RESEARCH PAPER

Effectiveness of Phytoestrogen Nutrition Education on Knowledge and Practice of Phytoestrogen Diet Among Perimenopausal Women at Selected Institutions of Ramaiah University of Applied Sciences, Bengaluru

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Abstract

Background: Perimenopause is a transitional phase in a women's life characterized by hormonal fluctuations, particularly a decline in estrogen levels, which may lead to various physical, psychological, and metabolic symptoms such as hot flashes, sleep disturbances, mood changes, fatigue, weight gain and reduced quality of life. With increasing life expectancy, women spend a significant portion of their lives in the menopausal transition period, making the management of perimenopausal symptoms an important public health concern. Hormone replacement therapy is commonly used for symptom management; however, its long-term use may be associated with certain health risks, leading many women to seek safer and natural alternatives. Phytoestrogens are naturally occurring plant compounds that possess estrogen-like properties and are found in foods such as soybeans, flaxseeds, whole grains, legumes, nuts, fruits, and vegetables. Regular intake of phytoestrogen-rich foods has been reported to help reduce menopausal symptoms and promote overall health among perimenopausal women. Despite their potential benefits, many women have inadequate knowledge and poor dietary practices regarding phytoestrogen consumption due to lack of awareness and nutritional education. Nutrition education plays an important role in improving dietary knowledge and encouraging healthy practices. Therefore, assessing the effectiveness of phytoestrogen nutrition education among perimenopausal women is essential to enhance awareness, improve dietary practices, and support healthier lifestyle modifications.

Methodology: A quasi-experimental, one group pre-test post-test study was carried out at Ramaiah Medical College Hospital, Bangalore. Total of 50 perimenopausal women working in non-health care professionals were selected through non-probability convenience sampling technique. Data was collected by using knowledge questionnaire and practice checklist on phytoestrogen diet. Phytoestrogen nutrition education was administered through individual teaching sessions of 45 minutes each using a power point presentation, followed by a pre-test and post-test to assess knowledge and practice regarding the phytoestrogen diet.

Results: The study compared the level of knowledge and practice of phytoestrogen diet among perimenopausal women in one group pre-test and post-test. Group was tested before and after an educational session. In pre-test, both knowledge and practice had inadequate and poor level. The pre-test knowledge had an average score 10.22 (SD = 4.53), and pre-test practice had an average score of 20.24(SD = 3.58). After intervention the post-test knowledge had an average score of 27.86 (SD = 5.22), and post-test practice had an average score of 40.34 (SD = 7.38). The difference between pre-test and post-test knowledge was statistically significant ($t = 22.38$, $p = 0.000$) similarly for practice ($t = 20.58$, $p = 0.000$). this result shows that phytoestrogen nutrition education was useful in enhancing the knowledge and practice of phytoestrogen diet. The study also found that a moderate positive correlation ($r = 0.63$, $p = 0.000$) between knowledge and practice and socio-demographic factors were not associated with knowledge and practice except monthly family income shows statistically significant association with knowledge ($p = < 0.05$).

Conclusion: The findings of the study from 50 perimenopausal women showed that majority reported adequate knowledge and good practice of phytoestrogen diet after the phytoestrogen nutrition education session. This indicates that the intervention was effective in enhancing the knowledge and practice of phytoestrogen diet among perimenopausal women.

Keywords: Effectiveness, Perimenopause, perimenopausal women, phytoestrogen diet phytoestrogen nutrition education.

How to cite this article: Maji D, Nagalakshmi K, Sangeetha X, Roy SM. Effectiveness of Phytoestrogen Nutrition Education on Knowledge and Practice of Phytoestrogen Diet Among Perimenopausal Women at Selected Institutions of Ramaiah University of Applied Sciences, Bengaluru. Int J Drug Deliv Technol. 2026;16(71s): 80-87. DOI: 10.25258/ijddt.16.71s.10

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Introduction

Perimenopause is the transitional phase before menopause, characterized by declining and fluctuating estrogen levels, leading to physical and psychological changes that may affect a woman's quality of life. Globally, the number of women entering the perimenopausal age group is increasing, and nearly 70–80% experience symptoms such as hot flashes, sleep disturbances, mood changes, anxiety, and joint pain during this period (WHO, 2021; United Nations, 2022). In India, the average age of natural menopause is around 46.6 years, and many women have limited awareness regarding symptom management and the role of nutrition in maintaining health (Ahuja, 2016; ICMR, 2020). In Karnataka, studies have also reported a high prevalence of perimenopausal symptoms and inadequate knowledge of self-care practices among middle-aged women (Journal of Mid-life Health, 2012). Phytoestrogens are naturally occurring plant compounds found in soybeans, legumes, flaxseeds, whole grains, nuts, seeds, fruits, and vegetables that possess estrogen-like activity and may help reduce perimenopausal symptoms. However, knowledge and dietary practices related to phytoestrogen-rich foods remain inadequate. Therefore, the present study was undertaken to assess the effectiveness of phytoestrogen nutrition education on knowledge and practice of phytoestrogen diet among perimenopausal women at selected institutions of Ramaiah University of Applied Sciences, Bengaluru.

Aim of The Study

To evaluate the effectiveness of phytoestrogen nutrition education in improving knowledge and practices related to consumption of phytoestrogen diet among perimenopausal women.

Objectives of the study

1. To assess the knowledge and practice of phytoestrogen diet among perimenopausal women.
2. To assess the effectiveness of phytoestrogen nutrition education on the knowledge and practices of phytoestrogen diet among peri menopausal women.
3. To find the relationship between knowledge and practice of phytoestrogen diet among perimenopausal women.
4. To find the association between knowledge and practice of phytoestrogen diet and selected sociodemographic variables.

Methodology

Research design: Quasi-experimental one-group pre-test and post-test design.

Setting of the study: The study was conducted in the Ramaiah medical college Hospital of Ramaiah University of Applied Science, Bengaluru.

Participants: perimenopausal women working in non-health care professionals aged 40 to 50 years who meet the inclusion criteria are available at the data collection period at Ramaiah medical college Hospital of Ramaiah University of Applied science, Bengaluru.

Inclusion criteria: perimenopausal women who were

- Aged between 40 – 50 years.
- Able to understand and read English or Kannada.
- Women working in non- health care professionals.

Exclusion criteria:

- Women who have attained menopause (natural and surgical).
- perimenopausal women allergic to phytoestrogen foods (soy products, cabbage).
- perimenopausal women those currently receiving estrogen hormone replacement therapy.

Sample size: Based on findings from previous literature, the minimum required sample size was calculated as 50 participants at 95% confidence level and 80% statistical power. A total 50 women were recruited.

Sampling technique: The perimenopausal women who fulfilled the inclusion criteria were selected for the study. A total of 50 perimenopausal women were included by using non-probability convenience sampling technique.

Data collection instruments:

Data were collected using:

Section A – socio demographic data (This section contains items, such as Age, marital status, educational status, occupation, monthly family income, place of residence, religion, type of family.

Section B - knowledge questionnaires on phytoestrogen diet (The knowledge questionnaires on phytoestrogen diet is a structured tool developed by student researcher with the help of experts and guide. It contained 19 items, self-report measure used to assess the knowledge regarding phytoestrogen diet.

The knowledge questionnaires cover the following components. General information about perimenopause (9 questions), sources of phytoestrogen rich foods (3 questions), health benefits of consuming these foods (2 questions), recommended intake of phytoestrogen foods (4 questions), the health risk of over consumption of phytoestrogen foods (1 question). The maximum score for the knowledge questionnaire is 37, while the minimum score is 0.

Section C- practice checklist on consumption of phytoestrogen diet (Practice checklist on consumption of phytoestrogen diet is a structured tool developed by student researcher with the help of experts and guide. It consists of 20 food items used to assess the participants'

practice of consuming phytoestrogen-rich foods. Each item is scored on ranging from 0 to 3, where 3 = daily intake, 2 = weekly intake, 1 = occasional intake, and 0 = never consumed. The maximum score is 60, and the minimum score is 0, with higher scores indicating better practice of phytoestrogen diet consumption.

The questionnaires required approximately 30-35 minutes to complete.

Ethical consideration: Ethical clearance was obtained from University Ethics Committee for human trial (UECHT) of M S Ramaiah University of Applied Sciences on October, 2025 (reference no: EC-25/141-PG-RINER).

Statistical analysis: Data were entered into Microsoft Excel and analysed using statistical software. Descriptive statistics (frequency and percentage distribution were used to describe the socio-demographic variables, frequency, percentage, mean and standard deviation were used to describe the pretest and posttest knowledge and practice scores) and Inferential statistics (The paired 't' test was used to determine the effectiveness of phytoestrogen nutrition education on knowledge and practice,Karl Pearson coefficient correlation was used to assess relationship between knowledge and practice score in the pre-test and post-test, Chi-square test/ Fisher Exact test was used to determine the association of knowledge and practice with selected socio-demographic variables).

Major findings of the study, Half of the participants were aged 40–45 years old and the remaining half were 46–50 years old (50% each), 90% of the subjects were married, most of the participants had secondary education (32%) and 30% subjects had collegiate level education, the majority of participants worked as class iv / security/floor supervisors (54%) followed by computer operators/ librarian (46%), the majority of the participants reported monthly family income < ₹45,000 (70%), only 30% subjects had monthly family income ≥ ₹45,000, 54% participants resided in urban areas followed by 22% in rural and 24% in semiurban areas, majority of the participants belonged to Hindu religion (96%), most of the participants were from nuclear families (92%). The study found that phytoestrogen nutrition education was effective in improving the knowledge and practice of phytoestrogen diet among 50 perimenopausal women. The mean knowledge score increased from 10.22 ± 4.53 to 27.86 ± 5.22, and the mean practice score increased from 20.24 ± 3.58 to 40.34 ± 7.38. The improvement in both knowledge and practice was statistically highly significant ($p < 0.001$). A moderate positive correlation was observed between knowledge and practice ($r = 0.63$, $p < 0.001$). Monthly family income was significantly associated with knowledge, while no significant association was found between practice and any selected socio-demographic variables.

Results

Table 1.1: Frequency and percentage distribution of socio-demographic variables of perimenopausal women such as age, marital status of women. **n = 50**

Sl no.	Socio-Demographic variables	Frequency (f)	Percentage (%)
1.	Age in years		
	40-45 years	25	50%
	46-50 years	25	50%
2.	Marital status		
	Married	45	90%
	Widow	5	10%

Table 1.2: Frequency and percentage distribution of socio-demographic variables of perimenopausal women such as educational status and occupation. **n = 50**

Sl no.	Socio-Demographic variables	Frequency (f)	Percentage (%)
3.	Educational status		
	No formal education (but able to read& write)	3	6%
	Primary education	5	10%
	Secondary education	16	32%
	Higher secondary education	11	22%
	Collegiate education/ Diploma/ Degree	15	30%
4.	Occupation		
	Computer operator	23	46%
	Class IV / security guard/ Floor supervisor	27	54%

Table 1.3: Frequency and percentage distribution of socio-demographic variables of perimenopausal women such as monthly family income and place of residence. **N = 50**

Sl no.	Socio-Demographic variables		Frequency (f)	Percentage (%)
5.	Monthly family income			
	<45,000		35	70%
	≥ 45,000		15	30%
6.	Place of residence			
	Rural		11	22%
	Urban/ Semiurban		39	78%

Table 1.4: Frequency and percentage distribution of socio-demographic variables of perimenopausal women such as religion and type of family. **n = 50**

Sl no.	Socio-Demographic variables	Frequency (f)	Percentage (%)
7.	Religion		
	Hindu	48	96%
	Muslim	1	2%
	Christian	1	2%
8.	Type of family		
	Nuclear	46	92%
	Joint	4	8%

Table 2: Frequency and percentage distribution of subjects according to pre-test and post-test level of knowledge and practice regarding phytoestrogen diet. **n = 50**

Variables	Pre-test						Post-test					
	Inadequate		Moderate		Adequate		Inadequate		Moderate		Adequate	
knowledge	f	%	f	%	f	%	f	%	f	%	f	%
	44	88	6	12	0	0	0	0	19	38	31	62
	Poor		Moderate		Good		Poor		Moderate		Good	
Practice	f	%	f	%	f	%	f	%	f	%	f	%
	40	80	10	20	0	0	0	0	20	40	30	60

Table 3: Effectiveness of phytoestrogen nutrition education on knowledge and practice of phytoestrogen diet among perimenopausal women (comparison of pre-test and post-test).

Paired t test n = 50

Variables	Mean	Standard Deviation	Mean difference	df*	t value	p value
Pre-test knowledge score	10.22	4.53	17.64	49	22.38	0.000
Post-test knowledge score	27.86	5.22				
Pre-test practice score	20.24	3.58	20.1	49	20.58	0.000
Post-test practice score	40.34	7.38				

*df = degree of freedom

Table 4: Correlation between knowledge and practice of phytoestrogen diet among perimenopausal women.

Karl Pearson correlation **n =50**

Variables		Mean	Standard Deviation	Karl Pearson Correlation (r value)	p value

Knowledge		10.22	4.53	0.63	0.000
Practice		20.24	3.58		

Table 5.1: Association between the level of Knowledge regarding phytoestrogen diet and Selected Socio-Demographic Variables such as age, marital status, educational status and occupation among perimenopausal women. n =50

Sl no.	Socio-demographic variables	Knowledge on phytoestrogen diet		Fisher exact value	p value
		Moderate knowledge	Inadequate knowledge		
1.	Age in years				
	40-45 years	3	22	7.681	0.684 NS
	46-50 years	3	22		
2.	Marital status				
	Married	6	39	1.000	0.513 NS
	Widow	0	4		
3.	Educational status				
	No formal education (but able to read & write)	0	3	1.157	0.872 NS
	Primary education	0	5		
	Secondary education	2	14		
	Higher secondary education	1	10		
	Collegiate education/ Diploma/ Degree	3	12		
4.	Occupation				
	Computer operator	5	18	3.826	0.050 NS
	Class IV / security guard/ Floor supervisor	1	26		

NS = non-significant

Table 5.2: Association between the level of Knowledge regarding phytoestrogen diet and Selected Socio-Demographic Variables such as monthly family income, place of residence, religion and type of family among perimenopausal women. n = 50

Sl no.	Socio-demographic variables	Knowledge on phytoestrogen diet		Fisher exact value	p value
		Moderate knowledge	Inadequate knowledge		
5.	Monthly family income				
	<45,000	1	34	9.235	0.007 S*
	≥ 45,000	5	10		
6.	Place of residence				
	Rural	1	10	2.412	1.000 NS
	Urban/semiurban	5	34		
7.	Religion				
	Hindu	1	42	1.378	1.000 NS
	Muslim	2	1		
	Christian	3	1		
8.	Type of family				
	Nuclear	6	40	0.593	0.441 NS
	Joint	0	4		

S* = Significant, NS = non-significant

Table 6.1: Association between the level of practice regarding phytoestrogen diet and Selected Socio-Demographic Variables such as age, marital status, educational status and occupation among perimenopausal women. n = 50

Sl no.	Socio-demographic variables	practice on phytoestrogen diet		Chi square value (x^2)/Fisher exact value	p value
		Moderate practice	Poor practice		
1.	Age in years				
	40-45 years	4	21	7.972	0.617
	46-50 years	6	19	Fisher exact test	NS
2.	Marital status				
	Married	9	36	0.000	1.000
	Widow	1	4	Fisher exact test	NS
3.	Educational status				
	No formal education (but able to read & write)	1	2	3.068 df=4 chi-square test	0.525 NS
	Primary education	0	5		
	Secondary education	4	12		
	Higher secondary education	1	10		
	Collegiate education/ Diploma/ Degree	4	11		
4.	Occupation				
	Computer operator	7	16	2.899	0.089
	Class IV / security guard/ Floor supervisor	3	24	Fisher exact test	NS

NS = non-significant, df= Degree of freedom

Table 6.2: Association between the level of practice regarding phytoestrogen diet and Selected Socio-Demographic Variables such as monthly family income, place of residence, religion and type of family among perimenopausal women. n = 50

Sl no.	Socio-demographic variables	practice on phytoestrogen diet		Chi square value (x^2)/Fisher exact value	p value
		Moderate practice	Poor practice		
5.	Monthly family income				
	<45,000	5	30	2.381	0.123
	≥ 45,000	5	10	df = 1 chi-square test	NS
6.	Place of residence				
	Rural	1	10	4.793	0.157
	Urban/semiurban	9	30	df = 1 chi-square test	NS
7.	Religion				
	Hindu	10	38	0.933	1.000
	Muslim	0	1	Fisher exact test	NS
	Christian	0	1		
8.	Type of family				
	Nuclear	9	37	0.068	1.000
	Joint	1	3	Fisher exact test	NS

NS = non-significant, df = Degree of freedom

Discussion

The present quasi-experimental study evaluated the effectiveness of phytoestrogen nutrition education among 50 perimenopausal women at Ramaiah Medical College Hospital, Bengaluru. At baseline, 88% of participants had inadequate knowledge and 80% had poor dietary practices regarding phytoestrogen intake. Following the PowerPoint-based nutrition education programme, both knowledge and practice improved significantly ($p < 0.001$), demonstrating the effectiveness of the intervention. These findings are consistent with previous studies by Fadel et al. (2019) and Nivedhapriya et al. (2024), which also reported significant improvements in knowledge and dietary practices after educational interventions on phytoestrogen-rich foods. The study further identified a moderate positive correlation between

knowledge and practice, indicating that increased knowledge promoted healthier dietary behaviour. Among the socio-demographic variables, only monthly family income showed a significant association with knowledge, while no significant association was found with practice. Overall, the findings suggest that structured nutrition education is a simple, feasible, and effective strategy to improve awareness and promote the consumption of phytoestrogen-rich foods among perimenopausal women, thereby supporting better management of perimenopausal health.

Limitations

- The study was limited to a small sample size, which may affect generalization of results.
- The study was confined to selected institutions, limiting wider applicability.
- Short duration of the study did not allow for long-term evaluation of practice changes.
- Data collection was based on self-reported practices, which may involve response bias.
- Lack of control group may limit the strength of causal inference.

Conclusion:

The present study provides evidence that a structured, PowerPoint-based phytoestrogen nutrition education programme significantly improves knowledge and self-reported dietary practices among perimenopausal women in an institutional setting ($p < 0.001$). These results align with international and Indian studies showing the effectiveness of educational interventions and suggest that scaling context-appropriate nutrition education could help women adopt dietary strategies to manage perimenopausal symptoms. Future research should broaden participant diversity, include objective intake measures and symptom outcomes, and assess long-term sustainability.

Recommendations:

- Similar studies can be conducted on a larger sample size to enhance generalizability.
- The study can be replicated in community settings and rural populations.
- Comparative studies between different educational methods can be undertaken.
- Inclusion of follow-up assessments to evaluate long-term retention of knowledge and practice.
- Development of culturally appropriate educational modules for wider dissemination.
- Test combined interventions (education plus provision of phytoestrogen-rich food or recipes) and measure clinical endpoints—vasomotor symptom scores, sleep, mood, and quality of life—in randomized controlled designs. Evaluate long-term maintenance with follow-up at 3, 6, and 12 months to assess sustainability and dose–response relationships.

Acknowledgement: The authors express their sincere gratitude to the principal, faculty members, expert validators and participants in the study. Special appreciation is extended to the research supervisor and institutional authorities for their continuous guidance and support throughout the study.

Informed Consent: Written informed consent was obtained from the participants.

Conflict of Interest: The authors declare that they have no conflict of interest.

Funding: The authors received no financial support for conduct, authorship, or publication of this research.

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