Impact of Educational Interventions on Students Cognitive, Affective, and Psychomotor Abilities in Detecting Breast Cancer Risk in Jambi City High Schools

ABSTRACT

Aims: This study sought to explore how personal factors, attitudes, competencies, and the involvement of schools influence students' capacity to recognize the risks linked to breast cancer symptoms and signs through participation in the Breast Self-Examination Education Program (SADARI).

Methods: This cross-sectional study conducted to 70 students of two high schools in Jambi City. The participants were selected proportionally and assigned into two groups: an intervention group (n = 35) and a control group (n = 35). Data were collected directly using structured questionnaires and skill assessment. The data were analyzed statistically using paired t-tests and independent t-tests.

Findings: The intervention group exhibited significant enhancements across knowledge, attitudes, skills, and school role scores following the implementation of the program. Specifically, mean knowledge scores increased from 52.0 ± 4.7 to 69.7 ± 9.8 ($p < 0.0001$), attitudes improved from 52.2 ± 4.9 to 71.1 ± 11.0 ($p < 0.0001$), and skills rose from 56.0 ± 9.1 to 73.1 ± 11.1 ($p < 0.0001$). A comparative analysis of post-intervention results between the intervention and control groups revealed significant differences ($p < 0.0001$). This finding highlights the effectiveness of the SADARI educational program in enhancing students' ability to recognize risk factors related to breast cancer.

Conclusion: The SADARI educational program was successful in improving students' knowledge, attitudes, skills, and the support they received from their schools. This initiative is suggested as an effective approach to encourage early breast cancer detection among adolescent students.

Keywords: Health Education, Early Detection, Breast Cancer, Students, School Role

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INTRODUCTION

Breast cancer is one of the most commonly diagnosed cancers worldwide and the leading cause of cancer-related death among women [1,2]. According to data from the World Health Organization (WHO), breast cancer accounts for approximately 25% of all cancer cases globally, with prevalence rates steadily increasing each year [3]. In developed countries, the prevalence of breast cancer is very high, particularly in European countries, North America, and Oceania. For example, in the United States, about 1 in 8 women are at risk of developing breast cancer during their lifetime, with more than 270,000 new cases diagnosed each year [4]. European countries such as France and Germany also show high prevalence rates, with over 50,000 new cases reported annually [5].

However, despite the high prevalence of breast cancer in developed countries, survival rates are much higher. This is due to more advanced healthcare systems, greater access to early detection, and higher levels of public awareness. Early detection techniques, such as mammography and breast self-examination, have been widely implemented in many developed countries, contributing to a decrease in mortality rates from breast cancer [6,7].

On the other hand, in developing countries, the prevalence of breast cancer is also on the rise, but detection rates and survival outcomes are much lower compared to developed countries [8,9]. In Indonesia, for instance, breast cancer is the leading cause of death among women, with GLOBOCAN (2020) data showing approximately 65,000 new cases each year [10]. Despite the increasing prevalence of breast cancer in Indonesia, many women still lack access to early screening or adequate treatment. One of the main reasons is the limited availability of healthcare facilities and the low level of public awareness about the importance of early detection.

A major challenge faced by developing countries, including Indonesia, is the unequal access to medical facilities and the low public awareness regarding the importance of early breast cancer detection [11]. Many women in Indonesia seek medical care only after the cancer has reached an advanced stage, significantly reducing their chances of recovery. Therefore, increasing knowledge about early detection techniques, such as breast self-examination (SADARI), is crucial, especially among students and women of reproductive age [12,13].

Breast cancer, despite being a global health issue, shows varying prevalence rates between developed and developing countries. For developing countries, including Indonesia, raising awareness about breast cancer and early detection is an important step in reducing mortality rates and improving the quality of life for women. Therefore, educational programs targeting early detection through breast self-examination and enhancing teacher involvement in health education can serve as effective solutions to increase survival rates and prevent further cases of breast cancer [14].

High school students are at a critical developmental stage for establishing lifelong healthy behaviors [15]. During this period, they are exposed to various sources of information, including education received at school. Despite the critical role of early breast cancer detection and practical techniques like SADARI, these topics have not been adequately incorporated into the current health education curriculum [16]. Teachers, as key educational agents, play a pivotal role in addressing this gap. Beyond disseminating knowledge, teachers act as role models and motivators, fostering positive attitudes and practical skills among students [17].

Teachers occupy a strategic position in promoting early detection of breast cancer due to their close relationships with students and their influence during the learning process. By delivering accurate educational content on breast cancer and SADARI, teachers can inspire and guide students to incorporate self-examination practices into their routines. However, many teachers lack sufficient knowledge about early detection, underscoring the need for targeted training and resources. In this context, teachers function not only as knowledge providers but also as facilitators who support students in developing the necessary skills for early breast cancer detection [18].

Individual factors, including students' knowledge, attitudes, and skills, play a crucial role in their ability to detect breast cancer risks effectively. Students who possess comprehensive knowledge of breast cancer's signs and symptoms are more likely to understand the importance of self-examination [19,20]. Furthermore, a positive attitude toward health and prevention can motivate students to adopt routine examination practices. Practical skills in performing SADARI, developed through hands-on training and health education, significantly increase the likelihood of early detection [21,22].

Despite receiving information about SADARI, many students lack the practical skills needed to perform it correctly, often due to insufficient hands-on training or interactive learning opportunities.

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Including hands-on practices such as SADARI in school programs is crucial to help students move beyond theoretical understanding and acquire the practical skills needed to actively monitor their breast health [23,24].
The purpose of this study is to investigate how personal factors and teacher involvement impact the ability of high school students in Jambi City to identify the signs and symptoms of breast cancer. By identifying the factors that affect students' abilities in early detection, this study seeks to inform the development of more effective strategies for improving students' knowledge, attitudes, and skills in practicing breast self-examination. Ultimately, the findings are expected to contribute to designing health education programs that enhance students' awareness and engagement in early breast cancer detection initiatives.

METHODS

Design

This observational analytic research uses a *quasi-experimental* study with a Two-Group Pretest-Posttest Design approach, which is an experimental method that compares the results of treatment in two different groups.

Participant

The study took place from April to June 2024 at SMA N 3 and SMA N 8 in Jambi City, with a total of 70 participants chosen based on specific inclusion criteria. These included being between the ages of 15 and 18, currently enrolled at the school, willing to participate, and having no medical conditions that could interfere with the results. The focus was on female students with no personal history of breast cancer or any breast cancer in their immediate family. These women lacked adequate knowledge of self-efficacy related to breast self-examination (BSE) skills. Exclusion criteria were applied to those who could not attend all sessions or declined participation.
The sample size, calculated using the Slovin formula for a large population with a 10% margin of error, resulted in 70 participants. This sample was divided into two equal groups of 35: one group receiving the intervention and the other serving as a control group. Randomization was used to ensure that the groups were balanced, with the intervention group participating in an educational program while the control group did not receive any intervention.

Variables and data collection

This study examined four primary variables: knowledge, attitude, school support, and students' skills in performing breast self-examination (SADARI), which were treated as dependent variables. Knowledge was defined as the students' understanding of the research topic and was assessed using a standardized multiple-choice questionnaire. Attitude referred to students' feelings, views, or inclinations towards the topic, measured with a 5-point Likert scale-based questionnaire. School support encompassed the school's role and contributions in facilitating the program, evaluated using a closed-ended questionnaire. Students' skills in performing SADARI were defined as their technical ability to carry out the examination independently and correctly, measured through direct observation with a checklist-based assessment sheet.
Data collection was carried out by two enumerators, who were trained to understand the research instruments and methods. The process was conducted in two phases: pre-intervention and post-intervention, to measure changes in the variables. In the first phase, the enumerators distributed questionnaires to assess the initial levels of knowledge, attitude, and school support, and observed the students' skills in performing SADARI. The second phase occurred after the intervention program was completed, to evaluate the impact of the intervention on all variables.
The validity and reliability assessments showed that the research tools were highly effective in accurately measuring the study variables. The validity test was conducted using the item-total correlation method, where each questionnaire item was analyzed against the total score. Invalid items were removed or replaced. The results showed that all items had a correlation value greater than 0.30, confirming their validity in measuring the intended aspects. The internal consistency of the instrument was evaluated using Cronbach's Alpha coefficient. The values for each variable were above 0.70, demonstrating strong reliability. Therefore, the tools utilized in this research were considered both valid and dependable for gathering data.
The breast self-examination (SADARI) education, delivered by lecturers from the Jambi Ministry of Health Polytechnic, targeted high school students and teachers with a session lasting 45 minutes.

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During the session, the lecturer provided detailed explanations about the importance of breast self-examination for detecting changes that could signal breast cancer. The material covered proper examination techniques, signs of changes to watch for, and steps for maintaining breast health. This education aimed to enhance awareness and knowledge among both students and teachers regarding the significance of early detection, enabling them to be more attuned to bodily changes and share this information with others.

After the educational session, a 15-minute question-and-answer period was held, allowing participants both students and teachers to ask questions and explore the material further. Before the educational session, participants took a pre-test to evaluate their existing knowledge of breast self-examination. This assessment was essential for determining their initial level of understanding and pinpointing areas where they might have gaps in knowledge. Following the education and question-and-answer session, a post-test was administered to evaluate the participants' understanding after receiving the material. This post-test was essential for measuring the effectiveness of the education and ensuring that the content was comprehended by both students and teachers. In this study, the post-test for students was conducted 15 minutes after the session, while the school role variable was assessed one week after the education. This timing allowed teachers to apply the material in their interactions with students.

Data analysis

The data analysis for evaluating the impact of the SADARI education program on high school students and teachers focused on three key variables: knowledge, attitudes, skills, and the role of the school. The analysis was carried out in two phases: univariate and inferential. In the univariate phase, pre-test and post-test data were reviewed to assess frequency distributions and track changes in the three variables. Descriptive statistics, including measures of central tendency (mean, median, mode) and dispersion (standard deviation, variance), were calculated to identify score variations.

Prior to conducting further analysis, a normality test was performed, which confirmed that the data followed a normal distribution ($p > 0.05$). In the inferential phase, a t-test was used to determine significant differences between pre-test and post-test scores, as well as between students and teachers. A paired t-test was used to compare the mean scores within the same group to assess significant changes in knowledge, attitudes, skills, and school roles. The independent t-test was applied to compare post-test score differences between students and teachers. A p-value of <0.05 was considered indicative of a statistically significant difference.

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RESULTS

Table 1. Frequency Distribution of Student and Parent Characteristics (Father)

Characteristics	Intervention Group		Control Group	
	n	%	n	%
Class				
Class 2	20	57.14	18	51.43
Class 3	15	42.86	17	48.57
Age (years)				
15	5	14.29	4	11.43
16	12	34.29	10	28.57
17	10	28.57	12	34.29
18	8	22.86	9	25.71
Education of Father				

No School	2	5.71	3	8.57
Elementary/junior school	6	17.14	8	22.86
High school / vocational	12	34.29	10	28.57
Higher Education	15	42.86	14	40.00
Father's occupation				
Not Working	4	11.43	6	17.14
Farmer / Laborer	8	22.86	10	28.57
Public Servant	5	14.29	4	11.43
Private / Self-employed	15	42.86	12	34.29
Retired	3	8.57	3	8.57

Table 1 outlines the demographic characteristics of the participants. The majority of students were in Grade 2, making up 57.14% in the intervention group and 51.43% in the control group, while Grade 3 students represented 42.86% and 48.57%, respectively. In terms of age, most students were 16 or 17 years old, with 34.29% and 28.57% in the intervention group, and 28.57% and 34.29% in the control group.

Regarding the education level of fathers, the majority had completed high school or college, with 34.29% and 42.86% in the intervention group, and 28.57% and 40.00% in the control group, respectively. Fathers with lower educational attainment made up a smaller portion. Concerning occupation, most fathers were self-employed (42.86% in the intervention group, 34.29% in the control group) or worked as farmers/laborers (22.86% in the intervention group, 28.57% in the control group). A smaller proportion of fathers were unemployed or retired. This data reflects an evenly distributed demographic across both groups.

Table 2. Mean values of research variables in the intervention and control groups

Intervention group	N	Mean±SD	Median	p value
Knowledge				
Pretest	35	52.0± 4.7	50	0.0001
Posttest	35	69.7± 9.8	60	
Attitude				
Pretest	35	52.2± 4.9	50	0.0001
Posttest	35	71.1± 11.0	60	
School role				
Pretest	35	52± 4.2	60	0.0001
Posttest	35	69.4± 9.4	70	
Skills				
Pretest	35	56± 9.1	60	0.0001
Posttest	35	73.1± 11.1	60	
Control group				
Knowledge				
Pretest	35	56.0±6.9	50	0.003
Posttest	35	58.5± 6.7	70	
Attitude				
Pretest	35	54.8± 5.1	50	0.001
Posttest	35	58.0± 5.8	70	
School role				
Pretest	35	57.1± 4.6	50	0.413
Posttest	35	58.0± 5.8	70	
Skills				
Pretest	35	57.1± 4.6	50	0.136
Posttest	35	58.8± 6.8	80	

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Table 2 illustrates that in the intervention group, there was a notable increase in the mean scores for knowledge, rising from 52.0±4.7 to 69.7±9.8, attitude from 52.2±4.9 to 71.1±11.0, school role from 52±4.2 to 69.4±9.4, and skills from 56±9.1 to 73.1±11.1. Meanwhile, the control group also experienced significant improvements in knowledge (p = 0.003) and attitude (p = 0.001), but the changes in school role (p = 0.413) and skills (p = 0.136) were not statistically significant. These findings indicate that the intervention group showed greater progress in knowledge, attitude, school role, and skills than the control group.

Table 3. Mean Posttest Value of Research Variables in Intervention and Control Groups

Study group	N	Mean±SD	Median	p value
Knowledge				
Intervention posttest	35	69.7± 9.8	50	0.0001
Control posttest	35	58.8± 6.7	60	
Attitude				
Intervention posttest	35	71.1± 11.0	50	0.0001
Control posttest	35	58.0± 5.8	60	
School role				
Intervention posttest	35	69.4± 9.3	60	0.0001
Control posttest	35	58.0± 5.8	70	
Skills				
Intervention posttest	35	73.1± 11.0	60	0.0001
Control posttest	35	58.8± 6.7	60	

Table 3 reveals that the intervention group achieved notably higher mean posttest scores than the control group across all assessed variables, with differences that were statistically significant (p < 0.0001). For knowledge, the intervention group had a mean score of 69.7±9.8, while the control group scored 58.8±6.7. Regarding attitude, the intervention group's mean score was 71.1±11.0, surpassing the control group's score of 58.0±5.8. In the school role category, the intervention group scored an average of 69.4±9.3, while the control group's average was 58.0±5.8. Lastly, for skills, the intervention group again outperformed the control group with a mean score of 73.1±11.0 compared to 58.8±6.7. These findings highlight the significant effectiveness of the intervention in enhancing students' knowledge, attitudes, school roles, and skills.

DISCUSSION

The findings of this study indicate that the SADARI (BSE) education program had a significant impact on improving students' knowledge, attitudes, school roles, and skills in identifying breast cancer risk signs and symptoms. In the intervention group, posttest scores across all variables were notably higher than those in the control group, with a p-value of <0.0001. These results are consistent with prior studies that emphasize the success of health education programs in raising awareness and understanding about the importance of early breast cancer detection [25].

The significant increase in knowledge within the intervention group reflects the effective delivery of educational content designed to improve student understanding. The mean posttest knowledge score for the intervention group (69.7±9.8) was considerably higher than that of the control group (58.8±6.7), suggesting that the program's interactive and engaging approach enhanced students' grasp of breast self-examination as a preventive measure. This increase in knowledge is likely to foster positive behavioral changes by boosting the confidence of the participants [26], and heightened confidence contributes to improving students' ability to perform breast self-examinations [27]. These results align with studies by Absavaran et al. [28], Pirzadeh et al. [29], and Ghafari et al. [30] in Iran, which also showed significant improvements in knowledge about SBE through video-based multimedia education.

Along with an increase in knowledge, students' attitudes towards the SADARI screening process also showed significant improvement. A more positive attitude suggests that students are more inclined to apply the knowledge they gained into their everyday routines. The mean attitude score for the intervention group (71.1±11.0) was higher compared to the control group (58.0±5.8). This shift can be attributed to the educational strategy, which highlighted both the personal health advantages of

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SADARI and its importance as a societal responsibility. This improvement reflects another positive outcome of the intervention, which not only boosted participants' knowledge but also influenced their attitudes. These findings align with those of Mohammad et al, [31], which demonstrated the success of similar programs in enhancing female students' attitudes toward breast cancer and Breast Self-Examination (BSE).

There was also a notable difference in school support between the intervention and control groups. The intervention group had a higher mean posttest score (69.4±9.3) compared to the control group (58.0±5.8). The active participation of schools in fostering a supportive environment for health education plays a critical role in the success and long-term viability of such programs. Factors such as allocating time for education, involving teachers, and providing oversight by school leaders all contribute to the program's effectiveness. Previous research has shown that individuals who receive strong social support tend to have higher self-esteem, and there is a significant correlation between these two factors [28]. Additionally, strong social support and high self-esteem can enhance self-efficacy, which in turn improves the likelihood of performing Breast Self-Examination (BSE) effectively [22].

The skill variable demonstrated the most significant improvement in the intervention group, with a mean posttest score of 73.1±11.0, compared to 58.8±6.7 in the control group. This result highlights that, beyond theoretical knowledge, hands-on training through simulations and demonstrations greatly improves students' ability to accurately conduct the SADARI examination. This skill is essential, as improper technique can reduce the effectiveness of early breast cancer detection [32,33].

The notable differences between the intervention and control groups in all variables highlight the success of the educational intervention, which had a greater impact compared to the typical learning experience in the control group. While the control group did show some improvement, it was not as significant as the progress seen in the intervention group, emphasizing the importance of a more focused and organized approach to achieving significant results.

These results highlight the importance of incorporating SADARI education programs at the secondary school level as part of broader breast cancer prevention efforts. By engaging both students and teachers, the program not only improves individual knowledge and skills but also fosters a school environment that is more attuned to the importance of breast health. This method is anticipated to act as a prototype for comparable programs in different areas.

Study limitations

This study has a few limitations. Firstly, the use of a cross-sectional design means that causal relationships cannot be determined. Secondly, the brief duration of the intervention prevents an assessment of its long-term effects. The study's ability to be generalized is also restricted, as it was carried out in just two high schools in Jambi City. Furthermore, relying on self-reported data introduces the possibility of social desirability bias, and assessing SADARI skills in a controlled setting may not fully represent how these skills are practiced in real-world scenarios.

CONCLUSION

This study shows that the SADARI education program has a notable positive effect on enhancing students' knowledge, attitudes, skills, and the role of schools in promoting early breast cancer risk detection. The intervention group, which participated in the education program, showed significantly greater improvements than the control group across all measured variables, with inferential analysis revealing statistically significant differences. These findings underscore the effectiveness of education-based interventions as a strategic approach to enhancing awareness and skills related to early breast cancer detection among students and teachers.

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