

Impact of a Health Education Program on Breast Self-Examination Awareness among Female College Students

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Abstract

Background: Breast cancer is the most common malignancy among women globally and a leading cause of cancer-related mortality in India [1–4]. Early detection significantly improves prognosis, and Breast Self-Examination (BSE) is an affordable, non-invasive method that empowers women to identify breast changes promptly [5–8]. However, awareness and regular practice remain inadequate among young women [7–10].

Objectives: To assess the effectiveness of a structured health-education intervention in improving knowledge and attitude regarding breast cancer and BSE among female college students.

Methods: A pre-post interventional study was conducted among 150 female students in a private engineering college in Chennai from July to September 2024. Participants were selected through simple random sampling. Baseline knowledge and attitude were assessed using a pre-tested questionnaire. A structured 45-minute educational session in Tamil, incorporating videos, flip-charts, and demonstrations, was delivered to groups of 30 students. The same questionnaire was administered immediately after the session. Data were analysed using STATA, and changes in proportions were assessed, with $p < 0.05$ considered statistically significant.

Results: The mean age of participants was 18.34 ± 1.22 years. Before intervention, only 76 percent had heard of breast cancer, and 29.3 percent knew about BSE. Correct knowledge of BSE steps was as low as 3.3 percent. Following the intervention, awareness of breast cancer increased to 93.5 percent, and knowledge of BSE rose to 82.7 percent. Correct understanding of BSE steps improved markedly to 89.3 percent. Attitude also improved significantly, with notable increases in confidence and willingness to perform BSE. All improvements were statistically significant ($p < 0.0001$).

Conclusion: The structured educational intervention effectively enhanced knowledge and attitude regarding breast cancer and BSE among college-going women. Incorporating skill-based breast health education into college health programs can promote early detection practices and contribute to reducing the breast cancer burden in the community.

Keywords: Breast cancer, Breast self-examination, Health education, College students, Early detection, Awareness

Introduction

Breast cancer remains the most commonly diagnosed malignancy among women worldwide, with more than 2.3 million new cases and approximately 685,000 deaths reported in 2020, according to the World Health Organization [1]. It has surpassed lung cancer as the leading cancer globally, comprising nearly 11.7 percent of all cancer diagnoses [2]. In India, breast cancer represents the foremost cause of cancer-related illness and mortality among women, with an estimated 178,361 new cases and 94,408 deaths recorded in 2020 [3,4]. The high disease burden in the country is associated with late presentation, insufficient awareness, and inadequate screening coverage. Early detection plays a pivotal role in improving prognosis, and breast self-examination (BSE) continues to be recognized as an affordable, non-invasive, and

accessible screening approach that enables women to identify breast changes at an early stage [5,6]. Despite this, evidence indicates that knowledge and regular practice of BSE are suboptimal, particularly among young women, including college students [7,8].

Persistent gaps between awareness and actual practice have been attributed to cultural barriers, misconceptions, fear, and inadequate guidance [9,10], emphasizing that information alone is insufficient to change behaviour [11,12]. Research suggests that repeated, structured, and skill-based educational interventions are essential to enhance technique, improve attitude, and build confidence toward BSE practice among young women [13,14,15]. College-going females represent a key target population, and findings from a recent quasi-experimental study in South India demonstrated significant improvement in both knowledge and BSE practice following structured health education, underscoring its effectiveness in shaping preventive health behaviours [16]. Health education not only improves awareness but also challenges misconceptions and stigma surrounding breast cancer, promoting an enabling environment for early detection. Assessing the impact of such interventions among college women is therefore crucial, as strengthening knowledge and practice of BSE in this demographic can contribute to early diagnosis and ultimately reduce the burden of breast cancer in the community.

Materials & Methods

Study Design

This pre–post interventional study was conducted to evaluate the effectiveness of a structured health education program on knowledge and attitude regarding breast self-examination (BSE) among female college students.

Study Setting and Duration

The study was carried out among female students of a private engineering college located within the premises of the affiliated medical college in Chennai. Data collection was conducted over a period of three months, from July 2024 to September 2024.

Study Population

The study population comprised female undergraduate and postgraduate students enrolled in the first and second years of B.Tech and MBA courses who were present during the study period and voluntarily agreed to participate. Participants were selected using a simple random sampling technique.

Sample Size

A total of 150 participants were included in the study. The sample size was calculated using OpenEpi software, based on a previously reported 17% awareness of breast self-examination among college-going women, with 95% confidence level, 5% absolute precision, an anticipated 20% improvement following the educational intervention, and 10% non-response rate.

Inclusion Criteria

Female students enrolled in the first or second year of B.Tech or MBA courses, who were available during the study period and provided written informed consent, were included in the study.

Exclusion Criteria

Female students who were absent during the data collection period, declined to participate, or did not provide written informed consent were excluded from the study.

Data Collection Tool

Following approval from the Institutional Ethics Committee and permission from the college administration, eligible participants were recruited after obtaining written informed consent. Prior to implementation of the educational intervention, two focus group discussions were conducted with representative female students to aid in the development of the study questionnaire and educational materials. Baseline information was collected using a pre-tested, structured, self-administered questionnaire designed to assess participants' knowledge and attitude regarding breast self-examination. The educational intervention consisted of a 45-minute health education session delivered in the Tamil language using PowerPoint presentations, flip books, and instructional videos. The session covered breast anatomy, epidemiology and risk factors of breast cancer, warning signs and symptoms, importance of early detection, recommended timing and frequency of breast self-examination, and the correct step-by-step procedure for performing BSE. The intervention was conducted by a trained faculty member and a postgraduate student from the Department of Community Medicine in batches of approximately 30 participants. As part of the awareness program, participants were provided with pink ribbons symbolizing breast cancer awareness and informed about their significance. Immediately following the educational session, the same questionnaire was re-administered to assess changes in knowledge and attitude. Before completion of the program, all participants received educational pamphlets illustrating the correct technique of breast self-examination for future reference.

Ethical Considerations

The study protocol received approval from the Institutional Ethics Committee and Institutional Research Committee before commencement of the study. Written informed consent was obtained from all participants after explaining the objectives and procedures of the study. Participation was entirely voluntary, and confidentiality and anonymity were maintained throughout data collection, analysis, and reporting in accordance with the ethical principles of the Declaration of Helsinki and the Indian Council of Medical Research (ICMR) guidelines.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using STATA statistical software. Descriptive statistics were used to summarize participant characteristics and responses, with categorical variables expressed as frequencies and percentages. The effectiveness of the educational intervention was evaluated by comparing pre-intervention and post-intervention knowledge and attitude scores using appropriate statistical tests. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1: Socio-demographic characteristics of the study subjects (n=150)

S. No	Variable	n (%)
1	Age	18.34 ± 1.22 (<i>Mean ± SD</i>)
2	Course studying	
a)	B. Tech	144 (96)
b)	MBA	6 (4)
3	Year of course	
a)	I year	24 (16)
b)	II year	90 (60)
c)	III year	36 (24)
4	Education of the mother	
a)	Illiterate	7 (4.7)

b)	Primary school	24 (16)
c)	High school	64 (42.7)
d)	Pre-university	29 (19.3)
e)	Graduate	17 (11.3)
f)	Post graduate	8 (5.3)
g)	Any other	2 (1.3)

The study included 150 participants with a mean age of 18.34 ± 1.22 years, indicating that the sample comprised predominantly young adults. Most respondents were pursuing B. Tech (96 percent), while a smaller proportion were MBA students (4 percent). With regard to the academic year of study, 16 percent were in the first year, 60 percent in the second year, and 24 percent in the third year. The educational status of the participants' mothers varied, with 4.7 percent being illiterate, 16 percent having completed primary education, and 42.7 percent having completed high school. Additionally, 19.3 percent had pre-university education, 11.3 percent were graduates, and 5.3 percent were postgraduates, while 1.3 percent reported other educational qualifications. Overall, the participants represented a young academic population with varied maternal educational backgrounds.

Table 2: Knowledge on Breast Cancer and Breast Self- Examination (BSE) among the study subjects before and after the intervention, (n=150)

S. No	Variable	Before intervention n (%)	After intervention n (%)	p value*
1	Ever heard of breast cancer	114 (76)	140 (93.5)	<0.0001
2	Ever heard of causes of breast cancer	64 (42.5)	132 (88)	<0.0001
3	Mentioned correct causes of breast cancer	10 (6.7)	125 (83.5)	<0.0001
4	Ever heard of symptoms of breast cancer	43 (28.7)	126 (84)	<0.0001
5	Mentioned correct symptoms of breast cancer	23 (15.3)	136 (90.7)	<0.0001
6	Early detection of breast cancer possible	65 (43.3)	126 (84)	<0.0001
7	Mentioned BSE as a method for early detection of breast cancer	6 (4)	68 (45.3)	<0.0001
8	Breast cancer is a curable disease if detected early	86 (57.3)	119 (79.3)	<0.0001
9	Ever heard of Breast Self-Examination	44 (29.3)	124 (82.7)	<0.0001
10	Mentioned correct purpose of BSE	27 (18)	127 (84.7)	<0.0001
11	Mentioned correct steps of BSE	5 (3.3)	134 (89.3)	<0.0001

Before the intervention, awareness levels regarding breast cancer and Breast Self-Examination (BSE) were relatively low among participants, with only 76 percent having ever heard of breast cancer and just 42.5 percent aware of its causes. Knowledge of correct causes and symptoms was particularly poor, reported by only 6.7 percent and 15.3 percent, respectively. Awareness of early detection was also limited, with 43.3 percent recognizing that breast cancer can be detected early and only 4 percent identifying BSE as a method for early detection. Similarly, just 29.3 percent had heard of BSE, 18 percent understood its purpose, and only 3.3 percent knew the correct steps. Following the intervention, a substantial improvement was observed across all knowledge indicators. Awareness of breast cancer increased to 93.5 percent, and 88 percent reported knowledge of its causes. Knowledge of correct causes rose dramatically to 83.5 percent, and awareness of symptoms improved to 84 percent, with 90.7 percent identifying correct symptoms. Understanding of early detection increased to 84 percent, and recognition of BSE as a screening method

improved to 45.3 percent. Furthermore, awareness of BSE increased to 82.7 percent, while correct knowledge of its purpose and steps rose to 84.7 percent and 89.3 percent respectively. All improvements were statistically significant ($p < 0.0001$), indicating the intervention was highly effective in enhancing knowledge and awareness related to breast cancer and BSE among participants.

Table 3: Attitude towards BSE among the study subjects before and after the intervention, (n=150)

S.No	Variable	Before intervention, n (%)	After intervention, n (%)	p value*
1	I will feel comfortable in performing Breast Self-Examination	56 (28)	105 (52.5)	<0.0001
2	I will consult a doctor if I find some changes in my breasts	86 (43)	179 (89.5)	<0.0001
3	I will feel comfortable sharing with friends/family about any changes in my breasts	82 (41)	133 (66.5)	<0.0001
4	I feel confident in doing Breast Self-Examination	47 (23.5)	175 (87.5)	<0.0001

The table presents the change in participants' attitudes and intentions related to Breast Self-Examination (BSE) before and after a health education intervention. Each statement reflects a positive behavioral or attitudinal outcome toward breast cancer awareness and self-examination practices. The percentages indicate the proportion of participants who agreed with each statement. All four variables show a statistically significant improvement after the intervention ($p < 0.0001$), meaning the changes are highly unlikely to be due to chance.

Discussion

The current study demonstrated a significant improvement in breast cancer awareness among female college students following a structured health education session, with awareness levels increasing from 76% pre-intervention to 93.5% post-intervention. These findings are consistent with those of Yadav et al. [17], who reported an increase in awareness from 64.8% to 91.2% among nursing students in Nagpur, and Thanushree et al. [18], who observed a rise from 58% to 89.3% among university students in Karnataka. In contrast, Saha et al. [19] reported that only 16.6% of rural women in South India had ever participated in a breast cancer education program, highlighting persistent gaps in community-level awareness initiatives. Knowledge regarding breast cancer symptoms and risk factors also improved significantly in the present study, with correct responses increasing from 6.5% and 15.5% to 83.5% and 90.5%, respectively. These findings align with studies by Gore et al. [20] in Maharashtra and Mukherjee Das et al. [21] in Delhi, both of whom documented substantial gains in knowledge following educational interventions. Awareness of breast self-examination (BSE) increased from 29.5% to 82.5% in this study, comparable to improvements reported by Jadhav et al. [22] in Tamil Nadu and Mainaz et al. [23] in rural Karnataka. Similarly, Patel and Vyas [24] reported notable improvement in BSE awareness among college students in Ahmedabad. Correct knowledge regarding the purpose and steps of BSE increased sharply from 18% and 3% pre-intervention to 84.5% and 89% post-intervention, respectively. These findings are consistent with earlier studies by Vijayalakshmi et al. [25] and Sowmini et al. [26], who also reported significant improvements following structured demonstrations and teaching sessions. Attitudinal changes were evident in the present study, with comfort and confidence to perform BSE increasing from 28% and 23.5% to 52.5% and 87.5%, respectively. Similar improvements in self-efficacy were reported by Nidhi et al. [27] among undergraduate

students in Gujarat. Health-seeking intentions also improved substantially, with willingness to consult a doctor increasing from 43% to 89.5%, consistent with findings by Gawande and Kulkarni [28]. Strengths of this study include its focus on young female college students—an ideal target group for early breast cancer awareness—use of context-specific educational content, and inclusion of a two-month follow-up to assess BSE practice.

One limitation of the study is that awareness was assessed immediately after the intervention, which may have inflated post-test scores. However, sustained improvements in awareness are supported by broader public health efforts. Mitra et al. [29] reported strong commitments in Puducherry toward non-communicable disease control through NCD clinics, healthcare workforce training, and community awareness programs. Under the National Health Mission, Tamil Nadu [30], initiatives such as “Screen to Win” and “Makkalai Thedi Maruthuvam” have been implemented to improve cancer screening access. Despite these efforts, screening uptake remains suboptimal due to poor compliance and limited follow-up. Kalaiarasi et al. [31] reported that although Tamil Nadu has a relatively higher breast cancer screening rate of 5.5%, women aged 20–24 years are significantly less likely to undergo screening compared to those aged 35–49 years, underscoring the importance of early awareness initiatives such as the present study.

Conclusion

This study demonstrates that a structured health education session on breast self-examination significantly improves the knowledge and attitudes of young female college students. The observed improvement reflects a positive shift in health-seeking behavior and utilization of health services among participants. Empowering young women through context-specific awareness programs can play a vital role in reducing breast cancer-related morbidity and mortality. However, further research with follow-up assessments is required to determine whether these improvements lead to sustained behavioral changes, particularly the regular practice of breast self-examination. Extending this program to female students across diverse academic streams can facilitate early detection of breast cancer and promote wider dissemination of knowledge and positive attitudes within the community. As this was our first initiative to educate students outside health-related disciplines under the STS project, plans include expanding the program to other institutions, along with follow-up assessments to evaluate improvement in breast self-examination practices.

Conflict of Interest: Nil

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