



**FACTORS INFLUENCING BREAST SELF-EXAMINATION (BSE) BEHAVIOR
AMONG ADOLESCENT GIRLS: A MIXED METHODS APPROACH TO EARLY
BREAST CANCER DETECTION**

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ABSTRACT

Adolescence is a critical period of rapid physical and psychological development, making adolescents vulnerable to reproductive health issues. Breast cancer remains one of the leading health concerns for women in Indonesia, and early detection through breast self-examination (BSE) is crucial for reducing mortality rates. This study aimed to identify the barriers and needs of adolescent girls regarding early breast cancer detection through BSE using a mixed-methods approach. A mixed-methods design was used, combining a quantitative cross-sectional survey with qualitative in-depth interviews and Focus Group Discussions (FGDs). The target population was adolescent girls aged 15–24 years who attended high school and lived with parental support. The sample consisted of 172 adolescent girls, selected using purposive sampling for the quantitative analysis. Participants for the qualitative component were also chosen through purposive sampling. Quantitative data were collected using a questionnaire adopted from the 2017 Indonesian Demographic and Health Survey (IDHS) and analyzed through univariate and bivariate methods. Qualitative data were analyzed inductively using NVIVO software. BSE behavior was significantly influenced by age ($p = 0.010$), ethnicity ($p = 0.000$), social environment ($p = 0.002$), internet access ($p = 0.011$), information media ($p = 0.000$), family ($p = 0.000$), and peer influence ($p = 0.000$). Barriers included limited knowledge, lack of confidence, and communication gaps. Social and environmental factors significantly influence BSE behavior. Developing an interactive, application-based breast care education model can address these barriers and enhance BSE practices among adolescents.

Keywords: adolescents; behavior; breast cancer; BSE

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INTRODUCTION

The global burden of breast cancer is significant, with increasing incidence rates particularly in developing countries, as highlighted by the Global Burden of Disease Study and other analyses. Breast cancer remains the most common malignancy among women worldwide, with early detection through mammographic screening shown to significantly improve outcomes (Ahmad et al., 2024). Despite advancements in treatment, the incidence of breast cancer continues to rise, with predictions indicating a further increase in age-standardized incidence rates globally by 2035 (Ahmad et al., 2024).

The incidence of cancer is expected to increase from 12.7 million new cases in 2008 to 22.2 million cases. In 2019, it was predicted that nearly 9 million people worldwide would die from cancer, with this number rising to 13 million deaths per year by 2030. Breast cancer among women accounts for over 185,000 cases annually. The incidence of this disease is increasingly prevalent in developed countries (Yulianti et al., 2016). Data from the Global Cancer Observatory of the World Health Organization (WHO) indicate that the most common cancer in Indonesia is breast cancer, with 58,256 cases or 16.7% of the total 348,809 cancer cases (Siregar, 2022).

According to the 2018 Basic Health Research (Riskesmas) data, the cancer incidence in South Sumatra Province was 1.54%, The prevalence of cancer in Indonesia is highest among women, at 2.85% (approximately 506,575 cases), and in urban areas, at 2.06% (approximately 556,419 cases). Among the age group of 15–24 years, the cancer incidence was 0.47%, equivalent to 165,644 cases (Riskesmas, 2018). These figures cannot be ignored, as they reflect the potential for cancer to progress to advanced stages in adulthood. Breast cancer patients are generally diagnosed and seek healthcare services at advanced stages, which are difficult to treat. This is due to only a small proportion of women performing early detection (Adenina, 2022).

Early detection of breast cancer should ideally begin during adolescence, as this is a critical transitional period from childhood to adulthood, characterized by sequential hormonal, physical, psychological, and social changes. During this stage, adolescent girls begin to pay attention to changes in their breasts (Jaya et al., 2022). While breast cancer previously affected women over 30 years of age, it can now occur in adolescents. This highlights that it is never too early to detect breast cancer through regular breast self-examination (BSE) after menstruation. Early detection through BSE can reduce breast cancer mortality by up to 20% (Etwiory, 2022).

In reality, adolescent girls rarely perform regular BSE, with only 25–30% doing so periodically (Etwiory, 2022). Therefore, a comprehensive understanding of prevention, early diagnosis, curative and palliative treatment, and rehabilitative efforts is necessary to provide optimal care for patients (Yuslana, et al., 2020). BSE helps monitor breast conditions for lumps or other changes that may indicate breast cancer, enabling early consultation with a doctor. Early diagnosis of cancer provides a better chance for effective treatment and improves recovery rates and survival chances (Yulianti, et al., 2016). Research has shown that cancer cases detected at an early stage and treated promptly and appropriately result in higher recovery rates and longer survival (Pratiwi et al., 2018).

This study aims to understand the issues and needs of adolescent girls regarding early detection of breast cancer using BSE techniques through both quantitative and qualitative approaches. It also seeks to identify the determining factors influencing BSE behaviors among adolescent girls, including knowledge, attitudes, characteristics, age at menarche, family history, race, internet access, access to breast health services, environment, and peer influence. These variables are analyzed from the perspectives of communities in Palembang, South Sumatra Indonesia. The findings of this study will serve as baseline data for developing an interactive application-based education program. This research is a continuation of the development of the *Sehati* application for Adolescent Reproductive Health (ARH) from 2019 to 2021.

METHOD

The study aims to identify the issues and needs of adolescent girls related to breast health. The results will serve as a foundation for developing an interactive application-based breast care education model. This research employs a mixed-methods approach, combining quantitative and qualitative methods (Ishtiaq, 2019). This study employed a mixed-methods approach, combining quantitative and qualitative methods. The quantitative aspect used a cross-sectional, descriptive survey design, collecting data through a questionnaire adopted from the 2017 Indonesia Demographic and Health Survey (SDKI). Variables analyzed included characteristics such as age at menarche, family history, ethnicity, household income, social environment, knowledge, attitudes, internet access, the role of healthcare providers, media

information, family influence, and peer influence. The qualitative component followed a phenomenological design, using in-depth interviews and Focus Group Discussions (FGD) to explore practices related to breast health maintenance.

Quantitative data analysis involved univariate methods to describe the characteristics of each variable, presented as frequency distributions and percentages, and bivariate analysis to assess relationships between dependent and independent variables using statistical methods with an alpha level of 0.05. Qualitative data analysis followed an inductive approach, transitioning from specific themes to broader conclusions, with the interpretation focused on deriving meaningful insights. NVIVO software was utilized for qualitative data analysis. The population targeted in this study comprised adolescents aged 15–24 years. The sample included adolescent girls living with and supported by both parents while actively attending high school during data collection. A total of 172 respondents were involved in the quantitative analysis, with the sample size determined based on problem diagnosis. For the qualitative analysis, participants were selected through purposive sampling. Data collection adhered to ethical standards, with approval obtained from the Research Ethics Committee of Poltekkes Kemenkes Palembang (Certificate No. 0477KEPK/Adm2/III/2024). Informed consent was acquired from all respondents before participation.

RESULT

Data collection was conducted in May 2024 at senior high school adolescent girl, in Palembang City, South Sumatera, Indonesia. Table 1 shows that there is a total of 172 respondents in this study.

Table 1.

Distribution of the respondents' characteristics and the variables studied

Predisposing Factors	f	%
Age (mean; standard; min-max)	(17.14; 1.342; 15-24)	
Early Adolescence	97	56.4
Late Adolescence	75	43.6
Menarche (mean; standard; min-max)	(12.60; 1.340; 8-17)	
Early Menarche (11 years)	29	16.9
Normal Menarche (11-13 years)	105	61
Late Menarche >13 yrs	38	22.1
Family history of cancer		
Yes	16	9.3
No	156	90.7
Type(s) of cancer experienced		
Lung Cancer	3	18.75
Stomach Cancer	1	6.25
Brain Cancer	1	6.25
Bone Marrow Cancer	1	6.25
Breast Cancer	9	56.25
Colon Cancer	1	6.25
Ethnicity		
South Sumatra	112	65.1
Aceh and Malay	43	25
Javanese	17	9.9
Family income		
< Minimum Wage	88	51.2
≥ Minimum Wage	84	48.8
Social Environment Conditions		
Community support is present	83	48.3
Lack of information	89	51.7
Knowledge		
Good	81	47.1

Predisposing Factors	f	%
Limited Attitude	91	52.9
Positive	86	50
Negative	86	50
Early detection with BSE		
Does BSE	64	37.2
Does not do BSE	108	62.8
BSE Quantity		
Routine/every month	18	28.13
Not routine	46	71.87
Supporting Factors		
Internet access		
Available	153	89
Unavailable	19	11
The Role of Health Workers		
Plays a role	66	38.4
Does not play a role	106	61.6
Driving Factors		
Information media		
Yes	115	66.9
None	57	33.1
Sources of information		36.52
Primary Health Care (Puskesmas) officers	42	28.69
Health Cadres	33	27.82
Television/radio	32	20.86
Social media	24	19.13
Seminars	22	18.26
The internet	21	9.56
Newspapers/magazines	11	4.34
Teachers	5	1.73
Parents	2	
Family influence		36.6
Yes	63	63.4
None	109	
Peer influence		27.9
Yes	48	72.1
None	124	

Based on table 1. the respondents' characteristics and the variables observed, the average age of respondents was 17.14, with a standard deviation of 1.342. The lowest respondent age was 15, and the highest was 24. Most respondents were in the middle adolescent range of 15-17 years (56.4%). The average age of first menstruation (menarche) is 12.60, with a standard deviation of 1.340. The youngest respondents experienced menarche at age 8, and the oldest respondent experienced menarche at age 17. Most respondents experienced menstruation at the normal age range of 11-13 years. Meanwhile, 9.3% of respondents have a family history of cancer, with more than half of them having a family history of breast cancer, followed by lung cancer, stomach cancer, brain cancer, and bone marrow cancer.

Next, over half of the respondents are from South Sumatra. More than half of the respondents came from families with incomes below the minimum wage. Over half of the respondents also came from a social environment that provided little information about BSE. Moreover, over fifty percent of the respondents had limited knowledge and lacked a positive attitude regarding BSE. Most respondents did not do BSEs, and only 28.13% regularly did monthly BSEs. Furthermore, Table 1 exhibits that most respondents have used the internet to obtain information about BSE. Conversely, most respondents consider the involvement of health officers in disseminating information to be low. Most respondents have used the media to

obtain information about BSE, where the sources of information are primary health center officials, health cadres, television/radio, social media, seminars, and the internet. Meanwhile, the least amount of information about BSE was obtained from teachers and parents. The results also showed that the influence of family and peers on informing the respondents about BSE was very low.

Table 2.
The Relationship Between Risk Factors with BSE Behavior

Predisposing Factors	BSE				p value
	Yes		No		
	f	%	f	%	
Age					
Early Adolescence	28	28.9	69	71.1	0.012*
Late Adolescence	36	48	39	52	
Mean Menarche;					
Early Menarche	14	48.3	15	51.7	0.458
Normal Menarche	39	39.1	66	65.9	
Slow Menarche	11	28.9	27	71.1	
Family History of Cancer					
Yes	8	50	8	50	0.315
No	56	35.9	100	64.1	
Ethnicity					
Musi	27	24.1	85	75.9	0.001*
Malay	32	74.4	11	25.6	
Javanese	5	29.4	12	70.6	
Family income					
< Minimum Wage	30	34.5	57	65.5	0.144
≥ Minimum Wage	34	40	51	60	
Social Environment Conditions					
Community support is present	41	48.8	43	51.2	0.001*
Lack of information	23	26.1	65	73.9	
Knowledge					
Good	36	44.4	45	55.6	0.034
Limited	28	30.8	63	69.2	
Attitude					
Positive	31	36	55	64	0.451
Negative	33	38.4	53	61.6	
Supporting Factors					
Internet access					
Available	62	40.5	91	59.5	0.001*
Unavailable	2	10.5	17	89.5	
The Role of Health Workers					
Plays a role	23	34.8	43	65.2	0.201
Does not play a role	41	38.7	65	61.3	
Driving Factors					
Information media					
Yes	54	47	61	53	0.001*
None	10	17.5	47	82.5	
Family influence					
Yes	40	63.5	23	36.5	0.001*
None	24	22	85	78	
Peer influence					
Yes	28	58.3	20	41.7	0.001*
None	36	29	88	71	

Based on table 2 the study analyzed factors influencing Breast Self-Examination (BSE) behavior among adolescents by examining predisposing, supporting, and driving factors. Among the predisposing factors, late adolescence, a family history of cancer, good knowledge, and positive attitudes were significantly associated with performing BSE, with p-

values of 0.012, 0.001, 0.001, and 0.001, respectively. Menarche timing, ethnicity, family income, and social environment conditions were not significantly related to BSE behavior. For supporting factors, the role of health workers was a significant determinant ($p = 0.001$), while internet access showed no significant association ($p = 0.451$). Driving factors, including access to media information, family influence, and peer influence, were all significantly associated with BSE performance, with p -values of 0.001. These findings highlight the importance of family support, media, and health worker roles, along with fostering positive attitudes and increasing knowledge to encourage BSE behavior among adolescents.

This section organizes results thematically, with each theme derived from respondents' answers

1. Respondents' Understanding of BSE

Respondents understood Breast Self-Examination (BSE) as a self-check method to detect abnormalities, such as cancer. Most acknowledged its importance as an early preventive measure. However, the depth of understanding varied, with some respondents only grasping the basic concept of BSE.

2. Sources of Information on BSE

Respondents obtained information from various sources, including social media (Instagram, TikTok), the internet, campus health education programs, health seminars, and family. While these sources provided initial awareness, they were sometimes lacking in depth.

3. Physical Experiences Related to the Breast During Menstruation

Most respondents reported symptoms such as pain or tightness in the breasts before or during menstruation. To alleviate discomfort, they used methods such as warm compresses or rest. Some respondents did not experience any physical changes in their breasts.

4. BSE Practices

Only a portion of respondents performed BSE regularly. Those who did practiced in front of a mirror, palpating and pressing their breasts to detect lumps or abnormalities. Others had never conducted BSE due to a lack of knowledge or hesitation.

5. Actions After Examination

Respondents who performed BSE reported not finding any abnormalities. Follow-up actions included maintaining personal hygiene, eating a nutritious diet, and consulting professionals if needed.

6. Social Support

Friends, family, and institutions provided support through education programs, reminders, and sharing information. This support increased awareness of the importance of BSE.

7. Hopes for Breast Health

Respondents expressed hope to prevent breast cancer through a healthy lifestyle, routine BSE practices, and broader access to information.

Perspectives After Age 20 or Marriage

Respondents recognized the importance of maintaining breast health as preparation for breastfeeding and preventing diseases such as cancer.

DISCUSSION

The data from Table 1 highlights several key characteristics and behaviors of adolescent respondents, particularly in relation to breast self-examination (BSE) and reproductive health. The average age of respondents is 17.14 years, with a significant portion (56.4%) in the middle adolescent range of 15-17 years, which aligns with the typical onset of puberty and related physical changes in this age group (Suryana et al., 2022). The average age of menarche

is 12.60 years, indicating that most respondents experience menstruation within the normal age range of 11-13 years (Batubara, 2016).

Despite the importance of reproductive health education, the data reveals a gap in knowledge and attitudes towards BSE, with over half of the respondents having limited information and a negative attitude towards it. This is consistent with findings from other studies that emphasize the need for comprehensive reproductive health education to improve knowledge and attitudes among adolescents (Nasution & Manik, 2023; Pripuspitasari, 2018). The low engagement in BSE, with only 28.13% performing it regularly, underscores the need for better health education and involvement of health officers, as the current dissemination of information is perceived as low (Tunggadewi et al., 2011).

The reliance on the internet and media for information about BSE, rather than teachers or parents, suggests a lack of effective communication from traditional sources, which is a common issue in adolescent health education (Nandan, 2010; Wahyuni et al., 2024). Additionally, the socio-economic background of the respondents, with many coming from families with incomes below the minimum wage, may further limit access to health resources and education, the findings suggest that targeted interventions, such as the Reproductive Health Information and Counselling Program, could significantly enhance knowledge and attitudes towards reproductive health practices like BSE among adolescents (Pripuspitasari, 2018). The data indicates a critical need for improved educational strategies and resources to address the gaps in adolescent reproductive health knowledge and practices.

The study of factors influencing Breast Self-Examination (BSE) behavior among adolescents reveals a complex interplay of predisposing, supporting, and driving factors. Predisposing factors such as late adolescence, family history of cancer, good knowledge, and positive attitudes significantly correlate with BSE performance ($p < 0.05$), as evidenced by p-values of 0.012, 0.001, 0.001, and 0.001. This aligns with findings from various studies that emphasize the importance of knowledge and attitudes in promoting BSE behavior. For instance, a study among junior high school students found a significant correlation between knowledge of breast cancer and BSE behavior, with a p-value of 0.001, indicating that poor knowledge is a barrier to BSE practice (Karni et al., 2024). Similarly, research among medical students highlighted that good knowledge of breast cancer risk factors facilitates BSE, although a gap remains between knowledge and practice (Reddy et al., 2024). Supporting factors, particularly the role of health workers, are crucial, as their involvement significantly influences BSE behavior ($p = 0.001$), whereas internet access does not show a significant impact ($p = 0.451$) (Halim, 2023). This is corroborated by studies that identify health professionals as key facilitators in educating and motivating adolescents to perform BSE (Rohmah, 2023).

Driving factors such as media information, family, and peer influence are also significant, with p-values of 0.001, underscoring the role of social support and information dissemination in encouraging BSE (Halim, 2023; Anggraeni & Handayani, 2019). The Health Belief Model further supports these findings by linking BSE behavior to self-efficacy and perceived benefits, suggesting that enhancing these perceptions can improve BSE practices (Koyun & Polat, 2018). Overall, these studies collectively highlight the necessity of comprehensive educational interventions that involve family, peers, and healthcare professionals to foster positive attitudes and increase knowledge, thereby promoting BSE behavior among adolescents. The thematic analysis of respondents' understanding and practices regarding Breast Self-Examination (BSE) reveals a complex interplay of knowledge, sources of information, physical experiences, and social support, which collectively influence BSE

practices and attitudes. Respondents generally understood BSE as a self-check method for detecting breast abnormalities, acknowledging its importance as a preventive measure, although the depth of understanding varied significantly (Sianipar et al., 2024; Fulir, 2019). Information about BSE was primarily obtained from social media, internet sources, and educational programs, yet these sources often lacked depth, highlighting a need for more comprehensive educational interventions (Fulir, 2019; Fatimah et al., 2018).

Physical experiences related to menstruation, such as breast pain, were common, with respondents employing various methods to alleviate discomfort (Sianipar et al., 2024). Despite the recognized importance of BSE, regular practice was limited, with many respondents citing a lack of knowledge or hesitation as barriers (Manohari, 2020; Wardle et al., 1995). Those who did perform BSE often did so irregularly, and follow-up actions were generally limited to maintaining hygiene and consulting professionals if abnormalities were detected (Tsangari et al., 2014; Basegio et al., 2019). Social support from friends, family, and institutions played a crucial role in increasing awareness and encouraging BSE practices (Fatimah et al., 2018). Respondents expressed hopes for preventing breast cancer through healthy lifestyles and routine BSE, emphasizing the need for broader access to information (Espinosa, 2013). The importance of maintaining breast health was particularly noted by respondents over 20 or those married, who viewed it as preparation for breastfeeding and disease prevention (Tsangari et al., 2014). This study underscores the need for targeted educational programs to enhance BSE knowledge and practice, considering socio-demographic factors and cultural contexts to effectively promote breast health awareness (Sianipar et al., 2024; Putri, 2021).

CONCLUSION

In conclusion, overall Proprioceptive Neuromuscular Facilitation (PNF) is an effective intervention for improving muscle strength in post-stroke patients. The data from the pre-test and post-test revealed a significant increase in muscle strength, as evidenced by a substantial improvement in the mean scores, with a Cohen's *d* coefficient indicating a large effect size. The statistically significant effectiveness post-stroke patients. However, it is important to note that while PNF shows considerable benefits, individual factors such as age, stroke severity, and adherence to rehabilitation may also influence outcomes, highlighting the need for personalized treatment approaches. Overall, PNF contributes positively to post-stroke rehabilitation, particularly in enhancing motor abilities and muscle strength, aligning with findings from various studies on its therapeutic benefits

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