Knowledge Level towards Breast Cancer and Breast Self-Examination among Medical Students of Indonesia

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Abstract
Breast cancer is a life-threatening disease among Indonesian women. The etiology of breast cancer is still uncertain, and therefore adequate primary prevention is difficult. Early diagnosis improves cancer prognosis while also reducing medical costs, substantially reducing mortality rates. Knowledge and awareness of breast cancer risk factors and their screening may help women take preventive measures. The community service program aimed to assess the level of understanding of undergraduate medical students on breast cancer and breast self-examination (BSE). It was a one-group pretest-posttest quasi-experimental study to measure the level of knowledge of 100 medical students in Indonesia from August 20²⁰, 2020, to February 27²⁶, 2021. The participants were asked 36 questions, which was an adaptation of previous questionnaires. A mini-lecture managed the program that focuses on risk factors and early detection. Furthermore, pretest and post-test were conducted to analyze the knowledge level before and after the dissemination. The participants included in this study were mostly 20 years and above (62%). The average recognition of breast cancer and its early detection was not high. The knowledge of breast cancer among medical students was found to be moderate. The efficacy of dissemination among medical students was apparent in knowledge change. However, good cancer awareness, especially breast cancer, needs to be established and integrated through effective cancer educational programs in the medical curricula. Hence, modification of the medical curriculum through extensive training on breast cancer preventive measures and early diagnosis is required.

Keywords: Cancer awareness, cancer education, dissemination, early detection, screening

Introduction
Breast cancer is a malignant tumor that develops within the breast tissue.¹ Breast cancer is one of the foremost common sorts of cancer in women.¹ Breast cancer can happen in any region, but the incidence rate is higher in developed areas.² In Southeast Asia, there are 137,514 new breast cancer cases, with Indonesia as the most significant contributor with 58,256 new cases and cause of death for 22,692 women.³ Various factors contribute to its occurrences, such as population structure, lifestyle, genetics, and environment.⁴ From the data presented above, efforts are needed to prevent and control breast cancer. Early detection with proper management can significantly reduce mortality in breast cancer.⁵

Cancer is usually due to disruption of the molecular activity of genes so that abnormalities in cell division occur. Breast cancer also happens in some patients with hormonal anomalies that initiate cellular modification and tumor advancement.⁶ Approximately 5% to 10% of the cases are innate, and most of the cases were related to the BRCA1 or BRCA2 gene mutation.⁷ However, some studies found breast cancer cases in non-BRCA mutation patients.⁸,⁹ The breast cancer cases in these patients tend to be caused by other causes that can initiate cancer development.⁸ The risk factors are separated into individual, family history, reproductive, and modifiable environmental factors.

Breast cancer can be detected by breast self-examination (BSE).¹⁰ BSE is a vital screening measure for breast cancer detection which is easy,
inexpensive, and simple to perform and does not
depend on a health practitioner’s assistance.\textsuperscript{10–12}
In Indonesia, a study of 1967 women in Surabaya
showed that 44.4% of women had performed
BSE at least once, and 55.6% of women had
never performed BSE. This study also shows that
older women with high educational backgrounds
and breast cancer history in family members
were more likely to perform BSE practice.\textsuperscript{13} This
indicates BSE is still rarely done by women due
to a lack of education regarding breast cancer.\textsuperscript{10,14}
By educating the young generation on breast
cancer and BSE will increase awareness among
their family and friends so that the morbidity and
mortality of the breast cancer incidence may be
reduced.\textsuperscript{10}

A medical student is a person enrolled
in medical school so that they have a high
awareness of health. However, the National
Standard Competencies of Indonesian Medical
Doctors contain only 5% cancer topics of the
overall competency assigned to Indonesian
medical doctors. Moreover, cancer is in the
advanced stage of the specialist program. Thus,
undergraduate medical students can not imagine
simple modalities to detect breast cancer earlier.

The objective of this study was to assess the
level of knowledge of undergraduate medical
students on breast cancer and BSE after
dissemination and input for stakeholders to
address BSE concepts in medical curricula.

Methods

This study used a quasi-experimental one-group
pretest-posttest research design on medical
students of Indonesia. Undergraduate medical
students aged 18–24 years were included in
this study. We conducted a self-administered
electronic survey to collect information on
respondents’ knowledge of breast cancer and
BSE. The online survey was developed through
Google Forms and distributed on social media
messaging apps (WhatsApp) and social platforms
(Instagram and Facebook). The survey was spread
through colleagues, acquaintances, and personal
contacts with an indication to send randomly.
Data collection was set by limiting the number of
possible responses to 1 per participant.

All participants provided consent to participate
and received an electronic link via Google Form,
accompanied by a cover letter stating study,
privacy, anonymity, confidentiality, possible
risks and benefits, voluntary rights, length of the
survey, and the primary investigator’s name and
contact. All collected data were kept anonymous,
de-identified, and exported to Microsoft Excel for
analyses, protected by passwords, and only the
primary investigator and statistician had access
to the data.

The questionnaire’s items were designed to
to obtain information on sociodemographic
characteristics, knowledge of symptoms, risk
factors, BSE, management, and perceptions of
breast cancer. It was adapted and modified from
the United Kingdom Breast Cancer Awareness
Measure\textsuperscript{15} and a study by Grunfeld et al.\textsuperscript{16}
The questionnaire was delivered in Bahasa
and was revalidated in a smaller sample (not
included in the final sample). The final validated
questionnaire was used in this study.

The method used in the study was carried
out as previous study\textsuperscript{17} using a pre-and post-
survey method to assess the knowledge of online
information literacy (dissemination) on breast
cancer and BSE. The research was conducted from
August 20\textsuperscript{th}, 2020, to February 27\textsuperscript{th}, 2021. The
measurement of knowledge used the Guttman
scale, in which the number of true and false
answers to the item was identified.\textsuperscript{18} Each true
answer was scored one mark, and an incorrect
answer was zero. The total score obtained by
each information in this study was converted
to a percentage. Interpretation of the level of
knowledge is arbitrarily measured through the
cumulative number of valid scores to the total
score. A higher cumulative score signifies a higher
level of knowledge, with the interpretation of the
percentage scale of >75%, 50–75%, and <50% as
good, sufficient, and evil, respectively.

All data were analyzed using SPSS version
22 (SPSS Inc., U.S.A.) and Microsoft Excel. The
t test was used to distinguish the proportions of
the pretest and posttest. The level of statistical
significance was set at p<0.05.

This study has received ethics approval
from the Health Research Ethics Committee of
Universitas Padjadjaran Bandung, number 614/
UN6.KEP/EC/2020. Furthermore, respondents
had received informed consent regarding their
participation in this study.

Results

Two hundred and twelve respondents filled
in the study registration. However, only 100
respondents filled out all the required forms completely. Therefore, we excluded respondents who did not fill out, complete, or send the research questionnaire. Data on the characteristics of the respondents who participated in the study were obtained through the information filled by respondents in the Google Form. The data taken includes the respondents’ gender, age, religion, family income, family history of having breast cancer, scholarship recipients, exposure to information about breast cancer, and the respondent ethnicity, which can be seen in Table 1. The majority of respondents were women (87%) aged 20 years old (37%), Islam and Javanese tribes dominated the religion and ethnicity of respondents (83% and 34%, respectively), and family income mainly was above 5 million per month (79%), most of the respondent did not have any history of familial breast cancer (90%), and no scholarship was owned by the majority of respondents (74%). In addition, most respondents heard of breast cancer (94%).

Table 2 shows the data regarding the sources of previous information exposure received by the respondents. Of the 100 respondents, 94 respondents had heard about breast cancer through various sources. Most sources of information exposure were through online video platforms such as YouTube (73.95%), followed by social media Instagram (15.62%). Meanwhile, other sources such as journals, webinars, e-books, online, and Twitter are the sources which information has the minor exposure to the respondents (under 5%).

The assessment of the level of knowledge of different symptoms of breast cancer before and after the dissemination can be seen in Table. Table 3 showed that regarding symptoms, meaningful changes were recorded in the understanding of breast size similarity, breast injury healing speed, nipple size and position change, nipple rash, abnormal discharge from

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**Table 1 Respondent Characteristics**

| Characteristics                  | n=100 (%) |
|----------------------------------|-----------|
| **Gender**                       |           |
| Men                              | 13 (13)   |
| Women                            | 87 (87)   |
| **Age (year)**                   |           |
| <18                              | 1 (1)     |
| 18                               | 10 (10)   |
| 19                               | 27 (27)   |
| 20                               | 37 (37)   |
| 21                               | 16 (16)   |
| 22                               | 2 (2)     |
| 23                               | 3 (3)     |
| ≥24                              | 4 (4)     |
| **Religion**                     |           |
| Islam                            | 83 (83)   |
| Protestant                       | 6 (6)     |
| Catholic                         | 6 (6)     |
| Hinduism                         | 5 (5)     |
| **Family income (IDR)**          |           |
| <5,000,000                       | 21 (21)   |
| 5,000,000–10,000,000             | 38 (38)   |
| 10,000,000–15,000,000            | 14 (14)   |
| 15,000,000–20,000,000            | 13 (13)   |
| 20,000,000–25,000,000            | 4 (4)     |
| >25,000,000                      | 10 (10)   |
| **Family history of breast cancer** |         |
| Yes                              | 10 (10)   |
| No                               | 90 (90)   |
| **Scholarship grantee**          |           |
| Yes                              | 26 (26)   |
| No                               | 74 (74)   |
| **Tribes**                       |           |
| Sundanese                        | 22 (22)   |
| Javanese                         | 34 (34)   |
| Batakese                         | 3 (3)     |
| Buginese                         | 3 (3)     |
| Minangkese                       | 7 (7)     |
| Betawis                          | 3 (3)     |
| Balinese                         | 6 (6)     |
| Lampungnese                      | 2 (2)     |
| Banjarneese                      | 1 (1)     |
| Chinese                          | 3 (3)     |
| Padang                           | 1 (1)     |
| Palembang                        | 1 (1)     |
| Sumatera                         | 1 (1)     |
| Papua                            | 1 (1)     |
| Aceh                             | 1 (1)     |
| Others (Madurese, Dayak, Bantenese, Lampung, Gorontaloan, Torajan, Butonese, Sangirese, and Bungku) | 11 (11) |
| **Exposed to information**       |           |
| Yes                              | 94 (94)   |
| No                               | 6 (6)     |

**Table 2 Previous Information Source**

| Media                                                  | n=100 (%) |
|--------------------------------------------------------|-----------|
| Online video platforms (YouTube, etc.)                  | 71 (71)   |
| Instagram                                              | 15 (15)   |
| Journal                                                | 3 (3)     |
| Webinar                                                | 2 (2)     |
| E-book                                                 | 1 (1)     |
| Line                                                   | 1 (1)     |
| Twitter                                                | 1 (1)     |
| No prior information exposure                           | 6 (6)     |
the nipple, and abnormality of breast skin symptoms of breast cancer. Interestingly, most respondents correctly identified breast lumps and the alteration of breast or nipple shape as breast cancer symptoms. Moreover, a significant increase in knowledge was not recorded (p>0.05) on questions about the non-healing lesion on the breast, and pain in the armpit area, suggesting a good prior understanding of breast cancer symptoms. Meanwhile, only one respondent was aware that a breast lump is a definite symptom of breast cancer after dissemination.

Knowledge of age-related and lifetime risk of breast cancer was well-aware among respondents, as seen in the second section of Table 3. After dissemination, respondents correctly recognized one-eighth of all women having a lifetime risk of developing breast cancer (96%) and the susceptibility of senior women to get breast cancer compared to a woman in their 30s or 50s (59%).

The percentage of women who identified breast cancer risk factors was also shown in Table 3. Understanding risk factors may help women in taking preventive measures. Most respondents believed smoking (97%), genetic inheritance (94%), and a sedentary lifestyle (93%) lead to breast cancer. However, knowledge of important biological risk factors like alcohol consumption (6%), workaholic (6%), age of menstruation
(14%), grilled food (13%), married women without children (31%), birth control pill consumption (34%), premature menopause (35%) were low prior dissemination, although they had heard of breast cancer.

Of all 100 respondents, before dissemination, only 4% knew that BSE prevents breast cancer (Table 4). Around eleven out of one hundred said breast cancer could be detected through BSE. Our results showed that most of the respondents have good knowledge that BSE should be done monthly. However, most of the respondents (92%) think that BSE may change the shape and density of the breast, but after dissemination, they were aware that it is not altered (88%).

Good knowledge of breast cancer management was understandable by respondents, as seen in Table 5. First, they had heard modalities for breast cancer management was chemotherapy. Subsequently, their knowledge was significantly increased regarding light therapy and surgery to manage breast cancer.

Our results showed the good knowledge of respondents on curative activities to recognize the first symptom that initiates medical consultation (Table 5). But the level of respondents’ insecurity about telling the doctor about their changes was quite prominent (67%).

Table 6 indicates medical students of Indonesia had good knowledge of breast cancer and BSE. T test results show that p=0.000. Hence, it can be concluded that there was a significant

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**Table 4 Knowledge of Breast Self-examination**

| Question about Breast Self-examination | Pretest Score (%) | Posttest Score (%) | Asymp. Sig. |
|---------------------------------------|-------------------|--------------------|-------------|
| Breast self-examination prevents breast cancer | 4 | 100 | 0.000 |
| Breast self-examination is an observation that one does to her breast every month | 89 | 95 | 0.109 |
| Regular monthly breast self-examination will not help in detecting changes in the breast | 11 | 92 | 0.000 |
| The shape and density of the breast can not change | 8 | 88 | 0.000 |

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**Table 5 Knowledge of Breast Cancer Management and Behavior in Seeking Medical Help**

| Management Knowledge and Behavior in Seeking Medical Help | Pretest Score (%) | Posttest Score (%) | Asymp. Sig. |
|----------------------------------------------------------|-------------------|--------------------|-------------|
| Questions about breast cancer management                  |                   |                    |             |
| Light therapy is one of the treatments for breast cancer   | 74                | 93                 | 0.000       |
| The only treatment for breast cancer is surgery            | 11                | 92                 | 0.000       |
| Chemotherapy is one of the treatments for breast cancer    | 94                | 97                 | 0.257       |
| Questions about seeking medical help                       |                   |                    |             |
| If I find any sign of changes in my breasts, I will immediately consult a doctor | 95 | 98 | 0.180 |
| I feel there are obstacles for me to telling the doctor about changes in my breasts such as lack of confidence, fear, etc. | 46 | 67 | 0.015 |

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**Table 6 Analysis of Knowledge Level before and after Dissemination**

|                      | n   | Average±s.b. | Average Difference±s.b. | 95% CI          | p'          |
|----------------------|-----|--------------|-------------------------|----------------|------------|
| Pretest score        | 100 | 51.08±32.23  | 40±30.02                | 0.29529–0.50582 | 0.000      |
| Posttest score       | 100 | 84.81±22.17  |                         |                 |            |

Note: *Paired t test; CI: confidence interval

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increase in knowledge among medical students after breast cancer and BSE dissemination.

Discussion

Breast cancer incidence and mortality are rapidly growing worldwide, including in Indonesia.\textsuperscript{2,3,19} The etiology of breast cancer is still uncertain, and therefore, adequate primary prevention is uneasy. Moreover, breast cancer in Indonesia has mainly been diagnosed much later.\textsuperscript{20} Early diagnoses improve cancer outcomes while also reducing the cost of various treatments such as chemotherapy and radiotherapy, which could substantially reduce mortality rates.\textsuperscript{21} Therefore, early cancer detection programs are essential in Indonesia.

Knowledge of breast cancer and BSE is one strategy for early breast cancer detection, especially in low- and middle-income countries. In contrast, resources for early detection methods, such as mammography and ultrasonography, are unavailable.\textsuperscript{22} Indonesia National Movement for Prevention and Early Detection of Breast and Cervical Cancer Program was launched in 2015. This program encourages women aged 20 and older to visit primary health care centers once a month.\textsuperscript{23} Public education and awareness is the basic level of resources to develop cultural sensitivity for target populations to convey the value of early detection, breast cancer risk factors, and breast health awareness.\textsuperscript{24}

Over half of the participants in our study were aged 20 and older. Although early screening and diagnosis would not decrease the incidence of breast cancer, it may improve the prognosis and treatment outcomes.\textsuperscript{24} A study in Turkey of women in various age groups showed that BSE is unfamiliar and insufficiently practiced.\textsuperscript{25} Our results showed that breast cancer knowledge among medical students was poor. Health education significantly improves knowledge levels on breast cancer and BSE among participants. The rate of correct answers increases between 51.1% and 84.8%. Similarly, a previous study on nursing students demonstrates a good level of knowledge after training.\textsuperscript{26}

It is the first study conducted on medical students in Indonesia. Our study reveals valuable insight to address the knowledge gap on breast cancer and screening using the Breast Cancer Awareness Measure.\textsuperscript{15} It contains 36 questions with five domains, including signs and symptoms, risk factors, BSE, management, and seeking medical health for breast cancer in female medical students in Indonesia.

Our result shows a lack of knowledge in all domains questioned before intervention in this study. The incidence of breast cancer increases past the age of 35, while the prognosis of the disease acquired at an earlier age is markedly worse due to late screening. Therefore, developing awareness of breast health and BSE among young women in their twenties, such as medical students, is very significant.\textsuperscript{27}

Different published reports highlight an increased risk in the numerous type of cancer, including breast cancer. Although the relationship between breast cancer and alcohol consumption or smoking has not been clearly explained, some studies on the two are reported.\textsuperscript{28,29} Low awareness of these risk factors was also found in the studies among female health care professionals in Saudi Arabia.\textsuperscript{30}

The risk for a woman with familial history of breast cancer is reported to be 1.7–2.5 fold in a first-degree relative, while the bilateral involvement in a mother or sister’s history of breast cancer increases the risk to 5–6 fold.\textsuperscript{29} Familial breast cancer was present in 10% of our sample population. Therefore, enhancing students’ awareness of the familial history of this disease is essential for early detection and prevention.

Among the subjects in our study who were aware of routine BSE practice, only four indicated BSE was a preventive measure, and eleven recognized BSE as a screening method. Moreover, a study in Malaysia showed prevalence rate for regular BSE practice among female medical students aged 20 was 24.4%.\textsuperscript{31} These results emphasize that even if they were aware of the existence of BSE from an online video platform, they lacked sufficient knowledge and needed additional information through their medical curricula.

Conclusions

This study revealed a poor level of knowledge regarding breast cancer among medical students. However, after being given health education about breast cancer and BSE and assessed using the Breast Module of the Cancer Awareness Measure, correct answers were increased. Thus, it is necessary to address this gap on an educational level by modifying the medical curriculum to
include extensive training on breast cancer preventive measures and early diagnosis.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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