



IMPACT OF A STRUCTURED NUTRITIONAL INTERVENTION ON THE MANAGEMENT OF MENOPAUSAL SYMPTOMS

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ABSTRACT

Background: Menopause is associated with various physiological and psychological symptoms due to declining estrogen levels, including hot flashes, sleep disturbances, mood swings, and an increased risk of osteoporosis and metabolic disorders. While hormone replacement therapy (HRT) is effective, concerns over its risks have led to interest in alternative approaches such as dietary interventions. Nutritional strategies rich in phytoestrogens, essential vitamins, and minerals may provide a non-pharmacological means of managing menopausal symptoms.

Objective: This study aimed to evaluate the impact of a structured nutritional intervention on the management of menopausal symptoms in women attending a tertiary care hospital in Pakistan. The study assessed the effectiveness of a Pakistan-specific meal plan tailored to improve vasomotor, psychological, and metabolic health outcomes in menopausal women.

Methodology: A randomized controlled trial was conducted over six months, including 120 postmenopausal women aged 45-60 years experiencing moderate to severe menopausal symptoms. Participants were randomly assigned to either the intervention group (structured meal plan) or the control group (usual diet without modification). The intervention group followed a diet rich in phytoestrogens, omega-3 fatty acids, calcium, and vitamin D, designed for cultural relevance. Menopausal symptoms were assessed using the Menopause Rating Scale (MRS), and metabolic and bone health parameters were measured. Data were analyzed using SPSS, with statistical significance set at $p < 0.05$.

Results: After six months, the intervention group exhibited a significant reduction in menopausal symptoms compared to the control group ($p < 0.05$). Hot flashes reduced by 55%, sleep disturbances by 43%, and mood swings by 39% in the intervention group. Bone health improved significantly, with a 20% increase in serum calcium levels and an 18% improvement in vitamin D status ($p = 0.011$ and $p = 0.019$, respectively). Metabolic outcomes showed a 6% reduction in BMI and an 8% improvement in fasting blood glucose levels ($p = 0.027$ and $p = 0.03$, respectively). 85% of participants adhered to the dietary recommendations, demonstrating feasibility and acceptance.

Conclusion: This study provides strong evidence that a structured nutritional intervention can effectively alleviate menopausal symptoms, improve metabolic health, and enhance bone mineral

status among postmenopausal women. Given the safety and sustainability of dietary interventions, healthcare professionals should integrate nutritional counseling and structured meal planning into menopause management as a viable alternative or complement to pharmacological therapies.

Keywords: Menopause, nutritional intervention, phytoestrogens, metabolic, health, bone density, dietary therapy, Pakistan

INTRODUCTION

Menopause is a natural biological transition that marks the cessation of ovarian function and the end of a woman's reproductive years, typically occurring between the ages of 45 and 55 [1]. This period is associated with a decline in estrogen and progesterone levels, leading to a range of physiological and psychological symptoms, including hot flashes, night sweats, mood swings, sleep disturbances, weight gain, and an increased risk of osteoporosis and cardiovascular diseases [2]. The severity and duration of these symptoms vary among women, and effective management is crucial for maintaining overall well-being and quality of life.

Hormone replacement therapy (HRT) has been widely used to alleviate menopausal symptoms. However, concerns over its long-term risks, including cardiovascular diseases and hormone-related cancers, have led many women to seek alternative approaches [3]. Among these, dietary and nutritional interventions have gained significant attention as safer, non-pharmacological means of managing menopausal symptoms. Nutritional strategies, including the consumption of phytoestrogens, vitamins, minerals, and balanced macronutrients, have been shown to influence hormonal balance and alleviate menopausal discomforts [4].

Phytoestrogens, plant-derived compounds with estrogen-like activity, are found in soy products, flaxseeds, and legumes. Several studies have demonstrated that soy isoflavones can reduce the frequency and severity of hot flashes, with some findings showing a 50-60% reduction in symptoms compared to placebo [5,6]. Additionally, adequate intake of calcium and vitamin D is essential for maintaining bone density and preventing osteoporosis, a major concern post-menopause. The Women's Health Initiative (WHI) study confirmed that calcium and vitamin D supplementation significantly reduced the risk of hip fractures in postmenopausal women [7].

Omega-3 fatty acids, abundant in fatty fish and flaxseeds, have demonstrated potential in improving mood and cognitive function during menopause, with randomized controlled trials indicating a 20-30% improvement in depressive symptoms compared to placebo [8]. Furthermore, dietary fiber from whole grains, fruits, and vegetables has been linked to better weight management and improved cardiovascular health [9].

Given the increasing global interest in holistic and lifestyle-based approaches to health, this paper aims to explore the effectiveness of various nutritional interventions in managing menopausal symptoms. By reviewing current research and clinical findings, we seek to highlight evidence-based dietary recommendations that can enhance the health and well-being of menopausal women. This discussion will also address potential dietary modifications and supplementation strategies that align with individual needs and preferences.

Understanding the role of nutrition in menopause management is essential for healthcare providers, dietitians, and women navigating this life stage. A comprehensive approach to nutrition can empower women with practical dietary choices that mitigate symptoms and improve long-term health outcomes.

OBJECTIVE

The primary objective of this study is to evaluate the impact of a structured nutritional intervention on the management of menopausal symptoms in women attending a tertiary care hospital. This research aims to assess the effectiveness of a Pakistan-specific meal plan rich in phytoestrogens,

essential vitamins, and minerals in alleviating vasomotor, psychological, and metabolic symptoms associated with menopause. The study also seeks to determine the feasibility of implementing dietary modifications as a non pharmacological intervention for menopausal health management.

METHODS

Study Design and Setting

This study was conducted as a randomized controlled trial at a tertiary care hospital in Pakistan over six months. A total of 120 postmenopausal women aged 45-60 years experiencing moderate to severe menopausal symptoms were recruited from the gynecology outpatient department. Participants were randomly assigned to either the intervention group (nutritional meal plan) or the control group (usual diet without modification).

Intervention

The intervention group received a structured meal plan tailored to the Pakistani diet, emphasizing foods known to improve menopausal health. The plan was designed by clinical dietitians and explained in detail to each participant. The participants were provided with dietary guidelines and follow-up sessions to ensure adherence.

Pakistan-Specific Meal Plan for Menopausal Women

- **Breakfast:** Oatmeal with flaxseeds and almonds, one boiled egg, green tea
- **Morning Snack:** Handful of roasted chickpeas or walnuts, fresh seasonal fruit
- **Lunch:** Brown rice, grilled fish or lentils, vegetable curry, cucumber raita
- **Afternoon Snack:** Low-fat yogurt with chia seeds and honey
- **Dinner:** Whole wheat chapati, spinach and paneer, lentil soup, carrot salad
- **Bedtime Drink:** Warm turmeric milk with a pinch of cinnamon

Assessment Tools and Data Collection

Menopausal symptoms were assessed at baseline, 3 months, and 6 months using the Menopause Rating Scale (MRS). Bone health was evaluated through serum calcium and vitamin D levels, and psychological well-being was assessed using the Beck Depression Inventory-II (BDI-II).

Statistical Analysis

The data were analyzed using SPSS version 26.0. Paired t-tests and repeated-measures ANOVA were used to compare symptom changes within and between groups. A p-value of <0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of the tertiary care hospital. Written informed consent was obtained from all participants before enrollment in the study. This methodology ensures a scientifically rigorous approach to evaluating the role of nutrition in managing menopausal symptoms while considering dietary and cultural preferences of women in Pakistan.

RESULTS

A total of 120 women completed the study, with 60 in the intervention group and 60 in the control group. The demographic and baseline characteristics were similar between the groups ($p>0.05$). These findings suggest that a structured nutritional intervention tailored to local dietary patterns can effectively alleviate menopausal symptoms, improve metabolic health, and enhance bone mineral status in postmenopausal women. The statistically significant improvements in symptom reduction, weight management, and biochemical markers highlight the potential role of dietary interventions as a primary or adjunctive approach in menopause management.

Tables 1-4. Key Findings**Table 1. Improvement in Menopausal Symptoms (6 Months)**

SYMPTOM	INTERVENTION GROUP (REDUCTION)	CONTROL GROUP (REDUCTION)	P-VALUE
Hot Flashes	55%	18%	0.002
Sleep Disturbances	43%	12%	0.008
Mood Swings	39%	10%	0.015

Table 2. Bone Health and Vitamin D Levels (6 Months)

PARAMETER	INTERVENTION GROUP (IMPROVEMENT)	CONTROL GROUP (IMPROVEMENT)	P-VALUE
Serum Calcium Levels	20%	5%	0.011
Vitamin D Levels	18%	7%	0.019

Table 3. Weight and Metabolic Outcomes (6 Months)

PARAMETER	INTERVENTION GROUP (IMPROVEMENT)	CONTROL GROUP (IMPROVEMENT)	P-VALUE
BMI Reduction	6%	No significant change	0.027
Fasting Blood Glucose	8%	2%	0.03

Table 4. Adherence and Quality of Life (6 Months)

PARAMETER	INTERVENTION GROUP	CONTROL GROUP	P-VALUE
Adherence to Plan	85%	N/A	N/A
MRS Scores (Overall Improvement)	25%	9%	0.005

DISCUSSION

The results of this study demonstrate that a structured nutritional intervention significantly alleviates menopausal symptoms, improves metabolic health, and enhances bone mineral status in postmenopausal women. The reduction in hot flashes, mood swings, and sleep disturbances among the intervention group is consistent with previous studies showing that phytoestrogens from soy and flaxseeds can reduce vasomotor symptoms by up to 60% [10]. The observed 55% reduction in hot flashes aligns with findings from Lethaby et al. [11], who reported that soy isoflavones effectively reduce hot flashes compared to placebo.

The 20% increase in serum calcium levels and 18% improvement in vitamin D status highlight the importance of adequate micronutrient intake during menopause. These findings support earlier research suggesting that a diet rich in calcium and vitamin D can significantly lower osteoporosis risk [12]. Additionally, the significant 6% BMI reduction and 8% decrease in fasting blood glucose levels emphasize the metabolic benefits of a fiber- and protein-rich diet, as observed in studies by Rondanelli et al. [13].

The adherence rate of 85% in the intervention group indicates that dietary modifications were well-accepted among participants. This suggests that a culturally appropriate dietary intervention is both feasible and effective for managing menopause-related health concerns. The structured dietary approach, emphasizing whole grains, lean proteins, and omega-3 fatty acids, likely contributed to improved cardiovascular and metabolic outcomes [14].

Despite the positive outcomes, this study has some limitations. The relatively short duration (six months) limits the ability to assess long-term adherence and health outcomes. Additionally, self-reported dietary adherence may introduce recall bias, though follow-up sessions helped mitigate this

issue. Future research should consider longitudinal studies with larger sample sizes to confirm these findings and explore the potential for dietary interventions to replace or complement pharmacological therapies for menopause management.

In conclusion, this study provides strong evidence supporting nutritional interventions as a viable, non-pharmacological approach for managing menopausal symptoms. The findings reinforce the role of dietary phytoestrogens, essential micronutrients, and macronutrient balance in improving vasomotor, metabolic, and bone health outcomes. Healthcare providers should integrate dietary counseling and meal planning into menopause management strategies, especially in settings where hormone replacement therapy is not preferred or feasible.

CONCLUSION

This study provides strong evidence that a structured nutritional intervention significantly alleviates menopausal symptoms, enhances metabolic health, and improves bone mineral status among postmenopausal women. The findings demonstrate that a meal plan rich in phytoestrogens, omega-3 fatty acids, calcium, and vitamin D is effective in reducing hot flashes, improving sleep quality, stabilizing mood, and promoting bone health. The statistically significant reductions in BMI, fasting blood glucose levels, and improvements in serum calcium and vitamin D levels further highlight the importance of dietary interventions in preventing metabolic syndrome and osteoporosis in postmenopausal women. The high adherence rate (85%) suggests that a culturally appropriate dietary intervention is both practical and sustainable for managing menopause-related health concerns.

Given the risks associated with hormone replacement therapy, this study reinforces the viability of dietary strategies as a primary or adjunctive approach for menopause management. Future research should focus on longitudinal studies to assess long-term adherence and outcomes, exploring how dietary interventions compare to pharmacological treatments in menopause care. Healthcare professionals should integrate nutritional counseling and structured meal planning into menopause management, especially in resource-limited settings where access to medical therapies may be restricted.

Final Recommendations

- Promote awareness about the role of nutrition in menopause management.
- Encourage the inclusion of phytoestrogen-rich foods such as soy, flaxseeds, and legumes in daily meals.
- Ensure adequate intake of calcium and vitamin D through diet and supplementation.
- Advocate for personalized meal plans based on individual metabolic and lifestyle needs.

By prioritizing nutrition-based approaches, we can enhance the quality of life for menopausal women and reduce the long-term health risks associated with this transition.

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