

Original Research Article

A study to assess the effectiveness of a health education programme on awareness regarding breast self-examination among females

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ABSTRACT

Background: Breast cancer remains a major public health concern among women, and limited awareness regarding breast self-examination may delay early recognition and timely reporting of breast-related abnormalities.

Methods: This pre-experimental one-group pre-test post-test study was conducted during November 2025 among females selected according to the study criteria. A structured knowledge questionnaire was used to assess awareness regarding breast self-examination before and after the health education programme. The pre-test was conducted first, followed by the planned health education programme. After the intervention, a post-test was conducted using the same questionnaire. The collected data were analyzed using descriptive and inferential statistics.

Results: The post-test awareness score was higher than the pre-test awareness score, showing improvement in awareness regarding breast self-examination after the health education programme. The findings showed that the health education programme was effective in improving awareness among females.

Conclusions: The health education programme was effective in improving awareness regarding breast self-examination among females.

Keywords: Awareness programme, Breast cancer awareness, Breast self-examination, Early detection, Health education, Pre-test post-test study

INTRODUCTION

Breast cancer is one of the major public health problems among women worldwide and continues to contribute substantially to cancer-related morbidity and mortality. According to the GLOBOCAN 2022 estimates, breast cancer remained among the most commonly diagnosed cancers globally, making early awareness and timely detection an important area of preventive health care.¹ In India also, cancer burden has shown a rising pattern, and breast cancer has been reported as the leading cancer site among females in national estimates.² This situation becomes more important because many women still present late, when the disease is already clinically advanced, and treatment becomes more complicated,

costly and emotionally disturbing for the patient and family.

Early detection of breast abnormalities depends not only on availability of diagnostic facilities but also on awareness among females regarding warning symptoms, risk factors and screening practices. Breast self-examination is a simple, low-cost and self-performed method through which women may become familiar with the normal appearance and feel of their breasts. It does not replace clinical breast examination or mammography, but it can help in improving body awareness and may encourage women to seek medical advice when any lump, nipple discharge, skin change, pain or asymmetry is noticed. Sarker et al observed that educational

intervention improved breast cancer knowledge and breast self-examination practice among female university students, showing that lack of awareness can be corrected through planned teaching.³

In the Indian setting, awareness regarding breast cancer and breast self-examination remains uneven across different groups of women. Sinha and Sharma conducted a quasi-experimental study among rural women in Bihar and reported that digital media intervention improved knowledge, attitude and screening-related practice for breast cancer.⁴ Shipra et al studied women in Lucknow, North India, and found gaps in knowledge and self-breast examination practices, although willingness to learn and participate in screening-related activity was present.⁵ Jadhav et al. from Tamil Nadu also reported that knowledge, attitude and practice of breast self-examination were associated with general self-care and cultural factors, indicating that awareness is influenced by social behaviour, personal habit and health-seeking attitude.⁶

Several community and student-based studies have shown that females may have heard about breast cancer but still lack correct knowledge regarding breast self-examination technique, timing and regular monthly practice. Kandasamy et al reported gaps between knowledge, attitude and actual practice of breast self-examination among women in a web-based community study.⁷ Saju et al also observed that awareness and actual practice of breast self-examination did not always move together, as many women were aware but were not regularly performing it.⁸ Raghavan et al evaluated knowledge, attitude and practice among female medical students and reported that even educated females may not have satisfactory regular practice, showing that only general education is not enough unless specific health education is provided.⁹

Health education has a practical role in such conditions because it can convert vague awareness into correct understanding and repeated practice. Uruntie et al reported that educational intervention improved knowledge, attitude and practice of breast self-examination among female students in Southern Nigeria.¹⁰ Ogunmodede et al also found that teaching methods improved knowledge and practice related to breast self-examination among female adolescents.¹¹ Similarly, Kucheki et al showed that a virtual educational intervention based on self-efficacy theory improved women's breast self-examination skills.¹² These findings suggest that structured education, demonstration, audiovisual tools and repeated reinforcement can make females more confident in identifying breast changes.

Pre-test and post-test designs are commonly used for assessing the effectiveness of health education programmes because they directly compare awareness before and after the intervention in the same participants. Mansoor et al used a pre-post quasi-experimental

educational intervention and reported improvement in breast cancer awareness after the programme.¹³ Nsaful et al also demonstrated the impact of breast cancer educational intervention among high school students, supporting the usefulness of teaching-based intervention in younger female populations.¹⁴ Recent studies from Ethiopia and Jordan have also shown continuing gaps in breast self-examination knowledge and practice among female students and teachers, further supporting the need for repeated awareness-based programmes.¹⁵⁻¹⁷

Therefore, awareness regarding breast self-examination should be strengthened through simple, structured and understandable health education programmes. Such programmes are especially useful in settings where females may hesitate to discuss breast-related symptoms, may not know the correct method of examination, or may not seek early consultation due to fear, shyness or lack of perceived risk.

With this background, the present study was conducted to assess the effectiveness of a health education programme on awareness regarding breast self-examination among females. The study also aimed to compare pre-test and post-test awareness scores and to find the association between baseline awareness and selected socio-demographic variables.

METHODS

This pre-experimental one-group pre-test post-test study was conducted during November 2025 in a breast awareness camp organized in a selected hospital. Adult women who were working in the hospital or visited the breast awareness camp during the data collection period were enrolled by non-probability convenience sampling technique.

The sample size was calculated for a one-group pre-test post-test design. Considering 5% level of significance, 80% power and a moderate expected effect size of 0.5 for improvement in knowledge after health education, the minimum required sample size was 32. After adding allowance for non-response and incomplete forms, the required sample size became 36. As complete paired data were available for 64 eligible participants, the final sample size for analysis was taken as 64.

Adult women aged 18 years and above who were working in the selected hospital or visited the breast awareness camp, were willing to participate, and were available for both pre-test and post-test were included in the study. Women below 18 years of age, women who were not willing to participate, women who did not complete either the pre-test or post-test, women who left the session before completion, and women who had recently attended any formal breast cancer or breast self-examination awareness programme were excluded from the final analysis.

The data collection tool consisted of two sections. The first section was a socio-demographic and background proforma, which included age, marital status, education, occupation, working status, department or place of work where applicable, purpose of hospital visit, family history of breast cancer and previous practice of breast self-examination. The second section was a self-structured knowledge and practice questionnaire on breast cancer awareness and breast self-examination. The questionnaire was prepared after reviewing standard breast health education material and previous related studies. It included items related to breast cancer awareness, common risk factors, early warning signs, meaning and purpose of breast self-examination, correct time, frequency, steps of breast self-examination and action to be taken after noticing any abnormal finding. The structured questionnaire was validated by subject experts before final administration. The total knowledge score ranged from zero to 25. Knowledge scores were categorized as inadequate knowledge for scores from zero to eight, moderate knowledge for scores from nine to 17 and adequate knowledge for scores from 18 to 25.

Formal permission was obtained from the concerned hospital authority before data collection. The study was conducted as a non-invasive educational awareness activity during a breast awareness camp, and no clinical intervention, invasive procedure, biological sample collection was involved. Written informed consent was obtained from all participants before enrolment. Participation was voluntary, and confidentiality of the collected information was maintained.

The pre-test was conducted before the breast awareness session using the selected tool. After completion of the pre-test, a structured breast awareness session was delivered. The session included information regarding breast cancer, common risk factors, early warning signs, importance of early reporting, breast self-awareness and breast self-examination. The correct time, frequency and steps of breast self-examination were explained through lecture, discussion, poster/chart and demonstration, as per availability during the camp. The post-test was conducted after completion of the awareness session using the same questionnaire, and necessary clarification was provided in the local language wherever required.

The collected data were coded, entered and analyzed using IBM SPSS Statistics version 23.0 (IBM Corp., Armonk, NY, USA). Frequency and percentage were used for categorical variables. Mean and standard deviation were used for awareness and knowledge/practice scores. Paired t-test was used to compare pre-test and post-test mean scores. Chi-square test or Fisher's exact test was used, as applicable, to assess the association between pre-test knowledge level and selected socio-demographic and occupational variables. A p value of less than 0.05 was considered statistically significant.

RESULTS

A total of 70 women initially attended the breast awareness camp and participated in the pre-test. Out of these, six participants could not complete the post-test because they left the session before completion due to work-related or personal reasons. Therefore, complete paired pre-test and post-test data were available for 64 participants, and final analysis was performed on these 64 women.

Table 1: Sociodemographic profile of study participants.

Sociodemographic variables	Categories/ value	Frequency/ value
Age (years)	Mean±SD	39.64±11.45
Age range (years)	Minimum-maximum	19–60
Marital status	Married	45 (70.3)
	Unmarried	15 (23.4)
	Widow	4 (6.2)
Education	Primary	5 (7.8)
	Secondary	13 (20.3)
	Higher secondary	14 (21.9)
	Graduate	23 (35.9)
	Postgraduate	9 (14.1)
Participant category	Hospital staff	28 (43.8)
	Camp visitor	36 (56.2)
Residence	Rural	22 (34.4)
	Urban	29 (45.3)
	Semi-urban	13 (20.3)
Family type	Joint	25 (39.1)
	Nuclear	35 (54.7)
	Three-generation	4 (6.2)

Values are expressed as number (%) unless otherwise stated. SD: standard deviation.

The mean age of the study participants was 39.64±11.45 years, with age ranging from 19 to 60 years. Most participants were married, 45 (70.3%), followed by unmarried women, 15 (23.4%), and widows, four (6.2%). Regarding educational status, 23 participants (35.9%) were graduates, 14 (21.9%) had higher secondary education, 13 (20.3%) had secondary education, nine (14.1%) were postgraduates, and five (7.8%) had primary education. Among the participants, 28 (43.8%) were hospital staff and 36 (56.2%) were camp visitors. Most participants belonged to urban areas, 29 (45.3%), followed by rural areas, 22 (34.4%), and semi-urban areas, 13 (20.3%). Nuclear family was reported by 35 (54.7%) participants, joint family by 25 (39.1%), and three-generation family by four (6.2%) participants (Table 1).

Table 2: Comparison of knowledge scores before and after health education intervention.

Parameters	Mean±SD	Median	Range	95% CI of mean difference	Paired t value	P value
Pre-test knowledge score	11.73±3.02	12	5-17			
Post-test knowledge score	21.59±1.86	22	18-25			
Mean paired improvement	9.86±2.27			9.29 to 10.43	34.688	<0.001

Values are expressed as mean±SD unless otherwise stated. CI: confidence interval; SD: standard deviation. Paired t-test was applied for comparison of pre-test and post-test knowledge scores. A p value <0.05 was considered statistically significant.

Table 3: Distribution of participants according to knowledge level before and after intervention.

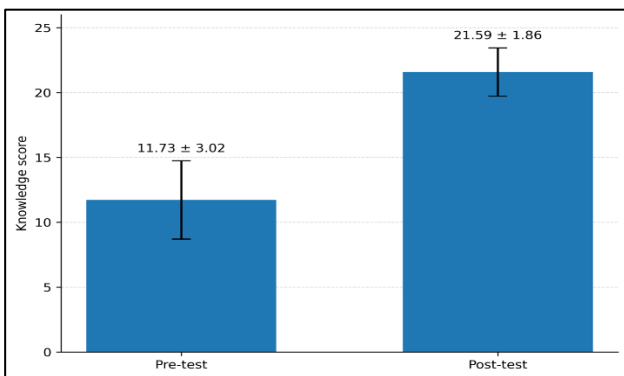
Knowledge level	Pre-test N (%)	Post-test N (%)
Inadequate	10 (15.6)	0 (0.0)
Moderate	54 (84.4)	0 (0.0)
Adequate	0 (0.0)	64 (100.0)

Values are expressed as number (%). Knowledge categories were defined as inadequate knowledge for scores of 0-8, moderate knowledge for scores of 9-17 and adequate knowledge for scores of 18-25

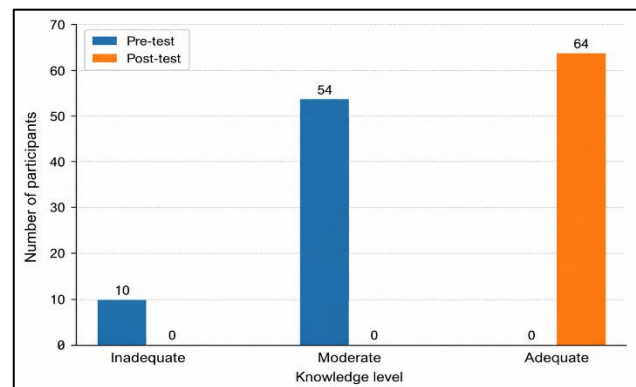
Table 4: Domain-wise comparison of knowledge scores before and after intervention.

Knowledge domain	Maximum score	Pre-test Mean±SD	Post-test Mean±SD	Mean improvement	P value
General breast cancer awareness	12	5.56±1.88	10.42±1.26	4.86	<0.001
BSE concept and purpose	3	1.66±0.84	2.64±0.68	0.98	<0.001
BSE timing and method	7	2.97±1.23	5.94±1.10	2.97	<0.001
Action after abnormal finding	3	1.55±0.89	2.59±0.61	1.05	<0.001

Values are expressed as mean±SD. SD: standard deviation; BSE: breast self-examination. Paired t-test was applied for each domain-wise comparison. A p value <0.05 was considered statistically significant.

**Figure 1: Comparison of mean knowledge scores before and after health education intervention.**

The overall knowledge score showed marked improvement after the health education intervention. The mean pre-test knowledge score was 11.73±3.02, with a median score of 12 and range of 5-17. After the intervention, the mean post-test knowledge score increased to 21.59±1.86, with a median score of 22 and range of 18-25. The mean paired improvement was 9.86±2.27, with a 95% confidence interval of 9.29 to 10.43. This improvement was statistically significant on paired t-test, with t value 34.688 and p<0.001 (Table 2, Figure 1).

**Figure 2: Distribution of participants according to knowledge level before and after intervention.**

Before the intervention, 10 participants (15.6%) had inadequate knowledge and 54 participants (84.4%) had moderate knowledge. None of the participants had adequate knowledge in the pre-test. After the health education intervention, all 64 participants (100.0%) reached the adequate knowledge category, while no participant remained in the inadequate or moderate knowledge category. This showed a complete shift in knowledge level after the intervention (Table 3, Figure 2).

Table 5: Comparison of practice-related and intention-related responses before and after intervention.

Practice items	Response categories	Pre-test N (%)	Post-test N (%)
Have you ever practiced breast self-examination?	Regularly	1 (1.6)	53 (82.8)
	Irregularly/sometimes	23 (35.9)	11 (17.2)
	Never	35 (54.7)	0 (0.0)
	Not sure	5 (7.8)	0 (0.0)
If you practiced BSE, how often did you do it?	Monthly	1 (1.6)	57 (89.1)
	Once in 3-6 months	8 (12.5)	7 (10.9)
	Rarely	12 (18.8)	0 (0.0)
	Never practiced	43 (67.2)	0 (0.0)
Main reason for not practicing BSE regularly was	Did not know correct method	35 (54.7)	4 (6.2)
	Fear or hesitation	19 (29.7)	6 (9.4)
	Lack of time	5 (7.8)	1 (1.6)
	Not applicable/already practicing	5 (7.8)	53 (82.8)
If abnormal breast change is noticed	Consult doctor/health worker	36 (56.2)	61 (95.3)
	Ignore it	12 (18.8)	0 (0.0)
	Hide it due to fear	9 (14.1)	0 (0.0)
	Use only home remedy	7 (10.9)	3 (4.7)
Willingness to practice BSE after proper teaching	Yes	36 (56.2)	59 (92.2)
	No	1 (1.6)	0 (0.0)
	Not sure	10 (15.6)	0 (0.0)
	Need more information	17 (26.6)	5 (7.8)

Values are expressed as number (%). BSE: breast self-examination. Practice-related and intention-related responses were analyzed separately as frequency and percentage.

Table 6: Association between pre-test knowledge level and selected sociodemographic variables.

Variables	Categories	Inadequate knowledge N (%)	Moderate knowledge N (%)	Total	Test value	P value
Education	Primary	5 (100.0)	0 (0.0)	5	33.284	<0.001
	Secondary	2 (15.4)	11 (84.6)	13		
	Higher secondary	3 (21.4)	11 (78.6)	14		
	Graduate	0 (0.0)	23 (100.0)	23		
	Postgraduate	0 (0.0)	9 (100.0)	9		
Residence	Rural	4 (18.2)	18 (81.8)	22	0.183	0.912
	Urban	4 (13.8)	25 (86.2)	29		
	Semi-urban	2 (15.4)	11 (84.6)	13		
Marital status	Married	7 (15.6)	38 (84.4)	45	0.327	0.849
	Unmarried	2 (13.3)	13 (86.7)	15		
	Widow	1 (25.0)	3 (75.0)	4		
Participant category	Hospital staff	0 (0.0)	28 (100.0)	28	7.232	0.007
	Camp visitor	10 (27.8)	26 (72.2)	36		

Note: Values are expressed as number (%). Chi-square test or Fisher's exact test was applied as applicable. A p value <0.05 was considered statistically significant.

Domain-wise analysis also showed significant improvement in all components of knowledge. The mean score for general breast cancer awareness increased from 5.56 ± 1.88 to 10.42 ± 1.26 , with a mean improvement of 4.86. Knowledge regarding breast self-examination concept and purpose improved from 1.66 ± 0.84 to 2.64 ± 0.68 , with a mean improvement of 0.98. Knowledge regarding breast self-examination timing and method increased from 2.97 ± 1.23 to 5.94 ± 1.10 , with a mean improvement of 2.97. Awareness regarding action after

abnormal findings improved from 1.55 ± 0.89 to 2.59 ± 0.61 , with a mean improvement of 1.05. All domain-wise improvements were statistically significant with $p < 0.001$ (Table 4, Figure 3).

Practice-related responses also improved after the intervention. In the pre-test, only one participant (1.6%) reported regular practice of breast self-examination, 23 (35.9%) practiced it irregularly or sometimes, 35 (54.7%) had never practiced it, and five (7.8%) were not sure.

After the intervention, 53 participants (82.8%) gave regular practice as the response and 11 (17.2%) gave irregular or occasional practice as the response, while none reported never practicing or being unsure (Table 5).

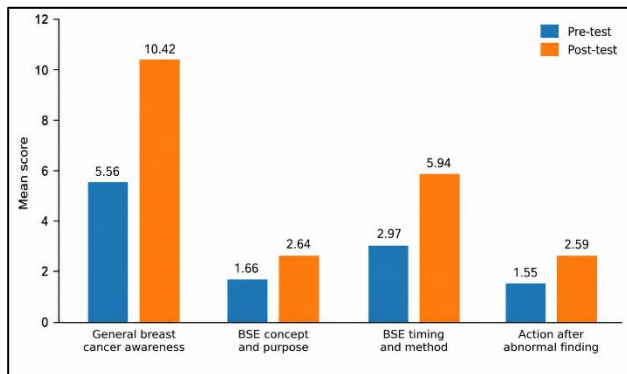


Figure 3: Domain-wise comparison of knowledge scores before and after intervention.

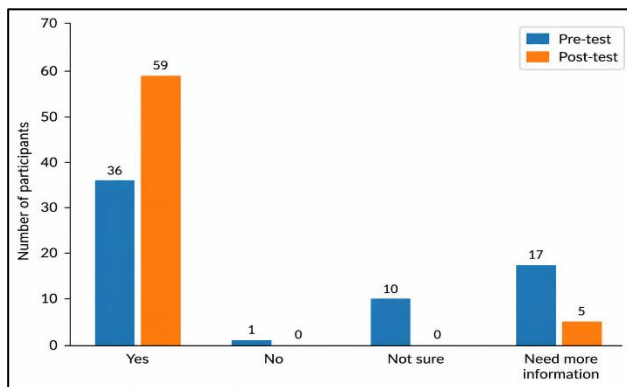


Figure 4: Willingness to practice breast self-examination before and after intervention.

The frequency of breast self-examination practice also changed after health education. Before the intervention, only one participant (1.6%) reported monthly practice, eight (12.5%) practiced once in three to six months, 12 (18.8%) practiced rarely, and 43 (67.2%) had never practiced breast self-examination. After the intervention, 57 participants (89.1%) gave monthly practice as the correct/intended response and seven (10.9%) gave practice once in three to six months as the response. No participant reported rare practice or never practicing after the intervention (Table 5).

The main reason for not practicing breast self-examination regularly before the intervention was lack of knowledge regarding the correct method, reported by 35 participants (54.7%). Fear or hesitation was reported by 19 participants (29.7%), lack of time by five (7.8%), and five (7.8%) were already practicing or the question was not applicable. After the intervention, only four participants (6.2%) reported that they did not know the correct method, six (9.4%) reported fear or hesitation, and one (1.6%) reported lack of time. In 53 participants

(82.8%), the response was not applicable or they were already practicing after the intervention (Table 5).

The response to abnormal breast changes also improved after the intervention. In the pre-test, 36 participants (56.2%) stated that they would consult a doctor or health worker if any abnormal breast change was noticed. This increased to 61 participants (95.3%) after the intervention. Before the intervention, 12 participants (18.8%) reported that they would ignore the finding, nine (14.1%) would hide it due to fear, and seven (10.9%) would use only home remedy. After the intervention, none of the participants reported that they would ignore or hide the finding due to fear, while only three (4.7%) reported that they would use only home remedy (Table 5).

Willingness to practice breast self-examination after proper teaching also increased. In the pre-test, 36 participants (56.2%) were willing to practice breast self-examination, one (1.6%) was not willing, 10 (15.6%) were not sure, and 17 (26.6%) needed more information. After the intervention, 59 participants (92.2%) reported willingness to practice breast self-examination, no participant reported unwillingness or uncertainty, and only five (7.8%) reported need for more information (Table 5, Figure 4).

Association between pre-test knowledge level and selected sociodemographic variables showed that educational status was significantly associated with baseline knowledge regarding breast self-examination. Inadequate knowledge was highest among participants with primary education, where all five participants (100.0%) had inadequate knowledge, while all graduate and postgraduate participants had moderate baseline knowledge. Participant category was also significantly associated with pre-test knowledge level. All hospital staff had moderate baseline knowledge, whereas 10 camp visitors (27.8%) had inadequate knowledge. Residence and marital status were not significantly associated with pre-test knowledge level, showing that baseline awareness gap was present across different residential and marital groups (Table 6).

DISCUSSION

The present study assessed the effectiveness of a health education programme on awareness regarding breast self-examination among females. Complete paired pre-test and post-test data were available for 64 women, with mean age 39.64 ± 11.45 years, ranging from 19 to 60 years. Baseline awareness was inadequate in most participants, as the pre-test mean knowledge score was 11.73 ± 3.02 out of 25, which increased to 21.59 ± 1.86 after the intervention. The mean paired improvement was 9.86 ± 2.27 , with 95% confidence interval of 9.29 to 10.43, paired t value 34.688, and $p < 0.001$, showing that the health education programme was effective in improving awareness regarding breast self-examination. This finding

is similar to Sarker et al, who reported improved breast cancer knowledge and breast self-examination practice after educational intervention among female university students in Bangladesh.³ It also agrees with Sinha and Sharma, who reported improvement in breast cancer awareness and screening-related practice among rural women in Bihar after digital media intervention.⁴

The distribution of knowledge level also changed markedly after the intervention. In the pre-test, 10 participants (15.6%) had inadequate knowledge, 54 (84.4%) had moderate knowledge, and none had adequate knowledge. After the intervention, all 64 participants (100.0%) reached the adequate knowledge category. This complete shift from inadequate or moderate knowledge to adequate knowledge was one of the main findings of the study. It indicates that the teaching session was not only statistically effective but also practically useful. This finding is in agreement with Uruntie et al, who reported improvement in knowledge, attitude and practice of breast self-examination after educational intervention among female students in Southern Nigeria.¹⁰ Similar improvement was also reported by These studies support the finding that structured teaching has a direct effect on awareness scores.

Domain-wise analysis also showed significant improvement in all areas of knowledge. General breast cancer awareness improved from 5.56 ± 1.88 to 10.42 ± 1.26 out of 12. Knowledge regarding breast self-examination concept and purpose improved from 1.66 ± 0.84 to 2.64 ± 0.68 out of three. Knowledge regarding timing and method improved from 2.97 ± 1.23 to 5.94 ± 1.10 out of seven. Awareness regarding action after abnormal findings improved from 1.55 ± 0.89 to 2.59 ± 0.61 out of three. All these domain-wise improvements were statistically significant with $p < 0.001$. The maximum improvement was seen in general breast cancer awareness and breast self-examination timing and method. This is understandable because women may have heard about breast cancer in general, but many may not know the correct timing, steps and purpose of monthly breast self-examination.

The improvement in breast self-examination concept, timing and method is supported by Kucheki et al, who showed that a virtual educational intervention based on self-efficacy theory improved women's breast self-examination skills.¹² The present study also suggests that lack of method-related knowledge was a major barrier, because before the intervention many participants reported that they did not know the correct method. After education, the number of women giving this reason reduced sharply. This shows that the problem was not only lack of motivation but also lack of correct procedural knowledge. Ogunmodede et al also reported that teaching tools improved knowledge and practice related to breast self-examination among female adolescents.¹¹ This supports the role of demonstration, explanation and

repeated health messaging in improving breast self-examination-related understanding.

Practice-related responses in the present study also showed a favourable change. Before intervention, only one participant (1.6%) reported regular practice of breast self-examination, while 35 participants (54.7%) had never practiced it and five (7.8%) were not sure. After the intervention, 53 participants (82.8%) reported regular practice response, and none reported never practicing. Monthly breast self-examination response increased from 1.6% before intervention to 89.1% after intervention. This finding indicates that the education programme not only improved knowledge score but also changed practice-related response and intention toward regular monthly breast self-examination. Similar improvement in breast self-examination practice after educational intervention was reported by Sarker et al. and Uruntie et al.^{3,10} However, as the present study assessed post-test responses soon after the intervention, long-term continuation of monthly practice would need follow-up assessment.

Reasons for not practicing breast self-examination also reduced after the intervention. Before the programme, 35 participants (54.7%) did not know the correct method and 19 (29.7%) reported fear or hesitation; after the intervention, these reduced to four (6.2%) and six (9.4%), respectively. This shows that health education helped reduce common barriers such as lack of knowledge, fear, shyness and poor confidence. Jadhav et al also reported that knowledge, attitude and practice of breast self-examination were influenced by self-care and cultural factors, supporting the role of confidence, habit and social background in breast self-examination practice.⁶

The response to abnormal breast changes also improved after the intervention. Before the programme, 36 participants (56.2%) said they would consult a doctor or health worker if an abnormal breast change was noticed. After the programme, this increased to 61 participants (95.3%). Before the intervention, some participants reported that they may ignore the finding, hide it due to fear, or use only home remedies. After the intervention, ignoring or hiding due to fear was not reported by any participant, and only three participants (4.7%) still selected home remedy. This finding is practically important because awareness programmes should not only teach how to examine the breast but should also teach what to do if any abnormality is detected. Early consultation is the real benefit of awareness. This agrees with the broader findings of Kandasamy et al and Saju et al, where gaps were seen between awareness and actual practice, highlighting the need for education that connects knowledge with action.^{7,8}

Willingness to practice breast self-examination after proper teaching also improved. Before intervention, 36 participants (56.2%) were willing to practice breast self-examination after proper teaching, while 10 (15.6%) were

not sure and 17 (26.6%) needed more information. After intervention, 59 participants (92.2%) expressed willingness to practice breast self-examination, and none were unwilling or unsure. This shows that health education can reduce uncertainty and increase confidence. The finding is similar to the school and student-based intervention studies by Nsaful et al and Ogunmodede et al, where educational intervention improved breast health awareness among young females.^{11,14} Even though the age group and setting were different, the common point is that females respond positively when health education is provided in a simple and approachable manner.

In the present study, baseline knowledge level was significantly associated with educational status and participant category. Educational status showed a significant association with pre-test knowledge level, with test value 33.284 and $p < 0.001$. Inadequate knowledge was highest among participants with primary education, where all five participants (100.0%) had inadequate knowledge, while all graduates and postgraduates had moderate baseline knowledge. This finding was expected because education improves exposure to health-related information, reading ability and confidence in understanding preventive health messages. Participant category was also significantly associated with baseline knowledge, with test value 7.232 and $p = 0.007$. All hospital staff had moderate baseline knowledge, whereas 10 camp visitors (27.8%) had inadequate knowledge. This may be due to greater exposure of hospital staff to the hospital environment, health talks, patient-related discussions and general medical information. However, even among hospital staff, adequate knowledge was not present before the intervention, which again supports the need for specific and structured breast self-examination education.

Residence and marital status were not significantly associated with baseline knowledge, with p values of 0.912 and 0.849, respectively, suggesting that awareness gap was present across different residential and marital groups. The present study also showed that baseline regular breast self-examination practice was very low, despite many participants being educated and a large proportion being hospital staff. This is an important observation. It shows that general literacy or hospital exposure may not automatically lead to correct breast self-examination practice. Specific awareness and demonstration are required. Raghavan et al also reported gaps in knowledge, attitude and practice among female medical students, showing that even educated females may not perform breast self-examination regularly unless they receive focused teaching.⁹ This supports the need for regular health education programmes in hospitals, colleges, community camps and workplace settings.

Overall, the findings of the present study suggest that a structured health education programme was effective in improving awareness regarding breast self-examination among females. The improvement was seen in total

knowledge score, knowledge category, domain-wise knowledge and practice-related responses. The study findings are consistent with previous pre-post and quasi-experimental studies, which reported that educational interventions improved breast cancer awareness and breast self-examination-related knowledge and practice.^{3,4,10-14} The results support the inclusion of breast self-examination education in routine community health camps and women's health awareness activities.

The present study had some limitations. The sample size was small and the study was conducted among women attending a breast awareness camp, so the findings may not represent all females in the community. The post-test was conducted soon after the health education programme, so the long-term retention of knowledge and actual continuation of monthly breast self-examination could not be assessed. Practice-related responses were self-reported, and actual technique was not independently observed over time. Despite these limitations, the study provides useful evidence that a simple health education programme can produce significant immediate improvement in awareness regarding breast self-examination among females.

CONCLUSION

The present study concluded that the health education programme was effective in improving awareness regarding breast self-examination among females, as knowledge scores increased significantly from pre-test to post-test and all participants achieved adequate knowledge after the intervention. Improvement was also seen in practice- and intention-related responses, especially regarding regular monthly breast self-examination and early consultation for abnormal breast changes. Further studies with larger samples and follow-up are needed to assess long-term knowledge retention and actual practice continuation.

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