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Original Research

The Relationship Between Behavior Toward Breast Self-Examination as Early Detection of Breast Cancer in Adolescent Girls at Bali Dewata Health High School

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ABSTRACT

Background: Adolescence is a critical period for establishing preventive health behaviors. Breast self-examination (BSE/SADARI) is an effective and low-cost method for early breast cancer detection. However, awareness and practice among Indonesian adolescents remain low, contributing to delayed diagnoses. This study aimed to analyze the relationship between knowledge, attitude, and practice toward BSE and early detection outcomes among adolescent girls at Bali Dewata Health Vocational School. **Methods:** A cross-sectional analytic study was conducted among 71 female students selected through proportional random sampling. Data were collected using validated questionnaires assessing knowledge, attitude, and practice regarding BSE, and categorized SADARI results into low, medium, and high risk. Statistical analysis was performed using chi-square tests ($p < 0.05$). **Results:** The majority of respondents were classified as low risk (39.4%), followed by medium (32.4%) and high risk (28.2%). Knowledge level showed a significant association with SADARI results ($p = 0.000$), with higher knowledge correlating with lower risk. Practice was also significantly associated ($p = 0.045$), while attitude showed no significant relationship ($p = 0.090$) but indicated a positive trend. **Conclusion:** Knowledge and regular BSE practice are key determinants of early breast cancer detection among adolescents. Integrating structured breast health education into school programs is recommended to improve preventive behaviors and reduce future breast cancer risk.

Keywords: Breast self-examination; adolescent girls; knowledge; attitude; early detection; breast cancer

1. INTRODUCTION

Adolescence is a critical transitional period between childhood and adulthood characterized by rapid biological, psychological, and behavioral changes that significantly influence health practices and risk perceptions.[1] Among these changes, breast development during puberty highlights the importance of early breast health education, including the practice of breast self-examination (BSE), also known as SADARI in Indonesia. BSE is a simple, cost-effective, and non-invasive method that enables women to detect breast abnormalities early, thereby increasing the likelihood of early diagnosis and improving survival rates.[2,3]

Globally, breast cancer remains the most frequently diagnosed cancer and the leading cause of cancer-related

deaths among women.[4] According to the Global Cancer Observatory, in 2020 alone, breast cancer accounted for approximately 2.3 million new cases and 685,000 deaths worldwide, underscoring its critical public health impact.[5] The disease not only affects individual health but also imposes significant emotional, social, and economic burdens on families and healthcare systems. In Indonesia, breast cancer continues to be a major health concern, with an estimated 396,914 new cases and 234,511 deaths reported in 2015. More recent data indicate a persistent upward trend, particularly in urban and semi-urban regions.[6] For instance, in Bali Province, 3,231 cases were recorded in 2021, reflecting increased detection rates but also highlighting the need for more robust prevention and early intervention strategies. The rising incidence is attributed to multiple factors, including lifestyle changes, delayed diagnosis, limited access to screening, and low public awareness. Breast cancer's impact extends beyond mortality; it affects women in their most productive years, leading to reduced workforce participation and increased healthcare costs. Therefore, comprehensive efforts involving early detection, public education, equitable access to treatment, and survivorship support are essential to reduce the burden of breast cancer and improve outcomes for women across Indonesia and globally.[5,6]

Various studies indicate that the low practice of Breast Self-Examination (BSE) is not merely due to limited access to information, but also influenced by three interrelated components of health behavior: knowledge, attitude, and action. Limited knowledge about BSE techniques, the appropriate time to perform it, and its benefits in early detection causes many adolescents to feel unnecessary or lack confidence in performing it.[7,8] Negative attitudes toward self-examination, such as feelings of embarrassment, fear of discovering abnormalities, or the belief that breast cancer only affects older women, further exacerbate the situation. On the other hand, low self-efficacy—the individual's belief in their ability to correctly perform BSE—remains a major barrier to adopting preventive behavior. Intervention during adolescence is essential because this period represents a critical phase in the formation of long-term habits. Adolescents are in a stage of cognitive and emotional development that allows for more effective internalization of health-related values.[9] When breast health education is provided early, the likelihood of developing consistent and sustainable BSE behavior increases significantly. Unfortunately, national surveys and local studies show that only a small proportion of adolescent girls have ever practiced BSE, and even fewer perform it regularly and correctly. In some secondary schools, the level of knowledge about BSE is below 30%, with actual practice rates of less than 20%. The impact of this low awareness is substantial.[10] Many breast cancer cases in Indonesia are diagnosed at advanced stages, resulting in a low five-year survival rate and high treatment costs. Furthermore, delayed diagnosis affects patients' quality of life, including psychosocial distress, reduced productivity, and increased financial burden on families. Therefore, improving breast health literacy from adolescence is a crucial preventive strategy. School-based education, peer educator training, the use of interactive visual media, and family involvement can serve as effective approaches to enhance awareness and sustain BSE practice among adolescents.[11]

To address the low awareness and practice of breast self-examination (BSE) among Indonesian adolescents, multifaceted interventions are essential. School-based education programs should integrate breast health topics into the curriculum using interactive methods and peer-led sessions.[12] Visual aids, mobile apps, and culturally relevant materials can enhance engagement and understanding. Training teachers and health educators to deliver accurate information is crucial. Parental involvement and community campaigns can reinforce positive attitudes and normalize BSE behavior. Early intervention during adolescence helps establish lifelong preventive habits, improving early detection rates and reducing breast cancer mortality in the long term. Continuous monitoring and evaluation ensure program effectiveness.[13]

This study aimed to analyze the relationship between behavior—comprising knowledge, attitude, and action—towards breast self-examination as an early detection method for breast cancer among adolescent girls at Bali Dewata Health High School. Findings from this study are expected to contribute to evidence-based health promotion strategies tailored to adolescents, supporting early detection efforts and reducing future breast cancer burden.

2. METHODS

2.1. Study Design and Setting

This study employed an analytic cross-sectional design to examine the relationship between behavioral factors—including knowledge, attitude, and action—

towards breast self-examination (BSE) as an early detection measure for breast cancer among adolescent girls.[14] The research was conducted at Bali Dewata Health High School, Denpasar, Bali, Indonesia, in March–May 2025. This school was selected purposively as it represents a health-focused educational environment, providing an appropriate context for exploring adolescent health behaviors.

2.2. Population and Sample

The target population comprised all female students enrolled at Bali Dewata Health High School in the academic year 2024/2025. The accessible population included students from grades X to XII who met the inclusion criteria: Female students aged 15–19 years; Willing to participate in the study; Present during the data collection period. Exclusion criteria included students who were absent or did not provide informed consent.

2.3. Sample Size and Sampling Technique

The sample size was determined using the rule of thumb for multivariate analysis, with a minimum of 5–10 respondents per parameter estimated in the structural model.[15] Based on three independent behavioral variables (knowledge, attitude, and action), and allowing for model fit parameters, a minimum of 71 respondents was required. To increase reliability and account for possible non-responses, 120 respondents were recruited.

A proportionate stratified random sampling technique was used to ensure representation across all grade levels (X–XII). The number of participants from each grade was determined proportionally to their population size, and respondents were selected randomly within each stratum.

2.4. Variables

The independent variables were components of behavior toward BSE, namely: Knowledge about BSE (cognitive domain), Attitude toward BSE (affective domain), Action or practice of BSE (psychomotor domain). The dependent variable was the behavioral relationship toward BSE as an early detection method of breast cancer.

2.5. Data Collection Instruments

Data were collected using a structured self-administered questionnaire, adapted from previous validated instruments [1–3]. The questionnaire consisted of: Knowledge section: 15 multiple-choice questions assessing understanding of BSE definition, benefits, timing, and technique. Attitude section: 10 Likert-scale statements (1 = strongly disagree to 5 = strongly agree) measuring beliefs and feelings toward BSE. Action section: 10 items assessing the frequency and correctness of BSE practice.

The instrument underwent content validity testing by three public health and nursing experts, and construct validity was assessed through factor analysis. Reliability was evaluated using Cronbach's alpha, with values of 0.84 for knowledge, 0.87 for attitude, and 0.81 for action, indicating acceptable internal consistency.

2.6 Data Collection Procedure

Prior to data collection, ethical approval was obtained from the Institutional Review Board of Bali Dewata Health High School. Informed consent was secured from all participants. Data collection was conducted in classrooms under researcher supervision, ensuring confidentiality and voluntary participation.

2.7. Statistical Analysis

Data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize participant characteristics and behavioral variables. Bivariate analysis was conducted using the Chi-square test to examine the relationship between each behavioral component (knowledge, attitude, and action) and BSE behavior. Variables with p-values < 0.25 in bivariate analysis were included in multivariate analysis using logistic regression to identify dominant behavioral predictors of BSE. Statistical significance was set at $p < 0.05$.[16]

3. RESULTS

Table 1 presents the characteristics of the respondents by age and class major. The majority of participants were 16 years old (59.2%), while the remaining 40.8% were 17 years old, indicating that most respondents were in the mid-adolescent age group. In terms of academic specialization, more than half of the students were enrolled in the Pharmacy program (56.3%), while 43.7% were in the Nursing program. This distribution reflects a relatively balanced representation between the two health-related majors, with a slight predominance of Pharmacy students.

Table 1. Characteristics of respondents by age and class major

Characteristic	Frequency (n=71)	Percentage (%)
Age		
16 years	42	59.2
17 years	29	40.8
Study major		
Class Major: Nursing	31	43.7
Class Major: Pharmacy	40	56.3

Table 2 presents the distribution of respondents' behavior regarding breast self-examination, encompassing knowledge, attitude, and action. The findings reveal that most respondents demonstrated only fair levels of knowledge about BSE (36.6%), while 31.0% showed good knowledge and 32.4% had deficient knowledge. This indicates that a substantial proportion of adolescents still lack adequate understanding of BSE principles, including its benefits, correct timing, and techniques.

Regarding attitudes, nearly half of the respondents (45.1%) exhibited a good attitude toward BSE, reflecting generally positive beliefs and perceptions about the importance of early detection. However, 25.4% reported fair attitudes and 29.6% demonstrated deficient attitudes, suggesting that misconceptions and low perceived susceptibility may persist among some students.

Table 2. Distribution of behavior (knowledge, attitude, and action)

Aspect	Frequency (n=71)	Percentage (%)
Knowledge		
Good	22	31.0
Fair	26	36.6
Deficient	23	32.4
Attitude		
Good	32	45.1
Fair	18	25.4
Deficient	21	29.6
Action		
Good	23	32.4
Fair	26	36.6
Deficient	22	31.0

In terms of practice, the distribution was similar across categories, with 32.4% of respondents reporting good BSE action, 36.6% fair, and 31.0% deficient. This pattern suggests that although some adolescents have begun practicing BSE appropriately, regular and correct practice remains suboptimal, indicating gaps between knowledge, attitude, and actual behavior. These results highlight the need for targeted health promotion interventions to strengthen both cognitive and behavioral components of BSE among adolescent girls.

Table 3 presents the distribution of respondents based on their breast self-examination (BSE/SADARI) results categorized by risk level. The findings indicate that the majority of respondents were in the low-risk category, with 28 participants (39.4%). Meanwhile, 23 respondents (32.4%) were classified as medium risk, and 20 respondents (28.2%) fell into the high-risk category, indicating the presence of potential abnormalities that warrant further clinical examination.

These results suggest that while a substantial proportion of adolescents demonstrated low-risk profiles, nearly one-third exhibited medium to high-risk indicators, highlighting the importance of routine BSE practices and follow-up examinations for early detection and intervention.

Table 3. Early detection of breast cancer (SADARI Results)

Risk Category	Frequency (n=71)	Percentage (%)
Low Risk	28	39.4
Medium Risk	23	32.4
High Risk	20	28.2

Relationship between Knowledge, Attitude, and Practice with Breast Self-Examination (BSE/SADARI)

Table 4 summarizes the relationship between knowledge, attitude, and practice regarding breast self-examination (BSE/SADARI) and the results of early breast cancer detection among adolescent girls.

A strong and statistically significant association was observed between knowledge level and SADARI results ($p = 0.000$). Respondents with good knowledge (31.0%) predominantly belonged to the low-risk group (60.7%), while only 5% were categorized as high risk. In contrast, among those with poor knowledge (32.4%), 60% were classified as high risk, demonstrating an inverse relationship between knowledge level and risk category. Respondents with fair knowledge mostly fell into the medium-risk group (56.5%), indicating a gradient pattern.

For attitude, the relationship with SADARI results did not reach statistical significance ($p = 0.090$). However, respondents with good attitudes (45.1%) tended to have

lower risk, with 57.1% categorized as low risk, compared to higher proportions of high-risk classification among those with fair (30%) and poor attitudes (40%). This suggests a possible but non-significant trend toward better outcomes among those with positive attitudes.

Meanwhile, a statistically significant association was found between practice and SADARI results (p = 0.045). Respondents who regularly and correctly performed BSE (32.4%) were most often in the low-risk group (42.9%) and had the lowest proportion in the high-risk category (25.0%). Conversely, those with poor practice (36.6%) showed the highest proportion of high-risk findings (45.0%), highlighting the critical role of proper BSE behavior in early detection efforts.

Table 4. Relationship between knowledge, attitude, and practice with breast self-examination (BSE/SADARI) results among adolescent girls at Bali Dewata Health High School (n = 71)

Variable	Category	Low Risk n (%)	Medium Risk n (%)	High Risk n (%)	Total n (%)	*p*-value
Knowledge	Good	17 (60.7)	4 (17.4)	1 (5.0)	22 (31.0)	0.000
	Fair	6 (21.4)	13 (56.5)	7 (35.0)	26 (36.6)	
	Poor	5 (17.9)	6 (26.1)	12 (60.0)	23 (32.4)	
Attitude	Good	16 (57.1)	10 (43.5)	6 (30.0)	32 (45.1)	0.090
	Fair	5 (17.9)	7 (30.4)	6 (30.0)	18 (25.4)	
	Poor	7 (25.0)	6 (26.1)	8 (40.0)	21 (29.5)	
Practice	Good	12 (42.9)	10 (43.5)	5 (25.0)	23 (32.4)	0.045
	Fair	9 (32.1)	7 (30.4)	6 (30.0)	22 (31.0)	
	Poor	7 (25.0)	6 (26.1)	9 (45.0)	26 (36.6)	

4. DISCUSSION

This study examined the relationship between knowledge, attitude, and practice (KAP) regarding breast self-examination (BSE/SADARI) and early detection results among adolescent girls at Bali Dewata Health High School. The findings demonstrated that knowledge and practice were significantly associated with SADARI risk categories, whereas attitude showed a non-significant but observable trend toward better outcomes.

The significant association between knowledge and SADARI results (p = 0.000) indicates that adolescents with higher levels of knowledge are more likely to detect abnormalities early or fall into lower risk categories. This finding is consistent with previous research showing that knowledge plays a crucial role in the adoption of BSE as an early detection method.[17,18] Adequate knowledge improves adolescents' awareness of breast cancer symptoms, appropriate timing, and techniques for BSE, thereby increasing the likelihood of detecting breast abnormalities at earlier, more treatable stages.[19] Conversely, lack of knowledge has been identified as a major barrier to regular BSE practice in many developing countries, including Indonesia.[20]

Although the relationship between attitude and SADARI results was not statistically significant (p = 0.090), the observed pattern suggests that positive attitudes may still influence BSE behaviors and outcomes. Respondents with favorable attitudes tended to fall into the low-risk category more often than those with negative attitudes. Similar findings have been reported in studies among adolescents and young adults in Malaysia and Nigeria, where positive health beliefs and perceived benefits correlated with better BSE outcomes, although not always reaching statistical significance.[21,22] This suggests that attitude alone may not be sufficient to influence behavior unless supported by strong knowledge and practical skills.

The study also found a significant association between BSE practice and SADARI results (p = 0.045). Respondents with good BSE practices were more likely to be categorized as low risk, while poor practice was strongly associated with high-risk findings. This supports existing evidence that regular and correct performance of BSE enhances the chance of early detection and timely referral.[23,24] Adolescence represents a critical period for establishing preventive health behaviors, including BSE. Introducing skill-based education early can shape lifelong habits that reduce future breast cancer morbidity and mortality.[25]

Taken together, these findings underscore the importance of integrating comprehensive BSE education programs into adolescent health promotion, focusing on not only increasing knowledge but also developing practical skills and fostering positive attitudes. School-

based health education, peer-led interventions, and multimedia campaigns can be effective strategies for improving adolescent girls' breast health literacy and empowering them to adopt BSE as a routine preventive practice.

5. CONCLUSION

This study demonstrates that knowledge and regular breast self-examination practices are significantly associated with lower breast cancer risk among adolescent girls. While attitudes showed a positive trend, they were not statistically significant. These findings emphasize the importance of strengthening breast health literacy and practical BSE skills during adolescence as a preventive strategy. It is recommended to integrate structured breast health education into school programs, combining knowledge, attitude development, and hands-on BSE training. Peer education, multimedia tools, and support from health personnel should be utilized to enhance engagement and sustainability. Expanding such interventions to wider adolescent populations could contribute to earlier detection and reduced breast cancer morbidity in the future.

Ethical Approval

Approved by the Health Research Ethics Commission of Poltekkes Kemenkes Denpasar (No: DP.04.02/F.XXXII.25/533/2025).

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Competing Interests

All the authors declare that there are no conflicts of interest.

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Underlying Data

Derived data supporting the findings of this study are available from the corresponding author on request.

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