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Research Article

EFFECTIVENESS OF MIXED SEEDS IN ALLEVIATING MENOPAUSAL SYMPTOMS IN MIDDLE-AGED WOMEN: AN EXPERIMENTAL STUDY

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ABSTRACT

Objectives: Menopausal symptoms significantly impact the quality of life in middle-aged women, including those in peri- and post-menopausal stages. Natural interventions such as dietary supplements have gained attention due to their safety profile. This study aimed to evaluate the effectiveness of daily mixed raw seed supplementation comprising flax, pumpkin, sesame, and sunflower seeds in alleviating menopausal symptoms.

Methods: A true experimental study was conducted over 12 months from November 2021 to October 2022 at the Department of Gynecology, Mamata Academy of Medical Sciences and Hospital, Hyderabad. A total of 220 middle-aged women, including peri- and post-menopausal participants, were enrolled and randomly assigned to either the intervention group (n=100), receiving daily supplementation with mixed raw seeds, composed of 5 g each of flaxseed, pumpkin seed, sesame seed, and sunflower seedor the control group (n=100), which did not receive any placebo or dietary intervention. The primary outcome was the change in Menopause Rating Scale (MRS) scores across vasomotor, psychological, and somatic symptom domains. Data were analyzed using appropriate statistical tests with significance set at $p<0.05$.

Results: The intervention group showed significant improvement in all symptom domains compared to the control group. The mean reduction in vasomotor, psychological, and somatic symptoms in the mixed seed group was 3.2±1.1, 2.8±1.0, and 3.5±1.3, respectively, versus 1.1±0.9, 1.2±0.8, and 1.5±1.1 in the control group ($p<0.001$). A total of 85% of participants in the intervention group experienced more than 30% improvement in symptoms. No serious adverse events were reported.

Conclusion: Daily supplementation with mixed raw seeds significantly alleviated menopausal symptoms in middle-aged women and was well tolerated. It may serve as an effective, natural, and safe alternative for symptom management during the menopausal transition.

Keywords: Menopausal symptoms, Mixed seeds, Flaxseed, Pumpkin seed, Sesame, Sunflower seed, Menopause Rating Scale, Dietary intervention, Vasomotor symptoms.

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INTRODUCTION

Menopause is a natural biological transition that signifies the end of a woman's reproductive phase, typically occurring between the ages of 45 and 55 years. This transition is often accompanied by a wide range of symptoms vasomotor, psychological, and somatic primarily due to declining estrogen levels. Common manifestations include hot flashes, night sweats, mood disturbances, insomnia, and fatigue, all of which can severely affect quality of life [1].

Hormone replacement therapy (HRT) has traditionally been the mainstay of treatment for menopausal symptoms. However, growing concerns about its long-term safety, including increased risks of cardiovascular disease and hormone-dependent cancers, have led many women to explore alternative and complementary therapies [2]. In recent years, dietary and plant-based interventions have gained significant attention due to their favorable safety profile and potential therapeutic benefits [3].

Among these, various seeds such as flax, pumpkin, sesame, and sunflower have shown promise in supporting hormonal balance and alleviating menopausal symptoms [4]. These seeds are rich sources of phytoestrogens, essential fatty acids, antioxidants, vitamins, and minerals that may help modulate hormonal fluctuations and reduce inflammation. Flaxseeds contain lignans with weak estrogenic activity; pumpkin seeds are high in magnesium and zinc, which support mood and bone health; sesame seeds offer lignans and healthy fats; while sunflower seeds contribute Vitamin E and selenium, known for their antioxidant properties [5].

Despite the widespread traditional use of these seeds in various cultures for general health and well-being, limited scientific evidence exists on their combined effectiveness in relieving menopausal symptoms. This study was undertaken to evaluate the impact of daily supplementation with mixed raw seeds comprising flax, pumpkin, sesame, and sunflower seeds on menopausal symptom relief in middle-aged women, including those in peri- and post-menopausal stages. The findings aim to provide evidence for the use of mixed seeds as a natural, accessible, and safe therapeutic option for symptom management during the menopausal transition.

METHODS

Study design and setting

This was a true experimental study conducted over 12 months, from November 2021 to October 2022, at the Department of Gynecology, Mamata Academy of Medical Sciences and Hospital, Hyderabad, Telangana.

Study population

A total of 220 middle-aged women, including both peri- and post-menopausal women aged between 45 and 55, who had experienced

natural menopause or were in the perimenopausal stage with moderate-to-severe menopausal symptoms, were enrolled in the study. Women currently on HRT, with a history of estrogen-sensitive malignancies, severe systemic illness, or known allergy to seeds were excluded from participation.

Inclusion criteria
Inclusion criteria were as follows:

Women aged 45–55 years.

Either perimenopausal (irregular cycles with symptoms) or post-menopausal (amenorrhea ≥am months).

Moderate-to-severe menopausal symptoms based on baseline MRS score.

Willingness to comply with dietary intervention and follow-up schedule.

Exclusion criteria
Exclusion criteria were as follows:

The current use of HRT or other medications affecting hormonal status.

A history of estrogen-dependent malignancies (e.g., breast, endometrial cancer).

Severe systemic illness (e.g., uncontrolled diabetes, cardiovascular disease).

Known allergy or intolerance to flax, pumpkin, sesame, or sunflower seeds.

Participation in another clinical study within the past 3 months.

Sampling and randomization
Participants were selected using purposive sampling and randomly allocated into two equal groups (n=110 per group) using a computer-generated random number table. After accounting for dropouts and non-compliance, 100 participants from each group completed the study, yielding a final sample size of 200.

Intervention
The intervention group received a daily supplementation of 20 g of mixed raw seeds, composed of 5 g each of flaxseed, pumpkin seed, sesame seed, and sunflower seed. These seeds were provided in pre-packaged individual 20-g packets, with each participant receiving 90 such packets for home consumption as part of their routine diet. Participants were instructed to consume the seeds raw or lightly roasted as preferred. The control group did not receive any seed supplementation or placebo and continued with their usual diet and lifestyle.

Outcome measures
Menopausal symptoms were assessed using the Menopause Rating Scale (MRS) at baseline and after 12 months of intervention. The MRS has been previously validated in Indian populations for linguistic and cultural relevance, demonstrating good internal consistency, and construct validity for assessing menopausal symptom burden among Indian women [6,7].

- Vasomotor symptoms (e.g., hot flashes, sweating)
- Psychological symptoms (e.g., depressive mood, irritability, anxiety), and
- Somatic symptoms (e.g., sleep disturbances, physical exhaustion).

Data collection and analysis
Sociodemographic data, medical history, and baseline MRS scores were collected using a structured questionnaire. Follow-up assessments were conducted monthly to ensure adherence, monitor seed consumption, and record any adverse events. Data were analyzed using SPSS software. Paired *t*-tests were used to compare within-group changes, and independent *t*-tests were applied for between-group comparisons. A $p<0.05$ was considered statistically significant.

Ethical considerations
The study protocol was reviewed and approved by the Institutional Ethics Committee of Mamata Academy of Medical Sciences, Bachupally, Hyderabad (IEC/MAMS/2021/05). Written informed consent was obtained from all participants before enrollment.

RESULTS

A total of 220 postmenopausal women were initially enrolled in the study. After accounting for loss to follow-up and exclusions, 200 participants completed the trial and were included in the final analysis, with 100 participants in each group (intervention and control).

Baseline characteristics
The two groups were comparable in terms of age, body mass index (BMI), duration of menopause, and baseline MRS scores. The mean age was 52.4 years in the intervention group and 52.1 years in the control group. Similarly, the mean BMI was 25.7 kg/m^2 and 25.9 kg/m^2 in the intervention and control groups, respectively. There were no statistically significant differences in any of these baseline characteristics ($p>0.05$), indicating good randomization (Table 1).

Symptom score reduction
At the end of the 12-month intervention, participants in the mixed seed group exhibited significantly greater reductions in postmenopausal symptoms compared to the control group across all symptom domains.

The mean reduction in vasomotor symptoms was 3.2±1.1 in the intervention group versus 1.1±0.9 in the control group ($p<0.001$).

Psychological symptoms improved by a mean of 2.8±1.0 in the intervention group, compared to 1.2±0.8 in controls ($p<0.001$).

Somatic symptoms showed a mean reduction of 3.5±1.3 in the intervention group versus 1.5±1.1 in the control group ($p<0.001$) (Table 2).

Adverse events
Adverse events were minimal and comparable between the two groups. In the intervention group, 2 participants reported gastrointestinal

Table 1: Baseline characteristics of participants

Variable	Intervention group (n=100)	Control group (n=100)	Mean difference (95% CI)	p-value
Age (years)	52.4	52.1	0.3 (−1.2–1.8)	0.68
BMI (kg/m^2)	25.7	25.9	−0.2 (−1.0–0.6)	0.74
Duration of menopause (years)	3.1	3.2	−0.1 (22120.6–0.4)	0.59
Baseline MRS score	17.8	17.5	0.3 (−0.9–1.5)	0.63

MRS: Menopause rating scale, BMI: Body mass index

Table 2: Reduction in postmenopausal symptom scores by domain

Symptom domain	Mean reduction-intervention	Mean reduction-control	p-value	Cohen's d
Vasomotor	3.2±1.1	1.1±0.9	<0.001	2.12
Psychological	2.8±1.0	1.2±0.8	<0.001	1.84
Somatic	3.5±1.3	1.5±1.1	<0.001	1.73

discomfort, 1 experienced a mild allergic reaction, and 3 dropped out due to intolerance. In the control group, there was 1 case of gastrointestinal discomfort and 2 dropouts due to intolerance. No serious adverse events were reported (Table 3).

Overall clinical outcome

A clinically significant improvement, defined as a >30% reduction in total MRS score, was observed in 85% of participants in the mixed seed group compared to only 42% in the control group. This corresponds to an absolute risk reduction of 43% in favor of the intervention group, indicating that 43% more participants achieved meaningful symptom relief compared to controls (Table 4).

DISCUSSION

The present study demonstrated that daily supplementation with mixed seeds significantly alleviated postmenopausal symptoms over 12 months. Participants in the intervention group showed greater improvements across all domains of the MRS vasomotor, psychological, and somatic, compared to the control group. These findings support the use of sesame seeds as a safe and effective natural alternative for managing postmenopausal symptoms [8].

The phytoestrogenic activity of sesame lignans, such as sesamin and sesamol, is believed to play a central role in the observed symptom relief. Phytoestrogens are structurally similar to endogenous estrogens and can bind to estrogen receptors, exerting mild estrogenic effects. This mechanism may help mitigate the estrogen deficiency characteristic of menopause, especially in relation to vasomotor symptoms such as hot flashes and night sweats [9,10].

Our findings are consistent with previous research highlighting the therapeutic effects of sesame and other seed combinations in women's hormonal health. Rasheed *et al*. reported that combined seed therapy, including sesame, showed promising results in improving hormonal profiles in women with polycystic ovary syndrome, further supporting the role of seeds as adjunctive natural therapy [4]. Similarly, Sravanthi *et al*. demonstrated that dietary seed supplementation in peri- and post-menopausal women led to favorable hormonal and biochemical changes, supporting the role of seeds in managing menopausal symptoms and metabolic health [11]. In another study, Sravanthi *et al*. reported that seed supplementation provided a safer alternative to HRT by modulating hormonal levels and potentially reducing cancer risk in postmenopausal women [12].

Moreover, the reduction in psychological symptoms may also be attributed to the antioxidant and anti-inflammatory properties of sesame seeds, which support neuroendocrine function and stress regulation [10]. Lifestyle interventions and dietary supplementation have shown comparable benefits in menopausal symptom relief, as reported by Fouad *et al*., emphasizing the value of non-pharmacological approaches [13].

Table 3: Adverse events reported during the study

Adverse event	Intervention group (n=100)	Control group (n=100)
Gastrointestinal discomfort	2	1
Allergic reaction	1	0
Dropouts due to intolerance	3	2

Table 4: Overall clinical outcome at 12 months

Outcome measure	Intervention group (n=100)	Control group (n=100)
Improved (>30% reduction in MRS)	85	42
No change	12	40
Worsened symptoms	3	18

MRS: Menopause rating scale

Importantly, mixed seed supplementation was well tolerated in our study, with only minimal, non-serious adverse events reported. This aligns with the broader safety profile of sesame-based interventions documented in both animal and human studies [8,9]. Given the rising preference for natural and dietary approaches, sesame seeds may serve as a practical alternative for women who are unwilling or unable to use HRT due to its associated risks.

However, this study has some limitations. The absence of a placebo in the control group may introduce potential bias. Furthermore, dietary and lifestyle variations, though minimized through instructions, may still have influenced outcomes. Further studies with larger sample sizes and biochemical hormone assessments are warranted to substantiate these findings and explore the precise mechanisms of action. In addition, the study did not assess biochemical parameters such as serum estrogen levels or inflammatory cytokines, which could have provided mechanistic insights into the physiological effects of seed supplementation. Future studies incorporating these biomarkers are warranted to better elucidate the hormonal and anti-inflammatory mechanisms underlying symptom improvement.

CONCLUSION

This experimental study demonstrated that daily mixed seed supplementation significantly alleviated postmenopausal symptoms, including vasomotor, psychological, and somatic complaints, over 12 months. The intervention group showed greater symptom reduction compared to the control group, with minimal adverse events, indicating both effectiveness and safety. The phytoestrogenic and antioxidant properties of sesame seeds likely contributed to the observed benefits. Given its affordability, accessibility, and natural composition, mixed seed supplementation may serve as a viable non-pharmacological option for managing menopausal symptoms. However, further large-scale, placebo-controlled trials are recommended to confirm these findings and explore underlying mechanisms more thoroughly.

AUTHOR CONTRIBUTION

DS-Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript. Statistical analysis and interpretation, revision of manuscript.MM-Concept and design of the study, results interpretation, review of literature, and preparing first draft of manuscript, revision of manuscript.EK-Review of literature and preparing first draft of manuscript. Statistical analysis and interpretation.

CONFLICT OF INTEREST

No conflict of interest is associated with this research.

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