ongoing scrutiny, are essential to this system. This has been further streamlined by recent developments in 2025 and 2026, require digital compliance through the SUGAM portal.

Conclusion
Regulatory science for ATMPs highlights India's evolving framework and key challenges and opportunities in developing safe cell and gene therapies.

Keywords: Regulatory Science, ATMPs, Indian Regulatory Framework.

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INTEGRATED PHARMACOPHORE-BASED VIRTUAL SCREENING AND MOLECULAR DYNAMICS SIMULATION TO IDENTIFY NOVEL UGT1A1 INHIBITORS FOR REVERSING CHEMORESISTANCE IN PANCREATIC ADENOCARCINOMA

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Abstract

Objective

Pancreatic ductal adenocarcinoma (PDAC) remains one of the most lethal malignancies, largely due to intrinsic and acquired resistance to conventional chemotherapy. UDP-glucuronosyltransferase 1A1 (UGT1A1) plays a critical role in this resistance by catalyzing the glucuronidation and inactivation of active drug metabolites such as SN-38, the active form of irinotecan. The objective of this study was to identify potential drug-repurposing candidates capable of inhibiting UGT1A1 using an integrated computational approach.

Methods

An integrated in silico workflow was employed. A Tier-1 molecular dataset comprising compounds reported in the ChEMBL database with experimentally validated bioactivity values (IC_{50}, K_i, Kd, or related activity endpoints) against UGT1A1 was curated and used to develop and validate a structure-based three-dimensional pharmacophore model. The validated pharmacophore was applied to screen a library of FDA-approved and clinical-stage compounds, yielding top-scoring candidates. These hits were further refined by molecular docking using the AutoDock-FR (ADFR) suite against the human UGT1A1 crystal structure (PDB ID: 2O6L), with particular focus on the conserved C-terminal domain involved in cofactor binding and catalytic activity. The stability and dynamic behavior of the top-ranked ligand–protein complexes were evaluated through 100 ns molecular dynamics simulations using NAMD2.

Results

Pharmacophore-based virtual screening shortlisted approximately 250 candidate compounds with favorable binding features. Molecular docking and molecular dynamics analyses revealed that several repurposed agents exhibited stable binding conformations, low RMSD fluctuations, and persistent hydrogen-bonding interactions within the UGT1A1 active site, indicating strong inhibitory potential at the molecular level.

Conclusion

This study presents a robust computational framework for the rapid identification of repurposable UGT1A1 inhibitors. The identified candidates demonstrate promising binding stability and mechanistic relevance, supporting drug repurposing as a viable strategy for addressing chemoresistance associated with pancreatic adenocarcinoma.

Keywords: Pancreatic Adenocarcinoma; UGT1A1; Drug Repurposing; Pharmacophore Modelling; Molecular Docking (ADFR); Molecular Dynamics (NAMD2); Chemoresistance

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A COMPREHENSIVE REVIEW OF SUSTAINABLE HERBAL SKIN CARE

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Abstract

Objective
This review explores the paradigm shift toward sustainable herbal skin care, evaluating how eco-friendly practices in cultivation, extraction, and formulation impact product efficacy and environmental health. The primary objective is to establish a scientific framework for "Green Beauty" that balances dermatological benefits with ecological responsibility.

Methods
A systematic analysis of research from 2020 to 2026 was conducted using databases such as PubMed, ScienceDirect, and Google Scholar. The study focused on the transition from conventional chemical processing to Green Extraction Techniques, including Supercritical Fluid Extraction (SFE) and Natural Deep Eutectic Solvents (NADES). Comparative data on carbon footprints, solvent toxicity, and bioactive yield (e.g., polyphenols and terpenoids) were synthesized to assess sustainability.

Results
Findings indicate that sustainable extraction methods significantly improve the purity and stability of botanical actives like Bakuchiol and Fermented Green Tea. Innovative "waterless" formulations and biodegradable nanocarriers have emerged as key trends, reducing preservative requirements and plastic waste. Clinical data suggests that these sustainable alternatives provide superior barrier-repair and antioxidant protection with a lower incidence of contact dermatitis compared to synthetic counterparts.

Conclusion
Sustainable herbal skin care is no longer a niche market but a scientific necessity. The integration of traditional ethnobotanical knowledge with modern green chemistry offers a viable pathway for high-performance, ethical cosmetics. However, global standardization of "sustainable" certifications remains a critical challenge for future industry growth.

Keywords: Sustainable Beauty; Green Extraction; Herbal Cosmeceuticals; Bioactive Yield; Eco-friendly Packaging; Skin Barrier Repair.

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Abstract No.: GNIPST/FMPASTII/P077

ETHNOMEDICINAL HERBS FOR ORAL AND DENTAL CARE

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Abstract

Objective
This review explores the ethnobotanical importance of medicinal herbs in oral health, aiming to validate traditional dental practices through modern pharmacological insights. The study focuses on identifying plant-based alternatives for the prevention and treatment of dental caries, gingivitis, and periodontitis.

Methods
A systematic survey of ethnomedicinal literature and recent clinical trials was conducted. The analysis focused on bioactive compounds—such as tannins, alkaloids, and essential oils—extracted from widely used species like *Azadirachta indica* (Neem), *Syzygium aromaticum* (Clove), and *Acacia nilotica* (Babool). Evaluation parameters included minimum inhibitory concentrations (MIC) against oral pathogens like *Streptococcus mutans* and the impact of herbal extracts on biofilm formation.

Results
The findings reveal that ethnomedicinal herbs possess potent antimicrobial, analgesic, and anti-inflammatory properties. Specifically, *Syzygium aromaticum* demonstrated high efficacy in pain management via eugenol content, while *Azadirachta indica* significantly reduced plaque index scores. Furthermore, herbal "chew sticks" (Miswak) were found to provide mechanical cleansing alongside the chemical release of fluorides and silica, comparable to synthetic toothbrushes and pastes but with fewer side effects.

Conclusion
Ethnomedicinal herbs offer a cost-effective, culturally accessible, and scientifically viable approach to oral hygiene. Integrating these botanical agents into modern dental formulations can mitigate issues like antibiotic resistance and chemical sensitivity. However, further standardization of dosages and delivery systems is required for clinical integration.

Keywords: Ethnomedicine; Oral Health; Dental Caries; Bioactive Phytochemicals; Antimicrobial Activity.

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Abstract No.: GNIPST/FMPASTII/P078

EXPLORING THE SYNERGISTIC POTENTIAL OF EMULGELS IN MODERN THERAPEUTICS

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Abstract

Objective
This review explores the structural and therapeutic synergy of emulgels, a hybrid drug delivery system that integrates the advantages of emulsions and gels. The study aims to evaluate how this combination overcomes the limitations of traditional topical vehicles in delivering hydrophobic drugs and enhancing patient compliance.

Methods
A systematic analysis was conducted on recent pharmaceutical developments (2020–2026), focusing on the formulation parameters of emulgels. The research evaluated the role of various gelling agents (e.g., Carbopol, HPMC) and oil-in-water (O/W) emulsions in stabilizing poorly soluble drugs. Comparative studies on rheological behavior, spreadability, and *in vitro* skin permeation kinetics were synthesized to determine the system's efficiency over conventional creams and ointments.

Results
The findings demonstrate that emulgels provide a unique "dual-control" release mechanism. The emulsion phase acts as a reservoir for lipophilic drugs, while the gel network provides structural stability and a non-greasy, easily washable texture. Results indicate a significant increase in drug loading capacity and skin penetration depth due to the presence of penetration enhancers within the formulation. Furthermore, emulgels showed superior stability against phase separation and oxidative degradation compared to simple emulsions.

Conclusion
Emulgels represent a versatile and superior platform for modern therapeutics, particularly for dermatological and transdermal applications. By combining high solubilization power with optimal rheological properties, they offer a highly effective solution for the topical delivery of challenging molecules. Continued research into "nano-emulgels" is expected to further refine targeted delivery and bioavailability.

Keywords: Emulgel; Hybrid Delivery System; Hydrophobic Drugs; Topical Administration; Rheology; Transdermal Permeation.

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Abstract No.: GNIPST/FMPASTII/P079

GUIDING PRINCIPLES OF GOOD AI PRACTICE IN DRUG DEVELOPMENT- DATA GOVERNANCE AND DOCUMENTATION

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Abstract

Objective
The objective of this study is to establish guiding principles for good AI practice in drug development with a strong emphasis on robust data governance and systematic documentation across the entire drug product lifecycle. The study seeks to ensure that AI-generated evidence used in regulatory decision-making is accurate, reliable, transparent, and reproducible while maintaining high standards of data integrity in line with GxP and ALCOA+ principles. It also aims to promote responsible, ethical, and patient-centric use of AI by safeguarding data privacy, security, and confidentiality throughout AI development and deployment, and to align AI practices with internationally harmonized regulatory expectations.

Methods
A multimethod approach was adopted, including review of international AI governance frameworks, analysis of global regulatory principles, and synthesis of insights from healthcare, pharmaceutical, and AI governance literature. Key principles were mapped against expectations from regulatory bodies such as FDA, EMA, ICH, and WHO to develop a harmonized framework applicable across jurisdictions.

Results
The study identifies data governance and documentation as central to trustworthy AI use in drug development. Essential elements include clear data provenance, traceability of analytical decisions, secure data storage, privacy protection, bias mitigation, and continuous model monitoring. Comprehensive documentation covering data sources, model development, validation, risk assessment, and lifecycle management was found critical for auditability and reproducibility.

Conclusion
Strong data governance and transparent documentation are fundamental to responsible AI implementation in drug development. Adoption of these principles will enhance regulatory confidence, improve evidence quality, reduce risks, and support faster, safer, and more ethical development of medicines.

Keywords: Artificial Intelligence in Drug Development, Data Governance, Documentation and Traceability, Regulatory Compliance (GxP/ALCOA+), AI Lifecycle Management, Patient-centric and Ethical AI

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Abstract No.: GNIPST/FMPASTII/P080

MULTIFUNCTIONAL ZINC OXIDE NANOPARTICLES AS PROMISING ANTICANCER AND ANTIMICROBIAL AGENTS

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Abstract

Objective
Zinc oxide nanoparticles (ZnO NPs) have emerged as multifunctional nanomaterials with significant anticancer and antimicrobial potential. However, variations in synthesis strategies, physicochemical control, and biological response profiles have limited their reproducibility and translational reliability. The objective of this review is to critically analyze the relationship between synthesis approaches, material properties, and the underlying mechanisms governing the anticancer and antimicrobial activities of ZnO nanoparticles.

Methods
This review systematically evaluates peer-reviewed literature describing commonly employed ZnO nanoparticle synthesis strategies, including precipitation, sol–gel, co-precipitation, and green synthesis methods. Emphasis is placed on correlating critical physicochemical attributes such as particle size, morphology, crystallinity, surface chemistry, and dispersion stability characterized using techniques including X-ray diffraction (XRD), scanning and transmission electron microscopy (SEM/TEM), Fourier-transform infrared spectroscopy (FTIR), dynamic light scattering (DLS), and energy-dispersive X-ray analysis (EDX), with reported non-clinical anticancer and antimicrobial outcomes.

Results
The reviewed studies demonstrate that ZnO nanoparticles exhibit pronounced size-, morphology-, and surface chemistry–dependent biological activity. Anticancer effects are predominantly mediated through intracellular reactive oxygen species (ROS) generation, mitochondrial membrane depolarization, activation of apoptotic signaling cascades, and cell cycle arrest, often showing selective toxicity toward malignant cells. Antimicrobial activity arises from synergistic mechanisms involving ROS production, Zn^{2+} ion release, membrane destabilization, and disruption of essential microbial metabolic processes. Importantly, synthesis-dependent variability strongly influences biological selectivity, reproducibility, and safety profiles.

Conclusion
Zinc oxide nanoparticles represent a versatile non-clinical nanoplatform with dual anticancer and antimicrobial functionality. This review underscores the necessity of synthesis standardization, controlled particle engineering, and mechanism-driven evaluation to support reliable preclinical translation and the rational design of next-generation ZnO-based nanomaterial systems.

Keywords: Zinc Oxide Nanoparticles; Anticancer Mechanisms; Antimicrobial Activity; Reactive Oxygen Species; Nanomaterials; Translational Nanoscience

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Abstract No.: GNIPST/FMPASTII/P081

DEVELOPMENT AND OPTIMIZATION OF QUERCETIN LOADED LIPOSOMAL DRUG DELIVERY SYSTEM FOR ENHANCED BIOLOGICAL ACTIVITY

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Abstract

Objective
The objective of the present study was to develop and optimize a quercetin-loaded liposomal drug delivery system to enhance its aqueous solubility, stability, and biological performance, addressing the limitations of poor bioavailability and rapid metabolism associated with free quercetin.

Methods
Quercetin-loaded liposomes were prepared using the thin film hydration technique using lecithin and cholesterol. Formulation optimization was performed by varying lipid composition and sonication time. The resulting liposomes were purified by centrifugation and membrane filtration. Particle size and polydispersity index (PDI) were determined using dynamic light scattering (DLS), while FTIR spectroscopy was employed to assess drug–excipient compatibility, encapsulation integrity, and formulation stability.

Results
The optimized quercetin-loaded liposomal formulation exhibited nanoscale characteristics with mean particle sizes ranging from approximately 220–280 nm and a polydispersity index (PDI) of 0.35–0.48, indicating a relatively homogeneous dispersion. Formulation F6 showing a Z-average particle size of 370.3 nm with a PDI of 0.393 after filtration. Notably, the DLS intensity distribution revealed a dominant particle population (~97.2%) at 50.69 nm, confirming effective vesicle size reduction and nanoscale uniformity. FTIR spectral analysis displayed the characteristic peaks of quercetin, lecithin, and cholesterol, without significant peak shifting or disappearance, confirm successful encapsulation of quercetin, and drug–excipient compatibility. Furthermore, liposomal encapsulation significantly enhanced the aqueous dispersibility and physical stability of quercetin compared to the free drug, suggesting improved bioavailability and sustained drug retention. Drug release study indicates improved *in- vitro* bioavailability of the formulation.

Conclusion
The study successfully developed and optimized quercetin-loaded liposomes using the thin film hydration technique. Overall, liposomal delivery effectively improves the physicochemical limitations of quercetin and offers a promising approach for enhancing its biological activity.

Keywords: Quercetin, Liposomes, Thin Film Hydration, Sonication, Dynamic Light Scattering, FTIR, Nano drug delivery system, Bioavailability, Optimization.

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Abstract No.: GNIPST/FMPASTII/P082

ISOLATION AND CHARACTERIZATION OF OKRA BIOPOLYMERS

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Abstract

Objective

Abelmoschus esculentus (L.) Moench. (Okra) is a rich source of bioactive polysaccharides (Rhamnogalacturonan I and II, Homogalacturonan), mucilage and cellulose with significant pharmaceutical applications representing a sustainable biopolymer source for pharmaceutical excipients, films, biomedical materials and food formulations. This study aims to isolate, characterize and compare biopolymers from Okra, extracted using Hot-Water Extraction and Ultrasound-Assisted Extraction (UAE).

Methods

Fresh unripe okra pods were processed using two distinct extraction methods, Hot-Water Extraction and Ultrasound-Assisted Extraction. Both extracts were precipitated with ethanol and dried until constant weight was obtained. Extracted mucilage from both methods were characterized using Fourier Transform Infrared Spectroscopy (FTIR) and UV-Visible Spectrophotometry to identify functional groups.

Results

FTIR spectroscopy revealed polysaccharidic characteristic functional groups, O-H/N-H stretching, C-H stretching, C=O stretching, C-O stretching and UV-Visible spectrophotometry identified the presence of Phenolic compounds for both extracted mucilage samples. Ultrasound-Assisted Extraction fares better compared to Hot-Water Extraction and demonstrates greater extraction efficiency. The superior yield and faster extraction time combined with lower processing temperature make UAE the preferred extraction method, reducing thermal degradation and preserving bioactive characteristics.

Conclusion

These findings demonstrate that Ultrasound-Assisted Extraction is a superior extraction technology for Okra Biopolymers, yielding higher extraction efficiency while maintaining structural integrity and bioactive properties. The isolated okra biopolymers exhibit characteristic polysaccharidic features and antioxidant potential, making them promising sustainable alternatives to synthetic pharmaceutical excipients. These biopolymers have significant applicability in controlled drug delivery systems, biomedical materials, and functional food formulations. Further optimization of extraction parameters and comprehensive characterization using advanced techniques (13-C NMR, HPTLC, SEM, XRD, DSC) will facilitate their development as pharmaceutical grade excipients.

Keywords: *Abelmoschus esculentus* (L.) Moench., Okra Biopolymers, Ultrasound-Assisted Extraction

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Abstract No.: GNIPST/FMPASTII/P083

PSYCHOBIOTIC INTERVENTION OF *LACTOBACILLUS* SP. AND *BIFIDOBACTERIUM* SP. IN COMBATTING POSTPARTUM HORMONAL FLUCTUATIONS

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Abstract

Objectives
This work focusses on the role of psychobiotic strains, particularly *Lactobacillus spp*. and *Bifidobacterium spp*., in modulating the gut-brain axis during postpartum hormonal fluctuations and resulting depression. Furthermore, this work maps the behavioural outcomes, stress hormone regulation, neuroinflammatory signalling and gut microbial alterations involved with postpartum depression, with the potential of psychobiotics as supportive interventions.

Methods
Relevant clinical studies investigating postpartum stress, hormonal changes, gut microbiota composition and psychobiotic supplementation placed emphasis on employing female rodent models to study postpartum-like stress, thereby conducting behavioural assays for anxiety and depressive symptoms, biochemical assessment of stress hormones, and microbiome profiling techniques. Evidence involving psychobiotic strains such as *Lactobacillus plantarum* and *Bifidobacterium breve* were specifically reviewed to assess their reported neuromodulatory effects.

Results
Reported literature suggests that psychobiotic supplementation act by modulating neurotransmitters such as serotonin and GABA reducing pro-inflammatory cytokines and, on the Hypothalamus-Pituitary-Adrenal axis to modulate stress-associated genes such as CRH (Corticotropin-releasing hormone) while enhancing expression of BDNF (Brain-Derived Neurotrophic Factor) and TPH2 (Tryptophan Hydroxylase-2), indicating improved neuroplasticity and serotonergic signalling. Several studies report an increase in beneficial microbiota alongside improvements in anxiety and depression-related behaviours, supporting the role of psychobiotics in gut-brain axis regulation during hormonally vulnerable periods.

Conclusion
This work emphasises on psychobiotics as promising tools to combat postpartum hormonal disturbances and associated mental health challenges of women. Furthermore, this is also in congruence with the objectives of the *National Mental Health Programme (National Health Mission)*, thereby addressing global *Sustainable Development Goal 3: Good Health and Well-Being*.

Keywords: Postpartum depression, Psychobiotics, Gut–brain axis, *Lactobacillus plantarum*, *Bifidobacterium breve*

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Abstract No.: GNIPST/FMPASTII/P084

A REVIEW ON EMERGING DISRUPTIVE TECHNOLOGIES IN CLINICAL LABORATORIES FOR PRECISION DIAGNOSTIC APPLICATIONS

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Abstract

Objective
Disruptive innovation describes the kind of technology that changes the already existing markets by altering the value propositions presented by the already existing markets to bring out new value propositions which eventually replace the orthodox standards.

Methods
The most receptive to disruptive innovation field is the realm of health care, particularly the focus is put on the pathology and laboratory medicine because it is highly relying on the diagnostics which are based on the technologies. The digitization of the pathology, and an expanded scope of diagnostics and remote consultation and advanced analytics is one of the examples of a disruptive change. Next-generation sequencing is a twofold revolution in that it integrates an array of specialized tests into one low-cost system and changes the paradigm of laboratory medicine to a predictive, preventive and primary care system.

Results
The other innovations that have been pertinent include the dry chemistry reagent, point-of-care and increasing the use of artificial intelligence to increase the precision of diagnostics, workflow integration and efficiency.

Conclusion
Disruptive innovation is driven by the rising cost of health care, the increasing demand of diagnostics, and the escalating level of complexity of precision medicine. Nonetheless, regulatory limitations, stakeholder resistance, and payer and provider reluctance are a significant challenge. A culture of innovation in laboratory medicine has to be nurtured so as to get the full potential of the disruptive technologies in patient care.

Keywords: Disruptive innovation, Pathology, Laboratory medicine, Precision diagnostics, Next-generation sequencing, Artificial intelligence.

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Abstract No.: GNIPST/FMPASTII/P085

STRESS-INDUCED PHYTOCHEMICAL ENHANCEMENT AND *IN VITRO* ANTIDIABETIC AND ANTI-INFLAMMATORY ACTIVITIES OF SOIL-GROWN URAD MICROGREENS: A COMPARATIVE STUDY

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Abstract

Objective
To quantify key bioactive compounds like phenolics and flavonoids under different stress condition and assess their anti-diabetic and anti-inflammatory potential via *in vitro* assay.

Methods
The microgreens of Urad were raised under normal, 25%, 50%, and 100% saline stress conditions. Phytochemical estimation was done for total flavonoid content (TFC), total phenolic content (TPC), anthocyanin, and pigment content using 70-80% ethanol for the extracted samples. The antidiabetic activity was calculated by doing α-amylase enzyme inhibition assays. The anti-inflammatory activity was calculated by doing egg albumin denaturation assay.

Results
Alkaloids, carbohydrates, phenolics, flavonoids, and steroids were confirmed for their presence in the plant extract. TPC reached its highest peak at 100% salinity (0.1422±0.0012 GAE/g) extract concentration, while TFC reached its highest peak at 50% salinity (0.5969±0.2238 QU/g) extract concentration. At 50% salinity conditions, the highest peak of anthocyanin was measured at 0.3197±0.0011 µg/g FW. Under normal conditions, total chlorophyll was measured highest (8.2919±0.0703 µg/g FW), carotenoids (1.8014±0.8014 µg/g FW), chlorophyll b (7.26±0.0653 µg/g FW), and chlorophyll a (1.8914±0.0106 µg/g FW) were at their maximum under normal circumstances. Surprisingly, 100% salinity-stressed microgreens showed the strongest bioactivity with superior α-amylase inhibition (IC_{50} 23.84 µg/mL) and anti-inflammatory activity (IC_{50} 2.56 µg/mL).

Conclusion
Flavonoid accumulation was maximized in moderate stress of 50%. Stress-induced urad microgreens are promising as a functional food. Chlorophyll a content with high salinity stress of 100% increased anti-inflammatory properties along with high antidiabetic properties.

Keywords: *Vigna mungo*, salinity stress, antidiabetic, enzyme inhibition, phytochemicals

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Abstract No.: GNIPST/FMPASTII/P086

ARSENATE INDUCED REDUCTION IN THE LEVEL OF GLUTATHIONE BY REGULATING THE ACTIVITIES OF GLUTATHIONE SYNTHESIZING ENZYMES AND PHYTOCHELATIN SYNTHESIS IN RICE (*ORYZA SATIVA L.*) SEEDLINGS

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Abstract

Objective
To study the effects of arsenate, alone and in combination with phosphate, on plant growth, glutathione metabolism, and phytochelatin production in rice seedlings (cv. MTU1010), with emphasis on detoxification mechanisms.

Methods
Rice seedlings were treated with different concentrations of arsenate (20–50 µM and above), with or without phosphate. Levels of reduced glutathione (GSH), activities of glutathione-related enzymes (GR, GST, GPx), and phytochelatins (PC2 and PC3) were measured in roots and shoots.

Results
Arsenate exposure increased GSH content and the activities of GR and GST, while GPx activity decreased in both roots and shoots. When phosphate was applied together with arsenate, GSH levels and GR and GST activities decreased, whereas GPx activity increased. Growth inhibition and visible damage were observed at arsenate concentrations of 50 µM and above, while minimal effects were seen at 20 µM. Higher PC2/PC3 ratios in roots suggest a protective detoxification role for shoots.

Conclusion
Arsenate activates glutathione-based detoxification mainly in rice roots, helping to protects hoots from damage. However, the presence of phosphate alters these responses and may reduce arsenate tolerance.

Keywords: Arsenic, Glutathione, Phosphate, Phytochelatin, Rice

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Abstract No.: GNIPST/FMPASTII/P087

A REVIEW ON ROLE OF BIOSIMILARS IN REDUCING HEALTHCARE COSTS AND IMPROVING PATIENT ACCESS

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Abstract

Objective
Biologic medicines have revolutionized the control of chronic and life-threatening diseases because they are providing an effective therapeutic option, but their complicated manufacturing procedures and high costs of development have substantially increased healthcare spending and decreased accessibility to patients. The rising cost of new biologic treatments is a significant threat to the sustainability of health care mechanisms the world over. Here, the biosimilars and biologic products that are very similar to the approved reference biologics in quality, safety and efficacy have become one of the potential measures in order to get a solution to the economic and access-related issues.

Methods
The role of biosimilars in saving healthcare costs and assisting with patient access is discussed in this review with references to the evidence obtained under the healthcare reforms and based on the experience in the global market in practice.

Results
Specifically, the significance of increasing access to effective remedies and limiting costs, which the United States Patient Protection and Affordable Care Act (ACA) emphasizes, is a goal that the biosimilars position themselves well to aid. Biosimilars can also help reduce the cost of prescription medications by increasing the competition in the market without negatively affecting the clinical results, as compared to their originator biologic counterparts.

Conclusion
In general, biosimilars are a vital part of sustainable care provision, which facilitates equal access to high-quality biologic therapy and contributes to cost-containing in the contemporary healthcare.

Keywords: Biosimilars, Biologic medicines, Reference biologics, Sustainability, Affordable Care Act (ACA).

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Abstract No.: GNIPST/FMPASTII/P088

CARBON DOTS AS A SOURCE OF NUTRITION FOR ENHANCEMENT OF RICE (*ORYZA SATIVA* L.) PLANTS GROWTH AND INCREASE DISEASE RESISTANCE

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Abstract

Objectives
To evaluate the potential of carbon dots (CDs) as a safe, eco-friendly nanomaterial for enhancing growth and disease resistance in rice (*Oryza sativa* L.) seedlings, thereby offering an alternative to excessive use of chemical fertilizers and pesticides.

Methods
Rice seedlings were grown hydroponically and treated with varying concentrations of carbon dots (0.02–0.002 g ml^{-1}) for 10 days. Growth parameters, including total chlorophyll, protein content, and biomass, were measured. Antioxidant enzyme activities such as catalase (CAT) and peroxidase (CPx) were analyzed to assess oxidative stress. Cellular uptake of CDs and their effect on disease-resistance gene expression were also examined.

Results
The lowest concentration of CDs (0.002 g ml^{-1}) proved most effective, significantly enhancing chlorophyll content, protein levels, and biomass. This treatment also showed maximum CAT and CPx activities, indicating reduced reactive oxygen species accumulation. Additionally, CDs were able to enter plant cells, localize in the nucleus, and induce the expression of disease-resistance genes, thereby lowering susceptibility to infections.

Conclusion
Carbon dots promote growth and strengthen defense responses in rice seedlings, demonstrating their potential as a biocompatible and environmentally safe nanomaterial for sustainable rice cultivation.

Keywords: Carbon dots (CDs); Nanomaterials; Biocompatibility; Rice seedlings; Bio safety

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Abstract No.: GNIPST/FMPASTII/P089

LIVING THERAPEUTIC MATERIALS: INTEGRATION OF LIVE CELLS INTO ENGINEERED CONSTRUCTS FOR LOCAL AND SUSTAINED THERAPEUTIC EFFECTS

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Abstract

Objective
The Living Therapeutic Materials (LTMs) represent a notable advancement in the fields of biomedical and pharmaceutical research. These materials integrate engineered microorganisms with biocompatible matrices, enabling innovative therapeutic functions, particularly in the realm of sustained drug delivery. This review focuses on the current state of LTMs, highlighting preclinical challenges, safety considerations, and recent advancements in the field. The exploration of LTMs seeks to elucidate their potential applications and the obstacles that must be addressed to fully harness their capabilities in therapeutic contexts.

Methods
This review orchestrates recent literature concerning microbe-based Live Therapeutic Materials (LTMs) through in-vitro, ex-vivo, and in-vivo studies. It evaluates various methodologies and performance metrics, focusing on critical aspects such as biocompatibility, immune activation, cytotoxicity, pharmacokinetics, and therapeutic efficacy. The review aims to assess common practices in the field, including advanced therapy medicinal products and live biotherapeutic products (LBPs), highlighting trends and advancements in the development and application of these innovative therapeutic strategies.

Results
The LTMs are shown to produce significant therapeutic outcomes, including functions such as the controlled release of drugs, tissue repair, and immune modulation. Despite these advancements, there are persistent challenges that need to be addressed, particularly concerning genetic stability, regulatory classification, and numerous other issues that impact their use and development.

Conclusion
LTMs, are a complex yet promising framework for the creation of next-generation medicines. Although these treatments have a lot of potential advantages, there are a lot of obstacles that must be overcome to guarantee their effectiveness and safety in clinical settings.

Keywords: Living Therapeutic Materials; novel therapeutic; drug delivery; biocompatibility; Sustained delivery

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Abstract No.: GNIPST/FMPASTII/P090

COMBATING DENV 3 STRAIN OF DENGUE VIRUS WITH ANTIBODY-DEPENDENT ENHANCEMENT MEDIATED DENGVAXIA

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Abstract

Objective
This study aims to map the immunological mechanisms of Dengvaxia®-mediated protection against Dengue virus serotype 3 (DENV-3), with a particular focus on antibody-dependent enhancement (ADE) and the influence of genotype-specific variability on disease severity and vaccine efficacy.

Methods
Clinical evidence shows Dengvaxia® acts as a booster in individuals with prior dengue infection by strengthening pre-existing immune responses, including neutralizing antibodies formed during natural exposure. In dengue-naïve individuals, however, the vaccine can generate a weak or incomplete primary response. During infection with DENV-3, non-neutralizing antibodies may enhance viral entry into Fcγ receptor–bearing cells, causing antibody-dependent enhancement. This leads to increased viral replication and severe disease, including dengue hemorrhagic fever and dengue shock syndrome. Consequently, WHO recommends Dengvaxia® only for individuals with confirmed dengue infection.

Results
Analysis of clinical data demonstrated that Dengvaxia® significantly enhanced neutralizing antibody titers and protective immune responses in individuals with prior dengue exposure, supporting its booster effect in seropositive populations. In contrast, dengue-naïve individuals showed predominantly non-neutralizing antibody responses, which were associated with increased viral entry into Fcγ receptor–expressing cells upon DENV-3 infection.

Conclusion
This study underscores the critical importance of understanding Dengvaxia®-mediated immune mechanisms, particularly antibody-dependent enhancement and genotype-specific responses, to ensure safe and effective dengue control. Such insights directly support *SDG 3: Good Health and Well-being* by promoting vaccine safety, reducing the risk of severe dengue outcomes, and guiding targeted public health interventions. Strengthening immunological research and surveillance will be essential for minimizing dengue-related morbidity and mortality and advancing global health equity.

Keywords: Denv-3, Dengvaxia®, Antibody-Dependent Enhancement, Fcγ receptor, Molecular Surveillance

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Abstract No.: GNIPST/FMPASTII/P091

A REVIEW ON ADVANCES IN BIOSENSOR TECHNOLOGIES FOR HEALTHCARE DIAGNOSTICS AND THERAPEUTIC DRUG MONITORING

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Abstract

Objective
Recent developments in biosensors for drug monitoring and health diagnostics are covered in this overview, with an emphasis on wearable and implantable systems, point-of-care testing, quick detection, personalised treatment, major obstacles, and future prospects in personalised healthcare. This study aims to examine the current advancements in biosensing technology and their importance in disease biomarker detection and therapeutic drug monitoring, with the proposal of revolutionizing present-day medicine with biosensors.

Methods
A critical analytical review was conducted on various types of biosensors, including DNA biosensors, immunosensors, and enzyme-based sensors. The paper discusses their operating principles, medical applications, and recent technological advances, such as wearable biosensors, the integration of nanotechnology, and miniaturization. In addition to suggested strategic solutions, significant technical problems related to repeatability, sensitivity, specificity, and data security were assessed.

Results
New developments in biosensors improve precise diagnosis, tailored medication delivery, and real-time monitoring. Sensitivity and mobility are enhanced by wearable technology and nanotechnology, and biosensors have a bright future despite security and dependability issues.

Conclusion
Through better diagnosis, innovation, and decision-making, advanced biosensor technologies improve healthcare worldwide. To overcome technical, clinical, and integrative obstacles, ongoing interdisciplinary research is essential to their long-term clinical success.

Keywords: Biosensors; Disease biomarker detection; Healthcare applications; Nanotechnology integration; Therapeutic drug monitoring.

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Abstract No.: GNIPST/FMPASTII/P092

PHYTOCHEMICAL EXTRACTION AND CHARACTERIZATION OF ROOTS OF *WITHANIA SOMNIFERA*

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Abstract

Objective

Withania somnifera (Ashwagandha) is a widely used medicinal plant in traditional systems due to its broad therapeutic properties. Although its traditional use dates back centuries, scientific validation intensified after 2000. The present study, conducted in 2025, aims to investigate the phytochemical composition of *Withania somnifera* root extracts and to evaluate their antibacterial, antioxidant, anti-inflammatory, and analgesic activities, thereby providing experimental support for its traditional medicinal applications.

Methods

Roots of *Withania somnifera* were collected, authenticated, and subjected to solvent extraction using appropriate extraction techniques. Qualitative phytochemical screening was performed to identify major bioactive constituents such as alkaloids, flavonoids, phenolic compounds, and withanolides. The biological activities of the root extracts were assessed using standard *in vitro* models for antibacterial and antioxidant activity and established *in vivo* experimental models for anti-inflammatory and analgesic evaluation.

Results

Phytochemical analysis confirmed the presence of diverse bioactive compounds in the root extracts. The extracts demonstrated significant antibacterial activity against selected pathogenic microorganisms. Strong antioxidant potential was observed through effective free radical scavenging activity. Additionally, the extracts exhibited marked anti-inflammatory and analgesic effects in experimental models, indicating broad-spectrum pharmacological efficacy.

Conclusion

The findings validate the traditional use of *Withania somnifera* roots in managing various health conditions and highlight their multifaceted therapeutic potential. Future studies should focus on isolating individual bioactive compounds, molecular-level characterization, dose optimization, and clinical trials to enhance therapeutic precision and ensure safe pharmaceutical applications.

Keywords: *Withania somnifera*, Ashwagandha, Phytochemical analysis, Antioxidant activity, Anti-inflammatory activity, Analgesic activity

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Abstract No.: GNIPST/FMPASTII/P093

PHYTOCHEMICAL COMPLEXITY AND BIOACTIVITY CORRELATIONS: A SYSTEMATICS REVIEW OF METABOLOMICS IN *EUGENIA CARYOPHYLLUS* (SPRENG.)

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Abstract

Objective

The present systematic review aims to synthesize the findings from recent scientific literature on the comprehensive chemical characterization of "*Eugenia caryophyllus* (Spreng.)". A central objective involves the identification and critical evaluation of the primary and secondary metabolites elucidated through modern analytical techniques. Further aims include assessing the influence of variables such as geographical origin and extraction methods on its phytochemical profile, and exploring the established correlations between specific metabolite clusters and reported biological activities.

Methods

A structured search strategy was executed using major databases like PubMed, Scopus, and Web of Science, targeting studies from the last decade. Eligible studies utilized advanced metabolomic or chemical profiling techniques, such as GC-MS, LC-MS, and NMR, on clove samples. After applying inclusion and exclusion criteria, selected articles were assessed for data extraction and quality to validate the synthesized evidence.

Results

The analysis of studies on clove reveals a complex phytochemical profile, with eugenol as the main volatile compound. High-resolution metabolomics has identified additional bioactive compounds like acetyl eugenol and caryophyllene. Variability in composition is linked to climatic and processing factors. The data indicates strong associations between phenylpropanoid-rich chemical signatures and the antioxidant and antimicrobial properties of the samples.

Conclusion

The recent evidence highlights that modern metabolomic approaches have significantly enhanced the understanding of clove's phytochemical complexity, providing a comprehensive chemical basis for its applications. This underscores the importance of metabolomic profiling for quality standardization and targeted pharmacological development of "*Eugenia caryophyllus* (Spreng.)" products.

Keywords: Clove, ethnobotany, biological evaluation, phytoconstituents, metabolomics, clinical trials, eugenol.

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Abstract No.: GNIPST/FMPASTII/P094

IMPLICATIONS OF AI IN 3D-PRINTED PHARMACEUTICAL DOSAGE FORMS

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Abstract

Objective

Artificial intelligence (AI) enables precise optimization, predictive control, and personalized drug delivery in complex three-dimensional (3D)-printed pharmaceutical dosage form development. The aim of the review is to explore the integration of AI with 3D printing technologies in the evolution of pharmaceutical dosage forms. Emphasis is placed on the role of AI-driven tools in enhancing formulation design, optimizing printing processes, and enabling personalized drug delivery systems to meet patient-specific therapeutic needs.

Methods

A PRISMA-compliant systematic review evaluated AI-driven strategies in 3D-printed pharmaceutical dosage forms. Literature from 2014–2025 was sourced from PubMed, ScienceDirect, SpringerLink, and Google Scholar. Following duplicate removal and staged screening, eligible studies were qualitatively synthesized to assess AI-based formulation optimization, process modelling, dose personalization, and prediction of critical quality attributes.

Results

The integration of AI with 3D printing substantially enhanced dose accuracy, geometric fidelity, and drug-release predictability. Machine-learning techniques including Gaussian Process Regression, Random Forest, artificial neural networks, support vector machines, Bayesian optimization, and generative adversarial networks achieved strong predictive performance (R^2 ≈ 0.88–0.94) for printability, surface defect minimization, mechanical integrity, and dissolution kinetics. These AI-guided models enabled zero-defect printlets, reduced trial-and-error experimentation, accelerated development timelines, improved reproducibility, and facilitated precise, patient-specific dosage forms with customized release profiles.

Conclusion

The review reveals that AI-enabled 3D-printed pharmaceutical dosage forms represent a major advancement in modern pharmaceutics. This integrated approach supports personalized medicine, improves manufacturing efficiency, and enhances product quality and consistency, highlighting strong potential for future patient-centric drug therapy.

Keywords: Artificial Intelligence (AI), 3D Printing, Pharmaceutical Dosage Forms, Personalized Medicine, Machine Learning, Quality by Design (QbD).

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Abstract No.: GNIPST/FMPASTII/P095

ROLE OF QUALITY ASSURANCE IN LIFECYCLE ASSESMENT OF PHARMACEUTICAL PRODUCT: AN INTEGRATED REGULATORY PERSPECTIVE

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Abstract

Objective
From early development to post-marketing surveillance, the pharmaceutical product lifecycle consists of several phases that all need close supervision to guarantee quality, safety, and effectiveness. To support regulatory compliance, minimise risk, and safeguard patient health, proactive QA involvement is implemented. This study examines the evolving and integrative role of QA throughout the entire lifecycle.

Methods
Pharmaceutical development, technology transfer, manufacturing, quality control, distribution, and post-marketing activities were all covered by a lifecycle-based analytical approach. A critical evaluation was conducted of international regulatory guidelines, such as ICH Q8 (Pharmaceutical Development), Q9 (Quality Risk Management), Q10 (Pharmaceutical Quality System), Q11 (Development and Manufacture of Drug Substances), and Q12 (Product Lifecycle Management). Key QA interventions about Quality by Design (QbD), validation, change control, deviation management, documentation systems, and continuous improvement mechanisms were identified through case-based assessments.

Results
Early and continuous QA involvement greatly improves lifecycle control. It does this by improving understanding of CPPs and CQAs through QA-driven QbD principles. Strong documentation, effective validation, and organised change management lower variability, deviations, and non-compliance. Post-approval QA oversight further strengthens product reliability by efficiently managing complaints, recalls, and ongoing process checks.

Conclusion
Quality assurance is important at every stage of the pharmaceutical lifecycle. It ensures that products are consistently high-quality, meet regulations, and keep patients safe. A QA approach focused on the lifecycle improves the long-term reliability and success of products in tightly regulated global markets.

Keywords: Quality Assurance, Pharmaceutical Product Lifecycle, ICH Guidelines, Quality by Design (QbD), Regulatory Compliance, Post-market Surveillance.

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Abstract No.: GNIPST/FMPASTII/P096

AI-DRIVEN DISCOVERY TO REGULATORY REALITY: RENTOSERTIB'S JOURNEY FROM CADD TO CLINICAL TRANSLATION

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Abstract

Objective

Integration of computer-aided drug design with generative artificial intelligence enabled rapid discovery of rentosertib, first-in-class TNIK inhibitor. AI-driven workflows shortened development timelines to ~18 months while maintaining regulatory compliance and demonstrating acceptable safety with preliminary efficacy signals in idiopathic pulmonary fibrosis. This review examines how generative AI–integrated computer-aided drug design enabled discovery of rentosertib, a novel TNIK inhibitor for idiopathic pulmonary fibrosis, and evaluates its progression from in-silico design through preclinical studies to Phase 2a trials, demonstrating regulatory acceptance and compliance with GCP, GMP, and quality standards. The objective is to review how from AI-driven discovery to regulatory reality: rentosertib's journey from CADD to clinical translation

Methods

An integrative review assessed generative AI–enabled CADD, GLP preclinical studies, GCP Phase 2a trials, and regulatory compliance including IND, USAN recognition, CTD alignment, GMP quality systems and pharmacovigilance readiness.

Results

AI-assisted CADD reduced discovery timelines to ~18 months and validated TNIK as an IPF target. Phase 2a data shows acceptable safety, with higher doses improving forced vital capacity. USAN recognition and IND-compliant development confirmed regulatory equivalence with conventional drugs.

Conclusion

Rentosertib demonstrates that AI-driven CADD can accelerate drug innovation while maintaining GLP, GCP, and GMP compliance. Phase 2a outcomes support further development, and USAN recognition confirms regulatory legitimacy within established frameworks.

Keywords: AI-Driven Drug Discovery, CADD, Rentosertib, Regulatory Compliance.

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NOVEL TOLC CHANNEL INHIBITORS: DISRUPTING EFFLUX PUMPS TO OVERCOME MULTIDRUG RESISTANCE IN ENTEROBACTERIACEAE

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Abstract

Objective

Multi-drug resistance Enterobacteraceae evades antibiotics via AcrAB-TolC efflux pumps, where TolC forms the outer membrane channel expelling diverse drugs. Extensive review of Scopus – indexed papers highlights TolC as a prime target for inhibitors to restore susceptibility. The objective is to screen and characterize novel TolC inhibitors, assess efflux blockade, and evaluate synergy against MDR clinical isolates.

Methods

After reading numerous Scopus papers on TolC inhibitors, virtual screening and docking targeted TolC periplasmic sites with pyropyridine analogs , inspired by Alenazy et al.(2024) on AcrAB-TolC disruption criteria and Phan *et al* (2023)on MD stimulations. Efflux assayed via Hoechst33342 accumulation in ΔtolC E. coli, per jang (2023) protocols. CLSI micro dilution tested MICs on 25 MDR isolates; synergy via check board (FICI); RT-qPCR for acrAB-tolC expression; MTT cytotoxicity.

Results

These inhibitors can really stop a lot of efflux which is around 75-90%.This helps to decrease the amount of ciprofloxacin and menopenem that the cells can resist and it does so by a big margin which is 16 to 64 times less. When we use these together it gives us the result of 99.9% killing within 12 to 24 hrs providing a safe use upto 100 µM.

Conclusion

After summing up we can conclude that TolC inhibitors act as an addition to therapies against MDR Enterobacteriaceae.

Keywords: Multi drug resistance, AcrAB-TolC, TolC periplasmic, RT-qPCR, ciprofloxacin, menopenem, Enterobacteriaceae

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THERANOSTIC CARBON QUANTUM DOTS FOR TARGETED DRUG DELIVERY AND IMAGING IN BRAIN TUMORS

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Abstract

Objective

Brain tumors, particularly high-grade gliomas, remain among the most challenging malignancies due to their infiltrative growth, therapeutic resistance, and the restrictive nature of the blood–brain barrier (BBB). The objective of this review is to critically evaluate carbon quantum dots (CQDs) as emerging theranostic nanoplatforms capable of integrating targeted drug delivery with real-time imaging for brain tumor research.

Methods

This review analyzes recent preclinical literature focusing on CQD synthesis strategies, surface functionalization approaches, blood–brain barrier transport mechanisms, drug-loading methodologies, and fluorescence-based imaging capabilities. Comparative assessment with conventional nanocarrier systems is included to evaluate relative targeting efficiency, drug delivery performance, imaging potential, and non-clinical safety profiles.

Results

Carbon quantum dots exhibit distinctive physicochemical characteristics, including ultrasmall size, intrinsic and tunable photoluminescence, favorable aqueous dispersibility, and versatile surface chemistry, which collectively facilitate BBB penetration and tumor localization. Functionalization with targeting ligands such as transferrin, folic acid, peptides, and glucose enhances receptor-mediated uptake by glioma cells. Drug-loaded CQDs demonstrate stimulus-responsive release behavior, improved intracellular accumulation, and concurrent fluorescence imaging capability, enabling combined therapeutic delivery and diagnostic visualization in preclinical models. However, challenges related to large-scale synthesis, batch-to-batch reproducibility, rapid renal clearance, and limited translational validation remain.

Conclusion

Carbon quantum dots represent a promising theranostic nanoplatform for brain tumor research by unifying targeted drug delivery and diagnostic imaging within a single nanosystem. Continued optimization of surface engineering, multimodal functionality, and long-term non-clinical safety assessment is essential to advance their translational potential in neuro-oncology.

Keywords: Carbon Quantum Dots; Theranostics; Brain Tumors; Blood–Brain Barrier; Targeted Drug Delivery; Nanomedicine

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Abstract No.: GNIPST/FMPASTII/P099

NIPAH VIRUS INFECTION: ZOONOTIC THREAT AND PUBLIC HEALTH STRATEGIES

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Abstract

Objective
To provide a comprehensive overview of Nipah virus (NiV) infection, including its zoonotic origins, transmission dynamics, clinical manifestations, diagnosis, treatment challenges, and prevention measures for effective outbreak management.

Methods
This review synthesizes epidemiological data from major NiV outbreaks (e.g., Malaysia/Singapore 1998-1999, West Bengal 2001/2007, Kerala 2018-2021), virological characteristics (Paramyxoviridae, Henipavirus genus), transmission pathways (bat reservoirs, pig intermediates, human spillover), diagnostic protocols (RT-PCR, ELISA), and supportive care strategies as per WHO and AYUSH guidelines.

Results
NiV, hosted by Pteropus fruit bats, causes encephalitis with 40-75% fatality; symptoms progress from fever/headache to coma. Person-to-person spread occurs in healthcare settings, with no licensed vaccines or antivirals—only supportive care (e.g., m102.4 monoclonal antibodies in trials). Outbreaks in Asia highlight risks from contaminated date palm sap and animal contact.

Conclusion
Enhanced surveillance, bat avoidance, infection control, and accelerated vaccine development are essential to mitigate NiV's pandemic potential and protect vulnerable populations in endemic regions.

Keywords: Nipah virus, zoonotic, encephalitis, fruit bats, outbreak prevention

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Abstract No.: GNIPST/FMPASTII/P100

IN SILICO DRUG REPURPOSING TARGETING SARM1: A PHARMACOPHORE BASED VIRTUAL SCREENING AND MOLECULAR DYNAMICS STUDY FOR NOVEL LUNG CANCER THERAPEUTICS

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Abstract

Objective

The objective of this study was to identify potential drug-repurposing candidates targeting Sterile Alpha and Toll/Interleukin-1 Receptor Motif-containing 1 (SARM1), a key regulator of NAD^+ metabolism and neuronal stress signaling, using integrated in silico approaches, with the aim of exploring novel mechanistic strategies relevant to lung cancer research.

Methods

An integrated in silico workflow was employed. A Tier-1 molecular dataset comprising compounds reported in the ChEMBL database with experimentally validated bioactivity values (IC_{50}, K_i, Kd, or related activity endpoints) against SARM1 was curated and utilized to develop and validate a robust three-dimensional pharmacophore model. The validated pharmacophore was used to screen a curated library of FDA-approved and clinical-stage compounds. High-affinity candidates were shortlisted through pharmacophore-based virtual screening and further refined by molecular docking against the SARM1 crystal structure (PDB ID: 7NAL) using the AutoDock-FR (ADFR) suite. The stability, conformational behavior, and binding energetics of the top-ranked ligand–protein complexes were evaluated through 200 ns molecular dynamics simulations using NAMD2.

Results

Pharmacophore-based virtual screening identified approximately 250 candidate compounds exhibiting strong pharmacophore mapping and favorable binding features. Molecular docking and molecular dynamics analyses demonstrated that several top-ranked compounds maintained stable binding conformations within the catalytic NAD^+ binding pocket of SARM1, accompanied by favorable interaction energies, indicating potential enzymatic inhibition at the molecular level.

Conclusion

This study presents a systematic and robust computational framework for the identification of repurposable SARM1 inhibitors. The identified candidates exhibit promising binding stability and mechanistic relevance, supporting drug repurposing as a rapid and cost-effective strategy for advancing preclinical research related to SARM1-associated pathways in lung cancer.

Keywords: SARM1; Drug Repurposing; Lung Cancer; Pharmacophore Modelling; Molecular Docking (ADFR); Molecular Dynamics (NAMD2); Virtual Screening

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Abstract No.: GNIPST/FMPASTII/P101

CARBON QUANTUM DOTS: GREEN SYNTHESIS FROM KITCHEN WASTE AND ITS CHARACTERIZATION

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Abstract

Objective
To utilize fruit and vegetable peel waste as a sustainable and low-cost resource for the green synthesis of carbon dots (C-dots) and to evaluate their optical and morphological properties.

Methods
Carbon dots were synthesized from biodegradable fruit and vegetable peel wastes using a simple, cost-effective, and time-efficient method. The synthesized C-dots were characterized using optical techniques, microscopy, and Dynamic Light Scattering (DLS) to determine their size, structure, and morphological features.

Results
The study successfully demonstrated the synthesis of luminescent carbon dots from horticultural
waste materials. Microscopic and DLS analyses confirmed the nanoscale size and uniform morphology of the C-dots. Optical characterization revealed strong luminescent properties, highlighting their potential for diverse applications.

Conclusion
Fruit and vegetable peel wastes can be effectively converted into green, biodegradable carbon dots using an eco-friendly approach. This method offers a sustainable alternative to conventional carbon dots while addressing waste management, environmental concerns, and value-added product development.

Keywords: Carbon dots, Cucumber, Pineapple, Green synthesis, Bio-compatible, Fluorescence.

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Abstract No.: GNIPST/FMPASTII/P102

DESIGNING RESISTANCE TO DRUG ABUSE: SMART ABUSE DETERRENT FORMULATION IN MODERN THERAPEUTICS

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Abstract

Objective
To highlight recent advancements in mRNA-based therapeutic approaches and vaccines, emphasizing their potential to address previously untreatable disease. Therapeutics based on mRNA have the potential to completely modify the pharmaceutical sector.

Methods
Study the recent developments in biotechnology have made it possible to produce functional proteins, antibodies, and peptides using mRNA, offering quick and flexible solutions for therapeutic involvements and vaccine development, focusing on advances in mRNA design and structural elements (5′ cap, untranslated regions, and poly-A tail).

Results
Because of mRNA's great potency, safety, and efficiency, as well as its capacity for quick clinical development, scalability, and cost-effective manufacture, mRNA vaccines are a potent substitute for conventional vaccines. A new biotechnology platform for vaccination against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was introduced with the quick design and development of COVID-19 mRNA vaccines. mRNA therapies have shown great commitment in a diversity of clinical applications, their general success will ultimately depend on working out several important issues, including improving delivery routes, increasing stability and increasing output.

Conclusion
In this abstract, we study the latest advancements in mRNA-based approaches for disease treatment, highlighting their potential beyond conventional medicine-based therapies. This work offers the special qualities of mRNA vaccination strategies, examine the results of mRNA vaccines against infectious diseases, the difficulties including remodelling in design, delivery.

Keywords: mRNA therapeutics, Precision medicine, Lipid nanoparticle delivery, Immune modulation

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Abstract No.: GNIPST/FMPASTII/P103

COMPUTATIONAL SCREENING OF NOVEL SMALL MOLECULE SODIUM GLUCOSE CO-TRANSPORTER 2 (SGLT2) INHIBITOR FOR TYPE 2 DIABETES MELLITUS

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Abstract

Objective
Sodium-glucose cotransporter-2 (SGLT2) is a key renal transporter responsible for glucose reabsorption in the renal cortex on the apical membrane of the proximal convoluted tubule (PCT). Inhibition of SGLT2 reduces glucose reabsorption and lowers blood glucose levels. This makes it an important target for Type 2 diabetes Mellitus(T2DM). The current study aims to computationally screen and identify novel small molecule SGLT2 inhibitors as potential treatment for T2DM.

Methods
The marketed and Investigational New Drug (IND) SGLT2 inhibitors were selected from literature and docked with the SGLT2 protein (PDB ID-7VSI). The ligands were classified into three groups based on docking energy. Pharmacophore models were generated for each group, where they combined to generate a final pharmacophore. The pharmacophore was screened in molecular databases like COCONUT, ChEMBL etc. The hit compounds were further docked with the SGLT2 protein (PDB ID-7VSI). Pharmacophores generated from the screened molecules were then combined with the initial model to create an optimized pharmacophore. Quantitative Structure-Activity Relationship (QSAR) studies were then performed followed by ADME prediction and toxicity analysis of the final selected compound.

Results
Pharmacophore-based screening resulted in the identification of 190 compounds. Some compounds like CHEMBL2397445, CHEMBL589532, CNP0282141.1 showed a good docking score against SGLT2 protein. A final pharmacophore was obtained by combining pharmacophore models generated from the screened molecules with the initial pharmacophore. QSAR study was then performed to design a final optimized molecule. The ADMET analysis indicated that the final molecule possesses favourable properties supportive of its predicted biological activity.

Conclusion
The computational study identified a promising small-molecule SGLT2 inhibitor with favourable binding affinity and drug-like properties. The designed lead compound shows potential for further validation through *in vitro, in vivo and ex vivo* studies to confirm its antidiabetic potential and safety.

Keywords: Type 2 diabetes mellitus, SGLT2 inhibitors, docking, QSAR, pharmacophore.

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Abstract No.: GNIPST/FMPASTII/P104

TRANSLATING MONOCLONAL ANTIBODY ENGINEERING INTO CLINICAL PROTECTION: EMERGING EVIDENCE FROM MALARIA PREVENTION

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Abstract

Objective

Monoclonal antibodies (mAbs) have emerged as accurate and efficacious therapeutics to infections and inflammatory diseases as the interface between molecular knowledge and clinical therapy. Using the specificity of pathogen-derived antigens, immunomodulators or host receptors, mAbs provide highly selective treatment modalities leading to a greater effect with reduced off-target effects of traditional therapies. Recent studies highlight their translational potential in malaria prevention.

Methods

Scalable biotechnology platforms like recombinant protein engineering, hybridoma technology and high-throughput screening are used in the development of these biologics, supported by molecular diagnostics and immune profiling to predict improved dosing and efficacy. The discovery of antibodies has made possible to identify more epitope targets that are not in current vaccines, which has led to the next-generation improvised mAb designs. F_c-region mutations are incorporated to enhance antibody half-life and allow long-lasting protection through passive immunization.

Results

In infectious diseases, mAbs neutralize virulence factors, block pathogen entry and enhance host immune responses, providing possible substitutes against antimicrobial resistance constraints. In Mali, a mid-stage clinical trial showed that a single subcutaneous injection of the long-acting monoclonal antibody, L9LS, could provide up to 77% protection against symptomatic *Plasmodium falciparum* malaria in children during six months of the transmission season, with favourable safety profiles. L9LS and corresponding antibodies inhibit liver invasion by acting on the sporozoite stage.

Conclusion

Collectively, the mAbs are excellent examples of how mechanistic insights and biotechnological innovation can be translated into clinically actionable interventions, making them pivotal tool in prevention and treatment of infectious diseases, including malaria.

Keywords: Immunomodulator, Virulence factors, Translational potential, F_c-region mutations, Passive immunization, Recombinant protein engineering, Hybridoma technology.

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Abstract No.: GNIPST/FMPASTII/P105

TRANSFORMING NATURAL PRODUCT DRUG DISCOVERY THROUGH ARTIFICIAL INTELLIGENCE: A COMPREHENSIVE REVIEW

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Abstract

Objective
Natural products have historically been a valuable source of therapeutic agents; however, drug discovery and development from natural sources are often limited by structural complexity, limited availability, and time-intensive experimental workflows. Conventional drug discovery approaches also face challenges such as high costs, long development timelines, and low success rates. Recent advances in artificial intelligence (AI) are transforming natural product research by enabling data-driven, scalable, and predictive strategies across the drug discovery pipeline. This review aims to summarize and critically evaluate current AI-based approaches applied to natural product-derived drug discovery.

Methods
Peer-reviewed research articles, reviews, and case studies were collected from major scientific databases, including PubMed, Web of Science, Google Scholar, and IEEE Xplore. Studies were selected based on their relevance to artificial intelligence, machine learning, deep learning, natural products, and drug discovery applications.

Results
The reviewed literature indicates that AI significantly improves the efficiency of natural product-based drug discovery by accelerating virtual screening, enhancing target identification, and optimizing lead compounds. Machine learning and deep learning models demonstrate superior performance in predicting biological activity, binding affinity, and pharmacokinetic properties compared with traditional computational methods. AI-driven techniques such as quantitative structure–activity relationship modeling, generative algorithms, and multi-omics data integration with cheminformatics platforms facilitate the identification of novel bioactive scaffolds and provide insights into mechanisms of action. Nevertheless, challenges such as limited high-quality data, model interpretability, and the need for experimental validation remain.

Conclusion
Overall, the integration of artificial intelligence into natural product research offers a promising strategy to overcome long-standing limitations in drug discovery and is expected to play an increasingly important role in modern pharmaceutical research.

Keywords: Artificial Intelligence; Machine Learning; Deep Learning; Natural Products; Drug Discovery; Virtual Screening; Cheminformatics

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Abstract No.: GNIPST/FMPASTII/P106

INVESTIGATING THE THERAPEUTIC MECHANISM AND ADVANTAGEOUS EFFECTS OF *ACTINIDIA DELICIOSA*'S PHYTOCONSTITUENTS AGAINST HYPERTENSION USING MOLECULAR DOCKING STUDIES

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Abstract

Objective

To evaluate the potential of carbon dots (CDs) as a safe, eco-friendly nanomaterial for enhancing growth and disease resistance in rice (*Oryza sativa* L.) seedlings, thereby offering an alternative to excessive use of chemical fertilizers and pesticides.

Methods

Rice seedlings were grown hydroponically and treated with varying concentrations of carbon dots (0.02–0.002 g ml^{-1}) for 10 days. Growth parameters, including total chlorophyll, protein content, and biomass, were measured. Antioxidant enzyme activities such as catalase (CAT) and peroxidase (CPx) were analyzed to assess oxidative stress. Cellular uptake of CDs and their effect on disease-resistance gene expression were also examined.

Results

The lowest concentration of CDs (0.002 g ml^{-1}) proved most effective, significantly enhancing chlorophyll content, protein levels, and biomass. This treatment also showed maximum CAT and CPx activities, indicating reduced reactive oxygen species accumulation. Additionally, CDs were able to enter plant cells, localize in the nucleus, and induce the expression of disease-resistance genes, thereby lowering susceptibility to infections.

Conclusion

Carbon dots promote growth and strengthen defense responses in rice seedlings, demonstrating their potential as a biocompatible and environmentally safe nanomaterial for sustainable rice cultivation.

Keywords: Carbon dots (CDs); Nanomaterials; Biocompatibility; Rice seedlings; Bio safety

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Abstract No.: GNIPST/FMPASTII/P107

ELECTROSTATIC "CHARGE-SWITCHING" NANOCARRIERS FOR CANCER DRUG DELIVERY

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Abstract

Objective

The objective of this work is to present the concept and potential of electrostatic charge-switching nanocarriers as an advanced strategy for targeted cancer drug delivery. These smart nanocarriers are designed to respond to the tumor microenvironment by altering their surface charge, thereby enhancing tumor specificity, cellular uptake, and therapeutic efficiency while minimizing systemic toxicity.

Methods

Charge-switching nanocarriers are developed using pH-responsive polymers and ionizable functional groups that remain neutral or negatively charged under physiological conditions but convert to a positive charge in the acidic tumor microenvironment. This design improves circulation stability and reduces premature drug release. Key formulation aspects such as particle size, charge transition behavior, stability, and drug encapsulation efficiency were evaluated based on reported experimental studies. The impact of charge switching on cellular uptake and intracellular drug delivery was analyzed using *in vitro* cancer cell models and physicochemical characterization techniques.

Results

The nanocarriers exhibited enhanced stability during systemic circulation and significantly increased cellular internalization under acidic conditions mimicking tumor tissues. Charge reversal promoted strong electrostatic interactions with cancer cell membranes, resulting in higher intracellular drug accumulation and controlled drug release at the tumor site. This approach demonstrated improved anticancer efficacy with reduced off-target effects.

Conclusion

Electrostatic charge-switching nanocarriers represent a promising tumor-responsive platform for targeted cancer drug delivery. Their ability to adapt to the tumor microenvironment offers significant advantages in improving therapeutic effectiveness and safety, supporting their translational potential in modern cancer treatment.

Keywords: Charge-switching nanocarriers, Cancer drug delivery, Tumor microenvironment, pH-responsive systems, Targeted nanomedicine.

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Abstract No.: GNIPST/FMPASTII/P108

EVALUATION OF HALOTOLERANT *BACILLUS SP.* FOR SUPPRESSION OF *ENTEROBACTERIACEAE* GROWTH AND VIRULENCEFOR CANCER DRUG DELIVERY

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Abstract

Objective
The emergence of antibiotic-resistant *Enterobacteriaceae* necessitates the development of alternative antimicrobial strategies. This study aimed to evaluate the probiotic potential of halophilic *Bacillus* species for suppressing the growth and virulence of pathogenic *Enterobacteriaceae* and to assess their suitability for gastrointestinal survival.

Methods
Halophilic *Bacillus* isolates were obtained from saline environments and characterized using morphological and biochemical methods. Probiotic properties, including tolerance to acidic pH, bile salts, and high salinity, were assessed to evaluate gastrointestinal survivability. Antagonistic activity against pathogenic *Enterobacteriaceae*, particularly *Escherichia coli* was determined using agar well diffusion and co-culture inhibition assays. The effects of *Bacillus*-derived metabolites on quorum sensing–regulated virulence factors were evaluated through quantitative assays for biofilm formation and motility, along with gene expression analysis of selected virulence-associated genes. Antimicrobial compounds were preliminarily characterized to identify organic acids, lipopeptides, and bacteriocin-like substances.
techniques.

Results
Several halophilic *Bacillus* strains exhibited strong tolerance to simulated gastrointestinal conditions and demonstrated significant inhibitory activity against *Enterobacteriaceae*. These strains effectively reduced pathogen growth and significantly attenuated key virulence determinants, including motility and biofilm formation. The anti-virulence effects correlated with the production of bioactive metabolites such as organic acids, lipopeptides, and bacteriocin-like compounds.

Conclusion
Halophilic *Bacillus* species show considerable potential as probiotic candidates for controlling Enterobacteriaceae infections. Their combined antimicrobial and anti-virulence activities suggest promising applications in functional foods and therapeutic formulations. Further *in vivo* studies are required to confirm their efficacy and safety.

Keywords: Halotolerant *Bacillus sp.*, *Enterobacteriaceae* suppression, virulence

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Abstract No.: GNIPST/FMPASTII/P109

FORMULATION AND DEVELOPMENT OF A PHYTOSOME-BASED DELIVERY SYSTEM TO ENHANCE THE STABILITY OF NUTRACEUTICALS DERIVED FROM V*ACHELLIA NILOTICA* (L.)

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Abstract

Objective
Nutraceuticals derived from plant sources has intensified research into advanced delivery systems capable of improving their stability, solubility, and bioavailability. Biopharmaceuticals delivered in form of nutraceuticals need innovative formulation strategies to enhance the stability of bioactive compounds. This research work aimed to develop and characterize phytosomal delivery of quercetin isolated from Vachellia nilotica (L.) with enhanced aqueous solubility and stability.

Methods
Soxhlation extraction was carried out to isolate Quercetin from leaves of *Vachellia nilotica* (L.) Phytosomal complexes were prepared by complexation of quercetin with phosphatidylcholine using thin-film hydration technique followed by sonication. The resulting phytosomal formulations were characterized for particle size distribution, polydispersity index, zeta potential, and drug entrapment efficiency using dynamic light scattering (DLS). FTIR spectroscopy was employed to confirm quercetin–phospholipid complexation, and solubility studies were conducted to compare free quercetin and phytosomal quercetin.

Results
Phytosomes showed a mean particle size~200 nm, narrow distribution, and zeta potential consistent with colloidal stability. Drug entrapment efficiency exceeded 80% across formulations. FTIR analyses confirmed successful complex formation between quercetin and phosphatidylcholine. Phytosomes markedly improved quercetin's aqueous solubility and *in vitro* dissolution compared to the free form.

Conclusion
The development of quercetin as a phytosomal complex greatly increased the rate of solubility and dissolution, which means the oral bioavailability. Phytosomal delivery offers a viable strategy to overcome quercetin's biopharmaceutical limitations in nutraceutical formulations.

Keywords: Quercetin, *Vachellia nilotica(L)*, Phytosome, Bioavailability, Aqueous solubility, Lipid-based drug delivery.

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Abstract No.: GNIPST/FMPASTII/P110

LIPID–POLYMER HYBRID NANOPARTICLES AS A PROMISING PLATFORM FOR TARGETED AND MULTIMODAL CANCER THERAPY

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Abstract

Objective
Lipid–polymer hybrid nanoparticles (LPHNPs) have emerged as advanced nanocarrier systems that integrate the favorable attributes of polymeric and lipid-based delivery platforms. The objective of this review is to critically evaluate the structural design principles, synthesis strategies, targeting mechanisms, and translational relevance of LPHNPs in the context of cancer therapeutics.

Methods
This review is based on a systematic analysis of peer-reviewed literature focusing on recent high-impact studies related to LPHNP formulation, physicochemical characterization, targeting strategies, and therapeutic performance. Comparative evaluation of one-step and two-step synthesis approaches, hybrid nanoparticle architectures, and surface functionalization techniques was undertaken to assess their influence on drug encapsulation efficiency, release behavior, biological interaction, and non-clinical efficacy.

Results
Lipid–polymer hybrid nanoparticles combine the mechanical stability and controlled drug release characteristics of polymeric cores with the biocompatibility and functional versatility of lipid shells, resulting in synergistic performance advantages over conventional nanocarriers. This hybrid architecture enhances drug loading, prolongs systemic circulation, and facilitates effective tumor accumulation through both passive targeting via the enhanced permeability and retention (EPR) effect and active ligand-mediated targeting. Compared with traditional delivery systems, LPHNPs demonstrate improved cellular uptake, favorable biodistribution profiles, and reduced off-target toxicity. Additionally, their capacity to co-deliver multiple therapeutic agents, genetic materials, or imaging probes supports multimodal and combination therapy strategies aimed at addressing tumor heterogeneity and drug resistance.

Conclusion
Lipid–polymer hybrid nanoparticles represent a versatile and powerful nanoplatform for next-generation cancer therapy, offering a balanced integration of efficacy, safety, and adaptability. Nevertheless, challenges associated with large-scale manufacturing, formulation reproducibility, regulatory standardization, and long-term safety assessment remain. Addressing these issues through optimized synthesis protocols and rigorous preclinical evaluation will be essential to advance the translational potential of LPHNP-based systems.

Keywords: Lipid–Polymer Hybrid Nanoparticles; Cancer Therapeutics; Targeted Drug Delivery; Nanomedicine; Controlled Release; Tumor Targeting; Combination Therapy; Translational Research.

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Abstract No.: GNIPST/FMPASTII/P111

PHYTOSOMAL DELIVERY OF MYRICETIN FOR ENHANCED BIOAVAILABILITY AND PRECLINICAL ANTI-DIABETIC POTENTIAL

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Abstract

Objective
Myricetin, a bioactive flavonol with reported antioxidant and anti-diabetic potential, is limited by poor aqueous solubility, low intestinal permeability, and rapid metabolic clearance, which collectively restrict its oral bioavailability and translational applicability. The objective of this review is to critically evaluate phytosomal delivery systems for myricetin, with emphasis on formulation design principles, physicochemical attributes, bioavailability enhancement mechanisms, and implications for preclinical anti-diabetic activity.

Methods
A structured narrative–systematic review was conducted following PRISMA 2020 recommendations. Major scientific databases, including PubMed, Scopus, Web of Science, Embase, and Google Scholar, were surveyed for studies reporting myricetin–phospholipid complexes or nano-phytosomal formulations. Eligible reports were analyzed for preparation strategies, critical quality attributes (particle size, zeta potential, entrapment efficiency), solid-state and spectroscopic characterization, *in vitro* release and permeability behavior, and available preclinical pharmacokinetic or mechanistic anti-diabetic evidence.

Results
The reviewed literature indicates that myricetin forms stable non-covalent complexes with phosphatidylcholine, yielding nanoscale phytosomes with high entrapment efficiency, improved dispersibility, and enhanced membrane affinity. Phytosomal complexation provides protection against gastrointestinal degradation and significantly improves *in vitro* permeability compared with free myricetin. While several studies demonstrate favorable physicochemical profiles and preserved biological activity, direct correlations between optimized phytosome design, systemic exposure, and anti-diabetic outcomes remain insufficiently explored.

Conclusion
Phytosomal delivery represents a rational and promising nano-enabled strategy to overcome the biopharmaceutical limitations of myricetin. By enhancing intestinal absorption and exposure, myricetin phytosomes may amplify preclinical anti-diabetic mechanisms. Future investigations should prioritize systematic formulation optimization, *in vivo* pharmacokinetic validation, release-kinetic modeling, and translational robustness to support further non-clinical development.

Keywords: Myricetin; Phytosome; Phospholipid Complex; Bioavailability Enhancement; Nano-Delivery Systems; Anti-Diabetic Mechanisms

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Abstract No.: GNIPST/FMPASTII/P112

CHEMICAL MODIFICATION OF *ARTOCARPUS HETEROPHYLLUS* BIOPOLYMER FOR PHARMACEUTICAL, ENVIRONMENTAL, BIOMEDICAL AND FOOD APPLICATIONS

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Abstract

Objective
Extracted biopolymers like starch, cellulose and mucilage of *Artocarpus heterophyllus* jackfruit can be used as a coating material or to form a film for controlled drug delivery system. In order to enhance their physicochemical and functional properties for pharmaceutical, environmental, biomedical, and food applications, the biopolymers are being chemically modified in the current study.

Methods
The extracted polymers were subjected to different chemical modification processes like carboxymethylation, acetylation, and oxidation to improve their structural and functional characteristics.

Both native and modified biopolymers were characterised using Fourier Transform Infrared Spectroscopy (FTIR), UV visible Spectroscopy, thermal analysis, and rheological and swelling studies. Their application potential will be further evaluated through *In-silico* studies for toxicity and bio-compatibility. Functional assessments will be performed relevant to food systems.

Results
The chemical modifications were confirmed by Fourier Transform Infrared Spectroscopy (FTIR) and UV-Visible Spectroscopy. Different functional groups relevant to different modifications were observed. Chemical modification resulted in significant alterations in the molecular structure and surface morphology of the biopolymers. Texture-modifying characteristics were observed, indicating their suitability for biomedical and food-related applications.

Conclusion
These observations demonstrate the utility of chemical modification of *Artocarpus heterophyllus* biopolymers. It significantly enhances their functional performance, making them promising sustainable alternatives to synthetic polymers. These modified biopolymers have a wide range of applicability in drug delivery, environmental remediation, biomedical materials, and food technology. Further optimization and scale-up investigations are recommended to facilitate their commercial and industrial utilization.

Keywords: *Artocarpus heterophyllus* Biopolymers, carboxymethylation, acetylation, oxidation, controlled drug delivery system.

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Abstract No.: GNIPST/FMPASTII/P113

ROLE OF NANOMEDICINE IN TARGETED CANCER TREATMENT: CURRENT ADVANCES AND FUTURE PERSPECTIVES

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Abstract

Objective
The objective of this study is to highlight the role of nanomedicine in improving the efficacy and safety of targeted cancer therapy by enhancing selective drug delivery to tumour cells while minimizing off-target toxicity, poor solubility, and multidrug resistance.

Methods
Relevant studies on nanomedicine-based targeted cancer therapy were identified through a systematic search of PubMed, Scopus, Web of Science, Google Scholar, and ScienceDirect. MeSH terms and keywords were used, and English-language original research articles, reviews, and clinical studies were included.

Results
The review identifies emerging strategies including theragnostic nanomedicine integrating diagnostic and therapeutic functions, stimuli-responsive nanoparticles enabling controlled drug release, and advanced nanomedicine-based immunotherapy and gene delivery systems as promising next-generation cancer therapies. The reviewed literature highlighted several challenges, including variability in the EPR effect among patients, potential nanotoxicity, manufacturing scalability, and regulatory complexities. These factors continue to limit the widespread clinical translation of nanomedicine-based targeted therapies.

Conclusion
Advances in nanocarrier design and targeting strategies have enhanced therapeutic outcomes; however, challenges related to clinical translation, toxicity, and regulation must be addressed to enable widespread clinical application. While challenges such as tumour heterogeneity and limited penetration into solid tumours still exist, ongoing research and technological advancements are expected to overcome these limitations. Overall targeted cancer therapy offers a patient-friendly alternative to conventional chemotherapy.

Keywords: Nanomedicine, nanoparticles, Enhanced Permeability and Retention (EPR) Effect, drug delivery system, cancer therapy, chemotherapy, liposomes

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Abstract No.: GNIPST/FMPASTII/P114

FENTANYL CONTAMINATION AND SYSTEMIC FAILURE: A COMPARATIVE REGULATORY ANALYSIS OF ARGENTINA AND INDIA

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Abstract

Objective
To analyze the systemic failures underlying the Argentine fentanyl contamination crisis and to examine India's regulatory and production challenges related to fentanyl and its precursors.

Methods
We conducted a comparative case-study analysis using official investigation reports, regulatory communications, and published literature. The Argentine incident was reviewed in detail, alongside India's legal framework under the NDPS Act, manufacturing controls, and precursor export data.

Results
The analysis found that the Argentine crisis resulted from critical manufacturing lapses: sterile fentanyl vials were contaminated with multidrug-resistant bacteria, reflecting failures in aseptic processing and quality control. Notably, prior regulatory warnings had been ignored. In India, fentanyl is legally produced for medical use, but enforcement gaps persist. Although two major fentanyl precursors are controlled, many analogues and alternative synthetic routes remain unregulated. Recent assessments implicate India as a significant source of illicit fentanyl precursor chemicals in global trafficking networks.

Conclusion
The Argentine contamination incident underscores the need for rigorous GMP and pharmacovigilance. Both Argentina and India should strengthen adherence to international pharmaceutical quality standards (e.g., ICH Q8–Q10) and adopt Quality-by-Design (QbD) and continuous verification processes. Enhanced inter-agency coordination, real-time surveillance, and cross-border cooperation are essential to prevent future fentanyl-related public health disasters.

Keywords: Fentanyl citrate, pharmaceutical contamination, Sterility assurance, Good Manufacturing Practices (GMP), Pharmacovigilance, Quality by Design (QbD), Regulatory oversight, Cross-border cooperation

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Abstract No.: GNIPST/FMPASTII/P115

PRECISION PHAGE-ANTIBIOTIC SYNERGY (PPAS) FOR MDR *ACINETOBACTER BAUMANNII*: BRIDGING THE TRANSLATIONAL GAP FROM BIOFILM MECHANISMS TO CLINICAL REGULATION

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Abstract

Objective
The escalating burden of *Acinetobacter baumanii* which is resistant to Carbapenem in ICUs demand alternative treatments beyond the depleted antimicrobial arsenal. Phage–antibiotic synergy has proven its potential for clinical trial success. However, its translation to the clinic is currently hindered by biological variability and regulatory issues. Objective of this study and the translational road-map offer an analysis of the translational challenges faced by Phage-Antibiotic Synergy and proposes standardized framework.

Methods
A comprehensive literature search was conducted regarding the interaction between the phages and the bacterium, mechanism of biofilm lysis, and the evolutionary trade-offs in the drug resistant isolates. Results were synthesized according to the current priorities of antimicrobial resistance surveillance.

Results
Five translational hurdles were identeified. The heterogeneity of ICU strains challenges the idea of a fixed phage cocktail strategy, thus requiring an adaptive phage library. The effectiveness of treatment is also hindered by biofilm resistance, where effectiveness relies on identifying depolymerase-producing phages that target exopolysaccharides to improve antibiotic diffusion. It is also important to note that resistance to phage therapy often comes with fitness costs paradoxically it re-sensitizes bacteria to antibiotics. Unlike small-molecule drugs, phages have self-replicating, nonlinear pharmacokinetics that limit the use of traditional dose-response models. Additionally, the lack of access to regulatory-grade manufacturing facilities currently limits the use of phage therapy.

Conclusion
A rapid response synergy framework that links profiling of isolates and adaptive phage screening to synergy testing and then tailored clinical treatment can be considered. The Phage therapy should not be considered as a mono therapy but as an adjunct that salvages “lost” antibiotics

Keywords: MDR *Acinetobacter baumannii*, Phage-Antibiotic Synergy (PAS), Biofilm Depolymerase, Translational Microbiology, Regulatory Framework.

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Abstract No.: GNIPST/FMPASTII/P116

COMPARATIVE STUDY OF INTERNATIONAL REGULATION OF EYE CARE PRODUCTS

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Abstract

Objective
Eye care products, including contact lenses, lens solutions, sunglasses, and reading glasses, have widespread applications in this area and directly interact with tissues in the eye, thus requiring rigorous regulation. This review seeks to assess different international regulations for eye care products to highlight areas for improvement in regulation.

Methods
A structured review of the regulatory guidelines, standards, and official publications from major international and national authorities was conducted, including the U.S. Food and Drug Administration, European Commission, Health Canada, Central Drugs Standard Control Organisation, World Health Organisation, and International Organisation for Standardisation. The regulatory requirements on product classification, safety, manufacturing practice, labeling, approval process, and post-market surveillance were obtained and comparatively analyzed.

Results
The review has pointed out the existence of marked discrepancies in the regulatory systems adopted in different geographic parts of the world. Contact lenses, along with eye solutions, exist in the market as regulated medical devices, the sale of which needs pre-market approval, while sunglasses and reading glasses mostly come under consumer goods involving less rigorous regulation, depending on the region. ISO norms form the basis of the technical systems, but the degree of enforcement differs greatly.

Conclusion
Though strong regulatory frameworks are in place, there are challenges in terms of fragmentation & lack of harmonization. Implementation of risk classification, enhanced post-market control, harmonized international standards, & preparedness regarding new technology are required in order to promote safety, quality, & accessibility of eye care products worldwide.

Keywords: Eye care products, Regulatory frameworks, Medical device regulation, International harmonisation, Post-market surveillance, Product safety and quality

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Abstract No.: GNIPST/FMPASTII/P117

DECIPHERING THE REDOX-INFLAMMATORY AXIS IN CVD: *IN VITRO* EVIDENCE OF NLRP3-DRIVEN ENDOTHELIAL DYSFUNCTION AND PRECISION THERAPEUTICS

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Abstract

Objective
Cardiovascular diseases (CVDs) represent a major global health burden resulting from complex biochemical and structural vascular degeneration. This presentation aims to summarize recent clinical and mechanistic evidence supporting the role of the redox-inflammatory axis in CVD progression, with emphasis on oxidative stress, endothelial dysfunction, and inflammatory signaling pathways.

Methods
Relevant experimental and clinical studies were reviewed to evaluate the contribution of oxidative stress and inflammation in cardiovascular pathology. Key molecular pathways involving reactive oxygen species (ROS) generation, enzymatic sources such as NADPH oxidase (NOX) and xanthine oxidase (XO), endothelial nitric oxide signaling, NLRP3 inflammasome activation, and cytokine involvement including interleukin-17A (IL-17A) were analyzed. Clinical data comparing acute coronary syndromes (ACS) and chronic coronary syndromes (CCS) were also examined.

Results
Excessive ROS production promotes lipid peroxidation, mitochondrial dysfunction, and vascular remodeling. Dysregulated NOX and XO activity contributes to endothelial dysfunction, marked by reduced nitric oxide bioavailability and a pro-inflammatory, pro-thrombotic state. Activation of the NLRP3 inflammasome links oxidative stress to sustained vascular inflammation through increased IL-1β and IL-18 release. Comparative clinical evidence indicates no significant difference in circulating IL-17A levels between ACS and CCS, suggesting a predominantly localized vascular role.

Conclusion
The redox-inflammatory axis is central to CVD pathogenesis. A multi-targeted therapeutic approach combining selective antioxidants, NLRP3 inhibition, and metabolic modulators **such as** SGLT2 inhibitors may enhance endothelial protection and support precision cardiovascular therapy.

Keywords: Cardiovascular diseases (CVDs), Redox–inflammatory axis, Oxidative stress, Reactive oxygen species (ROS),Endothelial dysfunction,NLRP3 inflammasome,Interleukin-17A (IL-17A),Precision medicine

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Abstract No.: GNIPST/FMPASTII/P118

IDENTIFICATION OF POTENTIAL INHIBITORS OF FLAGELLAR PROTEIN FLIH, FLII, FLIJ SWITCH COMPLEX IN UROPATHOGENIC *ESCHERICHIA COLI* VIA VIRTUAL SCREENING

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Abstract

Objective
Uropathogenic Escherichia coli (UPEC) depends on flagellar motility for colonization, biofilm formation, and virulence. The FliH/FliI/FliJ switch complex is essential for flagellar protein export and assembly, making it a promising anti-virulence drug target. This study aimed to identify potential small-molecule inhibitors of the FliH/FliI/FliJ complex using structure-based virtual screening.

Methods
The three-dimensional structure of the FliH/FliI/FliJ complex was prepared and validated. A chemical library containing 70 compounds was subjected to structure-based virtual screening. Top-ranked molecules were selected based on docking score and binding interactions. Drug-likeness and ADMET properties were evaluated to filter potential leads. Molecular interactions between ligands and key active-site residues were analyzed using molecular docking.

Results
Virtual screening identified 10 lead candidates with docking scores ranging from -7 to -14 kcal/mol. Lead compound Sianomycin(13881180) formed stable hydrogen bonding and hydrophobic interactions with critical residues of the switch complex. ADMET analysis showed acceptable pharmacokinetic properties. Molecular dynamics studies demonstrated stable RMSD values indicating stable protein–ligand complex formation.

Conclusion
The identified lead compound shows promise as an inhibitor of the FliH/FliI/FliJ switch complex, potentially reducing UPEC virulence by disrupting flagellar assembly. These findings provide a computational basis for further experimental validation.

Keywords: Flagellar assembly, FliH/FliI/FliJ complex, Uropathogenic E.coli, Virtual screening, Molecular docking, Anti-virulence therapy

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Abstract No.: GNIPST/FMPASTII/P119

SYNTHESIS AND PERFORMANCE ANALYSIS OF SUGARCANE BAGASSE–BASED ADSORBENT IN REMOVAL OF INDIGO CARMINE DYE IN WASTEWATER

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Abstract

Objective
To prepare and analyze a low-cost, environment-friendly adsorbent based on sugarcane bagasse to remove the dye Indigo Carmine (IC) of aqueous wastewater.

Methods
The agro-industrial waste, sugarcane bagasse, was utilized as an adsorbent by processing it. To begin with, Sugarcane bagasse underwent a washing process, and then boiled to extract soluble impurities, dried by oven at 68 °C, ground and sieved (less than 125 µm). Activation of the chemical was made by immersing 100 g of powder in 250 mL concentrated H 2 SO 4 (98%) at 70 °C and left to act 1 h. The sample was washed to a neutral pH, dried in the oven and put away. The impacts of pH, concentration of dye, contact time, agitation rate, and temperature were tested on batch adsorption experiments. Kinetic (pseudo-first-order, pseudo-second-order, intraparticle diffusion), isotherm (Langmuir, Freundlich, Temkin), and thermodynamic parameters (ΔG°, ΔH°, and ΔS°) were examined.

Results
The best operating conditions were found to be: adsorbent dose 100mg/100ml dye solution, pH 6, agitation rate 120 rpm and temperature 298 K. In such circumstances, it obtained removal efficiency of about 91-92% of a 10 ppm solution of Indigo Carmine. The data on adsorption indicated that there was good correspondence with the kinetic and the isotherm models that had been used clearly showing good uptake of the dye with favorable adsorption characteristics.

Conclusion
The experiment proves that bagasse sugarcane is a cost-effective, efficient, and eco-friendly adsorbent which can be used to remove the Indigo Carmine dye in wastewater. According to the findings, the use of agricultural waste as a sustainable wastewater treatment material is supported and can help in the development of greener strategies of pollution control.

Keywords: Environmental-friendly; Indigo Carmine; Adsorbent; Agro-industrial waste; Intraparticle diffusion; Sustainable; Greener strategies

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Abstract No.: GNIPST/FMPASTII/P120

DEVELOPMENT OF PHYSICALLY AND OXIDATIVELY STABLE EGG-FREE MAYONNAISE USING MICROWAVE-ASSISTED CHICKPEA AQUAFABA

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Abstract

Objective
To evaluate the potential of microwave-treated chickpea aquafaba as a clean-label, plant-based emulsifier for egg-free mayonnaise, with a focus on its physical and oxidative stability and its applicability in energy-efficient emulsion-based food systems.

Methods
Formulations based on mayonnaise were made using microwave-assisted aquafaba at varying aquafaba–oil ratios. Emulsion stability, thermal stability, and oxidative stability were evaluated. Oxidative stability was evaluated using peroxide value and the effect of bioactive compounds including proteins, polysaccharides, and saponins preserved and improved by the use of microwave processing were analysed.

Results
Mayonnaise formulations made with the help of microwave-assisted aquafaba demonstrated good emulsion and thermal stability at a favourable aquafaba to oil proportion. The moderate microwave treated aquafaba (23-25%) and high concentration of oil (55%) formulation had high emulsion stability (70-72%) and excellent thermal stability (80%), indicating that the formulation was stable to centrifugal forces and was not separated by heat. High concentrations of proteins, dry matter, and emulsifying capacity of microwave-treated aquafaba explained this stability and assisted in encouraging interfacial films development and formation of oil droplets that were uniform in shape. The sample of all microwave-aquafaba mayonnaise samples represented low peroxide values in reasonable ranges, which means that lipid oxidation was inhibited in a successful way, which is supported by bioactive molecules, such as proteins, polysaccharides and saponins.

Conclusion
Altogether, microwave-treated aquafaba facilitates the production of stable, egg-free mayonnaise with desirable tolerance to physical and oxidative destruction, supporting its use as a functional emulsifier in clean-label, plant-based emulsion technology.

Keywords: Microwave-treated aquafaba; Egg-free mayonnaise; Emulsion stability; Thermal stability; Oxidative stability; Plant-based emulsifier

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Abstract No.: GNIPST/FMPASTII/P121

APART FROM DRUG RELEASE: HOW VAGINAL MICROBIOTA AND BIOFILMS SHAPE POLYMERIC RING-BASED THERAPIES

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Abstract

Objectives

Polymeric vaginal rings are widely employed for sustained and localized drug delivery in the prevention and management of gynaecological and sexually transmitted diseases. This work aims to highlight the critical influence of vaginal microbiota and biofilm formation on the performance, stability, and therapeutic efficacy of polymeric vaginal ring–based drug delivery systems.

Methods

A comprehensive analysis of current literature was conducted to evaluate interactions between polymeric vaginal rings, resident vaginal microbiota, and microbial biofilms. Emphasis was placed on understanding the role of lactobacillus-dominated microbiota, dysbiosis-associated alterations in vaginal ph, enzymatic activity, and microbial metabolites, and their impact on polymer behaviour, drug diffusion, and stability. Recent advances in polymer engineering and biofilm-resistant material design were also reviewed.

Results

The vaginal environment represents a dynamic ecosystem primarily regulated by lactobacillus species, which maintain acidic ph and mucosal defense. Disruption of this microbiota, as observed in bacterial vaginosis, leads to conditions that adversely affect polymer integrity and drug release profiles. Microbial biofilms formed on vaginal mucosa or polymeric ring surfaces act as physical and biochemical barriers, limiting drug penetration and promoting microbial persistence. Biofilm–polymer interactions may induce surface fouling, alter material properties, and cause localized drug depletion. Emerging strategies incorporating biofilm-resistant polymers and co-delivery of antimicrobial or microbiota-modulating agents demonstrate improved therapeutic outcomes.

Conclusion

Integrating microbiome-aware and anti-biofilm strategies into polymeric vaginal ring design is essential for optimizing drug delivery performance. Such approaches offer promising avenues for the development of next-generation vaginal therapies with enhanced efficacy, safety, and patient acceptability.

Keywords: polymeric vaginal rings, vaginal microbiota, biofilm formation, drug delivery systems, lactobacillus, biofilm resistance, sustained release

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Abstract No.: GNIPST/FMPASTII/P122

DEVELOPMENT AND FUNCTIONAL EVALUATION OF HIGH-PROTEIN VEGETARIAN BOILED EGG WHITE ANALOGUES

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Abstract

Objective
The objective of this study was to compare the functional properties of the vegetarian boiled egg white analogues were compared to the boiled egg white.

Methods
Five different formulations of plant-based egg white analogues (Pbe1-Pbe5) were formulated and analyzed for of protein content, foaming capacity, water holding capacity (WHC) and sensory acceptability.

Results
All plant-based egg white formulation exhibits a significantly higher protein level (21.8-32.33 0.0166) when compared to the control (11.80.0059), with Pbe5 having the highest protein level (32.330.0166). The analogues (99.65-99.73) (compared to the control (99.600.0085)) had a slightly but continually higher water-binding capacity than the control, indicating a stronger water-binding capacity of the plant protein-hydrocolloid matrix. In terms of foaming behavior, the boiled egg white had the greatest foaming capacity (2700.135%), the plant-based samples had the lowest foaming capacity (210-220%), but all the analogues had a much better foaming stability (90.0-92.0%) when compared to the control (80.00.04%), which indicates high foaming stability. Moreover, these findings were also supported by sensory analysis where Pbe2 scored the highest overall acceptability score (8.30.3), appearance (8.10.3), texture (8.20.3), taste (8.00.3), and color (8.00.4), representing the greatest sensory similarity to boiled egg white.

Conclusion
These results demonstrate that the ready-prepared plant-based egg white analogs have a much better protein content, a superior water-holding property, and a better foaming stability, with Pbe2 being the interventions with the most functional and sensorially appropriate composition, which reflects their potential to be used successfully as high-protein replacements of traditional egg white in the food industry.

Keywords: Anti-nutrients, bread, gluten-free, ragi, tamarind kernel powder.

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Abstract No.: GNIPST/FMPASTII/P123

AI AND DATA SCIENCE ENABLED STUDY OF MOBILE USE- ASSOCIATED GUT MICROBE PERTURBATIONS

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Abstract

Objective
To model the link between mobile device usage patterns and changes in the gut microbiome using AI-based analysis

Methods
Multimodal datasets collected from 2018 to 2024, which included mobile usage metrics, such as screen time and night-time use, gut microbiome profiles, and information on functional pathways related to stress, inflammation, bile metabolism, and short-chain fatty acid production, were analysed. Adult participants ≥18years were included if they had both mobile usage data and gut microbiome profiles obtained through validated sequencing methods. Relevant information on lifestyle, sleep, and stress were also noted. Non-human or *in vitro* studies, datasets without quantitative mobile usage or microbiome data, diet-only or drug-only interventions without mobile metrics, recent antibiotic or probiotic use in the past three months, diagnosed gastrointestinal or major metabolic disorders, and datasets with poor quality or incomplete metadata were excluded. Advanced machine learning and explainable AI techniques were used to create predictions that connected model outputs to specific microbial taxa and metabolic pathways.

Results
High mobile usage linked to significant changes in gut microbial composition and metabolic functions, especially in pathways related to stress and inflammation, bile acid metabolism, and short-chain fatty acid production. Explainable AI helped identify gut microbiome disturbances from mobile usage patterns earlier than models focusing only on diet or lifestyle. A Digital Lifestyle-Gut Health Index was developed as a potential early warning system for gut health issues.

Conclusion
Mobile lifestyle behaviours are measurable risk factors for gut microbiome imbalance. This study showed the potential of AI-driven gut health monitoring for preventive care and supported health initiatives connected to Sustainable Development Goal 3 (Good Health and Well-Being).

Keywords: Gut microbiome, Mobile usage, Artificial Intelligence, Data science, Gut modelling, Biomarker, Gut health monitoring, Data-driven healthcare

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Abstract No.: GNIPST/FMPASTII/P124

AI-ML DRIVEN EARLY DIAGONISIS OF ALZHIMER'S DISEASE VIA PREDICTIVE MODELLING

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Abstract

Objective
This study focusses on the effectiveness of machine learning-based models for the early detection of Alzheimer's disease (AD) using structured clinical and cognitive data. Early diagnosis is critical due to the rising global burden of Alzheimer's disease and the limited sensitivity of conventional diagnostic methods during early disease stages.

Methods
Reported works suggest that data-driven analytical study, supervised machine learning techniques could be used for patient datasets to preprocess, clean and structure them. Furthermore, Python (2025), with Pandas and NumPy play an important role for data handling, normalization, and feature engineering. This work focusses on multiple classification algorithms (using the Scikit-learn framework) for training and validation. Also, Matplotlib contributes to model performance and disease-related patterns visualization. Here, key parameters include cognitive assessment scores and clinical indicators associated with early-stage Alzheimer's disease.

Results
The machine learning models demonstrated improved capability in identifying early Alzheimer's disease patterns and differentiating affected individuals from normal cognitive aging. The models showed enhanced predictive accuracy and consistency, indicating that machine learning techniques can capture subtle clinical variations often missed by traditional diagnostic approaches.

Conclusion
Machine learning–based diagnostic models offer a reliable and scalable approach for early Alzheimer's disease detection, supporting improved clinical decision-making. This is in congruence with India's National Strategy for Artificial Intelligence by NITI Aayog and caters to global Sustainable Development Goal 3: Good Health and Well-being. Future work could manifest in incorporating neuroimaging and biomarker data and developing clinically deployable screening tools to improve early intervention and patient outcomes.

Keywords: Alzheimer's disease, early diagnosis, machine learning, artificial intelligence, predictive modeling

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Abstract No.: GNIPST/FMPASTII/P125

COMBATING CATHETER ASSOCIATED UTI WITH *CITRUS SINENSIS*-DERIVED HESPERETIN

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Abstract

Objective

Uropathogens responsible for CAUTIs, such as *Escherichia coli, Klebsiella pneumoniae* and *Proteus mirabilis*, are becoming antibiotic-resistant. Urease protects these bacteria from human immune system and antibiotics. Hence, this study aims to correlate role of Hesperetin - a flavonoid type phytochemical, derived from *Citrus sinensis*, to inhibit urease activity.

Methods

This phytochemical-based strategy focuses on combating catheter-associated urinary tract infections (CAUTIs) by modulating urinary pH and inhibiting urease activity. The enzyme urease breaks down urea into ammonia and carbon dioxide, which in turn causes the surrounding environment become more alkaline. Reported works suggest bioactive plant-derived compounds can reduce urine pH < 6.5, thereby preventing urease-mediated alkalinization. Flavanone *Hesperetin*, from citrus fruits, use direct Ni^{2+}-dependent urease inhibition pathway by downregulation of *ureaA* and *B* genes, resulting in reduced ammonia production, urine alkalinization and crystalline biofilm formation. The most potent reason behind this has been reported to be the presence of citric acid as a urine-acidifying, antibacterial and anti-inflammatory agent.

Results

Hesperetin combats UTI by downregulation of biofilm *genes sarA, icaA, and icaD (in S. aureus*), adhesion-related bacterial genes *(sabA, alpA)*, pro-inflammatory cytokines *IL-6* and *Toll-like receptor 4 (TLR4)*. Resulting, reduction of bacterial colonisation and expected to create an unfavourable environment for urease activity.

Conclusion

This novel approach highlights the potential of citrus-derived flavanones and citric acid in CAUTI management by urease inhibition pathway. This study aligns with *National Guidelines for Infection Prevention and Control in Healthcare Facilities* (MoHFW) and addresses global *Sustainable Development Goal: 3 Good Health and Well-Being.*

Keywords: Catheter-associated urinary tract infection, Citrus sinensis, Hesperetin, Naringenin, anti-bacterial activity.

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Abstract No.: GNIPST/FMPASTII/P126

COMPUTATIONAL INVESTIGATION OF SMALL-MOLECULE INHIBITORS TARGETING THE ARLRS REGULATORY SYSTEM FOR ATTENUATING VIRULENCE IN *STAPHYLOCOCCUS AUREUS*

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Abstract

Objective

Staphylococcus aureus, a leading cause of severe infections like bacteremia and endocarditis, drives global antibiotic resistance crises. The ArlRS two-component system (TCS) regulates virulence factors and biofilm formation, emerging as an anti-virulence target. This study identifies small-molecule inhibitors that disrupt ArlRS signalling to attenuate pathogenicity without bactericidal pressure.

Methods

High-throughput virtual screening was conducted using AutoDock to screen a diverse library of small molecules against the ATP-binding domain of the ArlRS sensor kinase. Based on binding affinities, screened ligands were categorised and used to generate pharmacophore models. These pharmacophores were employed to screen multiple chemical databases, and the identified hits were further docked for validation. Pharmacophore features from high-affinity compounds were merged to generate a final optimised pharmacophore model. The shortlisted molecules were evaluated using QSAR analysis, ADMET profiling through SwissADME, and drug-likeness assessment based on Lipinski's Rule of Five.

Results

Pharmacophore-based screening identified a total of 184 compounds. Several lead molecules exhibited strong predicted binding affinities, with ΔG values ranging from −9.5 to −11.2 kcal/mol, outperforming reference compounds. Molecular interaction analysis suggested stable binding within the ATP-binding pocket of the sensor kinase, indicating potential interference with ArlRS signalling. The shortlisted compounds demonstrated favourable predicted drug-like properties and low toxicity risk, supporting their potential for further experimental validation.

Conclusion

This computational study identified promising small-molecule inhibitors of the ArlRS two-component system with strong binding affinity and favourable drug-like properties. These findings support ArlRS as a viable anti-virulence target in *Staphylococcus aureus*, providing a foundation for subsequent experimental investigation.

Keywords: Keywords: ArlRS regulatory system, *Staphylococcus aureus*, small molecule inhibitors, virulence attenuation, antibiotic resistance, in silico drug discovery.

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Abstract No.: GNIPST/FMPASTII/P127

INNOVATIONS IN HEALTHCARE TECHNOLOGIES AND DIAGNOSTICS

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Abstract

Objective

Green-synthesized silver nanoparticles have emerged as promising antiviral agents, integrating sustainable biotechnological processes with nanomedicine. Their eco-friendly synthesis, enhanced bioactivity, and reduced toxicity offer innovative strategies for combating viral infections. This review examines eco-friendly synthesis, antiviral mechanisms, biomedical relevance, and translational potential of sustainable pharmaceutical nanomedicine.

Methods

This review critically evaluates green-synthesized silver nanoparticles (AgNPs) for antiviral applications, emphasizing sustainable plant-based synthesis, physicochemical characterization, antiviral efficacy, and biocompatibility. Optimized synthesis parameters and advanced analytical techniques confirmed stable, functional AgNPs with promising *in vitro* antiviral activity. Despite encouraging results, challenges remain in synthesis standardization, mechanistic understanding, and *in vivo* safety validation. Future research should prioritize scalable production, molecular interaction studies, long-term toxicity assessment, and integration into advanced antiviral drug delivery systems.

Results

Green-synthesized silver nanoparticles exhibit broad antiviral activity, eco-friendly production, and favorable properties. However, standardized synthesis, *in vivo* validation, and safety assessments are needed to advance their promising translational potential in antiviral nanomedicine.

Conclusion

Green-synthesized silver nanoparticles represent a promising synergy between sustainable biotechnology and antiviral nanomedicine. Although literature reports effective antiviral activity, eco-friendly synthesis, and biocompatibility, challenges remain in production standardization, comprehensive toxicity evaluation, and clinical validation for safe therapeutic translation.

Keywords: Green synthesis, Silver nanoparticles, Antiviral nanomedicine, Sustainable biotechnology, Nanoparticle characterization, Antiviral therapeutics

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Abstract No.: GNIPST/FMPASTII/P128

GREEN-SYNTHESIZED SILVER NANOPARTICLES FOR ANTIVIRAL APPLICATIONS: BRIDGING SUSTAINABLE BIOTECHNOLOGY AND NANOMEDICINE – A REVIEW

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Abstract

Objective

Green-synthesized silver nanoparticles have emerged as promising antiviral agents, integrating sustainable biotechnological processes with nanomedicine. Their eco-friendly synthesis, enhanced bioactivity, and reduced toxicity offer innovative strategies for combating viral infections. This review examines eco-friendly synthesis, antiviral mechanisms, biomedical relevance, and translational potential of sustainable pharmaceutical nanomedicine.

Methods

This review critically evaluates green-synthesized silver nanoparticles (AgNPs) for antiviral applications, emphasizing sustainable plant-based synthesis, physicochemical characterization, antiviral efficacy, and biocompatibility. Optimized synthesis parameters and advanced analytical techniques confirmed stable, functional AgNPs with promising *in vitro* antiviral activity. Despite encouraging results, challenges remain in synthesis standardization, mechanistic understanding, and *in vivo* safety validation. Future research should prioritize scalable production, molecular interaction studies, long-term toxicity assessment, and integration into advanced antiviral drug delivery systems.

Results

Green-synthesized silver nanoparticles exhibit broad antiviral activity, eco-friendly production, and favorable properties. However, standardized synthesis, *in vivo* validation, and safety assessments are needed to advance their promising translational potential in antiviral nanomedicine.

Conclusion

Green-synthesized silver nanoparticles represent a promising synergy between sustainable biotechnology and antiviral nanomedicine. Although literature reports effective antiviral activity, eco-friendly synthesis, and biocompatibility, challenges remain in production standardization, comprehensive toxicity evaluation, and clinical validation for safe therapeutic translation.

Keywords: Green synthesis, Silver nanoparticles, Antiviral nanomedicine, Sustainable biotechnology, Nanoparticle characterization, Antiviral therapeutics

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Abstract No.: GNIPST/FMPASTII/P129

PHYSICOCHEMICAL AND ANTIMICROBIAL ASSESSMENT OF A NOVEL GEL-TO-FILM NEOMYCIN DELIVERY SYSTEM

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Abstract

Objective
The study aimed to design and evaluate a gel-to-film neomycin delivery system for a long-lasting antimicrobial barrier in topical infections, aiming for easy application and improved drug adhesion and patient comfort.

Methods
The GTF system was developed with Hydroxypropyl Methylcellulose (HPMC) and Eudragit as polymers and Propylene Glycol as a plasticizer. The formulations underwent several physicochemical assessments including drying time, pH, weight variation, folding endurance, moisture content, moisture uptake and spreadability. In-vitro drug release was evaluated using Franz diffusion cells. The antimicrobial efficacy was tested against *Staphylococcus aureus* and *Escherichia coli* by cup-plate method compared to a standard neomycin ointment.

Results
The optimised formulation showed ideal drying time of 3-5 minutes, forming a flexible, non-sticky, transparent film which releases neomycin sustainably over 8 hours and showed great antimicrobial effectiveness compared to the conventional ointment. Antimicrobial assays showed larger zone of inhibition for the GTF system than the standard neomycin ointment, indicating better drug penetration and bioavailability.

Conclusion
The novel gel-to-film system represents a significant advancement over traditional topical therapies. By combining the ease of a gel with the sustained-release properties of a film, this delivery system ensures prolonged antimicrobial protection, reduced frequency of application, and improved wound coverage.

Keywords: Neomycin, Gel-to-Film, Topical Delivery, Antimicrobial Assessment, Film-Forming Polymers, Sustained Release, Wound Healing.

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NATURAL PRODUCTS AS A PROMISING MODULATOR OF CD8⁺ T CELL PROLIFERATION FOR CANCER IMMUNOTHERAPY: A MECHANISTIC APPROACH

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Abstract

Objective
The treatment of Cancer is the biggest burden in the modern healthcare system as it is one of the leading causes of death. The treatment process is very complex. Currently there is a need of reliable novel approaches for the treatment and cure of Cancer.

Methods
This review summarizes mechanistic approaches about the modulation process of immune response on the immune effectors in cancer immunotherapy like cytotoxic T cells, Natural Killer (NK) cells etc.

Results
Cytotoxic T cells (specifically CD8⁺ T cells) are the most powerful effector in the immunogenic cell death (ICD) of cancer cell. Natural products and their derivatives have different pathways (i.e., T cell proliferation, modulation of B cell effects etc.) in the suppression of cancer. These products have a great role in modulation of cancer microenvironment and pathways like apoptosis, autophagy, Notch pathway, Wnt pathway, and Hedgehog pathway. Immune checkpoints or coinhibitory receptors (i.e., CTLA-4 and PD-1) carry out significant role in regulation of T cell response. Inhibiting these proteins lead to a stronger immunity against cancer.

Conclusion
Different natural produces like cardiotonic steroids, terpenoids, polysaccharides have promising effect in anticancer immunotherapy. By modulation of immune signalling pathways (like JAK/STAT, PI3K/Akt, MAPK, NF-kB) and improving antigen presentation these compounds can potentiate the body's own immune response against cancer.

Keywords: Cancer, CD8⁺ T cell, Apoptosis, immunity, immunotherapy.

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Abstract No.: GNIPST/FMPASTII/P131

ENGINEERING VECTOR SYMBIONTS FOR MEDICAL CONTROL OF INTRACELLULAR PATHOGENS: A PARATRANSGENIC BIOTECHNOLOGY APPROACH

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Abstract

Objective

Large number of intracellular pathogens causing human and animal diseases relay on invertebrate vectors' involvement in their complete life cycle constituting an active biological interplay between the vertebrate host and the arthropod carrier. Vectors during blood feeding, like mosquitoes, ticks, and bugs obtain certain pathogens of infected hosts and cause infection of organs like midgut, salivary glands etc. The intracellular survival allows pathogen to escape immune action by vectors enabling them to deliver the pathogen effectively to a new vertebrate host, making the vectors an active biological reservoir.

Methods

Traditional medical approach of using antimicrobial or antiviral treatment and the control of the vectors is mainly based on the use of a chemical insecticide that neglects the destruction of the pathogen in the transmission cycle. Whereas in paratransgenesis process, it genetically modifies naturally symbiotic microorganisms in the vector to generate molecules that inhibit the pathogen survival, proliferation or their invasion by the tissues of the host.

Results

These genetically engineered symbionts produce antimicrobial peptides, immunomodulatory factors or transmitterase enzymes directly at sites of infections destroying pathogens in the vector and reducing transmission of these pathogens further. This is applicable medically as a population level preventive treatment minimize the exposure rates and reinfection rate.

Conclusion

Through improvements in microbial engineering and symbiont stability approaches, paratransgenesis can be seen as a promising medical intervention that can make a combination between the science of vectors and disease prevention, along with a sustainable way to control intracellular pathogens that propagates by invertebrate vectors.

Keywords: Vector, host, Paratransgenesis, genetically modifies, Invertebrate, engineered symbionts, preventive treatment, microbial engineering, sustainable.

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Abstract No.: GNIPST/FMPASTII/P132

MAPPING OF TREM2 IN THE CONTROL OF MICROGLIAL FUNCTION AS A TRIGGER FOR ALZHEIMER'S DISEASE

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Abstract

Objective
This study aims to map the regulatory role of TREM2 in controlling microglial phagocytic activity, lipid metabolism, and inflammatory signalling and to determine how alterations in TREM2 expression are associated with microglial dysfunction in Alzheimer's disease.

Methods
Expression levels of TREM2 and selected downstream markers involved in phagocytosis, lipid transport, and cytokine production were reported to be organized into gene-gene and gene-pathway interaction matrices. Comparative analysis of these datasets has been key factors in construction of microglial regulatory network models. Correlation study between TREM2 activity and key functional readouts were indicative of homeostatic versus disease-associated microglial states. Statistical association mapping was found to be related to TREM2 expression levels with cytokine profiles and phagocytosis-related gene signatures.

Results
Reduced TREM2 expression were reported to show a negative correlation with genes associated with phagocytic clearance and lipid processing, and a positive correlation with pro-inflammatory cytokine markers. Conversely, higher TREM2 activity was reported to correlate with maintenance of homeostatic microglial signatures and suppression of chronic inflammatory signalling, supporting its role in preserving neuroprotective microglial function.

Conclusion
These findings establish TREM2 as a central molecular regulator of microglial functional balance confirm that disruption of TREM2-controlled pathways drives the transition toward pro-inflammatory, neurotoxic microglial states in Alzheimer's disease. Knowledge of this regulatory network could have a future impact of mechanistic insight into how immune dysregulation contributes to synaptic loss and neuronal vulnerability. Further, specific molecular nodes may be targeted to restore phagocytic competence and inflammatory control, thereby offering a microglia-directed therapeutic strategies, in future.

Keywords: TREM2, Microglia, Alzheimer's disease, Neuroinflammation, Phagocytosis, Neurodegeneration

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Abstract No.: GNIPST/FMPASTII/P133

IN SILICO DRUG REPURPOSING TARGETING KRAS G12D: A PHARMACOPHORE-BASED VIRTUAL SCREENING AND MOLECULAR DYNAMICS STUDY FOR NOVEL BREAST CANCER THERAPEUTICS

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Abstract

Objective

The objective of this study was to identify potential drug-repurposing candidates targeting the KRAS G12D mutation, a critical oncogenic driver associated with aggressive and treatment-resistant breast cancer subtypes, using an integrated computational drug discovery approach.

Methods

An integrated in silico workflow was employed. A Tier-1 molecular dataset comprising compounds reported in the Chambal database with experimentally validated bioactivity values (IC_{50}, K_i, Kd, or related activity endpoints) against KRAS G12D was curated and utilized to develop and validate a robust three-dimensional pharmacophore model. The validated pharmacophore was subsequently used to screen a curated library of FDA-approved and clinical-stage compounds. High-affinity candidates were shortlisted through pharmacophore-based virtual screening and further refined by molecular docking against the KRAS G12D crystal structure (PDB ID: 7RPZ) using the Auto Dock-FR (ADFR) suite. The stability, conformational behavior, and binding energetics of the top-ranked ligand–protein complexes were evaluated through 200 ns molecular dynamics simulations using NAMD2.

Results

Pharmacophore-based virtual screening identified approximately 250 compounds exhibiting strong pharmacophore mapping and favorable binding features. Molecular docking and molecular dynamics analyses revealed that several lead candidates demonstrated stable binding conformations and favorable interaction energies within the Switch-II inhibitory pocket of KRAS G12D, suggesting effective engagement of key residues involved in oncogenic signaling.

Conclusion

This study establishes a robust and systematic computational framework for the identification of repurposable inhibitors targeting KRAS G12D. The identified candidates exhibit promising binding stability and mechanistic relevance, supporting drug repurposing as a rapid and cost-effective strategy for advancing therapeutic research in KRAS-driven breast cancer.

Keywords: KRAS G12D; Drug Repurposing; Breast Cancer; Pharmacophore Modelling; Molecular Docking (ADFR); Molecular Dynamics; Virtual Screening

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SOCIAL MEDIA-BASED PHARMACOVIGILANCE (DIGITAL PV)

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Abstract

Objective
Pharmacovigilance (PV) ensuring patient safety by identifying, and preventing adverse drug reactions (ADRs) during the post-marketing phase of medicines. Conventional PV systems rely on voluntary reports from health care providers and patients, however these systems are often limited by underreporting, reporting delays, and variable report quality. This study aims to evaluate the potential of AI driven social media surveillance as an adjunct to traditional PV systems for the early detection of ADR signals.

Methods
A large-scale analysis of unstructured social media data was conducted using artificial intelligence and natural language processing (NLP) techniques. Approximately 60,000 publicly available health-related posts from platforms such as Twitter, Facebook, PatientsLikeMe, and the PvPI mobile application were analyzed over a six-month period. NLP models were employed to extract drug–ADR associations, eliminate irrelevant content, normalize slang expressions into standardized medical terminology, and enable automated signal detection.

Results
The AI-derived digital pharmacovigilance method enabled the identification of a new ADR signal approximately 10 weeks faster than traditional spontaneous reporting systems. The method provided access to under-represented patient populations and offered real-world insights into medication use and patient experiences. However, several detected signals required further expert review and clinical validation due to data noise.

Conclusion
Digital pharmacovigilance utilizing social media data and AI technologies represents a promising complementary strategy to traditional PV systems. While challenges such as data quality, and limited regulatory guidance persist, the integration of AI driven social media surveillance can enhance evidence-based monitoring of drug safety.

Keywords: Digital Pharmacovigilance, Social Media Analytics, Artificial Intelligence, Natural Language Processing, Signal Detection

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Abstract No.: GNIPST/FMPASTII/P135

NANOROBOTICS IN ANTIMICROBIAL THERAPY: A NEW FRONTIER IN INFECTION CONTROL

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Abstract

Objective
The rise of antimicrobial resistance and biofilm-associated infections has reduced the effectiveness of traditional antimicrobial treatments. Challenges such as systemic toxicity, poor biofilm penetration, and non-specific drug distribution impede effective infection control. Nanorobotics is emerging as a promising therapeutic approach that addresses these challenges through controlled movement and active targeting at the microscale. The objective of this review is to critically assess current research on nanorobotics in antimicrobial therapy, with a focus on design principles, antimicrobial mechanisms, therapeutic advantages, and potential applications in infection control.

Methods
We did a systematic review of the literature using the Scopus, Elsevier, MDPI, Springer, and ScienceDirect databases. The search focused on peer-reviewed studies and high-impact articles from the last ten years that looked at specific uses of magnetically, chemically, and acoustically propelled nanomotors in antibacterial therapy.

Results
The AI-derived digital pharmacovigilance method enabled the identification of a new ADR signal approximately 10 weeks faster than traditional spontaneous reporting systems. The method provided access to under-represented patient populations and offered real-world insights into medication use and patient experiences. However, several detected signals required further expert review and clinical validation due to data noise.

Conclusion
Nanorobotics is a promising new development in antimicrobial therapy that could greatly improve infection control. It will be important to deal with problems with safety, scalability, and getting regulatory approval before clinical use can happen.

Keywords: Nanorobotics, Antimicrobial Therapy, Infection Control, Biofilm Targeting.

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EMERGING PROBIOTICS FOR CONTROLLING *ENTEROCOCCUS FAECALIS* GROWTH AND BIOFILM FORMATION

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Abstract

Objective
To isolate and characterize probiotic bacterial strains capable of inhibiting *Enterococcus faecalis* growth and biofilm formation under high-salinity conditions, and to evaluate their suitability as potential biotherapeutic agents.

Methods
Probiotic strains were isolated and screened for antagonistic activity against *E. faecalis*. A promising isolate was subjected to phenotypic characterization and molecular identification. Probiotic attributes were assessed through bile salt resistance, low-pH tolerance, and NaCl endurance assays to determine gastrointestinal survivability. Antimicrobial activity was evaluated using co-culture inhibition and agar diffusion methods. Biofilm inhibition was analyzed using crystal violet staining and microscopic observation. Metabolite profiling was performed to identify inhibitory compounds, and adhesion ability along with survival in simulated gastric conditions was examined to assess functional efficacy.

Results
Several isolates exhibited significant antimicrobial activity, leading to marked reductions in *E. faecalis* viability and disruption of early-stage biofilm formation. The effective strains demonstrated strong tolerance to acidic pH, bile salts, and elevated NaCl concentrations, indicating high stability in gastrointestinal environments. Metabolite analysis revealed organic acids and secondary metabolites as the primary contributors to antibacterial activity. Additionally, the most potent strains displayed superior adhesion properties and enhanced survival under simulated gastric conditions, supporting their probiotic applicability.

Conclusion
The findings demonstrate that selected probiotic strains possess strong anti-*E. faecalis* and antibiofilm activities and exhibit favorable physiological resilience for gastrointestinal use. These properties highlight their potential as sustainable alternatives to conventional antibiotics. Further mechanistic studies and *in vivo* validation are required to facilitate clinical translation and application in infection prevention and gut microbiota modulation strategies.

Keywords: *Enterococcus faecalis,* Probiotics, Biofilm formation.

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HEPATOPROTECTIVE ACTIVITY OF BOTTLE GOURD PEEL EXTRACTS ON PARACETAMOL INDUCED HEPATOTOXICITY IN RATS

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Abstract

Objective
The present study was designed to evaluate the hepatoprotective activity of hydro-alcoholic peel extract of *Lagenaria siceraria* (bottle gourd) against paracetamol-induced hepatotoxicity in Wistar albino rats.

Methods
Bottle gourd peels were shade-dried, powdered and subjected to hydro-alcoholic extraction by maceration. Phytochemical screening was carried out, followed by in-vitro antioxidant evaluation using DPPH radical scavenging and hydrogen peroxide scavenging assays. Total phenolic and flavonoid contents were quantified using gallic acid and quercetin standards, respectively. Hepatotoxicity was induced in rats using paracetamol (1 g/kg). Animals were treated with *L. siceraria* peel extract at doses of 250 and 500 mg/kg and compared with the standard drug silymarin (200 mg/kg). Serum SGPT and SGOT levels were measured and histopathological analysis of liver tissues was performed.

Results
The extract showed high phenolic (43.61 ± 1.08 µg GAE/mg) and flavonoid content (43.82 ± 0.72 µg QE/mg). Strong antioxidant activity was observed with IC_{50} values of 89.59 µM (DPPH) and 90.78 µM (H_2O_2), comparable to ascorbic acid. Paracetamol significantly elevated SGPT and SGOT levels, indicating liver injury. Treatment with *L. siceraria* peel extract significantly ($p < 0.05$) reduced these enzyme levels, particularly at 500 mg/kg. Histopathological studies confirmed restoration of hepatic architecture in extract-treated groups.

Conclusion
The hydro-alcoholic peel extract of *Lagenaria siceraria* exhibits significant hepatoprotective and antioxidant activity against paracetamol-induced liver damage, supporting its potential as a natural hepatoprotective agent.

Keywords: *Lagenaria siceraria*, hepatoprotective activity, paracetamol, antioxidant, bottle gourd peel, SGPT, SGOT, Wistar rats

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Abstract No.: GNIPST/FMPASTII/P138

HYDROPHOBICALLY MODIFIED, WATER-SOLUBLE CHITOSAN DERIVATIVES FOR ENHANCED HAEMOSTATIC PERFORMANCE

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Abstract

Objective
Uncontrolled bleeding remains a critical challenge in trauma care and surgical interventions, necessitating the development of advanced topical haemostatic biomaterials with rapid clotting action, strong wet adhesion, and conformability to irregular wound surfaces. The objective of this review is to critically evaluate hydrophobically modified, water-soluble chitosan derivatives as next-generation haemostatic materials, with emphasis on how combined hydrophobic grafting and solubilizing chemical modifications modulate physicochemical properties and blood–material interactions.

Methods
This review is based on a comprehensive analysis of peer-reviewed literature describing chitosan derivatives incorporating hydrophobic moieties (e.g., alkyl chains introduced through Schiff-base or related chemistries) alongside water-solubilizing substitutions such as carboxymethylation. Reported synthesis strategies, degrees of substitution, structural and spectroscopic characterization techniques, and formulation architectures—including sponges, foams, and hydrogels—were examined and correlated with haemostatic performance metrics such as clotting time, blood absorption capacity, wet adhesion strength, and erythrocyte–platelet interaction profiles.

Results
The reviewed studies indicate that hydrophobic modification imparts amphiphilicity to chitosan, enhancing protein adsorption and wet tissue adhesion, while water-solubilizing modifications significantly improve solubility, swelling behavior, and processability under physiological conditions. Synergistic dual modification yields chitosan derivatives that demonstrate accelerated clot initiation, improved clot stability, enhanced red blood cell aggregation, and superior interfacial sealing compared with unmodified or singly modified chitosan systems.

Conclusion
Hydrophobically modified, water-soluble chitosan derivatives constitute a rationally engineered haemostatic platform in which amphiphilicity, electrostatic interactions, and controlled swelling act cooperatively to enhance haemostatic efficiency. This review establishes structure–function relationships and design principles that can guide optimization, standardization, and preclinical translation of next-generation chitosan-based haemostatic materials.

Keywords: Hydrophobically Modified Chitosan; Water-Soluble Chitosan Derivatives; Amphiphilic Biomaterials; Haemostatic Mechanisms; Biomaterial Design.

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Abstract No.: GNIPST/FMPASTII/P139

TARGETING CONSERVED MSP1 DOMAINS OF *PLASMODIUM FALCIPARUM*: A DRUG-LIKENESS AND TOXICITY ASSESSMENT OF NIC DERIVATIVES

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Abstract

Objective
Malaria still constitutes as a major global health problem, especially with the recent rise of drug-resistant strains to currently available antimalarial drugs. This research aimed to identify new small-molecule inhibitors of Plasmodium falciparum Merozoite Surface Protein-1 (MSP1), a significant protein mediating merozoite entry into erythrocytes, through a computational medicinal chemistry strategy based on conserved domains of this protein.

Methods
A virtual library of 2-butyl-5-chloro-3-(4-nitro-benzyl)-3H-imidazole-4-carbaldehyde (NIC) analogs was constructed from the PubChem database. Drug-likeness and pharmacokinetics were assessed using SwissADME, and the parameters of Lipinski's Rule of Five and oral bioavailability were considered. In silico toxicity profiling, including acute oral toxicity (LD_{50}), toxicity class, and organ-specific effects such as hepatotoxicity, was evaluated using the ProTox 3.0 web server.

Results
Computational analysis showed high drug-like similarity of NIC and its analogues, good adherence to the Lipinski's Rule of Five, and good pharmacokinetic profiles. In silico toxicity predictions using ProTox 3.0 indicated low hepatotoxicity and favorable LD_{50} values, with safety profiles surpassing those of several established antimalarial drugs. The evolutionary conservation of the MSP1 domain targeted in the discovery also lends credence to the potential robustness against resistance, NIC.

Conclusion
The combined approach of conserved conserved domain screening and computational medicinal chemistry identifies the potential of NIC and the imidazole-based derivatives as promising orally bioavailable, low-toxicity antimalarial candidates that show strong potential to disrupt merozoite- erythrocyte interactions. Future studies will include with molecular docking, biophysical validation, and parasite growth inhibition assays to substantiate their therapeutic potential.

Keywords: Malaria, Merozoite Surface Protein-1, NIC derivatives, In silico screening

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Abstract No.: GNIPST/FMPASTII/P140

ARTIFICIAL INTELLIGENCE IN TOXICOLOGY: A SYSTEMATIC REVIEW OF PREDICTIVE MODELS AND REGULATORY CHALLENGES

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Abstract

Objective
Artificial intelligence is transforming chemical safety assessment. AI tools predict how toxic substances affect humans by modelling biological mechanisms directly—without animal testing. This approach is faster, more ethical, and often more accurate than traditional methods. Current toxicology methods face serious limitations. Animal testing is slow, expensive, and ethically questionable—and it often fails to predict how chemicals affect humans. AI-based alternatives show promise, but the field hasn't agreed on how to validate or approve these new methods.

Methods
We conducted a systematic review of AI applications in toxicology following PRISMA guidelines, analysing ten peer-reviewed studies published between 2019-2024 from PubMed, Scopus, and Web of Science databases.

Results
AI-based models combine data from multiple sources using advanced machine learning techniques, proving more accurate than traditional methods. One study showed AI correctly predicted toxic effects 87% of the time—outperforming animal tests, which were only reproducible 81% of the time. Despite these advantages, AI faces regulatory roadblocks. Current validation systems were designed for animal testing and don't accommodate AI approaches. Without standardized approval criteria, regulators remain hesitant to accept AI-based methods.

Conclusion
AI-based toxicity testing is faster, cheaper, and more humane than animal experiments—and often more accurate. But these methods can't replace animal testing until regulators agree on validation standards. International agencies need to create unified approval criteria now, or this technology will remain sidelined while unnecessary animal testing continues.

Keywords: Artificial Intelligence, Toxicology, Regulatory Validation, Animal Testing Alternatives, Machine Learning

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Abstract No.: GNIPST/FMPASTII/P141

VITEXIN AS A CLINICAL CHRONOTHERAPEUTIC AGENT FOR CIRCADIAN-ASSOCIATED COLONIC COMPLICATIONS IN DIABETES

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Abstract

Objective
Colorectal health is increasingly compromised by metabolic disorders, particularly diabetes mellitus, and disturbances in circadian rhythm. Diabetes-induced metabolic dysregulation and chronic inflammation predispose individuals to gastrointestinal complications, including colonic epithelial injury. Emerging evidence suggests that circadian clock genes, especially BMAL1, play a crucial role in regulating intestinal homeostasis, immune responses, and epithelial repair. This study aimed to evaluate the protective effect of vitexin on diabetic colon injury through modulation of circadian rhythm and BMAL1-mediated apoptotic pathways.

Methods
We conducted a systematic review of AI applications in toxicology following PRISMA guidelines, analysing ten peer-reviewed studies published between 2019-2024 from PubMed, Scopus, and Web of Science databases.

Results
Vitexin demonstrated significant antidiabetic, anti-inflammatory, and anticancer properties. It effectively inhibited α-glucosidase, leading to reduced postprandial hyperglycemia and improved metabolic control. Vitexin also exhibited strong binding affinity to apoptotic and inflammatory mediators, suggesting its role in regulating oxidative stress and immune signalling. Restoration of circadian rhythmicity and regulation of BMAL1 expression resulted in reduced epithelial apoptosis and suppression of pro-inflammatory cytokines in colonic tissue.

Conclusion
Vitexin potentially mitigates diabetes-induced circadian disruption and colonic damage by restoring BMAL1-mediated pathways. These findings highlight vitexin as a promising chronotherapeutic agent for managing circadian-associated gastrointestinal complications in diabetes.

Keywords: Circadian rhythm, BMAL1, Colon injury, α-glucosidase inhibition, Apigenin, Chronopharmacology

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Abstract No.: GNIPST/FMPASTII/P142

A REVIEW ON PHARMACOLOGICAL MODULATION OF INFLAMMATORY MEDIATORS AND CYTOKINE PATHWAYS BY MARINE PHLOROTANNINS: MECHANISMS, PHARMACOKINETICS, AND THERAPEUTIC POTENTIAL

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Abstract

Objective
Inflammation is a fundamental biological response to injury. Prolonged or dysregulated pro-inflammatory mechanisms often lead to chronic conditions such as cardiovascular disease and neurodegeneration. Marine phlorotannins (PT) are unique polyphenolic secondary metabolites found in brown seaweeds which are potent pharmacological modulators due to their vast structural and functional diversity.

Methods
These compounds target several molecular pathways like: suppressing NF-κB, MAPK, and JAK-STAT signalling to modulate inflammatory responses and restore homeostasis.

Results
Research on Fucus vesiculosus demonstrates that low molecular weight PT fractions significantly inhibit nitric oxide (NO) production and down-regulate the expression of iNOS, IL-1β, and COX-2 in LPS-stimulated macrophages. This modulation is achieved by blocking the phosphorylation and degradation of IκBα, effectively blocking the inflammatory cascade at the transcriptional level. PTs also activate the Nrf2-HO-1 signalling pathway, which strengthens cellular antioxidant defences against oxidative stress-induced damage. PTs undergo significant biotransformation in the gastrointestinal tract; colonic microbiota ferment complex polymers into bioavailable low molecular weight metabolites that enter systemic circulation to reach target receptors.

Conclusion
These insights highlight the therapeutic potential of marine phlorotannins as safe, natural alternatives to traditional anti-inflammatory drugs for treating diverse chronic inflammatory and neurodegenerative disorders.

Keywords: Phlorotannin, Cytokine, inflammation, NF-κB, MAPK, and JAK-STAT.

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Abstract No.: GNIPST/FMPASTII/P143

DEVELOPMENT OF PH-RESPONSIVE MUCOADHESIVE NANOHYBRIDS OF EUDRAGIT-ZIZIPHUS FOR COLONIC DELIVERY OF QUERCETIN–*LACTOBACILLUS PLANETARIUM* IN INFLAMMATORY BOWEL DISEASE.

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Abstract

Objective
The present study is to develop and evaluate a pH-responsive, mucoadhesive nanohybrid system based on Eudragit and Ziziphus gum for colonic delivery of quercetin and *Lactobacillus plantarum* to enhance therapeutic efficacy in IBD.

Methods
Quercetin-loaded SLNs were prepared using the solvent evaporation-emulsification method followed by bath ultrasonication (90 min, 40 °C). Ziziphus gum was used as a coating polymer (0.2% w/v) in a 1:1.5 ratio with SLNs. Chemical modification of polysaccharides was attempted to impart cationic properties using epichlorohydrin under alkaline conditions. Successful modification of guar gum was confirmed by FTIR spectroscopy, while modification of Ziziphus gum was unsuccessful in the initial trial. Particle size distribution and stability were evaluated using dynamic light scattering (DLS). FTIR analysis was performed to confirm drug encapsulation and polymer coating.

Results
FTIR analysis of modified guar gum showed the appearance of N–H stretching peaks around 3323 cm^{-1} and C–N stretching in the range of 1200–1350 cm^{-1}, confirming successful chemical modification. FTIR spectra of Ziziphus gum–coated quercetin SLNs showed characteristic polysaccharide peaks (1200–1300 cm^{-1}) and shifts in the O–H stretching region (~3360 cm^{-1}), indicating successful coating and drug–polymer interaction. DLS analysis of quercetin SLNs showed a primary particle size of approximately 331 nm with a high polydispersity index (PDI ≈ 0.509) and Z-average values around 611 nm, indicating aggregation and poor stability. SLNs dispersed in pH 7–7.4 buffer exhibited severe aggregation with Z-average values up to 1390 nm and PDI ≈ 0.89.

Conclusion
The study confirms successful quercetin encapsulation and Ziziphus gum coating; however, high polydispersity and aggregation indicate that the formulation requires further optimization before advanced biological evaluation.

Keywords: Colon-targeted delivery, Quercetin, Ziziphus gum, pH-responsive delivery, Mucoadhesive polymers, Inflammatory Bowel Disease, Probiotic, Solid lipid nanoparticles.

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HISTOPATHOLOGICAL AND BIOCHEMICAL EVALUATION OF NEPHROPROTECTIVE EFFECTS OF RIPEND COCONUT EXTRACTS ON STREPTOZOTOCIN INDUCED DIABETIC RAT MODEL

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Abstract

Objective
Diabetic nephropathy, a major microvascular complication of diabetes mellitus, drives high morbidity and mortality. Despite antidiabetic drugs, adverse effects and limited long-term glycemic control persist. Ripened coconut (*Cocos nucifera L.*) agro-waste (husk/shell), widely cultivated in tropical regions, rich in phenolics, flavonoids, and antioxidants, was evaluated for nephroprotective potential in a streptozotocin (STZ)-induced diabetic rat model using histopathological and biochemical parameters.

Methods
Male Wistar rats were divided into seven groups included normal control, diabetic control (STZ 100 mg/kg i.p.), positive drug control, and diabetic rats treated orally with coconut husk/shell extracts (low/high doses) for 28 days. Renal biochemical markers were measured. Kidneys underwent H&E histopathological analysis for glomerular/tubular alterations.

Results
STZ significantly elevated renal injury markers and induced glomerular hypertrophy, tubular necrosis, and interstitial inflammation. Coconut extracts dose-dependently restored serum glucose, and glycated haemoglobin levels (HbA1c), serum, urine and kidney creatinine, urea, and total protein levels. Histopathology showed reduced glomerular distortion, tubular degeneration, and inflammation versus diabetic controls.

Conclusion
Ripened coconut extracts confer significant nephroprotection in diabetic rats, positioning them as promising natural candidates for diabetic nephropathy. Further studies should isolate active compounds and explore molecular mechanisms.

Keywords: Ripened coconut extract, diabetic nephropathy, STZ, biochemical markers, histopathology, Wistar rats.

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Abstract No.: GNIPST/FMPASTII/P145

COMPUTATIONAL SCREENING OF NOVEL SMALL MOLECULE TNF -ALPHA INHIBITORS FOR TARGETED CANCER THERAPY

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Abstract

Objective
Tumor necrosis factor-alpha (TNF-α) is a pro-inflammatory cytokine involved in cell proliferation, metabolism, inflammation, differentiation, and apoptosis through Nuclear Factor kappa B and Mitogen-Activated Protein Kinase signalling pathways. Biologic TNF-α inhibitors are clinically effective. Their high cost, immunogenicity, and limited tumor penetration restrict their broader therapeutic use. The current study aims to conduct the computational screening of potential small-molecule TNF-α inhibitors as alternative candidates for targeted cancer therapy.

Methods
Marketed TNF-α inhibitors were selected from literature, where found to be monoclonal antibodies. Sequence analysis of TNF-α inhibitors was performed to identify conserved and functionally binding sites to TNF -α. The active site of TNF-α was identified as well as verified through the CASTp web server. A library of marketed TNF-α inhibitors was identified from literature and screened for binding affinity and interaction stability with TNF-α using protein–protein docking using the ClusPro 2.0 platform. The complexes were ranked according to their docking scores, binding poses, and intermolecular interactions. Based on the docking rankings, a pharmacophore model will be derived, and database screening will be performed to generate potential small-molecule candidates.

Results
Protein–protein docking of monoclonal antibodies with TNF-α target (PDB ID: 2AZ5) was performed using the ClusPro 2.0 platform. Stable complexes with high binding affinity were observed. Adalimumab, Ipilimumab, Infliximumab, and Nivolumab are identified as the top-ranked monoclonal antibody complexes with the highest binding affinity and most favourable docking score. That indicates effective target engagement and complex stability.

Conclusion
These findings demonstrate the utility of virtual screening approaches in the identification of selective TNF-α modulators. This helps the development of potential small-molecule TNF-α inhibitors as alternative candidates for anticancer activity. As a future perspective, Based on the docking rankings, a pharmacophore model will be derived, and database screening will be performed to generate potential small-molecule candidates. Molecular dynamics simulations (Root Mean Square Deviation (RMSD), Root Mean Square Fluctuation (RMSF), and Radius of Gyration (Rg)) will be performed to assess the dynamic stability and conformational behaviour of the selected TNF-α ligand complexes. *In silico* ADMET profiling will be carried out to evaluate pharmacokinetic properties, drug-likeness, and safety and toxicity profiles. This integrated computational strategy may facilitate the identification of promising small-molecule TNF-α inhibitors for targeted cancer therapy.

Keywords: TNF-α (Tumor Necrosis Factor-alpha), Targeted cancer therapy, Molecular docking, Molecular docking

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Abstract No.: GNIPST/FMPASTII/P146

FORMULATION DEVELOPMENT OF CHEWABLE TABLETS FOR DELIVERY OF NUTRACEUTICALS FOR ENHANCED BIOAVAILABILITY

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Abstract

Objective
This study aimed to develop and optimize an oral chewable nutraceutical tablet to enhance bioavailability and patient compliance. Ascorbic acid and caffeine were selected due to their common use and health benefits.

Methods
Chewable tablets (650 mg) containing caffeine and ascorbic acid were prepared by wet granulation. Sorbitol and MCC PH102 were used as diluents, while PVP K30 and HPMC served as binders at varying concentrations. Talc acted as a glidant and anti-adherent, and magnesium stearate as a lubricant. Granules were dried, sized, and compressed at forces of 7, 8, and 8.5. Tablet hardness and physical appearance were evaluated using a Monsanto hardness tester.

Results
Formulations with low binder levels showed poor mechanical strength and surface defects. Optimization with 4% PVP K30 and 6% HPMC significantly improved granule cohesion and tablet integrity. A compression force of 8 produced tablets with acceptable hardness, smooth surfaces, and minimal defects. Higher compression forces caused elastic recovery, particularly in HPMC-based tablets.

Conclusion
Binder type, binder concentration, and compression force were critical in developing chewable nutraceutical tablets. Tablets met acceptable physical limits, showed no drug–excipient interaction by FTIR, achieved 97.8% drug release within 30 minutes, and remained stable. The optimized formulation may improve patient adherence, though further evaluation of bioavailability and sensory properties is warranted.

Keywords: Nutraceuticals, Caffeine, Ascorbic acid.

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Abstract No.: GNIPST/FMPASTII/P147

DEEP LEARNING IN MEDICAL IMAGING

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Abstract

Objective
Due to its efficiency, deep learning has proved an effective process for the analysis of medical images, outsmarting the traditional methods for image processing, and yielding more accurate results for the interpretation of difficult medical images. Deep learning enables images for learning automatic distinction of patterns of diseases. This review will help in keeping the reader updated about the latest developments in using deep learning for the analysis of medical images.

Methods
The structured literature review has been conducted by researching existing literature studies focusing on deep learning approaches applied for medical image analysis tasks. Several literature related to different anatomical and clinical domains such as neurological/brain, retinal, pulmonary, digital pathology, breast/cardiac, bone, abdominal, and musculoskeletal images have been considered. Deep learning algorithms applied for image classification, segmentation, or recognition, with a focus on their application towards processing voluminous data and predictability, were reviewed.

Results
The studies reviewed have shown that deep learning techniques have a higher degree of accuracy and robustness compared to the traditional methods. Deep learning approaches have been applied in the detection, categorization, and quantification of a specific disease. But the application of the deep learning technology in this aspect is still challenged by certain constraints.

Conclusion
Deep learning has found applications in medical image-related tasks. It is an ever-adapting and highly efficient technique with dramatic accuracy gains. Continued adaptation and improvement of guidelines will be required if improved dependability, interpretability, and integration of medical imaging with deep learning algorithms are to be achieved.

Keywords: Deep learning, medical image analysis, Artificial intelligence, Image classification, Accuracy, Survey.

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Abstract No.: GNIPST/FMPASTII/P148

A COMPREHENSIVE REVIEW OF *TINOSPORA CORDIFOLIA* IN THE MANAGEMENT OF DIABETIC FOOT ULCERS

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Abstract

Objective
This review systematically examines the therapeutic potential of Tinospora cordifolia (Guduchi) in the management of diabetic foot ulcers (DFUs). Emphasis is placed on the plant's multi-targeted approach in overcoming key physiological challenges of diabetic wound healing, including persistent inflammation, oxidative stress, and compromised angiogenesis.

Methods
A thorough literature search was performed using databases such as PubMed, Scopus, and Google Scholar, encompassing studies published between 2015 and 2025. The review focused on the pharmacological significance of major phytoconstituents—namely berberine, tinosporine, and cordifolioside A. Relevant data were synthesized to evaluate their influence on pro-inflammatory cytokines (TNF-α, IL-6), growth factor expression (VEGF), and collagen synthesis in both *in vivo* and *in vitro* diabetic models.

Results
The findings suggest that Tinospora cordifolia markedly enhances wound healing by regulating immune responses and alleviating the "stalled" inflammatory phase commonly observed in diabetic wounds. The results demonstrate its dual therapeutic action: functioning as a hypoglycemic agent to maintain systemic glucose control and as a topical regenerative therapy that stimulates neovascularization and fibroblast proliferation. Additionally, its strong antimicrobial activity against multidrug-resistant pathogens (e.g., S. aureus) lowers the risk of secondary infections and subsequent limb amputation.

Conclusion
Tinospora cordifolia emerges as a promising and cost-effective phytotherapeutic option for the treatment of DFUs. Its combined ability to control hyperglycemia and enhance tissue regeneration supports its potential role in integrated diabetic management. Nevertheless, further clinical studies are required to standardize dosage formulations and assess long-term safety in human populations.

Keywords: Tinospora cordifolia; Diabetic Foot Ulcer; Wound Healing; Angiogenesis; Phytotherapy; Inflammation.

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Abstract No.: GNIPST/FMPASTII/P149

MICROGREENS AS FUNCTIONAL NEUROPROTECTIVE FOODS: TARGETING MITOCHONDRIAL DYSFUNCTION AND NEUROINFLAMMATION IN PARKINSON'S DISEASE

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Abstract

Objective
Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by dopaminergic neuronal loss, mitochondrial dysfunction, oxidative stress, and chronic neuroinflammation. This review evaluates the potential of microgreens as functional neuroprotective foods, with emphasis on their ability to modulate key molecular pathways involved in PD pathogenesis.

Methods
A comprehensive review of preclinical, clinical, and ethnopharmacological literature was conducted, focusing on phytonutrients relevant to PD mechanisms. Evidence from studies on antioxidants, anti-inflammatory compounds, and mitochondrial modulators—including flavonoids, polyphenols, carotenoids, and alkaloids—was integrated with emerging data on microgreens. Traditional knowledge from Persian Medicine and modern advances in artificial intelligence (AI)–assisted phytonutrient screening were also examined to elucidate mechanistic pathways and therapeutic potential.

Results
Microgreens are rich in flavonoids, polyphenols, glucosinolates, carotenoids, and antioxidant vitamins with demonstrated neuroprotective potential. Evidence indicates that these bioactive compounds activate the Nrf2–ARE antioxidant pathway, enhance mitochondrial bioenergetics, and reduce reactive oxygen species generation. Concurrently, suppression of NF-κB–mediated inflammatory signaling attenuates microglial activation and pro-inflammatory cytokine release. Regulation of PINK1/Parkin-dependent mitophagy supports mitochondrial quality control, while inhibition of α-synuclein aggregation and modulation of MAPK and PI3K/Akt signaling pathways contribute to dopaminergic neuronal survival.

Conclusion
Microgreens represent a promising, sustainable functional food strategy for neuroprotection in Parkinson's disease. By modulating mitochondrial dysfunction and neuroinflammatory pathways, they may complement conventional therapies and inform future nutraceutical and precision nutrition interventions. Further large-scale clinical trials are required to validate their therapeutic efficacy.

Keywords: Microgreens, Parkinson's disease, Neuroprotection, Mitochondrial dysfunction, Neuroinflammation, Oxidative stress, Phytonutrients, Functional foods, Precision nutrition, Dopaminergic neurodegeneration

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Abstract No.: GNIPST/FMPASTII/P150

NEUROTHERAPEUTIC POTENTIAL OF CUCURBITACEAE FAMILY MICROGREENS: BRIDGING FUNCTIONAL NUTRITION AND NEUROLOGICAL DISORDERS

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Abstract

Objective
Microgreens, especially from the Cucurbitaceae family, are rich in bioactive compounds with promising neuroprotective potential and may serve as functional foods to help prevent or slow neurological disorders.

Methods
A thorough literature search was performed using databases such as PubMed, Scopus, and Google A systematic assessment of experimental and preclinical studies was conducted focusing on microgreens derived from Cucurbitaceae species, including cucumber, pumpkin, melon, and watermelon. Literature published between 2010 and 2025 was retrieved from PubMed, Scopus, Web of Science, and Google Scholar. Search terms included combinations of "Cucurbitaceae microgreens," "neuroprotection," "brain function," "oxidative imbalance," "neuroinflammation," "mitochondrial health," and "neurodegenerative disease." Studies evaluating phytochemical composition, antioxidant and anti-inflammatory properties, and molecular mechanisms associated with neuronal protection were included.

Results
Cucurbitaceae microgreens were found to be rich in polyphenols, flavonoids, carotenoids, vitamins, and trace elements that contribute to neuroprotective effects. These constituents reduce oxidative stress by suppressing reactive oxygen species and enhancing cellular antioxidant defenses through Nrf2–ARE signaling. Inflammatory responses in neural tissue are modulated via inhibition of NF-κB and MAPK pathways. Additional protective actions include activation of PI3K/Akt and AMPK signaling to support neuronal survival and metabolic regulation, prevention of mitochondrial dysfunction, reduction of apoptosis, and stabilization of neurotransmission and synaptic activity. Preclinical evidence also indicates potential cognitive benefits relevant to Alzheimer's and Parkinson's disease mechanisms.

Conclusion
Cucurbitaceae microgreens exhibit multi-targeted neuroprotective properties and represent promising functional foods for brain health support. Further research is required to establish bioavailability, optimal intake, and clinical efficacy.

Keywords: Cucurbitaceae microgreens; Neuroprotection; Functional foods; Neuroinflammation

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Abstract No.: GNIPST/FMPASTII/P151

VALORIZATION OF KITCHEN MIXED FOOD WASTE AND SCRAPS THROUGH BIOCHAR PRODUCT TO TREAT PERSISTENT ORGANIC POLLUTANT FROM CIVIC SEWAGE WATER

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Abstract

Objective
The escalating prevalence of Persistent Organic Pollutants (POPs) in aquatic ecosystems poses a critical challenge to global water security due to their bioaccumulative nature and resistance to conventional treatment. This research explores a circular economy approach by investigating the valorization of heterogeneous kitchen mixed food waste (KMFW) into high-efficiency biochar via slow pyrolysis.

Methods
Unlike traditional single-source precursors, KMFW offers a unique self-doping potential, where the intrinsic mineral diversity of domestic waste, ranging from calcium-rich shells to lignocellulosic vegetable scraps, synergistically enhances the carbonaceous architecture. Experimental focus is placed on the influence of variable feedstock ratios and pyrolysis temperatures (400°C–700°C) on the development of hierarchical porosity and surface functional groups. The study specifically addresses the research gap concerning competitive adsorption in complex matrices, evaluating the biochar's performance against a cocktail of POPs, including per- and polyfluoroalkyl substances (PFAS) and organochlorine pesticides, within real-world municipal effluent.

Results
Preliminary results suggest that the mineral-carbon composites derived from KMFW exhibit superior adsorption capacities compared to commercial activated carbon, driven by enhanced Pi-Pi interactions and pore filling. Furthermore, a rigorous leaching assessment confirms the immobilization of indigenous heavy metals within the biochar matrix, ensuring environmental safety.

Conclusion
This work provides a scalable framework for transforming localized urban waste into a low-cost, sustainable solution for the remediation of the most resilient chemical threats in wastewater.

Keywords: Persistent Organic Pollutants (POPs), heterogeneous kitchen mixed food waste, pyrolysis, self-doping, lignocellulosic vegetable scraps, per- and polyfluoroalkyl substances (PFAS), organochlorine pesticides.

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Abstract No.: GNIPST/FMPASTII/P152

REGULATORY COMPLIANCE FOR EXPORTING HERBAL PRODUCTS FROM INDIA TO THE USA

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Abstract

Objective
To outline the regulatory pathways and compliance requirements for exporting Indian herbal products to the U.S., focusing on necessary documentation, labeling standards, and quality control measures.

Methods
An analysis of Indian and U.S. regulatory frameworks was conducted, reviewing AYUSH/ CDSCO guidelines, DGFT policies (Form ANF-2A), FSSAI regulations, and FDA classifications. Documentation requirements including Importer-Exporter Code (IEC), FSSAI Central License (Form B), and Free Sale Certificates (Forms 26 E2-I/E2-II) were highlighted alongside compliance challenges.

Results
Indian herbal exporters face dual regulatory systems. Domestically, they need AYUSH manufacturing licenses, Schedule T GMP compliance, and Free Sale Certificates. DGFT mandates IEC registration via Form ANF-2A, and FSSAI requires a Central License. In the U.S., while FDA doesn't require pre-market approval for dietary supplements, products with New Dietary Ingredients (NDI) need 75-day advance notification. Post-market compliance with 21 CFR Part 111 cGMP standards is essential, yet 61% of Ayurvedic supplements fail labeling requirements. Key barriers include heavy metal contamination and unapproved health claims.

Conclusion
Successful exports necessitate strict adherence to regulatory frameworks in both India, and the U.S. Critical Indian requirements include IEC registration, FSSAI Central License, AYUSH approvals, and Free Sale Certificates. U.S. market entry relies on post-market surveillance, with specific attention to DSHEA regulations and cGMP standards. Ongoing testing and precise documentation are vital for successful market entry.

Keywords: Ayurvedic medicines, DSHEA compliance, dietary supplements, FDA regulations, herbal export barriers.

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Abstract No.: GNIPST/FMPASTII/P153

GLOBAL LANDSCAPE OF *PLASMODIUM FALCIPARUM* DRUG RESISTANCE: A COMPREHENSIVE CONTEMPORARY SURVEY

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Abstract

Objective
This study aims to synthesize and evaluate the present global status of antimalarial drug resistance in Plasmodium falciparum. By synthesizing recent clinical and molecular findings from diverse endemic settings, it seeks to provide a clearer understanding of emerging resistance trends and their significance for the future of malaria treatment and elimination.

Methods
A comprehensive review of recent peer-reviewed literature was conducted across major scientific databases. Studies reporting molecular markers of resistance, *in vivo* and *in vitro* susceptibility, and clinical correlations were included. Resistance mechanisms were categorized by antimalarial drug class, genetic determinants, and geographic region.

Results
The survey confirms widespread resistance to legacy antimalarials such as chloroquine and sulfadoxine-pyrimethamine across Africa, Asia, and South America. Artemisinin partial resistance, primarily associated with mutations in the pfkelch13 propeller domain, is well established in the Greater Mekong Subregion and gradually reported in parts of Africa. Partner drug resistance markers, including pfcrt, pfmdr1, Plasmepsin 2/3 gene copy number, and pfpm2 gene copy number variations, indicate declining efficacy of several artemisinin-based combination therapies.

Conclusion
Drug resistance in Plasmodium falciparum continues to evolve in complication and geographic spread, posing a sustained threat to the effectiveness of current antimalarial treatments. Although molecular surveillance remains vital for guiding policy, these trends highlight the urgent need for new therapeutic approaches. Targeting indispensable parasite proteins such as PfATP4 offers a realistic strategy to overcome established resistance and sustain global malaria elimination efforts.

Keywords: Plasmodium falciparum, antimalarial drug resistance, artemisinin resistance, molecular markers, global surveillance.

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Abstract No.: GNIPST/FMPASTII/P154

DEVELOPMENT OF SILVER NANOCOMPOSITE MATRICES INTEGRATED WITH NATURAL ANTIOXIDANTS FOR ENHANCED WOUND HEALING

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Abstract

Objective
Wound healing requires control of infection, oxidative stress, and tissue regeneration; however, most formulations lack this triple-action synergy. The current research aims to develop green-synthesised AgNPs using Curcuma Longa rhizome extract, integrated with L-ascorbic acid as precursors for polysaccharide matrices, thereby enabling sustained antimicrobial and antioxidant release to enhance biocompatibility and wound closure efficacy.

Methods
AgNPs prepared by green synthesis using the rhizome of Curcuma longa. The physicochemical property was evaluated using a UV-visible spectrometer, FTIR analysis and Dynamic light scattering. The same formulation was compared with chemically synthesised AgNP for stability analysis. The AgNPs were integrated with flaxseed polysaccharide and L-ascorbic acid, and ingredient ratios were optimised using Design-Expert software. The optimised formulation was evaluated for zeta potential, Transmission electron microscopy and stability analysis.

Results
The UV- spectrophotometric analysis revealed a surface plasmon response peak at 489 nm for green-synthesised AgNPs and 402 nm for chemically synthesised AgNPs. Green AgNPs exhibited a smaller particle size at 4–9 nm compared to chemically synthesised AgNPs at 42 nm, while L-ascorbic acid integration produced particles of 39.98 nm. FTIR analysis confirmed no chemical incompatibility among AgNPs, polysaccharide, and antioxidant, while indicating hydroxyl and carbonyl functional group binding, supporting stable nanocomposite formation. Antimicrobial assays showed greater inhibition by integrated green AgNPs (23.5 mm) than chemical AgNPs (18.75 mm), with activity comparable to amoxicillin (20.5 mm).

Conclusion
The study generated eco-friendly, antioxidant-enhanced AgNPs with potent antibacterial activity and high stability, enabling polysaccharide matrix integration for sustainable wound healing applications.

Keywords: Green synthesis, silver nanoparticles, antimicrobial activity, wound healing

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Abstract No.: GNIPST/FMPASTII/P155

TELE-PHARMACY AND REMOTE PATIENT MONITORING

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Abstract

Objective
This topic aims to study and explain how telepharmacy and RPM use digital and telecommunication technology to deliver effective pharmaceutical care, improve patient monitoring, etc.

Methods
The healthcare communication service market currently experiences international growth because telepharmacy and remote patient monitoring have become major technological advancements in the industry. Telepharmacy uses telecommunication systems to provide patients with pharmacist expertise and medication services. Digital healthcare pharmacists conduct medication reviews and provide counselling while they monitor blood pressure and glucose levels. Remote patient monitoring uses devices to gather and transmit patient data directly to the pharmacist. Clinical alerts and pharmacovigilance systems are supported by artificial intelligence and electronic health record systems, enabling healthcare professionals to identify adverse events earlier. The healthcare teams use shared platforms for collaboration, which leads to better care coordination. These technologies provide underserved populations with access to services through their ability to deliver prompt counselling and ongoing monitoring while maintaining affordable healthcare services.

Results
Telepharmacy with Remote monitoring improved medication adherence, chronic diseases, enhanced access and ensured continuous patient – centred pharmaceutical care.

Conclusion
The model results in improved medication adherence because it reduces drug-related incidents while it enhances diabetes management, which leads to better resource allocation in healthcare and more integrated patient-centred pharmacy services.

Keywords: Telecommunication & Role of RPM, Effect of pharmacist, Clinical decision support system, Effect

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Abstract No.: GNIPST/FMPASTII/P156

THERAPEUTIC AND PROGNOSTIC SIGNIFICANCE OF LYMPHOCYTE ACTIVATION GENE 3 (LAG-3) IN BREAST CANCER

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Abstract

Objective
Precise therapeutic targets and prognostic biomarkers in cancer hold immense potential in mitigating its devastating nature. Although some exemplary targets and biomarkers have been unearthed in recent past, the vastness of targets makes exploration of all target proteins a daunting task. Immune exhaustion, characterized by the enhanced expression of protein molecules like PD-1, PD-L1, LAG-3, TIM-3, CTLA-4, is a much sought after avenue in cancer immunotherapy. As LAG-3 is an aspiring target in the class that is still underexplored, we have investigated it's potential as a therapeutic and prognostic target in breast cancer, the later being a dominant and lethal cancer in women across India and Worldwide.

Methods
4T1 mice breast cancer cell line was grown and inoculated at mammary fat pad of 6 weeks old female BALB/c mice. Expression of LAG-3 in Peripheral blood mononuclear cells (PBMCs) was compared by RT-PCR between a control group and a tumor-bearing group (n=10 each) of mice at day 40-post tumor inoculation. Mice tumor volume, weight and mortality were monitored weekly till the end point of our study.

Results
Heightened expression of LAG-3 in PBMCs of tumor bearing group compared to null expression in control, indicates the importance of this less explored immune checkpoint in cancer control. Marked mortality and lessening of body weight correlated with the exhausted phenotype in tumor bearing mice.

Conclusion
The dual potential of LAG-3 as therapeutic and prognostic target is a promising avenue to combat cancer by precision immunotherapy and calls of deeper exploration.

Keywords: Immune checkpoints, immunotherapy, prognosis, breast cancer, exhaustion

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ANTIOXIDANT AND HEPATOPROTECTIVE EFFECTS OF *ATROCARPUS HETEROPHYLLUS* BIO-WASTE (PEEL) EXTRACTS *IN VITRO* AND *IN VIVO*

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Abstract

Objective
Agricultural residues are increasingly recognized as valuable sources of biologically active compounds. This study was designed to investigate the antioxidant potential and hepatoprotective effects of methanolic extracts of jackfruit (*Artocarpus heterophyllus*) peel, an agricultural bio-waste, using *in vitro* antioxidant assays and an *in vivo* paracetamol-induced hepatotoxicity model in rats.

Methods
The peel material was extracted using methanol to efficiently recover polyphenolic constituents. The total phenolic and flavonoid contents were determined employing established spectrophotometric techniques. Hepatoprotective efficacy was assessed in Wistar rats with paracetamol-induced hepatotoxicity, where the extract was administered orally at doses of 200 mg/kg and 400 mg/kg. Liver function was evaluated by estimating serum biochemical parameters and comparing them with normal and toxic control groups.

Results
The extract showed substantial phytochemical content, with total phenolic content of 37.60 ± 0.68 µg GAE/mg and total flavonoid content of 68.27 ± 0.15 µg QE/mg of dry extract. Significant antioxidant activity was observed, with IC_{50} values of 100.57 µmol/L (DPPH) and 132.88 µmol/L (H_2O_2).*In vivo* evaluation showed a significant improvement in liver biochemical markers in extract-treated animals, indicating a dose-related protective effect against paracetamol-induced hepatic damage.

Conclusion
The findings suggest that *A. heterophyllus* peel, an agricultural bio-waste, possesses potent antioxidant and hepatoprotective properties. This highlights its potential application in the nutraceutical and pharmaceutical domains, warranting further toxicological and mechanistic studies.

Keywords: Jackfruit peel, Antioxidant, Hepatoprotective, Biowaste, Bio-active

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ROLE OF PHARMACIST IN ANTIBIOTIC STEWARDSHIP PROGRAMS

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Abstract

Objective
The coordination and optimization of medications among patients, healthcare providers, and the general public is largely dependent on practicing pharmacists who offer pharmaceutical care services. For antibiotics to be used effectively, chemists play a crucial role. In order to coordinate and optimize antibiotics among healthcare professionals, patients, and the general public, practicing chemists must get adequate education and comprehensive training.

Methods
A PRISMA-guided systematic review was used to assess pharmacists' participation in antibiotic stewardship programs in India and elsewhere. Included were hospital-based studies that evaluated chemist participation and reported results on antibiotic use, patterns of resistance, or therapeutic impact. Two reviewers independently selected the studies and extracted the data; discrepancies were settled by consensus.

Results
In the 2000s, pharmacist-led research was first documented in high-income nations, but it eventually spread to all income levels. The most popular stewardship intervention is still audit and feedback. Over time, high income nations chemists' responsibilities grew to include de-labeling, outpatient stewardship, beta-lactam or penicillin allergy screening, and diagnostics.

Conclusion
This review shows that integrating chemists into hospital antibiotic stewardship programs improves prescribing, optimises therapy, and lowers inappropriate antibiotic use, costs, duration, and length of stay. Recommendations are also highly accepted. Pharmacist-led de-escalation was safe and successful, supporting expansion even when short-term resistance and mortality changes were minimal.

Keywords: Stewardship programs, Consensus, De-escalation, PRISMA

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CYTOKINE-MEDIATED NOVEL APPROACH FOR RHEUMATOID ARTHRITIS MANAGEMENT

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Abstract

Objective
Rheumatoid arthritis (RA) is a long-term autoimmune condition caused by a disruption of cytokine signalling, which results in ongoing inflammation, joint damage, and systemic problems. While present disease-modifying antirheumatic medicines give symptomatic relief, their long-term use is constrained by toxicity and insufficient illness control. This review aims to investigate cytokine-mediated innovative treatment approaches in light of developments in pharmaceutical sciences for the efficient and focused management of RA.

Methods
A comprehensive literature review, including published experimental, preclinical, and clinical studies looking at cytokine involvement in RA pathogenesis and new therapeutic approaches, was done. The focus was on cutting-edge drug development methods, which are Chimeric antigen receptor T cell treatment, Glucagon like peptide 1 receptor agonist, Dipeptidyl Peptidase 4 inhibitor together their immunomodulatory effects.

Results
Research reveals that synovial inflammation and joint damage mostly depend on inflammation causing cytokines like interleukin 6, interleukin 17, and tumour necrosis factor-α. New medicinal approaches focused on cytokine networks showed improved accuracy in immune regulation. Though they have metabolic control, Dipeptidyl peptidase 4 inhibitors, Glucagon like peptide 1 agonists showed anti-inflammatory as well as immune-regulatory properties outside of that. CAR-T therapy seemed promising in deleting autoreactive B cells. These methods give better results with less harm to the body.

Conclusion
For RA treatment, cytokine-mediated novel approaches represent a significant advancement in pharmaceutical science and drug development. A promising future direction for RA treatment is targeted immunomodulation, which may offer sustained illness control and a better safety profile.

Keywords: Rheumatoid arthritis, CAR-T therapy, GLP-1 agonists, DPP-4 inhibitors.

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Abstract No.: GNIPST/FMPASTII/P160

FLUORESCENCE-BASED CARBON NANOMATERIAL BIOSENSORS FOR EARLY DETECTION AND REAL-TIME MONITORING OF HUMAN ISLET AMYLOID POLYPEPTIDE (HIAPP) IN TYPE 2 DIABETES MELLITUS

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Abstract

Objective

A growing body of evidence indicates that dysfunction of pancreatic β-cells in Type 2 Diabetes Mellitus (T2DM) is closely associated with the self-assembly of human islet amyloid polypeptide (hIAPP) into cytotoxic oligomeric intermediates and mature amyloid fibrils. Early identification and continuous tracking of these aggregation events remain analytically challenging yet critically important. In this context, the present review aims to systematically examine recent progress in fluorescence-based biosensing strategies that utilize carbon nanomaterials for sensitive detection and real-time observation of hIAPP aggregation processes.

Methods

This review is based on a comprehensive survey of peer-reviewed literature retrieved from major scientific databases, including Web of Science, Scopus, and PubMed. Relevant studies published primarily within the last decade were identified using targeted keywords related to human islet amyloid polypeptide aggregation, carbon nanomaterials, and fluorescence-based biosensing. Selected articles were analyzed with emphasis on sensing mechanisms, nanomaterial–protein interactions, and surface functionalization strategies influencing detection performance. Comparative evaluation was performed based on sensitivity, selectivity toward aggregated hIAPP species, and real-time monitoring capability.

Results

Carbon nanomaterial-based fluorescence biosensors demonstrate high sensitivity toward hIAPP aggregates, with reported detection limits in the nanomolar range. GQDs and CDs, in particular, exhibit superior photostability, tunable emission characteristics, and enhanced temporal resolution compared to conventional amyloid-binding dyes. These systems effectively discriminate aggregated hIAPP species from monomeric forms and enable dynamic tracking of fibril formation processes.

Conclusion

Fluorescence biosensors based on carbon nanomaterials represent a promising non-invasive strategy for the early diagnosis and progression monitoring of T2DM through targeted detection of hIAPP aggregation. Their unique optical properties, surface tunability, and real-time sensing capability position them as strong candidates for next-generation nano-enabled diagnostic platforms.

Keywords: Human Islet Amyloid Polypeptide, Carbon Nanomaterials, Fluorescence Biosensors, Amyloid Aggregation, Type 2 Diabetes Mellitus, Real-Time Monitoring.

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Abstract No.: GNIPST/FMPASTII/P161

CAR T-CELL THERAPY: CURRENT CHALLENGES, ADVANCEMENTS, AND FUTURE DIRECTIONS IN TREATMENT

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Abstract

Objective
To explain the basic concept, structure, working mechanism, and medical importance of CAR T-Cell therapy, with emphasis on its benefits, clinical applications, limitations, and future potential in disease treatment. CAR T- Cell Therapy is a modern type of cancer treatment in which a patient's own T cells are genetically modified to fight cancer. In this therapy, special receptors called Chimeric Antigen Receptors are added to T cells so they can easily recognize and destroy cancer cells. These receptors combine parts of antibodies with T-cell signaling components, allowing strong and specific immune responses. Because of it's targeted action, CAR T-Cell Therapy has become an important advancement in biological cancer treatment.

Methods
In CAR T-Cell Therapy, T-Cells are collected from the patient's blood and modified in the laboratory using genetic engineering techniques to express CARs on their surface. These engineered T cells are then multiplied and infused back into the patient.

Results
CAR T-Cell Therapy has shown very effective results, especially in parents with blood cancers such as leukemia and lymphoma. It provides long-lasting immune responses and precise targeting of cancer cells. However, some side effects like cytokine release syndrome and limited effectiveness in solid tumors have been observed.

Conclusion
CAR T-Cell Therapy is a promising and fast-developing cancer treatment with strong clinical value. It's ability to use the patient's own immune system for targeted cancer destruction makes it a powerful therapeutic approach.

Keywords: Chimeric Antigen Receptor, Next-generation CAR engineering, Tumor microenvironment immunosuppression, Solid tumor immunotherapy.

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Abstract No.: GNIPST/FMPASTII/P162

ANTI-DIABETIC POTENTIAL OF BIO-WASTE-DERIVED PHYTOCHEMICALS FROM GARLIC AND ONION PEELS: *in vitro* & *in vivo* STUDIES.

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Abstract

Objective

Garlic and Onion are high in fibers, vitamins, and minerals. They also have bioactive phytochemicals such organosulfur compounds, phenolic acids, and flavonoids Diabetes mellitus is a long-term illness that causes high blood sugar because the body doesn't make enough insulin or the insulin not working well.This study evaluated the anti-diabetic potential of bio-waste derived phytochemicals that is extracted from garlic(*Allium sativum*) and onion(*Allium cepa*) peels, through *in-vitro* and *in-vivo* approaches to promote sustainable drug discovery.

Methods

Extract the phytochemicals from the Onion & Garlic peels by maceration method using 70:30 ethanol & water solution(hydro-ethanolic). Preliminary phytochemical screening was performed to identify bioactive constituents, *In-vitro* experiments evaluated the α-amylase and α-glucosidase inhibition assay, as well as the TPC and TFC. In *in-vivo* experiments, 35 male Wistar rats were divided into seven groups at random, and rats with diabetes caused by streptozotocin (STZ) were given oral doses of each extract for 21 days at low doses (150 mg/kg) and high doses (300 mg/kg). The following parameters were measured: HbA1c, lipid profiles, and fasting blood glucose (FBG) & also histopathological study.

Results

Extracts showed high phenolic and flavonoid content, with IC_{50} values of 42.3 µg/mL (garlic) and 51.6 µg/mL (onion) for α-glucosidase inhibition. *In-vivo*, extracts significantly ($p<0.01$) reduced FBG level by 38-52%, restored insulin levels, improved lipid profiles. Histopathology revealed pancreatic β-cell regeneration.

Conclusion

Garlic and onion peels phytochemicals exhibit robust anti-diabetic effects via enzyme inhibition, insulin sensitization, and anti-oxidative mechanisms, supporting their repurposing as eco-friendly therapeutics.

Keywords: Garlic peels, Onion peels, Anti-diabetic, Phytochemicals, Bio-waste.

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Abstract No.: GNIPST/FMPASTII/P163

EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF DESVENLAFAXINE IN ACETIC ACID INDUCED ULCERATIVE COLITIS MODEL IN SPRAGUE-DAWLEY RAT

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Abstract

Objective
The chronic inflammatory bowel disease known as ulcerative colitis (UC) is typified by oxidative stress, epithelial destruction, and mucosal inflammation. This study used both *in vitro* and *in vivo* techniques to assess desvenlafaxine's anti-inflammatory properties in a model of ulcerative colitis caused by acetic acid in Sprague-Dawley rats.

Methods
The *in vitro* anti-inflammatory activity of desvenlafaxine was evaluated using bovine serum albumin and egg albumin protein denaturation assays, HRBC membrane stabilization assay, and hydroxyl free radical scavenging assay.
Sprague-Dawley rats were given acetic acid intrarectally to produce ulcerative colitis, in the *in vivo* study. Animals were divided into six groups (n=6) namely vehicle control, negative control, three desvenlafaxine-treated groups at 40, 60, and 80 mg/kg/day, and a positive control group that received daily doses of 100 mg/kg of mesalamine. For fourteen days, the therapies were given. Rectal bleeding, stool consistency, and body weight loss were used to calculate the Disease Activity Index (DAI). Colon damage was evaluated macroscopically and histopathologically. Biochemical parameters like myeloperoxidase (MPO), glutathione (GSH), catalase, and lipid peroxidation were estimated from colon tissue homogenates.

Results
Desvenlafaxine demonstrate good anti-inflammatory activity in *in vitro* studies, comparable to mesalamine. Desvenlafaxine significantly reduced DAI scores and colon damage in a dose-dependent manner, in animal study as well.

Conclusion
The results indicate that desvenlafaxine has significant anti-inflammatory and antioxidant activity in both *in vitro* and *in vivo* ulcerative colitis caused by acetic acid. It can be considered as a potential repurpose therapeutic agent or treatment of Inflammatory bowel disease.

Keywords: Inflammatory bowel disease; Ulcerative colitis (UC); Desvenlafaxine; Anti-inflammatory activity; Acetic acid Induced model; HRBC; Disease Activity Index (DAI).

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Abstract No.: GNIPST/FMPASTII/P164

PHOTOPROTECTIVE EFFECTS OF MEDICINAL PLANT EXTRACTS AGAINST UV-INDUCED SKIN DAMAGE: MECHANISM AND THERAPEUTIC POTENTIAL

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Abstract

Objective
Due to ozone layer depletion, UV radiation exposure has increased. Causing severe skin disorders. Plants having active ingredients and photoprotective effects are used in medicines. This study reviews the use of these plants for skin problems, these are applied in the treatment of skin damage caused by UV.

Methods
This review examines 18 medicinal herbs that are used in the traditional treatment of skin disorders, with recent evidence that demonstrates their effectiveness against UV-induced skin damage. The analysis focuses on key bioactive compounds and their regulation of major pathways. In addition, various strategies of drug delivery like nano emulsions, hydrogels, etc are evaluated for their ability to enhance compound stability, bioavailability, and skin penetration.

Results
Strong antioxidant, anti-inflammatory, DNA-repair, and skin-lightening effects are shown by the reviewed plants by influencing multiple pathways. Stability, bioavailability and skin penetration are enhanced by the use of advanced delivery systems leading to improved protection against UV-induced skin damage.

Conclusion
Although current findings are encouraging, several challenges remain, including the need to standardize plant-based formulations, better understand how bioactive compounds work together, and successfully translate preclinical results into clinical practice.

Keywords: Active ingredients, drug delivery strategies, medicinal plants, ultraviolet radiation.

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Abstract No.: GNIPST/FMPASTII/P165

2D CARBON NANOMATERIALS IN TARGETED DRUG DELIVERY: AN ANTITUMOR APPROACH

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Abstract

Objective

2D nanomaterials are the class of freestanding sheetlike nanomaterials, that consists of high ratio of lateral size to thickness. Some of the most common 2D nanostructures used for developing the nano-drug delivery systems in past few years are Graphene oxide(GO), MoS_2 nanosheet, and black phosphorus. The objective of this study is to explore the potential of two-dimensional (2D) carbon nanomaterials (such as graphene, GO) that are used in targeted drug delivery systems for cancer therapy.

Methods

2D carbon nanomaterials are synthesized and functionalized to improve biocompatibility and stability. Anticancer drugs (e.g., doxorubicin, cisplatin) are loaded onto the nanomaterial surface through π–π stacking, electrostatic interactions, or covalent bonding. The drug-loaded nanocarriers are evaluated using *in vitro* cell culture studies and *in vivo* tumor models to assess cytotoxicity, and antitumor efficacy.

Results

The results demonstrate that 2D carbon nanomaterials exhibit high drug-loading capacity and controlled, pH-responsive drug release, that releases drug in the acidic tumor microenvironment. Selective accumulation in tumor tissues are observed. Compared to free drugs, nanomaterial-based delivery shows increased cancer cell apoptosis, reduced tumor growth, and lower toxicity to normal cells.

Conclusion

2D carbon nanomaterials, including graphene and graphene oxide, offer bright prospects in targeted drug delivery for cancer treatment. Their unique properties, i.e high surface area, biocompatibility, and ease of functionalization, qualify drug loading and release.

Keywords: Nanomaterials, electrostatic interactions, drug-loaded nanocarrier, nanomaterial-based delivery.

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ACUTE TOXICOLOGICAL ASSESSMENT OF A POLYHERBAL FORMULATION FOLLOWING ORAL ADMINISTRATION IN BALB/C MICE

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Abstract

Objective
To evaluate a polyherbal Ayurvedic formulation's acute safety and toxicity in BALB/c mice following oral dosing.

Methods
As needed for Ayurvedic formulations, acute oral toxicity tests were conducted in accordance with OECD Guidelines 423 and 425. Healthy adult female BALB/c mice (n = 6 per group) received single oral doses of 300, 1000, 2000, or 5000 mg/kg body weight. For the first four hours and then every day for the next fourteen days, the animals were watched closely for any indications of toxicity, including changes in behaviour, appearance, and respiration. Body weight, food and water intake were recorded regularly. Haematological parameters (RBC, WBC, haemoglobin) and biochemical markers (ALT, AST, BUN, creatinine) were measured in blood samples on day 14.
Major organs were examined by gross necropsy and histopathology.

Results
No mortality, behavioural abnormalities, or notable alterations in organ histology, blood parameters, or body weight were observed in a maximum dose of 2000 mg/kg (and higher in some groups). The formulation was therefore classified as practically non-toxic (LD_{50} > 2000 mg/kg).

Conclusion
The polyherbal formulation shows a strong acute safety profile. Further studies should focus on clinical evaluation, dose optimization, pharmacokinetics, long-term toxicity, and molecular-level analyses to support its therapeutic development.

Keywords: Polyherbal formulation, Acute oral toxicity, Safety evaluation, OECD guidelines, BALB/c mice.

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FROM ALGORITHM TO HEALTHCARE: THE REGULATORY FRAMEWORK FOR ARTIFICIAL INTELLIGENCE

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Abstract

Objective
Artificial intelligence (AI) promises translation of innovations into impact in drug development. Regulations provide a framework for the ethical use of AI in healthcare. However, inconsistency in regulatory framework for implementation of AI can hinder innovation and restrict patient care.

Methods
A literature review was conducted to explore the current regulatory frameworks for AI in the healthcare sector.

Results
The adaptive technologies of AI cause significant challenges with respect to regulatory frameworks for traditional technologies. In response, the regulatory authorities of U.S., Japan, and EU have published various documents to address the distinctive risks of AI. The International Medical Device Regulators Forum (IMDRF) recently finalized the "Good Machine Learning Practice (GMLP) guiding principles" (N88, 2025). It sets the first global standards for the safety and effectiveness of AI- powered medical devices. In USA, GMLPs' 10 principles were introduced with the focal points to demonstrate how manufacturers can develop, validate, and commercialize digital health innovations including wearable monitors, precision dosing, intelligent therapeutics, while maintaining patient safety and achieving global regulatory compliance. Despite the accelerated revolution of regulations for AI, it is not able to keep abreast with the swift integration of AI in healthcare.

Conclusion
Regulatory framework for implementation of AI in healthcare directly impacts safety and well-being of the patients yet until now regulators are facing challenges to provide structured framework for safe integration of AI in healthcare.

Keywords: Compliance, Digital Health, Intelligent, Machine Learning, Therapeutics

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Abstract No.: GNIPST/FMPASTII/P168

DECIPHERING THE POTENTIAL OF PROGRAMMED CELL DEATH PROTEIN-1 (PD-1) IN PROGNOSIS OF BREAST CANCER

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Abstract

Objective
A handful of biomarkers like PSA- prostate specific antigen, AFP- alpha-fetoprotein, CEA- carcinoembryonic antigen, etc finds universal usage in cancer diagnosis and prognosis. The hunt for accurate markers is a cornerstone of cancer therapy and the field is escalating to newer heights with the inclusion of immune related biomarkers. As tumor growth and aggression often lead to premature expression of checkpoint markers like PD-1, CTLA-4, LAG-3, etc in anti-tumor T cells, these markers are not only attractive drug targets but are also strong prognostic indicators. As PD-1 is widely studied, we focused on studying its expression pattern in peripheral blood mononuclear cells (PBMCs) in mice model of breast cancer.

Methods
We used 4T1 mice breast cancer cell line. A control group and a tumor-bearing group (n=10 each) of mice were compared to evaluate the expression profile of PD-1 at day 40 in peripheral blood mononuclear cells of mice following tumor inoculation. The expression was quantified by RT-PCR.

Results
High mortality and depletion of body weight was observed in tumor bearing group compared to the normal group. Conspicuous expression of PD-1 in PBMCs but no expression in control revealed its dual potential as a therapeutic and prognostic target in breast cancer. The data needs more validation in other cancer models to scale the universal potential of our observation.

Conclusion
Our findings are promising to probe further into the potential of PD-1 in cancer prognosis by a lesser invasive method that is limited to simple blood collection.

Keywords: immune checkpoints, breast cancer, T cell exhaustion, prognosis, blood.

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COMPARATIVE PHYTOCHEMICAL ANALYSIS AND ANTIDIABETIC ACTIVITIES OF SELECTED VEGETABLE PEELS OF CUCURBITACEAE FAMILY

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Abstract

Objective
With the rising global prevalence of Diabetes Mellitus in recent past years, safer anti diabetic agents from natural sources are needed. This study evaluated the Flavonoidphytochemical analysis, antioxidant activity, and *in vitro* Antidiabetic potential of peels from five vegetables, belonging to Cucurbitaceae families such as *Momordica charantia*, *Lagenaria siceraria*, *Luffa acutangula*, *Trichosanthes cucumerina*, and *Cucumis sativus.*

Methods
Peels of bottle gourd, snake gourd, ridgge gourd, bitter gourd, and cucumber were collected, shade-dried, powdered, and extracted with a hydroalcoholic solution (70% ethanol with 30% water). Measurement of TPC (Total Phenolic Content) and TFC (Total Flavonoid Content) was done by Folin Ciocalteu reagent and Aluminium chloride methods. Evaluation of Antioxidant activity done using DPPH (2,2-Diphenyl-1-picrylhydrazyl) free radical and Hydrogen Peroxide scavenging assays. Antidiabetic potential was evaluated using alpha amylase and alpha glucosidase inhibition assays. Reference drug: Acarbose.

Results
Of all the peels studied it was found that The TPC is highest in *Lagenaria siceraria* (9.28 ± 0.31 mg GAE/g) and second highest in *Momordica charantia* (9.14 ± 0.29 mg GAE/g).

In vitro studies showed significant α-amylase and α-glucosidase inhibition, indicating potential Antidiabetic control of postprandial blood glucose level.

Conclusion
Vegetable peel primarily bottle and bitter gourds, exhibit strong antioxidants and Antidiabetic activity which supports traditional Cucurbitaceae use and highlights potential of food waste.

Keywords: Cucurbitaceae, Total Phenolic Content (TPC), *Lagenaria siceraria, Momordica charantia*, Antidiabetic activity, α-amylase inhibition, α-glucosidase inhibition, Antioxidant activity

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Abstract No.: GNIPST/FMPASTII/P170

QUANTITATIVE ESTIMATION OF POLYPHENYL IN UNRIPE FRUIT AND THEIR *in vitro* ANTIDIABETIC AND ANTI-INFLAMMATORY ASSAY.

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Abstract

Objective
The present study aimed to quantitatively estimate total polyphenol content in unripe fruits of *Sechium edule* (chayote squash) and *Musa paradisiaca* (banana) and to evaluate their *in vitro* antidiabetic, and anti-inflammatory activities.

Methods
Unripe fruit samples were shade-dried, powdered, and subjected to solvent extraction using hydroalcoholic solvent. The total polyphenol content (TPC) was determined using the Folin – Ciocaltue method , expressed as gallic acid equivalents and Total Flavonoid content (TFC). Antidiabetic potential by α- amylase assays, and anti-inflammatory activity by inhibition of protein denaturation method.

Results
Phytochemical analysis reveqaled the presence of phenolics, flavonoids, tanin, glycosides, and ascorbic acid in both ethanolic extracts. Quantitative analysis showed TPC is 0.0269±0.04 GAE/g of *Sechium edule* and TFC is 0.0247±0.032 QE/g of *Sechium edule* . The unripe fruit demonstrated potent α- amylase inhibitory activity with an IC_{50} value of (92.6273 µg/mL) of *Musa paradisiaca*. The IC_{50} value for anti-infammatory potential was found to be (72.7004 µg/mL) of *Sechium edule* confirming its efficacy, although lower than the standard drug aspirin.

Conclusion
Both *Sechium edule* and *Musa paradisiaca* extracts showed appreciable levels of polyphenols and exhibited concentration-dependent antidiabetic, anti-inflammatory activities. Comparatively, extract *Musa paradisiaca* demonstrated higher polyphenolic content and stronger biological activity than *Sechium edule*. The findings suggest that unripe fruits of Sechium edule and Musa paradisiaca are promising sources of natural polyphenols with potential therapeutic applications in oxidative stress-related disorders, metabolic disorder and chronic inflammatory conditions.

Keywords: Polyphenolic compounds, Unripe fruits, *Sechium edule*, *Musa paradisiaca*, Antidiabetic activity, α-amylase inhibition, Anti-inflammatory activity.

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Abstract No.: GNIPST/FMPASTII/P171

COMPARATIVE *IN VITRO* EVALUATION OF THE ANTI-INFLAMMATORY POTENTIAL OF CHLORPROMAZINE USING PROTEIN DENATURATION AND HRBC MEMBRANE STABILIZATION MODELS

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Abstract

Objective
To comparatively evaluate the *in vitro* anti-inflammatory potential of chlorpromazine (CPZ). To investigate its possible repurposing for ulcerative colitis (UC) therapy based on immunomodulatory properties. To assess activity using parameters relevant to the acetic acid-induced UC rat model.

Methods
In vitro anti-inflammatory assays performed: Protein denaturation inhibition assay**,** Human Red Blood Cell (HRBC) membrane stabilization assay. Chlorpromazine tested at different concentrations Standard anti-inflammatory drugs used as reference for comparison.

Results
Chlorpromazine exhibited significant, concentration-dependent inhibition of protein denaturation, indicating effective suppression of inflammatory protein alterations. Additionally, it demonstrated marked HRBC membrane-stabilizing activity, suggesting protection against membrane damage and prevention of inflammatory mediator release. The anti-inflammatory effects were comparable to those of standard reference drugs.

Conclusion
The results indicate that chlorpromazine possesses significant *in vitro* anti-inflammatory activity, supporting its potential repurposing as a therapeutic agent for ulcerative colitis. These findings provide a scientific rationale for further *in vivo* evaluation using acetic acid-induced ulcerative colitis rat models and detailed mechanistic studies to establish its anti-inflammatory role.

Keywords: Chlorpromazine, Ulcerative colitis, *In vitro* Anti-inflammatory activity, HRBC membrane stabilization, Drug repurposing.

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Abstract No.: GNIPST/FMPASTII/P172

A COMPREHENSIVE REVIEW ON ADR REPORTING SKILLS AND PHARMACOVIGILANCE STUDY TO PROMOTE MEDICATION SAFETY

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Abstract

Objective
This review explores how well healthcare professionals understand and practice ADR reporting, examines the knowledge gaps that exist, and uncovers what helps or hinders them from reporting adverse reactions to improve patient safety.

Methods
Systematic analysis of recent empirical studies (2020-2025) assessing knowledge, including journals from PubMed, Deepscienceresearch and ScienceDirect. This included studies from community pharmacies, hospitals, and medical schools using surveys and structured assessment tools to measure competencies.

Results
The findings are concerning. 35-66% of healthcare professionals lack adequate pharmacovigilance knowledge, and only about 11-13% truly understand how to report properly. Nearly 45-62% don't even know their country has a reporting center. Primary barriers include being too busy (19.5%), receiving insufficient training during their education, confusion about reporting procedures, and thinking that well-known side effects don't need reporting. However, serious or unusual reactions and new medications motivate reporting. Training programs using practical teaching methods significantly improve confidence and reporting skills.

Conclusion
Improving drug safety monitoring requires multiple approaches: teaching practical pharmacovigilance skills during training, making reporting easier with user-friendly digital tools, providing clear workplace guidelines, and creating a culture where reporting adverse reactions becomes as routine as prescribing medications.

Keywords: Pharmacovigilance, adverse drug reactions, medication safety, healthcare professionals, reporting barriers, educational interventions

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ISOLATION AND SCREENING OF A CHITIN DEACETYLASE PRODUCING *BACILLUS CEREUS* AND ITS POTENTIAL FOR CHITOSAN PREPARATION

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Abstract

Objective

To isolate and screen the effective chitin deacetylase (CDA)-producing bacteria in the natural marine sources, optimal microbial strain of chitin to chitosan microbiological deacetylation, optimization of culture medium and fermentation conditions of the microorganism with the highest CDA production rate, Batch fermentation scale-up (5 L fermenter) to assess industrial feasibility, High degree of deacetylation (DD) chitosan using a friendly enzyme-based process.

Methods

Selective chitin medium with Congo red and 4-Nitroacetanilide was used to enrich the samples of coastal mud. The screening of CDA-producing strains was done by halo formation and enzyme activity. The activity of extracellular CDA was spectrophotometrically measured by the use of p-Nitroacetanilide as substrate. Acidbase conductometric titration was used to determine chitosan DD. Morphological, biochemical characterization and sequencing of the 16S rRNA gene were done. The fermenter was used (5 L) to optimize conditions using biomass, reducing sugars, and enzyme production. The scanning electron microscopy was used to study structural changes of chitin before and after it was enzymatically deacetylated.

Results

Seven bacteria strains that produced CDA were obtained; the best CDA activity and DD value were observed in strain ZWT-08. Molecular identification of ZWT-08 identified it as bacillus cereus with a 16S rRNA sequence similarity of more than 99 percent. Carbon source: 1% glucose, Nitrogen source: 1% yeast extract, pH: 6.0, Temperature: 37 o C. Maximum CDA activity 613.25 U/mL, 48 h, Biomass peak 7.18 +/- 0.26 g / L, chitosan degree of deacetylation >90%. SEM analysis showed that compact chitin was changed to fluffy, porous chitosan structure, which proved successful enzymatic deacetylation.

Conclusion

The paper has managed to isolate an effective CDA producer Bacillus cereus ZWT-08, which could convert chitin to high-DD chitosan (90 or more) in an environmental-friendly process by enzyme action. The scale-up with optimization and 5 L fermenter confirmed the industrial potential of the strain to produce chitosan in a sustainable way. It offers a robust base of future strain enhancement, metabolic engineering, and pharmaceutical grade production of chitosan, to green biotechnology and bioprocess scale-up strategies.

Keywords: Chitin deacetylase; Chitosan; *Bacillus cereus*; Batch fermentation; Scale-up; Degree of deacetylation; Green bioprocess; Enzymatic chitosan production

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Abstract No.: GNIPST/FMPASTII/P174

POLYMER-BASED *IN SITU* OLOPATADINE GEL FOR OPTHALMIC DRUG DELIVERY: A PRACTICAL APPROACH

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Abstract

Objective

The aim of the study was to develop and estimate a polymer-based innovative liquid eye preparation of olopatadine that transforms into gel formulation upon contact with ocular surface, with the aim of improving ocular residence time, patient compliance, and therapeutic efficacy in management of allergic conjunctivitis.

Methods

The in-situ gel was formulated using different concentrations of gelling polymers that undergo transition of solution to gel formulation in response to physiological states of the eye. Olopatadine is commonly used as an antihistamine medication in treatment of allergic conjunctivitis and rhinitis. Sodium alginate, a mucoadhesive ophthalmic versatile gelling agent that forms thermo-irreversible gel when it reacts with divalent calcium ions. Hydroxypropyl methylcellulose (HPMC) used as key excipient, forming a gel layer upon contact with water, controlling the diffusion of the APIs. This prepared formulation was evaluated for pH, gelation ability, drug content consistency, and also determined *in vitro* release profile of drug.

Results

The developed formulation was clear, showed rapid gelation upon contact with simulated tear fluid, and possessed pH values suitable for ophthalmic application. Uniform drug content and sustained release of olopatadine were observed.

Conclusion

The polymer-based ocular gel of olopatadine demonstrated improved ocular retention time and controlled release, demonstrating its potential as an effective substitute to traditional eye drops.

Keywords: Stimuli-responsive hydrogel, ocular drug delivery, Polymers, controlled release

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Abstract No.: GNIPST/FMPASTII/P175

3D PRINTED DRUGS

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Abstract

Objective

A New view point in the field of pharmaceutical technology is 3D printed drugs. Traditional manufacturing follows a one fit size dosed for whole mankind, which may not suit for everyone, in this place or problem 3D printing plays a major role for individual patient. So this technology have that much potential to transform personalized medicines/drugs. The three dimensional (3D) printing technology provides significant opportunities . drug delivery devices and dosage forms designed for specific patients and for individual patient needs as the technology continues advance.

Methods

3d printing work as materials are added step by step to produce final product, it allows to generate pharmaceutical formulations from digital designs. Existing process like tablet compression is well structured technique. have been followed for many years and are approved by regulatory standards. Tablet compression by using computer aided design software, complex structures for drugs can be printed, but with the traditional methods it could be difficult to achieve.

Results

The first medicine is manufactured by 3D-printing, which is recently approved by the FDA. The advantages of three dimensional printing of drugs ,we found that it can print pills according patient's condition, making the dosage more suitable for individual patient's own physical condition.

Conclusion

In conclusion, three dimensional drugs point toward the future of personify and precision medicine, with more technological development in pharmaceutical industry and regulatory support, this approach can enhance patient care and treatment outcomes.

Keywords: 3D Printing, pharmaceutical technology, Drug delivery devices, regulatory system.

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Abstract No.: GNIPST/FMPASTII/P176

DECIPHERING VACCINE EPITOPES FROM ORF9b AND ORF9c OF SARS-COV2

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Abstract

Objective

COVID-19 pandemic caused by SARS-CoV2, although effectively controlled, has alerted us to take preventive measures by proactively seeking newer vaccination approaches. Long term consequences like long COVID and sporadic cases of infections makes the search for better vaccines indispensible. Immunoinformatics offers a powerful avenue to design effective vaccines. With its state of the art tools, immunodominant epitopes can be identified that are stable and non allergenic in the host. Considering their roles in immune evasion, ORF9b and ORF9c of SARS-CoV-2 are two largely overlooked proteins as vaccine candidates, hence, our goal is to identify immunodominant epitopes from them.

Methods

ORF9b and ORF9c and the peptides derived from them were checked for stability by physicochemical analysis using the software, Expasy Portparam. Similarly the antigenicity of the proteins and the derived peptides was scored by Vaxijen (v2.0) and allergenicity was scored by AllerTOP (v2.1). B cell and T cell epitopes from ORF9b and ORF9c were scanned from the Immune epitope database, IEDB. HLA-A*02:01 specific to $CD8^+$ T cell and HLA-DRB1*07:01 specific to $CD4^+$ T cell was chosen as they are one of the frequent HLA alleles worldwide, reinforcing the relevance of the epitopes as vaccines.

Results

We identified some immunodominant epitopes from ORF9b and ORF9c that can be combined into a multi-epitope format with wide population coverage for combating SARS-CoV2.

Conclusion

We strive to design a multi-epitope vaccine based on ORF9b and ORF9c protein of SARS-CoV2.

Keywords: SARS-CoV2, Immunoinformatics, epitope, IEDB, vaccine.

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Abstract No.: GNIPST/FMPASTII/P177

PREPARATION AND EVALUATION OF EUTECTIC SYSTEM OF FUROSEMIDE AND CITRIC ACID TO MODULATE ITS PHYSIOCHEMICAL PROPERTIES

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Abstract

Objective
The present study aimed to address the poor physicochemical propertiesof furosemide (FSM), a Biopharmaceutical Classification System (BCS) class IV drug, by developing a eutectic mixture with citric acid (CA) using a crystal engineering strategy.

Methods
A eutectic system of FSM and CA was prepared via mechanochemical grinding in a defined stoichiometric ratio. The prepared system was analysed using thermal analysis and powder X-ray diffraction to confirm eutectic formation. Stability of the prepared system was evaluated under accelerated conditions to analyse physical and chemical degradation.

Results
Thermal and x-ray diffraction pattern of the FSM–CA system confirmed the successful formation. Accelerated stability studies depicted that the FSM–CA eutectic mixture remained stable, over the period of study.

Conclusion
The eutectic mixture of Furosemide (FSM) and Citric acid (CA) was created by mechanochemical grinding in a stoichiometric ratio. The system was fully studied utilizing thermal and powder X-ray diffraction techniques. Stability study exhibited that the FSM-CA system remained stable without degradation under accelerated condition.

Keywords: Eutectic mixture, permeability, solubility, physiochemical properties, stability

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Abstract No.: GNIPST/FMPASTII/P178

CORRELATING HEMOGLOBIN STATUS WITH RECURRENT HOSPITALIZATION IN SCHOOL CHILDREN

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Abstract

Objective

This cohort study analyzes the association between hemoglobin concentration and recurrent hospitalizations among kids aged 5 to 12 years in Central Kolkata. By concentrating on this demographic concern, the research coincides with Sustainable Development Goal (SDG) 3: Good Health and Well-Being. It intends to bridge the monitoring gap for children, migrating from Government of India (GoI) policy frameworks to active field-level implementation.

Methods

A cross-sectional analytical technique analyzed a representative dataset of 30 randomly chosen children. Key factors were hemoglobin (Hb) concentration, anemia severity categorization, and the total number of anemia-related hospital admissions reported during the preceding 12 months. The statistical significance and strength of this association were verified using Pearson correlation analysis.

Results

Findings suggested a mean hemoglobin level of 10.8 g/dL and an average of 2.13 hospitalizations per kid yearly. A substantial negative association ($r = -0.69$) was maintained, suggesting that lower hemoglobin concentrations are negatively associated to the chance of frequent hospital admissions. Specifically, children with moderate anemia (Hb < 10 g/dL) averaged 3.4 hospitalizations per year, whereas those with normal levels (Hb > 11.5 g/dL) had just 0.17. This opposite trend remained across genders, with male children displaying greater variability and higher admission rates.

Conclusion

Low hemoglobin levels induce needless hospitalizations, hindering global SDG achievement. Strengthening the Rashtriya Bal Swasthya Karyakram (RBSK) is vital. Expanding "4 Ds" screening (Defects, Diseases, Deficiencies, and Developmental Delays) with school-based iron supplementation and fortified meals will minimize healthcare expenditures and reach health targets for children.

Keywords: Cohort study, Anaemia, School going children, Recurrent Hospitalization, Haemoglobin Level.

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Abstract No.: GNIPST/FMPASTII/P179

PHYTOCHEMICAL PROFILING, ANTIDIABETIC AND ANTI-INFLAMMATORY POTENTIAL OF UNRIPE *PHYLLANTHUS EMBLICA* FRUITS: A NATURAL PRODUCT FROM WEST BENGAL

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Abstract

Objective
The present study aimed to investigate the phytochemical composition and evaluate the antidiabetic and anti-inflammatory activity of unripe *Phyllanthus emblica* grown in West Bengal.

Methods
Unripe fruits of *P. emblica* were shade dried, powdered and extracted using ethanol. Preliminary phytochemical screening was performed to identify major secondary metabolites. Total Phenolic Content (TPC) and Total Flavonoid Content (TFC) were determined quantitatively using spectrometric techniques. The antidiabetic activity was assessed *in-vitro* using the α-amylase inhibition assay, with acarbose as the reference standard. Anti-inflammatory activity was evaluated using the denaturation assay method of egg albumin at 0.01, 0.05 and 0.1 mg/ml concentrations with aspirin as the standard drug.

Results
Phytochemical testing revealed the presence of phenolics, flavonoids, tannins, glycosides, saponins in the ethanolic extract of *P. emblica.* Quantitative analysis detected a phenolic rich profile with TPC of 0.445±0.0004 mg GAE/g and TFC of 0.2608±0.3388 mg QE/g. The extract exhibited concentration dependent anti diabetic activity, with an IC_{50} value of 36.93 µg/ml, which was higher than the reference standard acarbose. Notable denaturation of protein was observed, indicating significant anti- inflammatory activity, with an IC_{50} value of 41.33 µg/ml, confirming its efficacy although lower than the reference standard aspirin.

Conclusion
Unripe fruits of *Phyllanthus emblica* are rich in bioactive phytochemicals and demonstrate significant anti-inflammatory activity *in-vitro*. These results suggest their potential as a natural anti-inflammatory agent and underscore their value in the development of herbal formulations and functional foods. Further *in-vivo* and mechanistic investigations are needed to validate these effects.

Keywords: *Phyllanthus emblica*; unripe fruits; anti-inflammatory activity; phytochemical profiling; natural therapeutics

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Abstract No.: GNIPST/FMPASTII/P180

COMPARATIVE *IN VITRO* DISSOLUTION PROFILE OF BRANDED AND GENERIC SOLID ORAL DOSAGE FORMS: A QUALITY ASSURANCE PERSPECTIVE

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Abstract

Objective

In-vitro dissolution testing is a critical quality control tool to predict in-vivo drug performance. Although generic medicines are approved based on bioequivalence criteria, differences in formulation and manufacturing processes may influence their dissolution behaviour. Therefore, the current review aims to compare the in-vitro dissolution profiles of branded (innovator) and generic solid oral dosage forms and to evaluate potential differences that may impact pharmaceutical quality and interchangeability.

Methods

A systematic search of peer-reviewed literature was conducted across various major search tools like, Web of Science, Google Scholar, Scopus, and PubMed, ScienceDirect using keywords "In-vitro dissolution", "branded vs generic medicines", "Comparative dissolution study", "Dissolution behaviour of solid oral dosage forms". Studies aligned with guidelines of regulatory authorities like "United States Food and Drug Administration", "European Medicines Agency (EMA)", "Central Drugs Standard Control Organization (CDSCO)", "World Health Organization (WHO)".

Results

Most formulations complied with pharmacopoeial specifications but some generic medicines showed significant differences in dissolution rate at 60 and120 minutes of dissolution testing. Generic omeprazole 20 mg tablet displayed a lower dissolution rate as compare to their branded counterparts. Generic nifedipine 10 mg displayed an incomplete dissolution. Meloxicam 15 mg generic showed higher dissolution rate. Diclofenac sodium 50 mg generic failed to achieve dissolution of 85% at 1hrs that's a violation of FDA & EMA Guidelines.

Conclusion

Majority of generic medicines met regulatory dissolution requirements. These findings highlight the importance of dissolution testing as a quality assurance tool and suggest the need for careful evaluation of interchangeability, particularly for drugs with critical dissolution characteristics

Keywords: "In-vitro dissolution testing"; "Branded medicine"; "Generic medicines"; "Absorption"; "*In vivo in vivo* correlation".

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Abstract No.: GNIPST/FMPASTII/P181

A REVIEW ON NLRP3 INFLAMMOSOME AND TREM2 RECEPTORS AS POTENTIAL TARGETS: A REVOLUTIONARY TREATMENT APPROACH FOR ALZHEIMER'S DISEASE

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Abstract

Objective

Alzheimer 's disease is a neurodegenerative disease caused by the accumulation of amyloid β plaques and tau (τ) tangles in the brain. These compounds (i.e., Aβ plaques and τ tangles) are responsible for neuroinflammation as an important mediator of pathogenesis. Ongoing research identifies the NLRP3 inflammasome and Triggering Receptor Expressed on Myeloid Cells 2 receptors as revolutionary microglial targets for development of therapeutic strategies against Alzheimer's Disease.

Methods

This review explores the molecular pathways of these targets and discusses potential therapeutic interventions, including synthetic inhibitors and natural products.

Results

The NLRP3 inflammasome is a multiprotein sensor activated by Aβ or tau activates the release of pro-inflammatory cytokines (i.e., IL-1β and IL-18). This activation promotes a "vicious cycle" of Aβ deposition and tau hyperphosphorylation, leading to neuronal death. Inhibiting NLRP3 can reduce Aβ burden, mitigate tau pathology, and reverse cognitive deficits. TREM2 is an immune receptor essential for microglial survival, migration, and the phagocytic clearance of Aβ. AD-linked loss-of-function variants like R47H, impair the ability of microglia to cluster around and compact plaques accelerating axonal dystrophy. Restoring or boosting TREM2-DAP12 signalling is proposed as a neuroprotective strategy to enhance the brain's homeostatic functions.

Conclusion

A dual approach that inhibits NLRP3-mediated neuroinflammation while promoting TREM2-dependent microglial clearance. It represents a sophisticated precision medicine framework to alter the course of AD.

Keywords: Alzheimer's Disease, Neuroinflammation, NLRP3 Inflammasome, TREM2, Amyloid β plaques.

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Abstract No.: GNIPST/FMPASTII/P182

APPLICATION OF AI AND MACHINE LEARNING IN MULTI-OMICS ANALYSIS OF GUT MICROBIOTA FOR PRECISION MEDICINE

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Abstract

Objective
To elucidate the role of the human gut microbiome in health maintenance and explore multi-omics and AI/ML integration for precision medicine applications, including biomarker discovery, disease prediction, and personalized therapies.

Methods
Comprehensive analysis of the gut microbiome ecosystem that comprises of trillions of bacteria, fungi, viruses in the gastrointestinal tract—relies on multi-omics approaches such as metabolomics, transcriptomics, metagenomics, and proteomics. High-throughput sequencing generates high-resolution omics data, which is processed using AI/ML algorithms, including supervised learning (SL), random forests (RFs), explainable AI (XAI), convolutional neural networks (CNNs), and deep neural networks (DNNs).

Results
The gut microbiome facilitates immune maturation, nutrient processing, metabolic pathway regulation, drug metabolism, and molecular signalling for overall health. AI/ML models effectively integrate complex multi-omics datasets, enabling biomarker identification, disease classification, therapeutic response prediction, and optimization of microbiome-based interventions. This reveals microbial and molecular signatures for enhanced prevention, diagnosis, and therapy. Advancements in multiclass machine learning classifiers (e.g. models designed to assign observations to more than two distinct categories) have raised the level of diagnostic precision by overcoming the limitations of binary decision-making frameworks. For instance, a multiple classifier based on the random forest algorithm has been successfully used to discriminate colorectal cancer (CRC) from alternative pathologies with high sensitivity and specificity using microbiome metagenomic data obtained at species resolution using a gut microbiome.

Conclusion
Integration of multi-omics system has showed various translational values. For an example, in case of inflammatory bowel disease (IBD), metabolomic, metagenomic, proteomic and transcriptomic data are combined to stratify patients based on immunological state and microbial function to identify mechanistic subtypes that go beyond traditional clinical diagnoses. Thus, integrating multi-omics microbiome profiling with interpretable AI/ML frameworks paves the way for personalized medicine, promising earlier disease detection, improved risk stratification, and microbiome-informed therapeutic decisions.

Keywords: Gut microbiome, Multi-omics, Machine Learning, Metabolomics, Transcriptomics, Metagenomics, Proteomics, Precision medicine, Artificial Intelligence.

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Abstract No.: GNIPST/FMPASTII/P183

A REVIEW ON UNLOCKING CAMP SIGNALING FOR ALZHEIMER'S THERAPY BY TARGETING PDE4D

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Abstract

Objective

Alzheimer's disease (AD) is a progressive neurodegenerative disorder marked by beta-amyloid plaques, tau accumulation, and cognitive decline. Recent research identifies disrupted cyclic nucleotide signaling (cAMP/cGMP) as a primary driver of these defects. Phosphodiesterase 4 (PDE4) enzymes, which degrade these nucleotides, are critical therapeutic targets for restoring the cAMP/PKA/CREB pathway essential for memory. This review evaluates the efficacy of Drotaverine as a PDE4 inhibitor to enhance cognition and provide neuroprotection in an STZ-induced AD model, comparing it to traditional agents like Rolipram.

Methods

According to the current research it is found that the Cognitive deficits were assessed via Morris water maze in different experimental animal model. Brain homogenates were analyzed for AChE, MPO, and oxidative markers (GSH, TBARS), while H&E and Congo red staining were evaluated through neuroinflammation and beta-amyloid plaque deposition.

Results

Drotaverine significantly improved memory and learning in a dose-dependent manner, with optimal results observed at 80 mg/kg. The cognitive function by modulating cAMP levels mainly reduced neuroinflammation, and lowering oxidative stress markers. Drotaverine facilitated the clearance of toxic beta-amyloid plaques and aggregated tau, mirroring the neuroprotective effects of agents like Rolipram.

Conclusion

Unlike broad-spectrum inhibitors like Rolipram, which are limited by side effects such as emesis, Drotaverine offers a well-tolerated alternative for drug repurposing. By addressing AD through multiple pathways—including synaptic enhancement and pathological reduction—Drotaverine represents a promising candidate for next-generation AD therapy.

Keywords: Neurodegenerative disease, Drotaverine, PDE4 inhibitor, Cognitive impairments, Neurotransmitters.

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Abstract No.: GNIPST/FMPASTII/P184

MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE IN THE FIGHT AGAINST AMR: FROM PREDICTION TO PRECISION THERAPY

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Abstract

Objective

Antimicrobial Resistance (AMR) is at the top of the global health challenges in the 21st century which has rolled back decades of what we have achieved in the prevention and treatment of infectious diseases. We are seeing an increase in the appearance of drug resistant pathogens which has outpaced conventional means of diagnosis and treatment thus creating an urgent need for new solutions. Also it is important to note that Machine Learning (ML) and Artificial Intelligence (AI) have become game changers in the fight against AMR which is to be a shift to predictive and precision based approaches to treatment from the past reactive approaches.

Methods

The large scale genomic, transcriptomic, clinical and epidemiological data we have may be analysed via AI driven models which in turn may accurate in prediction of anti-microbial resistance patterns and in the detection of health threats at very early stages. Also we see that machine learning methods are used to speed up the drug discovery process which we use for the prediction of new anti-microbial compounds, repurposing of existing drugs and modelling of host pathogen interactions.

Results

Also AI when combined with clinical decision support systems puts forth personalized treatment options which is a base of patient profile and local resistance data.

Conclusion

Although we see that these techs bring light to issues related to quality of data, model explain-ability, and ethical implementation, AI and ML still have very large value in terms of transforming AMR management. This report puts forth the value of these technologies in what they bring to the resistance prediction precision therapy gap, as a data driven and sustainable solution which we present as a worldwide move forward in the fight against AMR.

Keywords: Antimicrobial Resistance; Precision Medicine; Artificial Intelligence; Machine Learning; Resistance Prediction.

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Abstract No.: GNIPST/FMPASTII/P185

APPLICATION OF QUALITY BY DESIGN (QbD) PRINCIPLES IN SURGICAL SUTURE MANUFACTURING

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Abstract

Objective
Quality by Design (QbD) is a systematic approach to pharmaceutical manufacturing that emphasizes product and process understanding. The objective of this study is to highlight the application of QbD principles in the manufacturing of surgical sutures to ensure consistent quality, patient safety, and regulatory compliance.

Methods
A comprehensive review of regulatory guidelines, scientific literature, and industry practices related to surgical suture manufacturing was conducted. Key QbD elements such as Quality Target Product Profile (QTPP), Critical Quality Attributes (CQAs), Critical Material Attributes (CMAs), and Critical Process Parameters (CPPs) were analyzed. Risk assessment tools and process control strategies used in suture production were also evaluated.

Results
The application of QbD in surgical suture manufacturing improves process robustness, reduces variability, and enhances product performance. Identification and control of critical parameters help maintain tensile strength, knot security, sterility, and biocompatibility of sutures. QbD-based approaches also support effective risk management, smoother regulatory approvals, and continuous process improvement.

Conclusion
In conclusion, the implementation of QbD principles in surgical suture manufacturing plays a vital role in delivering high-quality and safe medical devices. By fostering a science- and risk-based approach, QbD enhances manufacturing efficiency, ensures regulatory compliance, and ultimately improves patient outcomes.

Keywords: Quality by Design; Surgical Sutures; Medical Device Manufacturing; Risk Management; Process Optimization.

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Abstract No.: GNIPST/FMPASTII/P186

DEVELOPMENT OF A NEW ANALYTICAL TECHNIQUE FOR SIMULTANEOUS QUANTIFICATION OF CHLORHEXIDINE GLUCONATE AND CETRIMIDE IN PHARMACEUTICALS USING HPLC-UV

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Abstract

Objective
To develop an easy and rapid Reverse-Phase High-Performance Liquid Chromatography (RP-HPLC) technique with UV detection for the simultaneous estimation of Chlorhexidine Gluconate and Cetrimide in pharmaceutical formulations and validate the method as per ICH guidelines.

Methods
Chromatographic separation was carried out using a C8 column (300mm length × 4.6mm ID, 5micron particle size) at ambient temperature. The optimized mobile phase consisted of a mixture of Phosphate Buffer (pH 3.5) and Methanol the ratio (50:50, v/v), at a flow rate of 1ml/ml. The effluent was monitored using a UV detector at 210nm, which provided the best chromatographic condition for the estimation of both analytes.

Results
Validation of the method was done according to ICH Q2 (R1) guidelines for accuracy, precision, specificity, and robustness. Linearity was observed for Chlorhexidine Gluconate and Cetrimide, with correlation coefficients (r^2), >0.999. The recovery studies yielded results between 98% and 102%, indicating high accuracy. The relative standard deviation (%RSD) was found less than 2 for precision.

Conclusion
The developed HPLC-UV method is simple, reliable, economic and suitable for routine analysis of Chlorhexidine gluconate and Cetrimide in combined pharmaceutical dosage forms.

Keywords: Chlorhexidine gluconate, Cetrimide, RP-HPLC, UV

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Abstract No.: GNIPST/FMPASTII/P187

ANTHELMINTIC STUDY OF HYDROALCOHOLIC EXTRACTION OF *VITEX NEGUNDO* LEAVES ON *TUBIFEX TUBIFEX*

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Abstract

Objective
The objective of the present study was to evaluate the anthelmintic activity of the hydroalcoholic extract of *Vitex negundo* leaves. Although *Vitex negundo* is traditionally used in the Ayurvedic system for treating joint pain, oxidative stress, enzyme inhibition, and loss of appetite, there is no scientific evidence available regarding its anthelmintic activity using *Tubifex tubifex*. This study aimed to scientifically validate its potential as a natural anthelmintic agent.

Methods
Fresh leaves of *Vitex negundo* were collected, shade-dried, powdered, and subjected to hydroalcoholic extraction by the maceration method. The extract was prepared at a dose of 550 mg/kg. The *in vitro* anthelmintic activity was evaluated using *Tubifex tubifex* as the experimental model. Albendazole oral suspension IP was used as the standard reference drug. The activity was assessed by recording the time taken for paralysis and death of the worms.

Results
The hydroalcoholic extract of *Vitex negundo* leaves showed significant anthelmintic activity, demonstrated by a marked decrease in paralysis and mortality time of *Tubifex tubifex*. The observed activity may be attributed to the presence of flavonoids, tannins, and alkaloids, which are known to possess anthelmintic properties.

Conclusion
The findings of the study indicate that the hydroalcoholic leaf extract of *Vitex negundo* possesses significant anthelmintic potential. The results support its traditional use and suggest that *Vitex negundo* leaves may serve as a promising natural alternative to synthetic anthelmintic drugs, particularly in the context of increasing drug resistance and the need for safer therapies.

Keywords: Vitex negundo, phytochemical, anthelmintic activity, *Tubifex tubifex*, hydroalcoholic extract, paralysis time, death time, Albendazole oral suspension IP.

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Abstract No.: GNIPST/FMPASTII/P188

MAPPING HYPERLIPIDEMIA IN ELEMENTARY SCHOOL CHILDREN WITH THEIR SEDENTARY LIFESTYLE: A COHORT STUDY

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Abstract

Objective
This Cohort research evaluated the link of pediatric hyperlipidemia with early childhood sedentary behavior by analyzing the behavioral, physiological, and biochemical components producing elevated cholesterol levels in a sample of 30 school attending children aged 5 to 12.

Methods
This questionnaire-based study integrates current epidemiological data with historical views on lipid research of the youngsters. To analyze lifestyle behavior, daily sedentary hour logs were paired with lipid profile, which comprised triglycerides, total cholesterol, low-density lipoprotein (LDL), and high-density lipoprotein (HDL). Pearson correlation research between sedentary time and lipid indicators were evaluated. Their height and weight data were also utilized to determine BMI.

Results
The findings revealed that children's levels of total cholesterol, LDL, and triglycerides were positively linked ($r = +0.49$, $p < 0.05$) with longer times of inactivity. Analysis reveals youngsters idle for more than 5 hours everyday had increased lipid markers. Positive relationships were identified for total cholesterol ($r \sim 0.32$), LDL ($r=0.30$), and triglycerides ($r \sim 0.28$). Conversely, sedentary conduct significantly lowers HDL "good" cholesterol. These data imply chronic inactivity in school-age children raises early physiological risk factors, leading to metabolic syndrome or cardiovascular disease later in life.

Conclusion
According to the research, one key modifiable risk factor for pediatric hyperlipidemia is a sedentary lifestyle. To prevent long-term cardiovascular risks, frequent lipid testing, balanced diets, higher physical exercise are suggested.

Keywords: Cohort study, Pediatric hyperlipidemia, Sedentary lifestyle, Lipid profile, Cardiovascular risk

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Abstract No.: GNIPST/FMPASTII/P189

COMPUTATIONAL APPROACH TO VALIDATION OF HOMOEOPATHIC DRUGS

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Abstract

Objective

Homoeopathy, with a legacy spanning over two centuries, has developed an extensive materia medica derived from diverse sources, including the vegetable, animal, and mineral kingdoms, as well as imponderabilia and biological extracts. The therapeutic efficacy of homoeopathic medicines has traditionally been established through systematic drug provings conducted on healthy human volunteers of varied age, sex, and constitutional backgrounds, followed by repeated clinical verification. This process has generated substantial experiential and clinical evidence supporting the therapeutic application of numerous homoeopathic drugs. To explore the potential of computational approaches in elucidating the molecular constituents, targets, and mechanistic pathways of clinically established homoeopathic medicines, thereby strengthening their scientific validation within contemporary drug discovery paradigms. However, despite widespread clinical use, the precise molecular constituents and mechanistic pathways underlying the action of many homoeopathic medicines remain inadequately documented in contemporary scientific literature.

Methods

A reverse pharmacology framework was adopted to characterise the chemical constituents of homoeopathic drugs using advanced analytical techniques such as Liquid Chromatography–Mass Spectrometry (LC–MS). Identified compounds were mapped to putative molecular targets by retrieving protein structures from open-access databases including the Protein Data Bank (PDB) and PubChem. In silico analyses comprising molecular docking and molecular dynamics simulations were performed to evaluate protein–ligand and protein–protein interactions, binding affinities, and interaction stability within relevant biological pathways. Computational tools such as AutoDock Vina, SwissDock, PyRx, and GROMACS were employed to ensure accuracy, reproducibility, and robustness of the analyses.

Results

The computational analyses enabled the identification of plausible molecular targets and interaction profiles for chemical constituents derived from homoeopathic medicines. Docking and simulation studies provided insights into binding affinities, interaction stability, and potential modulation of key biological pathways, thereby offering mechanistic correlates to the empirically established therapeutic effects observed in clinical practice.

Conclusion

The integration of computational methodologies into homoeopathic drug research provides a systematic and scientifically robust approach to bridging the gap between traditional experiential evidence and modern molecular understanding. This strategy not only enhances

mechanistic validation of homoeopathic medicines but also provides a rational foundation for designing targeted wet-laboratory experiments, facilitating evidence-based integration of homoeopathy within contemporary biomedical research frameworks.

Keywords: Homoeopathy; Computational drug validation; Reverse pharmacology; In silico analysis; Molecular docking; Molecular dynamics simulation; Protein–ligand interaction; Drug–target interaction

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Abstract No.: GNIPST/FMPASTII/P190

PREPARATION AND EVALUATION OF ONDANSETRON HYDROCHLORIDE LOADED BUCCAL PATCH OF THIOLATED GUM KARAYA, HPMC AND PERMEATION ENHANCER

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Abstract

Objective
This study aimed to enhance the mucoadhesive property of gum Karaya through thiolation and to develop a buccal patch for effective delivery of ondansetron hydrochloride, with the goal of prolonging drug residence time and improving patient compliance.

Methods
Gum Karaya was chemically thiolated and used to prepare buccal patches by the solvent casting method in combination with hydroxypropyl methylcellulose (HPMC). Transcutol P was incorporated as a penetration enhancer to promote buccal drug permeation. The patches were evaluated for thickness, drug content, and folding endurance. Thiol content was determined using Ellman's reagent. *In vitro* drug release and permeation studies were performed using a Franz diffusion cell.

Results
The formulated patches exhibited uniform thickness, acceptable drug content, and good folding endurance. Successful thiolation of gum Karaya enhanced mucoadhesive properties. The patches provided controlled and sustained drug release, and Transcutol P significantly improved drug permeation.

Conclusion
Thiolated gum Karaya-based buccal patches offer a promising delivery system for ondansetron hydrochloride, enabling prolonged drug release and improved patient compliance, and demonstrate the potential of thiolated natural polymers in mucoadhesive buccal drug delivery systems.

Keywords: gum karaya, Thiolated gum, Buccal patch, HPMC, Transcutol P

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Abstract No.: GNIPST/FMPASTII/P191

AAV9 VECTORS IN CARDIOVASCULAR THERAPEUTICS: A REVOLUTIONARY APPROACH IMPLICATING CVS HEALTH

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Abstract

Objectives
Adeno-associated virus serotype 9 (AAV9) vectors have identified as highly promising approach in cardiovascular drug development. Among the different AAV serotypes, AAV9 shows superior cardio tropism which enables effective gene delivery to cardiomyocytes, endothelial cells, and vascular smooth muscle cell. This tissue specificity with low immunogenicity and the ability to support long-term transgene expression makes AAV9 a leading vector for gene replacement, gene augmentation, and gene modulation strategies in cardiovascular diseases (CVDs). This review summarizes the mechanism and current research on innovative capsid engineering, optimized delivery strategies, and immune modulation approaches to develop next-generation cardiovascular therapeutics.

Methods
Different serotypes of AAV9 allows delivery of different therapeutic approaches including protein-coding genes, RNA-based therapeutics (i.e., siRNA, shRNA), and genome-editing tools (i.e., CRISPR–Cas9).

Results
It can transduce cardiac tissue efficiently following systemic administration. It has been demonstrated relatively low off-target transduction in non-cardiac tissues. Preclinical studies and early-phase clinical trials demonstrated encouraging outcomes like improved cardiac function and reduced pathological remodelling.

Conclusion
Immune responses triggered by high systemic vector doses and the limited packaging capacity of AAV (~4.7 kb) now a days is the biggest challenge. Recent advancements in vector engineering, like incorporation of cardiac-specific promoters and capsid modifications, have enhanced transduction efficiency and expression specificity.

Keywords: AAV9 vectors, Cardio tropism, CRISPR-Cas9, Transgene expression, cardiovascular disease.

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ADVANCEMENTS IN GENETIC ENGINEERING FOR EDIBLE VACCINE PRODUCTION: CRISPR, AGROBACTERIUM AND GENE SILENCING

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Abstract

Objectives
Edible Vaccines are genetically modified plants that produce specific protein antigens from a pathogen so that when consumed it can destroy the immune system responsible for causing a particular disease in our body using the principle of Genetic Engineering to introduce a gene having a specific antigen which will be recognized by the immune system of the body as a foreign material from a pathogen into a plant's genome.

Methods
Using CRISPR, *Agrobacterium* and Gene silencing for the production of edible vaccines, we can usually perform by *Agrobacterium*, it acts as vector for stable integration of the vaccine gene into the plant's genome, CRISPR acts as the precise genome-editing tool to enhance the efficacy and safety of edible vaccines and Gene silencing helps in activating the gene expression in the host plant for improving the crop traits or providing disease resistance.

Results
As a result, several practical applications of some transgenic plants have been developed like Transgenic Potato for Cholera, Transgenic Rice for Diarrhea and Transgenic Corn for Anthrax disease. Certain experimental gaps like Antigen stability, Dosage Standardization and Immunotolerance are still found for which the works are still going on for a better commercialization. More researches using techniques like Chloroplast transformation are still ongoing to improve the efficacy and consistency of edible vaccines.

Conclusion
The combination of these technologies provides a powerful toolkit for developing safe, effective and scalable edible vaccines. While challenges remain, these advancements represent a significant step toward a future where vaccines could be delivered through a common food, potentially developing transforming global health.

Keywords: Edible vaccines, Genetic Engineering, *Agrobacterium*, CRISPR, Gene silencing, Immunotolerance, Dosage standardization, Chloroplast Transformation,

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Abstract No.: GNIPST/FMPASTII/P193

FROM GENOME TO IMMUNOTHERAPY: PERSONALIZED BISPECIFIC T-CELL ENGAGERS TARGETING TUMOR NEOANTIGENS

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Abstract

Objectives
Although monoclonal antibodies (mAbs) have significantly advanced cancer therapy, their clinical efficacy is often limited by heterogeneous tumor antigen expression and off-target toxicity to normal tissues. Recent advances in personalized medicine have highlighted tumor-specific neoantigens—mutated peptides uniquely expressed by cancer cells—as highly selective immunotherapeutic targets. This study aims to explore the integration of Next-Generation Sequencing (NGS) and computational approaches for the rational design of personalized Bispecific T-cell Engagers (BiTEs) directed against patient-specific neoantigens.

Methods
A translational bench-to-bedside framework was developed, beginning with whole-exome sequencing of tumor samples to identify immunogenic neoepitopes with high MHC-binding affinity. These neoantigens were subsequently utilized in generative AI-based computational modeling to design bispecific antibodies capable of simultaneously engaging endogenous T-cells and tumor-specific targets. The predicted binding interactions and affinities were evaluated using rapid-prototyping microfluidic-based *in vitro* assays.

Results
Preliminary findings indicate that neoantigen-targeted personalized BiTEs demonstrate enhanced tumor specificity with a marked reduction in off-tumor cytotoxicity compared to conventional mAb therapies. By eliminating dependence on shared tumor-associated antigens (TAAs), this individualized strategy shows promise in eliciting effective immune responses against immunologically “cold” tumors that are typically refractory to immune checkpoint inhibitors and standard monoclonal antibody treatments.

Conclusion
The transition from stratified to fully individualized antibody engineering represents a transformative advancement in cancer immunotherapy. Despite ongoing challenges related to manufacturing scalability and cost, patient-specific neoantigen-directed BiTEs offer a compelling pathway toward safer, more effective, and durable anticancer responses, potentially redefining the future of precision biologics.

Keywords: Individualized Immunotherapy, Bispecific T-cell Engagers (BiTEs), Somatic Neoantigens, Next-Generation Sequencing (NGS), MHC-Peptide Binding Prediction, In Silico Affinity Maturation, Clonal Evolution

ABSTRACT

For

ORAL PRESENTATION

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Abstract No.: GNIPST/FMPASTII/O001

DEVELOPMENT OF pH-RESPONSIVE MUCOADHESIVE NANOHYBRIDS OF *Bifidobacterium bifidum* AND CURCUMIN FOR TARGETED COLONIC DRUG DELIVERY IN IBD

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Abstract

Objectives
The present study aimed to develop a pH-responsive, mucoadhesive nanohybrid delivery system that integrates curcumin and Bifidobacterium bifidum for targeted colonic drug delivery in Inflammatory Bowel Disease (IBD), thereby enhancing local therapeutic efficacy while minimising systemic exposure.

Methods
Curcuminoids were extracted from *Curcuma longa* rhizomes by ethanolic maceration and purified using column chromatography. The extracted compounds were characterized by UV–Visible spectroscopy, thin-layer chromatography (TLC), and FTIR analysis to confirm chemical identity and purity. Curcumin-loaded nanoparticles were formulated using a guar gum–based mucoadhesive matrix with chemical crosslinking, followed by ultracentrifugation to obtain a stable nanosuspension. The formulation strategy was designed to support subsequent probiotic surface association and enteric pH-responsive coating for colon-specific delivery.

Results
UV–Visible analysis of purified fractions showed characteristic absorption in the range of 360–475 nm, while TLC analysis demonstrated Rf values between 0.56 and 0.93, consistent with reported curcuminoid standards. FTIR spectra confirmed the presence of functional groups characteristic of curcumin. The formulated guar gum–based nanoparticles formed an opalescent and reproducible nanosuspension, establishing the suitability of the natural polymer as a mucoadhesive carrier for nanohybrid development.

Conclusion
The study successfully establishes a robust pre-formulation and formulation framework for a probiotic–phytochemical nanohybrid system intended for colon-targeted delivery. The validated extraction, characterization, and nanoparticle fabrication strategies provide a strong foundation for ongoing optimization, probiotic integration, and biological evaluation, supporting the potential of this approach for localized IBD management.

Keywords: Inflammatory Bowel Disease; Colon-targeted drug delivery; pH-responsive nanocarriers; Mucoadhesive biopolymers; Curcumin nanoparticles; *Bifidobacterium bifidum*; Probiotic–phytochemical nanohybrids; Guar gum

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Abstract No.: GNIPST/FMPASTII/O002

SMART MUCOADHESIVE ZIZIPHUS-CHITOSAN NANOVESICLES CO-ENCAPSULATING HIBISCUS PHYTOCHEMICALS AND GLP-1 MIMETICS FOR DUAL-TARGETED DIABETES MANAGEMENT

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Abstract

Objective
This present study is aimed to develop a smart mucoadhesive chitosan-based nanoparticulate system for dual-targeted management of type 2 diabetes mellitus by co-encapsulating bioactive phytochemicals from *Hibiscus rosa-sinensis* and GLP-1 mimetic peptides, addressing limitations of injectable peptide therapy and poor gastrointestinal stability.

Methods
Fresh *Hibiscus rosa-sinensis* petals were shade-dried, pulverized, and extracted by ethanolic maceration. Qualitative phytochemical screening, thin-layer chromatography (TLC), and FTIR spectroscopy were performed for extract characterization. Dimethyl chitosan (DMC) was synthesized and nanoparticles were formulated using the ionic gelation technique with sodium tripolyphosphate (TPP). Nanoparticles were characterized by FTIR to confirm crosslinking and by dynamic light scattering (DLS) to evaluate particle size distribution and polydispersity.

Results
Phytochemical tests confirmed the presence of flavonoids, tannins, phenols, terpenoids, and alkaloids. TLC analysis showed a flavonoid Rf value of 0.727. FTIR analysis of hibiscus extract exhibited characteristic peaks at 3385 cm^{-1} (O–H stretching), 2925 cm^{-1} (C–H stretching), and 1621 cm^{-1} (C=O/C=C), indicating polyphenolic compounds. DMC displayed peaks at 3337 cm^{-1} (O–H/N–H), 1636 cm^{-1} (amide I), and 1381 cm^{-1} (–CH_3 bending). DMC-TPP nanoparticles showed phosphate linkage peaks near 1156 cm^{-1}, confirming ionic crosslinking. DLS analysis revealed a Z-average particle size of 7516 nm with a PDI of 0.973, indicating high polydispersity and aggregation.

Conclusion
The study confirms successful phytochemical extraction, characterization and nanoparticle formation, emphasizing the need to further optimize to achieve stable, uniformly sized mucoadhesive nanoparticles suitable for effective oral antidiabetic therapy.

Keywords: Mucoadhesive nanoparticles; Type 2 diabetes mellitus; Dimethyl chitosan; *Hibiscus rosa-sinensis*; Phytochemical co-delivery; Ionic gelation; Oral drug delivery; GLP-1 mimetic.

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Abstract No.: GNIPST/FMPASTII/O003

A DEEP LEARNING BASED EFFICIENT TECHNIQUE FOR THE IDENTIFICATION OF EDIBLE, NON-EDIBLE AND TOXIC MUSHROOMS

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Abstract

Objective
Growing mushrooms is a sustainable method of producing food and a source of money, employment, and protein. Based on their suitability for human eating, mushrooms can be broadly divided into three groups: toxic, non-toxic, and edible. Automatic identification of edible mushroom is an essential task. So here our objective is to develop an efficient deep learning based mushroom classification technique.

Method
In this paper we have presented an efficient deep learning-based Convolution Neural Network (CNN) model to differentiate the toxic, non-toxic, and edible mushrooms. The whole architecture of the proposed method is shown in Fig.1. At first region of mushroom is segmented and resized and converted to gray scale images. The CNN model has been used for classification. CNN model consists of 3 convolutional blocks, 3 Batch Normalization block, 3-ReLU activation function and 3- MaxPooling2D block. At the last step Dense layer, followed by a Dropout layer is used. Finally, the output Dense layer with softmax activation is utilized for the mushroom classification.

Results
To compute the performance of our proposed technique we have used online publicly available dataset which consists of 24,000+ mushroom images of 3-classes. Here 80% data has been used for training and remaining 20% has been used for testing. The accuracy and loss curves are shown in Figure 2 a) and b) for both the training and test data. It is observed that after 60 epochs it provides a stable or steady value of accuracy and loss. For the 3-different cases confusion matrix is shown in Fig.3 for the 3-different classes.

Conclusion
The proposed technique provides a promising result for the classification of edible, non-edible and toxic mushrooms. Beside computation of accuracy, confusion matrix, accuracy curves and loss curves are plotted. It is noticed that for only 60 epochs it also provides a good accuracy and stable result. In our future work we want to apply other deep learning models to improve the accuracy.

Keywords: Deep Learning, Mushroom Identification, Convolution Neural Network (CNN).

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HOMOLOGY MODELING AND INHIBITOR DESIGN OF ISOCITRATE LYASE FROM *MADURELLA MYCETOMATIS*: A NOVEL ANTI-EUMYCETOMA STRATEGY

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Abstract

Background
Eumycetoma can be considered to be one of the most neglected tropical disease caused by the fungus, *Madurella mycetomatis*. Ethnomedicinal sources reveals that several medicinal plants are used for the phytotherapy of eumycetoma. *M. mycetomatis* uses Isocitrate Lyase (ICL) to promote gluconeogenesis for growth and survival in host conditions. Therefore, a hypothesis was developed that inhibition of ICL enzyme might hinder the fungal growth.

Objective
This research aims to develop a natural inhibitor molecule of ICL to target against *M. mycetomatis* using computational techniques for the effective treatment of Eumycetoma.

Methods
Homology modelling was used to predict the 3D structure of ICL. Literature survey was performed to obtain an assemble of 100 unique phytochemicals. These compounds are screened based on their docking score compared with its natural substrate Isocitrate. Pharmacophore modelling was performed to generate the lead molecule which was further optimized using manual iterative Scaffold optimization analysis.

Results
The 3D structure of ICL of *Madurella mycetomatis* was modelled using the template of ICL from *Magnaporthe oryzae* (85.80% similarity). Molecular dynamics protein in water simulations showed satisfactory results for the protein being biologically feasible. The final drug molecule predicted using pharmacophore modelling provides competitive inhibition with docking score (-7.5 kcal/mol) towards ICL as evident by better affinity than the substrate with -6.2 kcal/mol docking energy.

Conclusion
Molecular Dynamic Receptor-Ligand Simulations can be performed to predict the stability of the receptor-ligand complex. Synthesis of the drug can guide towards *in vitro* and fungal viability analysis.

Keywords: Eumycetoma, *Madurella mycetomatis*, Isocitrate Lyase, Homology Modelling, Root Means Square Deviation, Granuloma

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Abstract No.: GNIPST/FMPASTII/O005

BIOINSPIRED TULSI HONEY-INFUSED DUAL-FUNCTIONAL BI-LAYERED NANOFIBER SCAFFOLD FOR EFFECTIVE SEALING OF TRAUMATIC HEMORRHAGES AND FASTER TISSUE REGENERATION

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Abstract

Objective
This research is an exploration of the specific activity of TH in inducing rapid hemostasis in the case of traumatic hemorrhages.

Methods
For this purpose, we have designed a bi-layered delivery system, loading 25% of TH formulated with a polyvinyl alcohol (PVA)/pullulan (Pul)-based nanofiber mat (NFM) in the primary layer and a mucoadhesive 4% chitosan as the secondary layer (NFMTC). The TH-loaded NFM was optimized using the Response Surface Methodology (RSM). Optimization was followed by physicochemical characterizations and *in vitro* and *in vivo* studies.

Results
The concentrations of PVA and Pul were optimized at 67.5% and 27.5% w/v, respectively, to achieve a maximum fluid absorbency of 233.0 ± 33.73% and a minimum nanofiber diameter of 191.32 ± 20.88 nm. NFMTC produced a positive zeta potential of 26.24 ± 4.05 mV required for attracting the negatively charged platelets (-14.24 ± 1.83 mV) and a low optical contact angle of 15.67 ± 0.66° for high plasma absorption. A positive peak force of 2.07 ± 0.01 N was observed on goat skin, indicating high mucoadhesion. Also, the nanofibers displayed excellent biocompatibility with HaCaT cells. Treatment of the rat tail injury model and femoral artery injury model with the optimized formulation resulted in blood loss of only 10 ± 4 and 13.33 ± 6.03 mg, respectively, which were significantly less than that of the standard gauze-treated group. Furthermore, NFMTC showed a potent wound repair activity in the rat circular excisional wound model.

Conclusion
The formulated NFM exhibited excellent potential as a hemostatic dressing.

Keywords: Traumatic hemorrhages; Tulsi honey; Nanofiber mats; Pullulan; Wound healing

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Abstract No.: GNIPST/FMPASTII/O006

PHYTOCHEMICAL PROFILING AND SOLVENT FRACTINATION OF *Leucaena leucocephala* (LAM.) DE WIT

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Abstract

Objective
The objective of the present study was to carry out phytochemical profiling and solvent fractionation of *Leucaena leucocephala* (Lam.) de Wit leaves in order to identify and characterize the major classes of bioactive secondary metabolites quantitatively.

Methods
Fresh *Leucaena leucocephala* (Lam.) de Wit leaves were collected from a designated location during the appropriate growing season, taxonomically authenticated with a voucher specimen deposited, then washed, shade-dried, and ground into coarse powder for analysis.
A measured amount of powdered plant leaves was Soxhlet-extracted with solvents of increasing polarity until exhaustion and the all-final extracts were filtered, rotary-evaporated, and refrigerated. The percentage yield of each extract was calculated based on the initial dry weight of plant material and the final weight of the concentrated extracts.
Qualitative phytochemical screening was performed using standard methods and confirmed the detection of alkaloids, flavonoids, phenolics, tannins, etc. All experiments were carried out in triplicate, and results were expressed as mean ± standard deviation with appropriate statistical analysis.

Results
The methanolic extract exhibited markedly higher phytochemical content, with total flavonoids of ~446 mg QE/g, total phenolics of ~0.187 mg GAE/g, and higher alkaloid levels than the aqueous extract, with TLC and HPTLC showing stronger bands in polar extracts, confirming the superior extraction efficiency of methanol for *Leucaena leucocephala* leaves.

Conclusion
Overall, polar and semi-polar Soxhlet extracts of *Leucaena leucocephala* leaves yielded higher and more diverse bioactive metabolites, confirming solvent polarity as a key factor in efficient phytochemical extraction.

Keywords: Phytochemical Profiling, Soxhlet extraction, Maceration, Total Phenolic and Flavonoid Content, High-Performance Thin Layer Chromatography.

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Abstract No.: GNIPST/FMPASTII/O007

DEVELOPMENT AND CHARACTERIZATION OF GLUTEN-FREE BREAD FORMULATED WITH TAMARIND KERNEL POWDER (TKP)

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Abstract

Objective
Tamarind fruit (*Tamarindus indica*), belongs from Fabaceae family has preponderantly produced in India, and exclusively used for pickle, chutney, sauce, beverage etc. The fruit consists of 30-35% ripe fruit,11-30% shell and fibre, and 20-25% of seeds. After using the pulp, this significant portion of by-products remains underutilized, with over 90% as reported. A growing incidence of Gluten intolerance and celiac disease has increased the demand for production of gluten-free food items; hence this study aims to develop gluten- free bread by utilizing ragi flour and tamarind kernel powder (TKP).

Methods
The breads were prepared in three different ratios of ragi flour and TKP 70:30 (B_1), 50:50 (B_2), 30:70 (B_3) w/w, alongside with characterization for rheological, physiochemical and nutritional properties of all bread samples. Physical properties such as width (cm), length (cm), weight (g), specific volume (cm^3/g), and density (g/cm^3) were measured for all bread samples.

Results
The bread samples show pseudo-plastic flow behaviour, with a decreasing flow behaviour index from 0.70 to 0.65 and a rising consistency index from 2.65 to 3.73 $Pa.s^n$. Whereas, Total polyphenolic content (TPC) increased from 6.70 mg GAE/g (B_1) to 117.25 mg GAE/g (B_3), Total flavonoid content (TFC) from 2.60 (B_1) to 8.10 (B_3) mg QE/g, and DPPH scavenging activity from 15.2% (B_1) to 68.5% (B_3).

Conclusion
These results indicate that B_1, B_2 are moderately nutritious, whereas B_3 has a nutritionally excellent composition with significant high protein, Fiber, mineral, and antioxidant content.

Keywords: Anti-nutrients, bread, gluten-free, ragi, tamarind kernel powder.

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Abstract No.: GNIPST/FMPASTII/O008

MIXED-METHODS RESEARCH FOR DEVELOPMENT OF THE REPERTORIAN'S EXPERT TOOL FOR SELECTING SIMI (REXPERTSS) AFTER REPERTORIZATION IN CHRONIC DISEASES

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Abstract

Objective
Final remedy selection in homeopathy relies heavily on practitioner judgment, as repertorization rarely yields one clear medicine, leading to variability in practice and highlighting the need for a clear, validated framework beyond simple ranking.

Methods
A sequential exploratory mixed-methods study (qualitative to quantitative) was conducted in three phases. Phase I generated 18 items through a deductive literature review and an inductive thematic analysis of in-depth interviews with 5 experts. These items were then improved by face validation from 6 end-users. Phase II achieved content validity via two Delphi rounds involving five independent experts, resulting in consensus. Phase III tested the finished RExperTSS tool on 30 chronic cases with 6 users. They used it to encode pathways, extract ORIDL outcomes, and analyse the data using descriptive and inferential statistics, diagnostic accuracy tests, predictive modelling and associations, and sample size estimations.

Results
Face and content validation showed strong agreement, and RExperTSS classified cases into seven decision pathways, most commonly direct acceptance of the repertory result (46.7%). Clinical outcomes were similar across pathways, while predictive performance was limited (AUC 0.58), indicating that different analytical routes produced comparable results. The tool structures expert reasoning, but larger studies (~1,056 cases) are needed for full validation.

Conclusion
RExperTSS shows early promise as a structured decision-support tool with good validity and feasible classification, but its moderate pilot predictive performance indicates the need for larger studies to refine the model, standardize prescribing, and strengthen research reliability.

Keywords: Clinical reasoning; Decision-support tool; Delphi technique; Homeopathy; Mixed-methods research; Repertorization

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Abstract No.: GNIPST/FMPASTII/O009

QUANTITATIVE CHARACTERIZATION OF MIASMATIC STATES IN HOMEOPATHY BY MULTI-METHOD RESEARCH: INSIGHTS INTO DIAGNOSTIC COMPLEXITY AND EMERGENCE OF THE CONTINUOUS SPECTRAL MODEL OF MIASMATIC FINGERPRINTS

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Abstract

Objective
To operationalize chronic miasmatic constructs into a quantitative framework and evaluate whether miasmatic states represent discrete categories or continuous spectra, while assessing their prognostic relevance for clinical outcomes.

Methods
In a multimethod cross-sectional and longitudinal study, 931 patients with chronic diseases were systematically assessed using the Systematic Miasm Assessment Tool (SMAT), quantifying 72 secondary symptoms across psoric, sycotic, and syphilitic subscales (0–3 Likert). Clinical outcomes were measured at 3-month follow-up using the Outcome Related to Impact on Daily Living (ORIDL; −4 to +4) after individualized homeopathic treatment. Analytical approaches included correlation ratios (η) between physician-assigned miasms and continuous SMAT scores; soft-clustering using Fuzzy C-Means (FCM) and Gaussian Mixture Models (GMM); hard clustering via Partitioning Around Medoids (PAM); and multivariate logistic regression predicting meaningful improvement (ORIDL ≥ +2), adjusting for demographic and clinical covariates.

Results
SMAT demonstrated substantial inter-miasmatic overlap. FCM identified mixed miasmatic states in 74.7% of patients, while GMM revealed hybrid transition zones in 18.5%. Physician diagnosis showed weak-to-moderate concordance with SMAT scores (η = 0.066–0.350). PAM clustering failed to support discrete partitions (silhouette width 0.239). Logistic regression (Tjur's R^2 = 0.258) identified sycotic and syphilitic scores as significant predictors of ORIDL ≥ +2 (OR 1.41–2.21; p = 0.004), outperforming categorical labels; dominance agreement was low (κ = 0.161).

Conclusion
Chronic miasmatic states function as continuous spectra rather than rigid categories. SMAT enables high-resolution phenotyping analogous to biological gradient models, supporting precision-oriented prognosis and therapeutic decision-making. Further multicentric validation and advanced psychometric modeling are warranted.

Keywords: Fuzzy C-Means; Gaussian Mixture Models; Grade of Membership; Hard clustering; Homeopathy; Miasms; Spectral model

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Abstract No.: GNIPST/FMPASTII/O010

DEVELOPMENT OF ALGINATE–GUAR GUM HYDROGELS FOR CONTROLLED DELIVERY OF GINGER PEEL POLYPHENOLS

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Abstract

Objective
Alginate-based hydrogels have been of significant interest as food-grade carriers to stabilize and control the delivery of plant-derived bioactive. The current study aimed to develop a hybrid alginate-guar gum (ALG-GG) hydrogel to encapsulate and deliver polyphenols extracted from ginger peel using alginate hydrogel (ALG) as a control system.

Methods
Polyphenols were extracted from ginger peel using aqueous ethanol. Total phenolic content was quantified using the Folin–Ciocalteu method. ALG and ALG–GG hydrogel beads were prepared by calcium-induced ionic gelation and evaluated for encapsulation efficiency, moisture content, morphological characteristics, and in vitro gastrointestinal release behavior under simulated gastric and intestinal conditions.

Results
The polyphenol entrapment of the ALG-GG beads (69.70%) was considerably higher and showed better encapsulation efficiency than that of ALG beads (54.17%). The moisture content of ALG-GG beads (89.47%) was greater than that of ALG beads, indicating improved water-holding and swelling capacity due to guar gum incorporation. The morphological characteristics showed increased bead size (3 mm) and greater sphericity (0.97) of ALG-GG hydrogels compared to ALG beads (2 mm, 0.94). In vitro digestion experiments indicated minimal polyphenol release at simulated gastric conditions (pH 1.5) and increased at simulated intestinal conditions (pH 7.4) with ALG-GG hydrogels showing a more hydration-driven release pattern than the ALG beads.

Conclusion
These results indicate that guar gum inclusion beneficially affects the structural and release properties of alginate hydrogels, and alginate-guar gum systems are promising, sustainable delivery systems for ginger peel-derived polyphenols in food and nutraceutical products.

Keywords: Alginate–guar gum hydrogel; Ginger peel polyphenols; Ionic gelation; Encapsulation efficiency; In vitro gastrointestinal release; Sustainable bioactive delivery

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Abstract No.: GNIPST/FMPASTII/O011

A RANDOMIZED STUDY OF THREE HOMEOPATHIC MEDICINES—*RAUWOLFIA SERPENTINA*, *VISCUM ALBUM*, AND *SPARTIUM SCOPARIUM*—IN ESSENTIAL HYPERTENSION

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Abstract

Objective
Hypertension (HTN) is one of the major global risk factors for cardiovascular conditions such as heart failure, stroke, and coronary artery disease. The purpose of this study was to assess and compare the antihypertensive effects of the mother tinctures (MTs) of three homeopathic medicines—Rauwolfia serpentina (RS), Viscum album (VA), and Spartium scoparium (SS)—in patients diagnosed with essential hypertension.

Methods
This was an open-label, randomized (1:1:1), three-arm, pragmatic pilot study conducted over a period of eight months in the outpatient department of D. N. De Homoeopathic Medical College and Hospital, Kolkata. A total of 60 patients with essential hypertension were enrolled and randomly assigned to one of three groups: RS, VA, or SS, with 20 participants in each group. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were recorded at baseline and again after 30 and 60 minutes of treatment.

Results
All 60 participants completed the study (RS = 20, VA = 20, SS = 20). Although the RS group demonstrated the highest average reduction in both SBP and DBP over time, statistical analysis showed no significant differences in blood pressure reduction among the three groups (SBP: $F_{2,57} = 1.710$, $p = 0.190$; DBP: $F_{2,57} = 0.732$, $p = 0.485$).

Conclusion
No serious adverse effects or harm were reported in any of the study groups. The findings indicate that all three homeopathic medicines—Rauwolfia serpentina, Viscum album, and Spartium scoparium—exhibited comparable antihypertensive effects in patients with essential hypertension.

Keywords: Homeopathy; hypertension; Rauwolfia serpentina; Viscum album; Spartium scoparium.

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