



Effectiveness of Computer-Assisted Instruction on Knowledge and Attitude Regarding Breast Self-Examination among Rural Women in Kathua District: A Pre-Experimental Study.

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Abstract

Introduction

Breast cancer remains a major public health concern worldwide, particularly in low-resource settings where access to screening services is limited. Breast Self-Examination (BSE) is a simple, cost-effective method that promotes early detection, yet awareness and practice among rural women remain inadequate. The study aims to evaluate the effectiveness of Computer-Assisted Instruction (CAI) on post-intervention knowledge and attitude regarding Breast Self-Examination (BSE) and its association with demographic variables among females in the rural population.

Methodology

A pre-experimental study was conducted among 350 rural women selected by purposive sampling. Baseline knowledge and attitude were assessed using a validated interview schedule and BSE Knowledge & Attitude Scale. Participants received a structured CAI intervention. Post-test data were collected after four weeks. Data were analyzed using descriptive statistics and inferential statistics (paired t-test, chi-square) at a significance level of $p < 0.05$.

Result

Among 350 rural women, pre-test findings showed that 39.71% had poor knowledge and 74% held negative attitudes toward Breast Self-Examination (BSE). Following Computer-Assisted Instruction (CAI), knowledge improved significantly, with 45.71% achieving excellent scores and mean scores increasing from 9.66 to 16.45 ($p < 0.0001$). Attitudes also improved, with positive attitudes rising from 26% to 42.86% and mean scores increasing from 41.21 to 47.91 ($p < 0.0001$).

Conclusion

The study demonstrated that Computer-Assisted Instruction is highly effective in enhancing both knowledge and attitudes regarding BSE among rural women. Incorporating CAI into community health education can serve as a practical strategy to empower women in resource-limited settings, promoting early detection of breast cancer.

Keywords: Breast Self-Examination, Computer-Assisted Instruction, Knowledge, Attitude, Rural Women, Breast Cancer Prevention

Introduction

Breast cancer is the most common malignancy among women worldwide. As per the WHO report, more than 2.3 million new cases and 685,000 deaths were reported in 2020 alone. It remains a leading cause of morbidity and mortality, particularly in low- and middle-income countries (LMICs), where delayed diagnosis and limited access to advanced screening tools contribute to poor survival outcomes.¹ In India, breast cancer has surpassed cervical cancer as the most prevalent cancer among women, with a steady increase in incidence, especially among younger women in both urban and rural areas.² Early detection remains the cornerstone of breast cancer control. Mammography, though effective, is not universally accessible in rural and resource-limited settings due to high costs, lack of infrastructure, and limited trained personnel.³ In contrast, Breast Self-Examination (BSE) is a simple, cost-free, and non-invasive technique that empowers women to detect changes in their breasts and seek timely medical care. While BSE is not a substitute for clinical breast examination or mammography, it plays a crucial role in promoting self-awareness and early reporting of symptoms, especially in underserved populations.⁴ Despite its importance, multiple studies have shown that knowledge and practice of BSE are alarmingly low among Indian women, particularly in rural areas, where cultural taboos, low literacy, and lack of awareness are major barriers.⁵ Attitudinal factors also play a significant role in negative perceptions, misconceptions about breast cancer, and fatalistic beliefs reduce the likelihood of adopting preventive practices such as BSE.⁶ In recent years, technology-based educational interventions have emerged as effective strategies for health promotion. Computer-Assisted Instruction (CAI) offers interactive, consistent, and engaging learning experiences, making it especially useful in populations with low literacy levels.⁷ By combining visual, auditory, and textual content, CAI has been shown to improve knowledge retention and influence health-related attitudes and behaviors. In the context of breast health, CAI can serve as a culturally adaptable tool by providing visual demonstrations and culturally sensitive

information, can act as a strong cue to action while reducing perceived barriers and misconceptions and empower women with skills necessary for self-care and early detection. The Health Belief Model (HBM) serves as a complementary guide, emphasizing that women's likelihood of practicing BSE depends on their perceived susceptibility to breast cancer, perceived benefits of early detection, perceived barriers (such as fear, embarrassment, or lack of skill), and cues to action such as health education interventions.⁸The study aims to evaluate the effectiveness of Computer-Assisted Instruction (CAI) on post-intervention knowledge and attitude regarding Breast Self-Examination (BSE) and its association with demographic variables among females in the rural population.

Methodology

Study Design

This study adopted a pre-experimental, pre-test and post-test design to evaluate the effectiveness of Computer-Assisted Instruction (CAI) on knowledge and attitude regarding Breast Self-Examination (BSE) among rural women. A total of 350 women were recruited through purposive sampling from selected villages of Tehsil Nagri Parole, Kathua district, Jammu and Kashmir. The study was conducted from December 2023 to December 2024.

The research design included three phases:

- Pre-test assessment: Baseline knowledge and attitude of participants regarding BSE were assessed using a validated structured interview schedule.
- Intervention: Participants were provided with a structured CAI module that included multimedia-based content on breast cancer awareness, the importance of BSE, and a step-by-step demonstration of the technique.
- Post-test assessment: Knowledge and attitude were reassessed after four weeks using the same tool to evaluate the effectiveness of the intervention.

This design was chosen as it allows comparison of pre- and post-intervention outcomes in the same group, thereby minimizing inter-group variability and ensuring a more reliable measure of intervention effectiveness in the rural population.

Study Setting

The proposed study will be conducted at nine villages of Airwan Patwar Halqua, Tehsil Nagri Parole, Kathua district. The researcher selected this setting for the availability of samples, familiarity with the setting, and economic possibility of conducting the research.

Study Population

The study population consisted of rural females from selected villages of Tehsil Nagri Parole, District Kathua, Jammu and Kashmir, who met the inclusion and exclusion criteria.

Sample Size

The subjects represent a subset of the population selected by the researcher to participate in the study. The sample size was determined using Cochran's formula to ensure representativeness, resulting in a total of 350 females.

Sampling Criteria

Females aged 20–50 years who are willing to participate, provide consent, can read and understand Hindi or Dogri, and are available during data collection will be included. Excluded are males, females who participated in the pilot study, and those with any pathological breast disorder.

Data Collection and Analysis

Data were collected from December 2023 to December 2024 after obtaining formal permission from the district administration. Rapport was established, informed consent obtained, and interviews conducted to record demographic details along with knowledge and attitude regarding Breast Self-Examination (BSE). Data were coded, entered into Microsoft Excel, and analyzed using descriptive statistics and inferential statistics (Chi-square test) with significance set at $p < 0.05$.

Ethical Consideration

Permission to conduct the study was obtained from the administrative officer of Tehsil Nagri Parole, District Kathua. Informed consent was taken from all participants after providing a complete explanation of the research purpose and the intervention in a language they could understand. Participants were assured that the intervention would not cause any harm, and no invasive procedures were involved. They were granted full autonomy to decide on their participation, and data collection was scheduled according to their convenience. Confidentiality of all information was strictly maintained throughout the study.

Results

Distribution based on demographic variables of participants among the rural population

A total of 350 rural women participated in the study. The majority were aged between 26–31 years (25.14%), followed by 32–37 years (23.43%). Most participants were Hindu (40.86%), with Muslims (27.71%), Sikhs (16.29%), and Christians (15.14%) forming the remainder. The age at menarche was most commonly reported between 10–12 years (38%). A majority (76.57%) had regular menstrual cycles, and nearly half (22%) had completed 12th grade, reflecting moderate literacy levels.

Family structure analysis showed that most lived in joint families (37.71%), followed by nuclear (30%). Dietary habits revealed 36.29% were non-vegetarian, while 30% were vegetarian. Healthcare professionals were the primary source of BSE information for 45.14% of women. Most participants had two children (50%) and no family history of breast-related diseases (69.43%). In terms of health indicators, 44.29% had normal BMI, while

22.86% were overweight, 19.43% underweight and 13.43% obese. The majority did not smoke (93.71%) or use contraceptive pills (67.43%).

Evaluation of the pre & post-test level knowledge and attitude regarding breast self-examination among the females in rural population.

Table No. 01: Evaluation of the pre & post-test level of knowledge regarding (n=350)

Knowledge Grade	Score	Pre-Test		Post-Test	
		Frequency	Percentage	Frequency	Percentage
Poor	1-6	139	39.71%	26	7.43%
Average	7-12	127	36.29%	38	10.86%
Good	13-18	72	20.57%	126	36.00%
Excellent	19-25	12	3.43%	160	45.71%

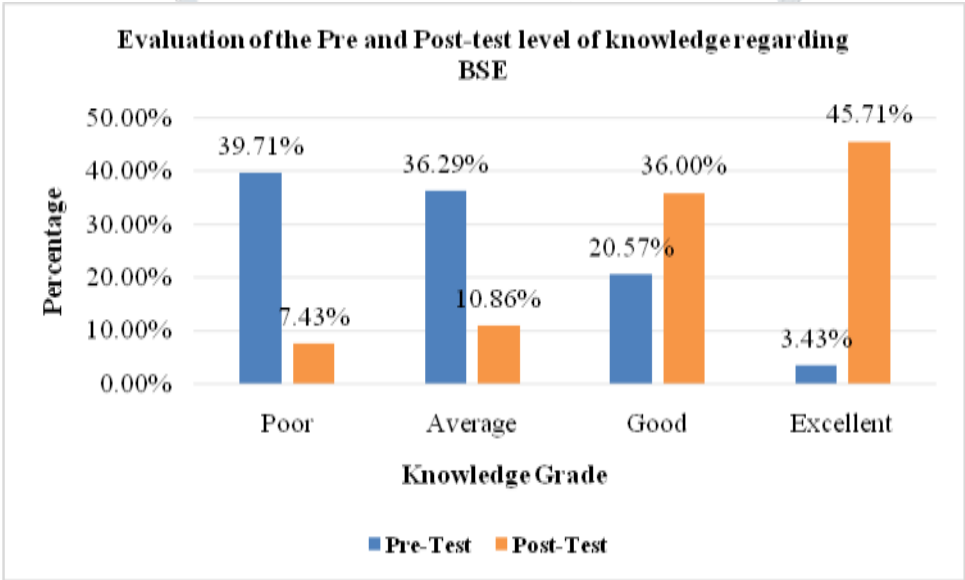


Figure No. 01:Evaluation of the pre & post-test level of knowledge regarding BSE

Table no. 01 and figure no. 01: Before the intervention, the majority of participants had poor (39.71%) or average (36.29%) knowledge of BSE, with only 3.43% achieving excellent scores. Following the CAI intervention, a marked improvement was observed, with 45.71% attaining excellent knowledge and 36% good knowledge, while only 7.43% remained in the poor category.

Table No. 02: Evaluation of Pre and Post-test level of attitude regarding BSE (n=350)

Attitude Category	Level of Attitude	Pre-Test		Post-Test	
		Frequency	Percentage	Frequency	Percentage
Positive attitude	55-80	91	26.00%	150	42.86%
Negative attitude	22-54	259	74.00%	200	57.14%

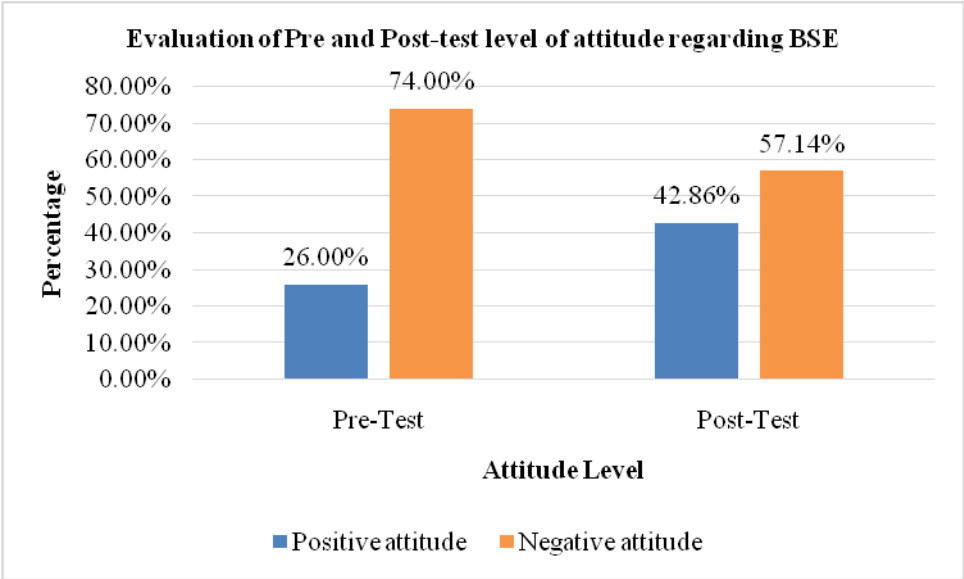


Figure No. 02:Evaluation of Pre and Post-test level of attitude regarding BSE

Table no. 02 and figure no. 02: In the pre-test, 74% of participants demonstrated a negative attitude towards BSE, with only 26% showing a positive attitude. After the intervention, the proportion of participants with a positive attitude increased to 42.86%, though a majority (57.14%) still retained negative attitudes.

Evaluation of the Effectiveness of Computer-Assisted Instruction (CAI) on the level of Knowledge and attitude regarding breast self-examination among the females in the rural population

Table No. 3: Comparison of mean pre-test and post-test knowledge score regarding BSE (n=350)

Test	Mean	SD	t value	dF	P value
Pre-test	9.66	4.24	20.808	349	<0.0001
Post-test	16.45	4.71			

The mean pre-test knowledge score was 9.66 ± 4.24, which significantly increased to 16.45 ± 4.71 post-intervention, showing a mean difference of 6.79 points. The improvement was statistically significant (t = 20.808, p < 0.0001), confirming the effectiveness of CAI in enhancing knowledge.

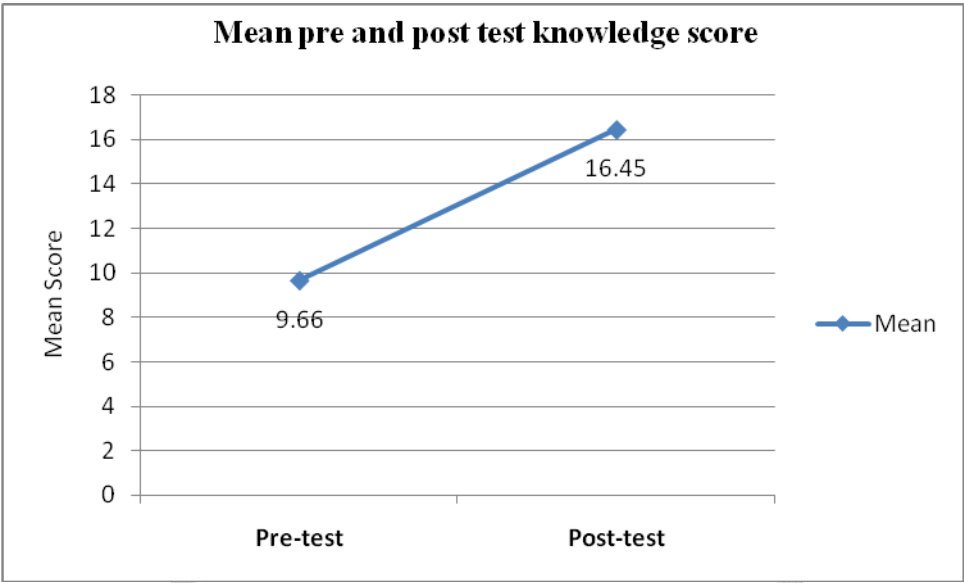


Figure No. 1: Comparison of mean pre-test and post-test knowledge score

Table No. 04: Comparison of mean pre-test and post-test level of attitude regarding breast self-examination among the rural population (n=350)

Test	Mean	SD	t value	dF	P value
Pre-test	41.21	15.62	6.488	349	<0.0001
Post-test	47.91	15.35			

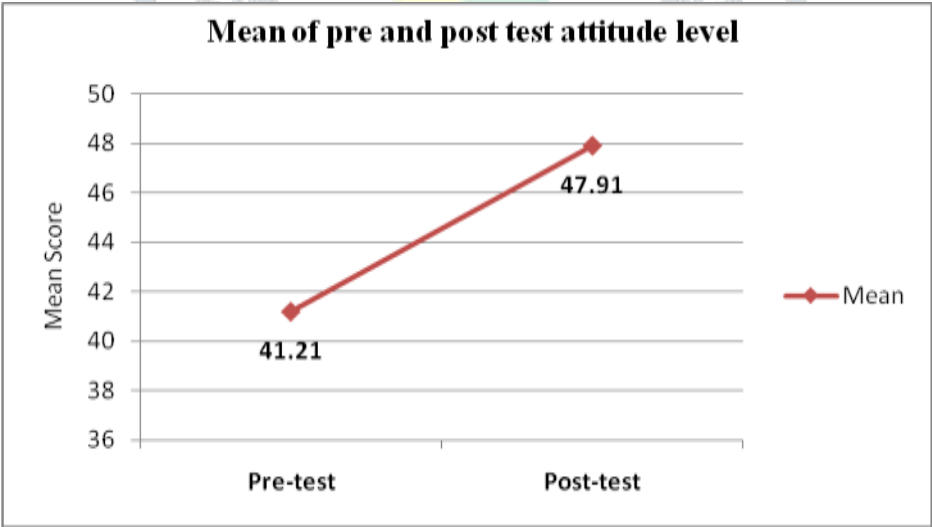


Figure No. 2: Comparison of mean pre-test and post-test attitude level.

The mean pre-test attitude score was 41.21 ± 15.62, which significantly increased to 47.91 ± 15.35 after the intervention, reflecting a mean difference of 6.7 points. This improvement was statistically significant (t = 6.488, p < 0.0001), indicating that CAI was effective in fostering more positive attitudes towards BSE.

Discussion

The present study evaluated the effectiveness of Computer-Assisted Instruction (CAI) on knowledge and attitude regarding Breast Self-Examination (BSE) among rural women in Kathua district. Findings revealed that before the intervention, a majority of participants had poor to average knowledge and predominantly negative attitudes toward BSE. Following the CAI intervention, there was a statistically significant improvement in both knowledge and attitude scores, demonstrating the effectiveness of technology-based education in enhancing breast health awareness among rural populations.

The mean knowledge score improved from 9.66 (± 4.24) in the pre-test to 16.45 (± 4.71) in the post-test ($p < 0.0001$), while the mean attitude score improved from 41.21 (± 15.62) to 47.91 (± 15.35) ($p < 0.0001$). This indicates that CAI not only imparted essential knowledge but also influenced participants' perceptions, encouraging a more favorable outlook toward BSE. These findings are consistent with Ameer et al. (2014), who reported that computer-based interventions significantly improved women's awareness and practice of breast cancer screening.⁹

Similar improvements have been reported in other contexts. Avci (2008) demonstrated that structured health education programs enhanced both knowledge and attitudes toward BSE among Turkish women.¹⁰ Likewise, Yerpude & Jogdand (2013) highlighted that baseline knowledge of BSE among rural Indian women was inadequate, but educational interventions led to notable improvements.¹¹ Our study reinforces these observations, showing that CAI can be a powerful alternative to traditional health education methods in low-literacy settings.

The role of healthcare professionals as the primary source of knowledge for nearly half of the participants emphasizes the need to empower them with modern educational tools. Gupta et al. (2015) also found that healthcare workers play a pivotal role in disseminating breast health information in rural communities.¹² However, the integration of digital interventions such as CAI may reduce dependence on direct personal communication and expand the reach of breast health education.

Interestingly, while significant improvements in knowledge were observed, attitudes remained more resistant to change, with 57.14% of participants still demonstrating negative attitudes in the post-test. This finding is in line with Akhtari-Zavare et al. (2015), who noted that while knowledge is relatively easier to improve; changing cultural beliefs, fears, and fatalistic attitudes requires sustained and context-specific interventions.¹³

International studies also support these results. A study in Ethiopia by Birhane et al. (2017) found that knowledge and positive attitudes toward BSE were strongly associated with family history of breast cancer and exposure to health education campaigns.¹⁴ Similarly, Al-Dubai et al. (2012) in Malaysia emphasized the importance of targeted educational programs in shaping positive health behaviors related to BSE.¹⁵

The findings from the present study highlight the importance of integrating CAI into community-based health promotion strategies. With the growing digital penetration in rural India, CAI offers a scalable and sustainable

solution to overcome literacy barriers, standardize health education delivery, and engage women through interactive learning. Moreover, WHO (2021) advocates the use of digital health technologies as innovative tools for improving awareness, early detection, and preventive practices in cancer control.

Overall, the study underscores that while CAI is effective in improving knowledge and partially enhancing attitudes, a multi-pronged approach combining digital education with peer support, counseling, and community mobilization may be necessary to bring about lasting behavioral change.

Conclusion

The study demonstrated that Computer-Assisted Instruction (CAI) was highly effective in enhancing both knowledge and attitude regarding Breast Self-Examination (BSE) among rural women. Post-intervention, a significant increase was observed in knowledge scores, with the majority of participants shifting from poor and average to good and excellent categories. Similarly, attitudes improved notably, with a higher proportion of women adopting a positive outlook toward BSE. These findings highlight the potential of CAI as a cost-effective, scalable, and engaging health education strategy to empower rural women, promote self-care practices, and contribute to the early detection of breast cancer.

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Conflict of Interest: The author declares that there is no conflict of interest associated with this study

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