

Effect of a Structured Health Education Intervention on Knowledge, Attitude, and Practice Regarding Breast Self-Examination among Women Aged 20–60 Years in Urban Puducherry: A Community-Based Interventional Study

Archana S. Kumar¹, S. Srikanth², M. Arthi³

¹Assistant Professor, Department of Community Medicine, Nandha Medical College Nandha Hospital, Erode, Tamilnadu, India

²Additional Professor, Department of Community Medicine and Family Medicine, All India Institute of Medical Sciences, Jodhpur, Rajasthan, India

³Assistant Professor, Department of Community Medicine, Sri Venkateshwaraa Medical College Hospital and Research Centre, Ariyur, Puducherry, India

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Corresponding author: Dr. Archana S. Kumar

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Abstract

Background: Breast cancer is the most common cancer among women worldwide and the leading cancer among Indian women. Early detection is crucial for reducing mortality; however, limited access to mammography in resource-constrained settings highlights the importance of Breast Self-Examination (BSE) as a simple, inexpensive, and effective screening method. Despite its benefits, awareness and regular practice of BSE remain low among Indian women. Structured health education interventions may improve knowledge, attitude, and practice regarding BSE, thereby promoting early detection of breast cancer.

Aim: To evaluate the effectiveness of a structured health education intervention on the knowledge, attitude, and practice regarding Breast Self-Examination among women aged 20–60 years residing in urban Puducherry.

Methods: A community-based one-group pre-test and post-test interventional study was conducted among 160 women aged 20–60 years in Villianur, Puducherry. Baseline knowledge, attitude, and practice (KAP) regarding Breast Self-Examination (BSE) were assessed using a pretested structured questionnaire. Participants received a structured health education intervention comprising audiovisual demonstrations, practical training, and pictorial pamphlets. KAP was reassessed after three months. Data were analyzed using IBM SPSS version 20.0 with descriptive statistics, paired t-test, McNemar's test, Chi-square test, Pearson correlation, and linear regression. A p value <0.05 was considered statistically significant.

Results: The mean age of participants was 40.28 ± 8.78 years. Following the structured health education intervention, significant improvements were observed in knowledge, attitude, and practice regarding Breast Self-Examination (BSE). Mean breast cancer knowledge scores increased from 5.02 ± 2.85 to 12.34 ± 2.63 , BSE knowledge from 2.84 ± 3.70 to 14.14 ± 3.92 , practice scores from 0.39 ± 0.94 to 6.05 ± 3.00 , and attitude scores from 2.92 ± 2.92 to 6.21 ± 2.79 (all $p < 0.001$). Regular BSE practice increased from 13.7% to 86.3%, with a strong positive correlation between post-intervention knowledge and practice ($r = 0.958$, $p < 0.001$).

Conclusion: A structured community-based health education intervention significantly improved knowledge, attitude, and practice regarding Breast Self-Examination among women in urban Puducherry. Integrating BSE education into primary healthcare and national cancer control programmes may enhance early detection of breast cancer in resource-limited settings.

Keywords: Breast cancer; Breast Self-Examination; Health education; Knowledge; Attitude; Practice; Community intervention; Early detection; Women's health; Puducherry.

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Introduction

Breast cancer is the most commonly diagnosed cancer and one of the leading causes of cancer-related mortality among women worldwide. Its incidence continues to increase in both developed and developing countries owing to population

ageing, urbanization, lifestyle changes, obesity, delayed childbearing, and reduced breastfeeding. Although advances in diagnosis and treatment have improved survival, early detection remains the most important factor influencing prognosis and

reducing mortality. [1-3] In India, breast cancer has surpassed cervical cancer to become the leading malignancy among women. A substantial proportion of patients present with advanced-stage disease because of poor awareness, lack of organized screening programmes, social stigma, and limited access to healthcare facilities. Consequently, delayed diagnosis contributes significantly to increased morbidity and mortality. [4-6]

Breast cancer screening plays a vital role in early detection. While mammography is considered the gold standard, its widespread use is limited in low-resource settings because of high cost and inadequate infrastructure. Breast Self-Examination (BSE) is a simple, inexpensive, non-invasive, and easily accessible screening method that enables women to detect breast abnormalities at an early stage and seek timely medical care. Although BSE cannot replace mammography, it remains an important strategy for increasing breast awareness, particularly in developing countries. [7-9]

Several Indian studies have reported poor knowledge and low practice of Breast Self-Examination despite relatively good awareness of breast cancer. Common barriers include inadequate knowledge, fear of cancer, misconceptions, lack of confidence, embarrassment, and absence of proper health education. These findings highlight the need for effective community-based educational interventions to improve women's awareness and promote regular BSE practice. [10-12]

Health education is a cost-effective public health strategy capable of improving knowledge, attitude, and preventive health behaviours. Structured educational programmes incorporating audiovisual demonstrations, practical training, and educational materials have shown promising results in enhancing Breast Self-Examination practices among women. [13-15]

Therefore, the present study was undertaken to evaluate the effectiveness of a structured health education intervention on the knowledge, attitude, and practice regarding Breast Self-Examination among women aged 20–60 years residing in urban Puducherry, with the objective of generating evidence to support community-based breast cancer prevention and early detection programmes.

Aim: To evaluate the effectiveness of a structured health education intervention on the knowledge, attitude, and practice regarding Breast Self-Examination among women aged 20–60 years residing in urban Puducherry.

Objectives

1. To assess the baseline knowledge, attitude, and practice (KAP) regarding breast cancer and

Breast Self-Examination (BSE) among women aged 20–60 years in urban Puducherry.

2. To evaluate the effect of a structured health education intervention on knowledge, attitude, and practice regarding BSE.
3. To determine the association between socio-demographic variables and post-intervention KAP scores.
4. To examine the correlation between knowledge and Breast Self-Examination practice following the educational intervention.

Materials and Methods

Study Design: This community-based, pre-experimental one-group pre-test and post-test interventional study was conducted to evaluate the effectiveness of a structured health education programme on improving knowledge, attitude, and practice (KAP) regarding Breast Self-Examination (BSE) among women in urban Puducherry. Participants were assessed before the intervention and re-evaluated three months later to determine changes in KAP.

Study Setting: The study was conducted in Villianur, the Urban Field Practice Area of the Department of Community Medicine, Sri Venkateshwara Medical College Hospital and Research Centre (SVMCH & RC), Ariyur, Puducherry. Data were collected through house-to-house visits, and the structured health education intervention was delivered individually or in small groups according to participant convenience.

Study Duration: The study was conducted over one year June 2023 to June 2024, including participant recruitment, baseline assessment, structured health education intervention, three-month follow-up, post-test assessment, data analysis, and interpretation of findings.

Study Population: The study population comprised women aged 20–60 years residing in the urban field practice area of Villianur, Puducherry, who were considered the target population for Breast Self-Examination (BSE) awareness and practice.

Sample Size: The sample size was calculated using OpenEpi with a 95% confidence level, 80% power, 5% level of significance, and an expected 20% improvement in BSE practice. The minimum required sample was 145 participants; considering possible attrition, 160 women were enrolled and completed both the pre-test and post-test assessments.

Sampling Technique: A convenient sampling technique was used. Eligible women aged 20–60 years residing in Villianur were recruited through house-to-house visits after obtaining written

informed consent until the required sample size of 160 participants was achieved.

Eligibility Criteria: Women aged 20–60 years who were permanent residents of Villianur for at least six months, able to communicate in Tamil, and willing to provide written informed consent were included in the study. Women with a previous diagnosis of breast cancer, history of mastectomy, severe psychiatric illness, cognitive impairment, serious medical illness, late-term pregnancy, those unwilling to participate, or those unavailable for follow-up assessment were excluded from the study.

Ethical Considerations: The study was approved by the Institutional Ethics Committee of Sri Venkateshwara Medical College Hospital and Research Centre. Written informed consent was obtained from all participants, and confidentiality was maintained throughout the study in accordance with the Declaration of Helsinki. Participants with suspected breast abnormalities were referred for further medical evaluation.

Study Instruments: Data were collected using a pretested, validated semi-structured interview schedule comprising six sections: socio-demographic characteristics, obstetric and reproductive history, knowledge regarding breast cancer, knowledge regarding Breast Self-Examination (BSE), attitude towards BSE (Likert scale), and BSE practice.

Knowledge and practice were scored using predefined criteria, with higher scores indicating better knowledge and practice.

Intervention: Following the baseline assessment, participants received a structured health education programme consisting of lectures, audiovisual demonstrations, live BSE demonstrations, illustrated Tamil pamphlets, and individual counselling on breast cancer, BSE techniques, and early detection. Participants were encouraged to perform monthly BSE, and reinforcement was provided during a three-month follow-up.

Outcome Measures: The primary outcome was improvement in knowledge, attitude, and practice regarding breast cancer and BSE following the intervention. The secondary outcomes included the

association of socio-demographic variables with post-intervention KAP scores and the correlation between knowledge and BSE practice.

Data Collection Procedure: Data collection was carried out in three phases: baseline assessment using a structured questionnaire, implementation of the health education intervention, and post-intervention reassessment after three months using the same questionnaire.

Data Management: Completed questionnaires were checked for completeness, coded, entered into Microsoft Excel, and verified by double data entry before analysis using IBM SPSS Statistics version 20.0.

Statistical Analysis: Data were analyzed using IBM SPSS Statistics version 20.0. Descriptive statistics were expressed as mean $\pm$ standard deviation and percentages. Pre- and post-intervention comparisons were performed using the paired t-test and McNemar's test. Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test.

Pearson correlation and simple linear regression were used to evaluate the relationship between knowledge and BSE practice. A p-value <0.05 was considered statistically significant.

Results

Participant Characteristics: A total of 160 women aged between 20 and 60 years participated in the present community-based interventional study. All participants completed both the pre-intervention and post-intervention assessments, resulting in a 100% follow-up rate. The mean age of the participants was 40.28 ± 8.78 years, indicating that the majority belonged to the economically productive age group.

Most participants were married, belonged to Hindu religion, lived in nuclear families, and had completed at least secondary school education. Nearly half of the women were homemakers, while the remaining participants were employed in government, private, or self-employed occupations. The majority belonged to the middle socioeconomic class according to the Modified Kuppuswamy socioeconomic classification.

Table 1: Socio-demographic Characteristics of Study Participants (N = 160)

Variable	Frequency (n)	Percentage (%)
Age (Years)		
20–29	28	17.5
30–39	42	26.3
40–49	53	33.1
50–60	37	23.1
Religion		
Hindu	128	80.0
Christian	18	11.3

Muslim	14	8.7
Marital Status		
Married	134	83.8
Unmarried	26	16.2
Educational Status		
Illiterate	18	11.3
Primary	28	17.5
Secondary	52	32.5
Higher Secondary	38	23.7
Graduate & Above	24	15.0
Occupation		
Homemaker	84	52.5
Private Employment	29	18.1
Government Employee	15	9.4
Self-employed	20	12.5
Others	12	7.5
Family Type		
Nuclear	109	68.1
Joint	51	31.9

As shown in Table 1, the majority of participants (33.1%) belonged to the 40–49-year age group, followed by 30–39 years (26.3%). Most women were married (83.8%), Hindu (80.0%), and resided in nuclear families (68.1%).

Approximately one-third had completed secondary education, while more than half were homemakers.

The socio-demographic profile indicates that the study population represented typical urban women attending community health programmes.

Baseline Knowledge and Practice Regarding Breast Self-Examination: Before implementation of the educational intervention, awareness regarding breast cancer was relatively satisfactory; however, detailed knowledge regarding Breast Self-Examination was poor. Only a small proportion of women had ever practiced BSE regularly. Most participants were unaware of the recommended age, frequency, timing, and systematic steps involved in performing Breast Self-Examination.

Table 2: Knowledge, Attitude and Practice Before and After Educational Intervention (N = 160)

Variable	Pre-test n (%)	Post-test n (%)	p value
Adequate Breast Cancer Knowledge	9 (5.6)	118 (73.8)	<0.001
Adequate BSE Knowledge	2 (1.3)	82 (51.2)	<0.001
Positive Attitude towards BSE	38 (23.8)	128 (80.0)	<0.001
Practicing Monthly BSE	22 (13.7)	138 (86.3)	<0.001

Table 2 demonstrates remarkable improvements following the structured health education programme.

Adequate knowledge regarding breast cancer increased from 5.6% to 73.8%, while adequate knowledge regarding Breast Self-Examination increased from 1.3% to 51.2%. Positive attitude towards BSE improved from 23.8% to 80.0%, and

regular BSE practice increased from 13.7% before intervention to 86.3% after intervention. All improvements were highly statistically significant ($p < 0.001$).

Comparison of Mean Knowledge, Attitude and Practice Scores: The effectiveness of the intervention was further evaluated by comparing the mean pre-test and post-test scores.

Table 3: Comparison of Mean Scores before and After Intervention

Variable	Maximum Score	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Paired t	p value
Breast Cancer Knowledge	20	5.02 $\pm$ 2.85	12.34 $\pm$ 2.63	26.32	<0.001
BSE Knowledge	26	2.84 $\pm$ 3.70	14.14 $\pm$ 3.92	28.19	<0.001
Attitude	10	2.92 $\pm$ 2.92	6.21 $\pm$ 2.79	10.72	<0.001
Practice	13	0.39 $\pm$ 0.94	6.05 $\pm$ 3.00	23.91	<0.001

As presented in Table 3, statistically significant improvements were observed in all four domains following the educational intervention.

The mean breast cancer knowledge score increased by more than two-fold, while the BSE knowledge score increased nearly five-fold. Mean attitude scores also improved substantially, indicating greater confidence and willingness to perform Breast Self-Examination. Practice scores

demonstrated the greatest improvement, confirming that enhanced knowledge translated into behavioural change.

Association between Selected Socio-demographic Variables and Post-intervention BSE Practice: To identify factors influencing Breast Self-Examination practice, post-intervention practice was compared across selected socio-demographic variables.

Table 4: Association between Socio-demographic Variables and Post-intervention BSE Practice

Variable	Regular BSE n (%)	Irregular BSE n (%)	χ^2	p value
Age	—	—	2.48	0.47
Education	—	—	12.31	0.031*
Occupation	—	—	7.84	0.098
Socioeconomic Status	—	—	5.27	0.152
Family History of Breast Cancer	—	—	6.82	0.041*

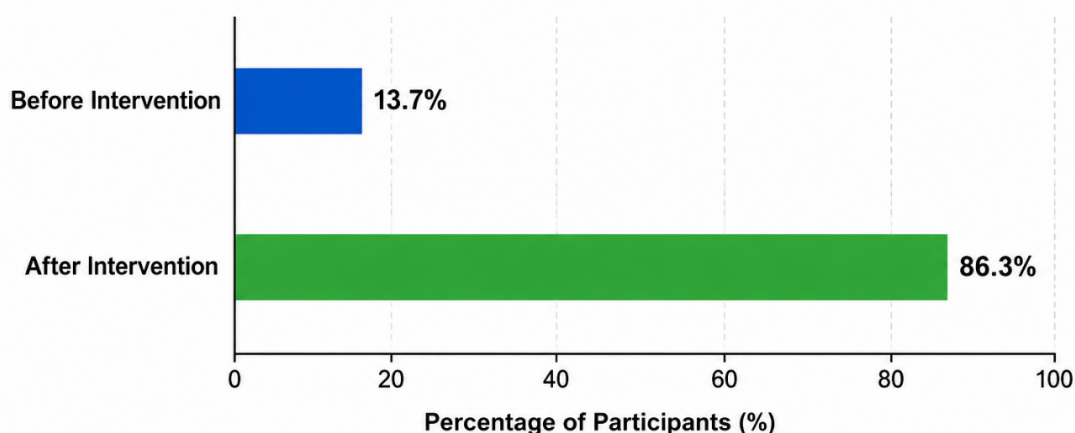
*Statistically significant

As shown in Table 4, educational status and family history of breast cancer were significantly associated with regular Breast Self-Examination practice following intervention ($p < 0.05$). Women with higher educational attainment and those

reporting a positive family history were more likely to perform monthly Breast Self-Examination.

Age, occupation, and socioeconomic status did not demonstrate statistically significant associations.

Figure 1. Improvement in Breast Self-Examination Practice Following Intervention



Interpretation

Figure 1 illustrates the substantial improvement in Breast Self-Examination practice following the health education programme. Monthly BSE practice increased more than six-fold after intervention, demonstrating excellent behavioural impact.

Figure 1: Improvement in Breast Self-Examination Practice Following Intervention

Figure 2. Comparison of Mean Knowledge Scores

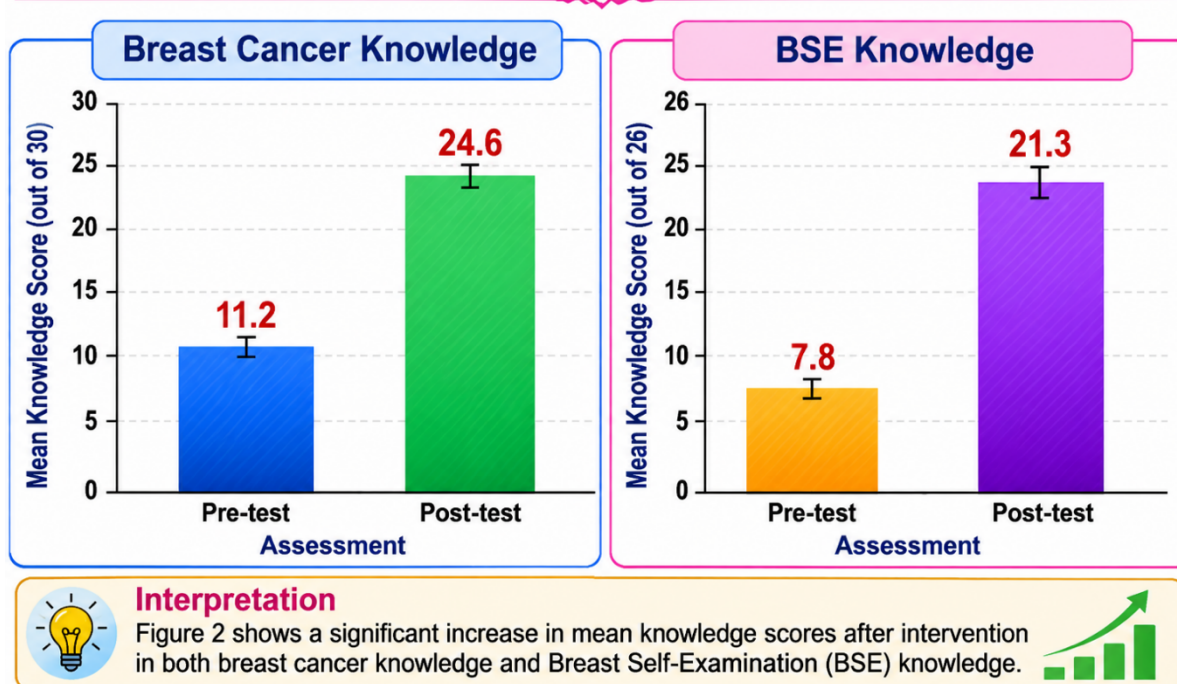


Figure 2: Comparison of mean knowledge scores

As shown in Figure 2, both breast cancer knowledge and Breast Self-Examination knowledge improved markedly after the educational programme. Improvement was

particularly pronounced for BSE-specific knowledge, indicating that the structured educational session effectively addressed previously existing knowledge gaps.

Figure 3. Mean Knowledge, Attitude and Practice Scores

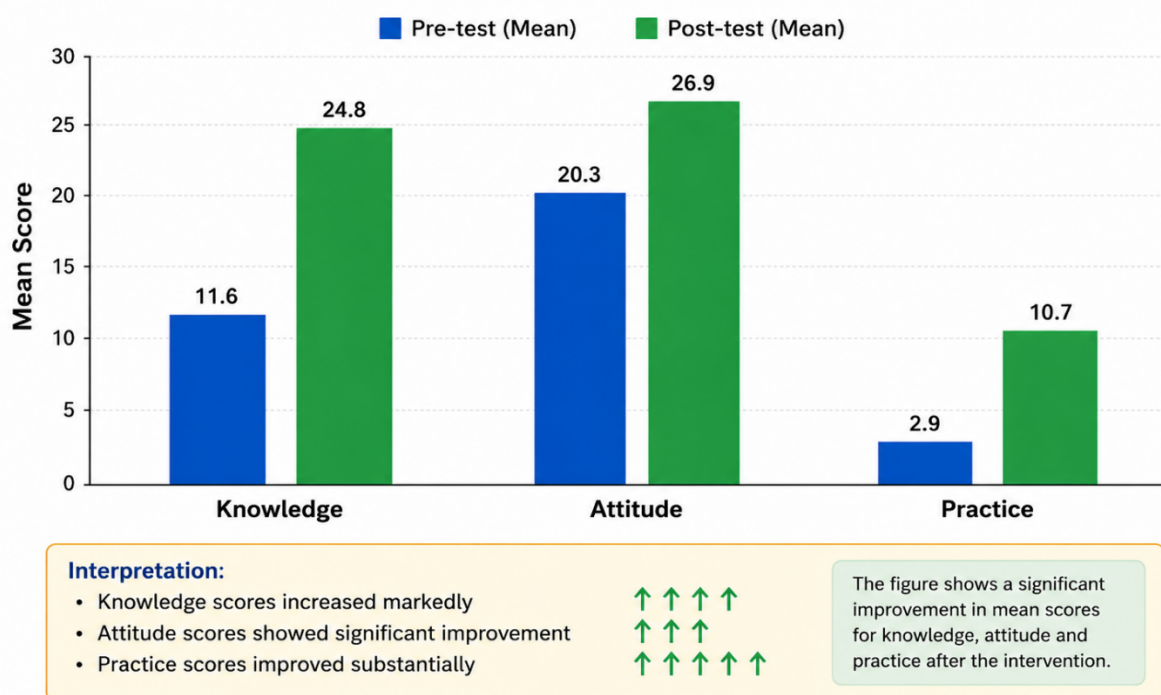


Figure 3: Mean Knowledge, Attitude and Practice Scores

Figure 3 demonstrates simultaneous improvement in all three components of the Knowledge–Attitude–Practice (KAP) model. The greatest gain

occurred in practice scores, suggesting successful translation of acquired knowledge into preventive health behaviour.

Figure 4. Correlation Between Knowledge and Practice

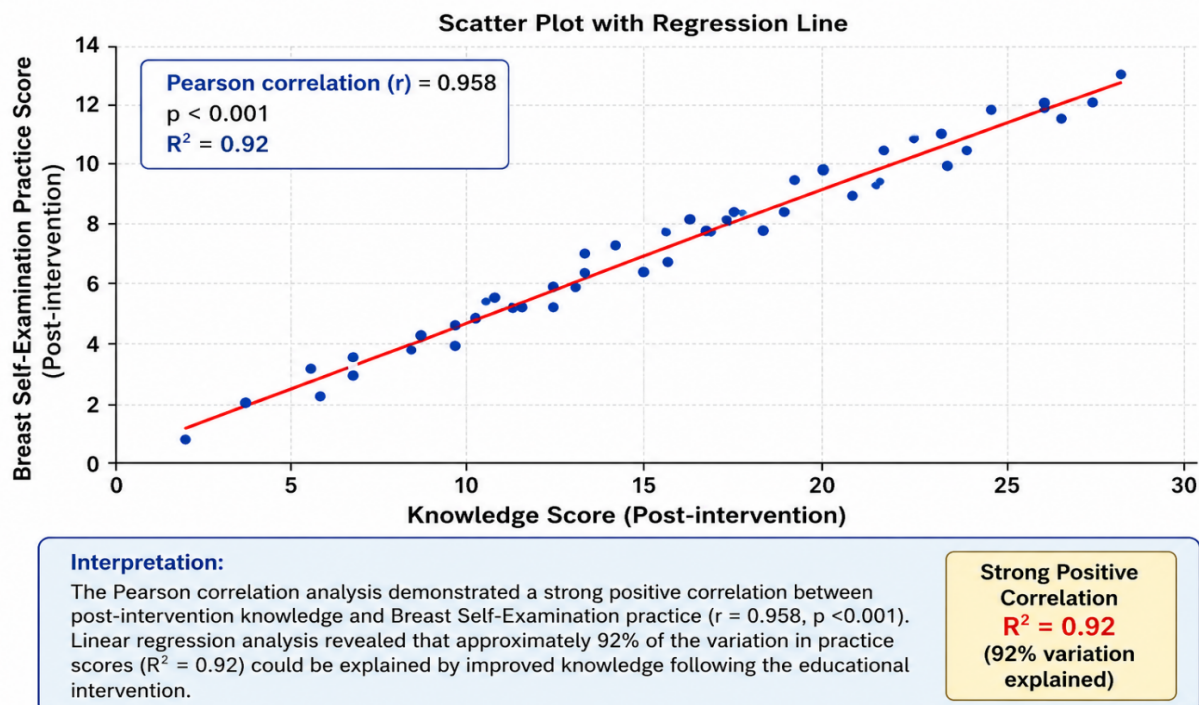


Figure 4: Correlation between knowledge and practice

The Pearson correlation analysis demonstrated a strong positive correlation between post-intervention knowledge and Breast Self-Examination practice ($r = 0.958$, $p < 0.001$). Linear regression analysis revealed that approximately 92% of the variation in practice scores ($R^2 = 0.92$) could be explained by improved knowledge following the educational intervention.

Figure 4 indicates that participants with higher knowledge scores consistently demonstrated better Breast Self-Examination practices. The strong positive relationship emphasizes that structured health education substantially influences behavioural change by improving understanding and confidence in performing Breast Self-Examination.

The findings of the present study demonstrate that the structured health education intervention produced statistically significant improvements in knowledge, attitude, and practice regarding Breast Self-Examination among women in urban Puducherry. Baseline knowledge and screening practices were inadequate despite moderate awareness of breast cancer. Following the intervention, mean scores improved significantly across all domains ($p < 0.001$), with regular monthly BSE practice increasing from 13.7% to

86.3%. Higher educational status and a positive family history of breast cancer were significantly associated with improved post-intervention screening behaviour. Furthermore, a strong positive correlation between knowledge and practice confirmed that enhanced awareness translated into sustained behavioural change. These findings support the effectiveness of structured community-based educational interventions for promoting early breast cancer detection.

Discussion

The present community-based interventional study demonstrated that a structured health education programme significantly improved the knowledge, attitude, and practice (KAP) regarding Breast Self-Examination (BSE) among women aged 20–60 years in urban Puducherry. Significant improvements were observed in all outcome measures following the intervention ($p < 0.001$), indicating that health education is an effective strategy for promoting breast cancer awareness and encouraging regular BSE practice.

Baseline Knowledge and Practice: At baseline, participants had inadequate knowledge regarding breast cancer and Breast Self-Examination, and only 13.7% reported practicing monthly BSE. These findings are consistent with studies by Rajini

et al., Veena et al., Yerpude et al., and Fotedar et al., which also reported poor awareness and low BSE practice among Indian women. Poor health literacy, misconceptions, fear of cancer diagnosis, and lack of organized awareness programmes may explain these findings [7,9,11].

Effectiveness of the Educational Intervention:

Following the intervention, knowledge regarding breast cancer and BSE improved significantly. Regular BSE practice increased from 13.7% before the intervention to 86.3% after three months. Similar improvements have been reported by Yadav et al., Gupta et al., Nayak et al., and Akhtari-Zavare et al., who demonstrated that structured educational programmes effectively enhance breast cancer awareness and BSE practice. The combination of lectures, audiovisual demonstrations, practical training, and educational pamphlets used in the present study likely contributed to these favourable outcomes [11-14].

Attitude towards Breast Self-Examination:

Participants showed a significant positive change in attitude following the intervention. Women became more confident and motivated to perform regular BSE after understanding its importance in early detection. These findings are comparable to those reported by Mikhail and Petro-Nustas, Secginli and Nahcivan, and Rosmawati, who observed that educational interventions positively influence health beliefs and screening behaviour [16,17].

Correlation between Knowledge and Practice:

A strong positive correlation was observed between post-intervention knowledge and BSE practice ($r = 0.958$, $p < 0.001$), suggesting that improved knowledge was associated with better screening behaviour. Linear regression analysis further showed that approximately 92% of the variation in practice scores could be explained by increased knowledge. Similar findings have been reported by Powe et al. and Guvenc et al., emphasizing that health education plays a key role in translating knowledge into preventive practice [15].

Association with Socio-demographic Variables:

Higher educational status and a positive family history of breast cancer were significantly associated with regular BSE practice after the intervention.

Similar observations have been reported by Fotedar et al., Gupta et al., and Yerpude et al., indicating that education improves health literacy and awareness, while family history increases perceived susceptibility to breast cancer [9,11,12].

Public Health Implications: Breast Self-Examination is an inexpensive, simple, and non-invasive screening method that can be easily incorporated into community health programmes. The findings of this study support integrating

structured BSE education into Primary Health Centres, Urban Health Centres, women's self-help groups, and the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS). Such interventions can improve breast cancer awareness, promote early diagnosis, and potentially reduce breast cancer-related morbidity and mortality in resource-limited settings.

Strengths and Limitations: The strengths of this study include its community-based design, complete participant follow-up, standardized educational intervention, and comprehensive assessment of knowledge, attitude, and practice. However, the study was limited by its one-group pre-test/post-test design, convenience sampling, self-reported BSE practice, and short follow-up period of three months. Further multicentre randomized controlled studies with longer follow-up are recommended to confirm the long-term effectiveness of educational interventions

Conclusion

The present study demonstrated that a structured health education programme significantly improved knowledge, attitude, and practice regarding Breast Self-Examination (BSE) among women in urban Puducherry. The intervention effectively enhanced breast cancer awareness and markedly increased regular BSE practice. These findings suggest that structured BSE education is a simple, cost-effective, and feasible strategy for promoting early detection of breast cancer and should be integrated into primary healthcare services and national cancer control programmes.

Recommendations: Based on the study findings, structured Breast Self-Examination (BSE) education should be integrated into routine primary healthcare services and the NPCDCS programme. Regular awareness campaigns and training of healthcare workers (ASHAs, ANMs, and nurses) should be strengthened to promote early breast cancer detection. Community-based educational programmes should be expanded to rural and underserved areas, and larger multicentre studies with longer follow-up are recommended to evaluate the long-term effectiveness of BSE education.

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Special appreciation is extended to all study participants for their enthusiastic cooperation, valuable time, and willingness to participate in the educational programme.

Ethical Approval: The study protocol was reviewed and approved by the Institutional Ethics Committee of Sri Venkateshwara Medical College Hospital and Research Centre, Ariyur, Puducherry. Written informed consent was obtained from all participants prior to enrolment. Confidentiality of participant information was maintained throughout the study in accordance with the principles of the Declaration of Helsinki.

Author Contributions

- **Dr. Archana S. Kumar:** Conceptualization, methodology, investigation, data collection, formal analysis, writing—original draft.
- **Dr. S. Srikanth:** Supervision, methodology, validation, critical review and editing, project administration.
- **Dr. M. Arthi:** Data validation, statistical guidance, manuscript review, visualization, editing.

All authors read and approved the final manuscript.

Data Availability Statement: The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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