Gaster, 24(2), 2026, 216 - 224
https://journal.aiska-university.ac.id/index.php/gaster
e-ISSN: 2549-7006; p-ISSN: 1858-3385
DOI: https://doi.org/10.30787/gaster.v24i2.2656

Original Research

Breast Cancer and Self-Examination Knowledge After Education Among Female Boarding-School Students

Fatma Maulida Abiya[1*], Andi Muhammad Idris [1], Bella Nur Azmy[1], Adinda Azka El-Kirami[1], Ikhwanul Muslim[2,3], Purwo Setiyo Nugroho[4,5]

[1] Faculty of Medicine, Universitas Muhammadiyah Kalimantan Timur, Indonesia
[2] Faculty of Law, Universitas Muhammadiyah Kalimantan Timur, Indonesia
[3] Ahmad Ibrahim Kulliyah of Laws, International Islamic University Malaysia, Malaysia
[4] Faculty of Public Health, Universitas Muhammadiyah Kalimantan Timur, Indonesia
[5] Visiting Scholar, ASEAN Institute for Health Development, Mahidol University, Thailand

ABSTRACT

Introduction: Breast cancer remains a major women's health burden, and health promotion for early detection is a core component of contemporary breast cancer control. Adolescence provides an opportunity to establish breast-health literacy before adulthood, yet evidence on focused breast-health education in Indonesian Islamic boarding schools remains limited.

Objective: To compare overall breast cancer and BSE knowledge immediately before and after education among female adolescents at an Islamic boarding school.

Method: Sixty-five female adolescents with complete paired data took part in a pre-experimental, one-group pretest-posttest study. A 15-item true/false questionnaire spanning breast cancer, its risk factors, warning signs, early detection, and BSE was used to gauge knowledge, and raw scores were converted into percentages. Normality of the pretest-posttest difference scores was checked with the Shapiro-Wilk test, after which paired pretest and posttest scores were compared through the Wilcoxon signed-rank test.

Result: Mean knowledge increased from 86.15 ± 9.45 to 95.49 ± 6.47; median scores increased from 86.67 to 100.00 (Wilcoxon $p<0.001$). The reported Wilcoxon statistic requires verification of its software definition.

Conclusion: Knowledge scores increased immediately following a single educational session. Without a comparison group or follow-up, causal improvement, durable retention, and BSE practice cannot be inferred.

ARTICLE HISTORY

Received : 19 May 2026
Revised : 2 July 2026
Accepted : 31 Ausgust 2026
Avaliable Online : 31 Ausgust 2026
Published regularly: 31 Ausgust 2026

KEYWORDS

Female adolescents; Breast cancer; Breast self-examination; Health education; Islamic boarding school

CONTACT

*Fatma Maulida Abiya
fma840@umkt.ac.id
Department of Medicine, Faculty of Medicine, Universitas Muhammadiyah Kalimantan Timur

Cite this as: Abiya.F.M, Idris A.M, Azmy B.N, El-Kirami A.A, Muslim I, Nugroho P.S. (2026). Breast Cancer and Self-Examination Knowledge After Education Among Female Boarding-School Students, 24(2). https://doi.org/ 10.30787/gaster.v24i2.2656

Gaster, 24(2), 2026, 216 - 224
https://journal.aiska-university.ac.id/index.php/gaster
e-ISSN: 2549-7006; p-ISSN: 1858-3385
DOI: https://doi.org/10.30787/gaster.v24i2.2656

INTRODUCTION

As a global public-health issue, breast cancer shows no sign of retreating. An estimated 2.3 million women worldwide received a new diagnosis in 2022 alone, representing 11.6% of all cancer diagnoses that year, and the disease claimed roughly 670,000 lives (1). To curb this mortality, WHO's Global Breast Cancer Initiative rests on three pillars: promoting early detection, ensuring timely diagnosis, and delivering comprehensive breast cancer management (2). Indonesia's own response includes public education on breast self-examination (SADARI) and clinical breast examination (SADANIS) led by the Ministry of Health, together with the National Cancer Control Plan 2024–2034, which places renewed emphasis on early detection within the country's broader cancer-control strategy (3,4).

Building breast-health awareness and preventive knowledge early has clear advantages, and adolescence stands out as a particularly suitable time to start: education delivered during these years can familiarize young people with breast cancer risk factors, warning signs, and the basic principles of breast self-examination (BSE). One Indonesian study of female adolescents illustrates the gap that remains: general awareness of breast cancer was fairly high, yet knowledge of specific risk factors and BSE lagged behind (5), pointing to particular content areas that health education still needs to address for this age group. A separate study conducted among women in Surabaya reinforces this concern, reporting that both breast cancer knowledge and attitudes toward BSE independently predicted whether BSE was actually performed (6). Together, these findings point to a need for stronger breast cancer and BSE education.

Several recent intervention studies point to the value of structured breast-health education for young women, although the details differ by setting and design. Among Nigerian secondary-school girls, peer education substantially improved breast cancer and BSE knowledge (7), and a comparable pre-post intervention among Bangladeshi university students raised knowledge of symptoms, risk factors, prevention, screening, and BSE procedures (8). School-based programs produced similar gains: students in Ghana improved on general breast cancer knowledge alongside recognition of symptoms, risk factors, and BSE/screening knowledge (9), while a controlled school intervention in Oman improved recognition of risk factors and symptoms and shortened the anticipated time to seeking medical help (10). Teaching format also made a difference: both traditional and modern instructional approaches improved BSE knowledge among adolescent girls in one study (11), whereas a Health Belief Model-based program improved both knowledge and BSE-related beliefs among female university students (12). A further intervention among university students reported parallel gains across knowledge, attitudes, and BSE practice (17).

Recent studies in Nigeria, Bangladesh, Ghana, and Oman report improved breast-health knowledge following educational activities, but they differ in design, population, teaching method, assessment timing, and outcomes (7-12). Indonesian evidence includes descriptive studies of breast cancer awareness, beliefs, and early-detection behaviors (5,6,14,19). A study at an Indonesian Islamic boarding school investigated early-detection behavior (14), but did not establish the effect of this particular educational package. Thus, the unresolved question addressed here is whether total breast cancer and BSE knowledge scores differ immediately after a brief combined lecture, discussion, and model-based demonstration in a residential adolescent population. This question concerns immediate knowledge acquisition and implementation in a specific school setting; it does not address knowledge retention, individual item-level learning, actual BSE performance, or cancer

Gaster, 24(2), 2026, 216 - 224
https://journal.aiska-university.ac.id/index.php/gaster
e-ISSN: 2549-7006; p-ISSN: 1858-3385
DOI: https://doi.org/10.30787/gaster.v24i2.2656

detection. The present investigation cannot isolate the contribution of each teaching component, and its setting does not by itself demonstrate a new intervention mechanism.

The study contributes a descriptive paired assessment of a focused breast-health education package in an Indonesian Islamic boarding school, explicitly documenting the baseline score, immediate post-education score, and limitations of a high-scoring knowledge instrument. Its setting-based contribution is programmatic rather than evidence of a novel mechanism or causal effectiveness. The aim was to describe and compare breast cancer and BSE knowledge scores before and immediately after the educational session.

METHOD

The methodology was structured systematically to ensure validity and reliability, including the following key components:

Research Type

This quantitative pre-experimental study used a single-group pretest-posttest design. The same participants completed a knowledge questionnaire immediately before and immediately after breast-health education; no concurrent control group or delayed follow-up was included. Consequently, the design estimates within-participant short-term score change and does not establish a causal intervention effect. Repeated testing, history, expectancy, and other uncontrolled influences remain plausible alternatives.

Population and Sample

The study took place among female adolescent students at Istiqomah Muhammadiyah Boarding School, Samarinda, East Kalimantan, Indonesia, during an educational activity in August 2025. All 65 attendees who completed the pretest and posttest were included in this census of the accessible activity population; no attendee was excluded from the paired analysis. Because eligibility was defined by attendance and completion, this is not a probability sample of all students in the school. No a priori sample-size calculation was reported. The sample size therefore reflects the available group rather than a prespecified precision or power target, potentially limiting detection of smaller effects and generalizability to non-attendees.

Research Location

The research was conducted at Istiqomah Muhammadiyah Boarding School Samarinda, East Kalimantan, Indonesia. The residential and group-learning characteristics of the boarding school provided a practical setting for delivering breast-health education to adolescent girls.

Intervention

A team of general practitioners delivered a single breast-health education session lasting approximately two hours. The package included a PowerPoint-supported lecture, interactive discussion, small-group practice using breast models (manikins), and a leaflet. Topics covered breast cancer concepts, selected risk factors, warning signs, breast and axillary awareness, the purpose and timing of breast self-examination (SADARI), healthy behaviors, and indications to seek professional evaluation for concerning changes. The posttest was conducted immediately after all components. The submitted materials do not specify time allocation per component, group size, facilitator training, standardized scripts, attendance fidelity, or observation of protocol adherence; these details require confirmation from the investigators before the intervention can be considered fully reproducible.

Instrumentation or Tools

Overall breast cancer and BSE knowledge was measured with 15 true/false items covering risk factors, warning signs, awareness, BSE principles, and early detection. Correct responses received one point and incorrect responses zero, with totals converted to percentages (0-100). Therefore,

Gaster, 24(2), 2026, 216 - 224
https://journal.aiska-university.ac.id/index.php/gaster
e-ISSN: 2549-7006; p-ISSN: 1858-3385
DOI: https://doi.org/10.30787/gaster.v24i2.2656

possible percentages occur in increments of 100/15, or approximately 6.67 percentage points. The manuscript reports that experts assessed item relevance on a four-point scale, but their number, qualifications, item-level and scale-level content validity indices, instrument source, and reliability or pilot-test coefficients are not available in the supplied documentation. As individual item responses were not available, no new validity, reliability, or domain-specific analyses could be performed. These limitations, guessing probability in a dichotomous instrument, and high baseline scores warrant caution when interpreting measured knowledge change.

Data Collection Procedures

The same 15-item questionnaire was completed immediately before and immediately after the educational session, with participant identifiers permitting paired comparisons. This administration schedule measures immediate knowledge recall, not longer-term retention. Use of the identical instrument may have contributed to a test-retest or recall effect; no alternate-form assessment was available.

Data Analysis

Knowledge scores are presented descriptively as mean and standard deviation (SD), median and interquartile range (IQR), and observed minimum and maximum. Means and SDs are descriptive; inference was non-parametric because Shapiro-Wilk testing of within-participant difference scores indicated a departure from normality ($W=0.923$; $p=0.001$). The Wilcoxon signed-rank test was used for the paired comparison at a significance threshold of 0.05. The source reports a Wilcoxon statistic of $W=96.0$ and $p<0.001$, but its software convention (signed-rank sum or other statistic), positive/negative ranks, ties, and a paired-change confidence interval were not supplied. These values cannot be reconstructed reliably from aggregate summaries and should be checked against the original analysis output. Statistical significance must not be interpreted as proof of a causal educational effect.

Ethical Consideration

Students were informed about the educational activity and invited to participate voluntarily; questionnaire responses were handled without identifying students in the report. Participants were adolescents aged 14-17 years.

RESULTS

A total of 65 female boarding-school students aged 14-17 years had complete paired breast cancer/BSE knowledge scores. The age distribution was 14 years (2; 3.1%), 15 years (19; 29.2%), 16 years (24; 36.9%), and 17 years (20; 30.8%). Grade level and previous exposure to breast-health education were not reported, limiting interpretation of baseline knowledge and transferability to other student groups (Table 1).

Table 1. Participant characteristics detail

Characteristic	Category/description	n (%)
Total participants	Female adolescents	65 (100.0)
Age	14 years	2 (3.1)
Age	15 years	19 (29.2)
Age	16 years	24 (36.9)
Age	17 years	20 (30.8)

Source: Primary data.

Table 2 describes the paired knowledge scores. The mean increased from 86.15 ± 9.45 to 95.49 ± 6.47, an unadjusted difference between group means of 9.34 percentage points (9.33 if calculated from unrounded original means). Because the scores are bounded at 100, absolute percentage-point differences are more interpretable than a relative increase based on an already high baseline. The posttest minimum reported as 73.30% requires confirmation against original records because a 15-item binary questionnaire yields scores in approximately 6.67-point increments.

Gaster, 24(2), 2026, 216 - 224
https://journal.aiska-university.ac.id/index.php/gaster
e-ISSN: 2549-7006; p-ISSN: 1858-3385
DOI: https://doi.org/10.30787/gaster.v24i2.2656

Table 2. Pre and post intervention breast cancer and BSE knowledge scores

Measure	Pretest	Posttest
n	65	65
Mean ± SD	86.15 ± 9.45	95.49 ± 6.47
Median (IQR)	86.67 (80.00-93.33)	100.00 (93.33-100.00)
Minimum-maximum	53.33-100.00	73.30-100.00

Source: Primary data.

The Shapiro-Wilk test of paired difference scores indicated non-normality (W=0.923; p=0.001). The source reports a Wilcoxon signed-rank statistic W=96.0 and p<0.001, consistent with a statistically detectable shift in paired knowledge scores. However, positive and negative rank totals, ties, the precise definition of W, and a paired-difference confidence interval were not supplied. Accordingly, neither an exact non-parametric effect size nor the distribution of individual change scores is asserted here. The result demonstrates an immediate within-group change, not causal efficacy or sustained improvement.

DISCUSSION

The main finding was a statistically significant short-term within-group increase in breast cancer and BSE knowledge scores after a single educational session among 65 boarding-school adolescents. Mean scores rose from 86.15 ± 9.45 to 95.49 ± 6.47, and the median rose from 86.67 to 100.00 (p<0.001). The descriptive mean difference was approximately 9.34 percentage points, although the true paired-change distribution and uncertainty interval were not provided. These findings support short-term change in questionnaire performance following education; without a control group, they do not establish the amount of change caused by the educational activities.

This pattern matches other adolescent-focused intervention studies. In Nigeria, Sadoh et al. found that peer education markedly improved breast cancer and BSE knowledge among secondary-school girls [7], and Nsaful et al. reported broad gains in general knowledge, symptom and risk-factor recognition, and BSE-related knowledge three months after a school-based program in Ghana [9]. A structured program among Omani adolescents produced a comparable improvement in recognizing breast cancer risk factors and symptoms [10], and Ogunmodede et al. found that both lecture-based and more modern didactic approaches raised BSE knowledge, with the modern-method group gaining more [11]. Similar improvements have been reported among female university students [17] and in other adult populations [21], although differences in participant characteristics limit direct comparison across studies. Taken together, these results suggest that breast-health knowledge responds fairly consistently to structured education, at least in the short term.

Baseline knowledge was relatively high, unlike the low initial scores reported in some school-based studies [7-9]. Indonesian studies suggest that general breast cancer awareness does not necessarily imply equivalent knowledge of specific risk factors, warning signs, or BSE-related practices [5,6]. Likewise, evidence from other countries distinguishes awareness, beliefs, and actual behavior [15,16,18,22]. The median posttest score of 100.00 suggests a measurement ceiling; many participants had limited room for further improvement. The source additionally reports that 29 students scored at least 93.33% before education and 36 reached 100% afterward, but these individual counts require verification against raw scores. A ceiling effect can compress and distort observed change; its direction and magnitude cannot be determined from the current summaries.

Gaster, 24(2), 2026, 216 - 224
https://journal.aiska-university.ac.id/index.php/gaster
e-ISSN: 2549-7006; p-ISSN: 1858-3385
DOI: https://doi.org/10.30787/gaster.v24i2.2656

Reusing the questionnaire immediately may also exaggerate measured learning through recall. Domain-specific interpretations should not be drawn from total scores without item-level responses.

The program may have supported immediate recall through combined verbal explanation, visual materials, discussion, and practical demonstration, although these processes were not separately tested. Studies in Nigeria, Ghana, and Oman similarly report knowledge gains after school-based education, but some evaluated different teaching strategies or included longer assessment intervals [7,9,10,11]. Hence the results cannot identify which component produced the observed change. Breast self-examination information should be framed as breast awareness, recognition of unusual signs, and prompt professional assessment, not as evidence that routine self-examination alone is an effective screening test or can replace age-appropriate clinical evaluation [2-4]. Knowledge gains in this study do not establish practical skill, behavior change, or earlier cancer diagnosis.

The Islamic boarding-school setting offers logistical opportunities for group education within an established learning schedule, and earlier Indonesian research documents breast-health-related behavior among boarding-school students [14]. The present data add a focused immediate paired knowledge assessment using a combined didactic and demonstration session. They do not measure cultural acceptability, facilitator fidelity, peer influence, implementation cost, or the comparative advantage of residential schooling; therefore, these attributes should be considered possible directions for implementation research rather than proven mechanisms. The novelty is limited but identifiable as context-specific, transparent short-term program evaluation rather than the invention of a new educational method.

The study has several limitations. Its single-group design cannot rule out testing, expectancy, history, or maturation effects; the immediate posttest measures recall rather than retention. A single school and attendance-based census constrain external validity, and no a priori sample-size or precision justification was provided. The 15-item true/false instrument may be vulnerable to guessing and ceiling effects; numerical content validity and reliability evidence were not available in the submitted materials. Only total scores were accessible, preventing item-level analysis and assessment of behavioral mechanisms. Grade level, prior education, intervention fidelity, parental permission, and ethics approval documentation need confirmation. Actual BSE performance, appropriate help-seeking, screening uptake, and clinical outcomes were not measured. Controlled multicenter research with delayed assessments and a validated instrument is required to examine sustained effects and transfer into health behaviors.

CONCLUSION

In this single-group pretest-posttest study, 65 female adolescents showed higher breast cancer and BSE knowledge scores immediately after education (mean 86.15 ± 9.45 before and 95.49 ± 6.47 afterward; Wilcoxon $p<0.001$). The findings provide descriptive evidence of short-term within-group change in a boarding-school educational setting, not proof of educational causality, sustained knowledge retention, improved examination skills, or cancer screening outcomes. Future controlled and longitudinal studies should assess instrument quality, individual knowledge domains, and actual breast-health behaviors.

Gaster, 24(2), 2026, 216 - 224
https://journal.aiska-university.ac.id/index.php/gaster
e-ISSN: 2549-7006; p-ISSN: 1858-3385
DOI: https://doi.org/10.30787/gaster.v24i2.2656

AUTHOR'S CONTRIBUTION STATEMENT

Fatma Maulida Abiya led the study design, intervention material development, data analysis, and manuscript drafting. Andi Muhammad Idris assisted with the literature review and manuscript revision. Bella Nur Azmy managed administrative permissions and participant recruitment. Adinda Azka El-Kirami handled data collection and management. Ikhwanul Muslim provided analytical and methodological input. Purwo Setiyo Nugroho supervised the project, offering methodological guidance and critical intellectual revisions. The final manuscript was read and approved by all authors.

SOURCE OF FUNDING STATEMENT

Funding was reported as provided by Universitas Muhammadiyah Kalimantan Timur. The role of the funder in the study design, data collection, analysis, interpretation, manuscript preparation, and decision to submit has not been specified in the supplied documentation and must be confirmed by the authors before publication.

CONFLICTS OF INTEREST

No conflict of interest related to this study is declared by the authors.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

For this manuscript, generative AI tools were used to assist with language editing and word choice. All scientific content and final manuscript integrity remain the responsibility of the authors.

ACKNOWLEDGMENTS

The authors acknowledge Istiqomah Muhammadiyah Boarding School Samarinda and all participating students for their contribution to the implementation of the health-education activity. No conflict of interest involving any party in this study is declared.

REFERENCES

1. World Health Organization. Global cancer burden growing, amidst mounting need for services [Internet]. Geneva: WHO; 2024. Available from: https://www.who.int/news/item/01-02-2024-global-cancer-burden-growing--amidst-mounting-need-for-services
2. World Health Organization. Global breast cancer initiative implementation framework: assessing, strengthening and scaling up of services for the early detection and management of breast cancer. Geneva: WHO; 2023. Available from: https://www.who.int/publications/i/item/9789240065987
3. Kementerian Kesehatan Republik Indonesia. Cegah kanker payudara dengan SADARI dan SADANIS [Internet]. Jakarta: Kementerian Kesehatan RI; 2022. Available from: https://kemkes.go.id/id/cegah-kanker-payudara-dengan-sadari-dan-sadanis
4. Kementerian Kesehatan Republik Indonesia. Rencana Kanker Nasional 2024–2034 [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2024. Available from: https://www.badankebijakan.kemkes.go.id/repositori/id/eprint/5958/1/Rencana%20Kanker%20Nasional%202024-2034_V71.pdf
5. Pangestuti RD, Armini NKA, Dewi LC. Self-structured breast cancer awareness among female adolescent. Pediomaternal Nurs J. 2021;7(1):1-7. doi:10.20473/pmnj.v7i1.20431.
6. Dewi TK, Ruiter RAC, Diering M, Ardi R, Massar K. Breast self-examination as a route to early detection in a lower-middle-income country: assessing psychosocial

Gaster, 24(2), 2026, 216 - 224
https://journal.aiska-university.ac.id/index.php/gaster
e-ISSN: 2549-7006; p-ISSN: 1858-3385
DOI: https://doi.org/10.30787/gaster.v24i2.2656

determinants among women in Surabaya, Indonesia. BMC Womens Health. 2022;22:179. doi:10.1186/s12905-022-01748-4.
7. Sadoh AE, Osime C, Nwaneri DU, Ogboghodo BC, Eregie CO, Oviawe O. Improving knowledge about breast cancer and breast self examination in female Nigerian adolescents using peer education: a pre-post interventional study. BMC Womens Health. 2021;21:328. doi:10.1186/s12905-021-01466-3.
8. Sarker R, Islam MS, Moonajilin MS, Rahman M, Gesesew HA, Ward PR. Effectiveness of educational intervention on breast cancer knowledge and breast self-examination among female university students in Bangladesh: a pre-post quasi-experimental study. BMC Cancer. 2022;22:199. doi:10.1186/s12885-022-09311-y.
9. Nsaful J, Dedey F, Nartey E, Labi J, Adu-Aryee NA, Clegg-Lamptey JN. The impact of a breast cancer educational intervention in Ghanaian high schools. BMC Cancer. 2022;22:893. doi:10.1186/s12885-022-09991-6.
10. Al-Hosni K, Chan MF, Al-Azri M. Effectiveness of an educational program on awareness of breast cancer risk factors, symptoms, and barriers to seeking medical help among adolescent Omani school students: an interventional study. Curr Oncol. 2023;30(4):4126-38. doi:10.3390/curroncol30040314.
11. Ogunmodede E, Ajala D, Aluko J, Anokwuru R, Awotunde T, Olajide AO, et al. Promoting breast health among female adolescents: a comparative analysis of the effects of two didactic tools on knowledge and practice regarding breast self-examination in Southwest Nigeria. BMC Cancer. 2024;24:1183. doi:10.1186/s12885-024-12949-5.
12. Wondmu KS, Tessema MT, Degu G, Mihiret GT, Sinshaw M. Effect of breast cancer education based on the health belief model on knowledge, health belief, and breast self-examination among female students of Debre Markos University, Northwest Ethiopia, in 2021. Front Oncol. 2022;12:1034183. doi:10.3389/fonc.2022.1034183.
13. Werdhianti GT, Ali I, Haris A, Fahrinda A, Dhanny ARP, Suhana SA. Peningkatan kesadaran remaja putri terhadap pencegahan stunting melalui edukasi 1000 Hari Pertama Kehidupan di Pondok Pesantren Istiqomah Muhammadiyah Samarinda. Borneo Nurs J. 2026;8(2):1842-8. doi:10.61878/bnj.v8i2.806.
14. Maulidia H, Prabamurti P, Indraswari R. The behaviour characteristics in early detection of breast cancer among Islamic boarding school students. J Public Health Trop Coast Reg. 2024;7(1):31-9. doi:10.14710/jphtcr.v7i1.22381.
15. El-Fakir MB, Aimrane A, Laaradia M, Ait Taleb K, Issaoune MO, Lahouaoui H, et al. Awareness about breast cancer and breast self-examination among undergraduate female students at the University of Agadir, Morocco: a cross-sectional descriptive study. Epidemiologia (Basel). 2024;5(3):385-401. doi:10.3390/epidemiologia5030028.
16. Hasi SN, Tabassum S, Arny RT, Pervin MD, Hossain MG, Hasan F, et al. Breast cancer knowledge and self-examination practices among university female students in Dinajpur, Bangladesh: a cross-sectional study. Health Sci Rep. 2025;8(7):e71048. doi:10.1002/hsr2.71048.
17. Uruntie RO, Oputa CH, Peters E, Otovwe A. Effect of educational intervention on the knowledge, attitude and practice of breast self-examination among female students at a private university in Southern Nigeria. BMC Cancer. 2024;24:355. doi:10.1186/s12885-024-12116-w.
18. Al-Shiekh SSA, Ibrahim M, Alajerami Y. Breast cancer knowledge and practice of breast self-examination among female university students, Gaza. ScientificWorldJournal. 2021;2021:6640324. doi:10.1155/2021/6640324.

Gaster, 24(2), 2026, 216 - 224
https://journal.aiska-university.ac.id/index.php/gaster
e-ISSN: 2549-7006; p-ISSN: 1858-3385
DOI: https://doi.org/10.30787/gaster.v24i2.2656

19. Azhar Y, Hanafi R, Lestari B, Halim F. Breast self-examination practice and its determinants among women in Indonesia: a systematic review, meta-analysis, and meta-regression. Diagnostics (Basel). 2023;13(15):2577. doi:10.3390/diagnostics13152577.
20. Jadhav BN, Abdul Azeez EA, Mathew M, Senthil Kumar AP, Snegha MR, Yuvashree G, et al. Knowledge, attitude, and practice of breast self-examination is associated with general self-care and cultural factors: a study from Tamil Nadu, India. BMC Womens Health. 2024;24:151. doi:10.1186/s12905-024-02981-9.
21. Mansoor NS, Naveed S, Ali H, Manzoor A, Zahoor S, Sheikh J. Evaluation of a pre-post quasi-experimental educational intervention on breast cancer awareness among pharmacy professionals in Karachi, Pakistan. Front Public Health. 2024;12:1443249. doi:10.3389/fpubh.2024.1443249.
22. Gamal A, Awwad S, Abdallfatah A, Azim A, Alhayek W, Elgamal H, et al. Knowledge, attitudes, and awareness of breast self-examination among female university students in three Arab countries: a multi-center cross-sectional study. BMC Public Health. 2025;25:2961. doi:10.1186/s12889-025-23932-5.
23. İncesu O, Kara Ö, Şenyuva E. The effect of web based and traditional self breast examination education on nursing students' knowledge, skills and self-directed learning skills: a randomised controlled study. Nurse Educ Pract. 2024;81:104167. doi:10.1016/j.nepr.2024.104167.
24. Pramesti SA, Kartini F. The influence of social media on breast self-examination (BSE) knowledge in adolescent: scoping review. J Aisyah J Ilmu Kesehatan. 2023;8(3). doi:10.30604/jika.v8i3.2283.
25. Ekim A, Özçevik Subaşı D, Ocakçı AF. Effect of breast cancer awareness education in adolescent girls: a quasi-experimental study. J Educ Res Nurs. 2024;21(2):137-43. doi:10.14744/jern.2024.99422.