



Breast self-examination for prevention and early detection of breast cancer: Insights into knowledge, attitudes, and practices of Sarajevo University female students

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ABSTRACT

Introduction: Breast cancer represents a global public health challenge, often diagnosed at advanced stages due to a lack of awareness and insufficient practice of breast self-examination (BSE). This study aims to assess and compare the knowledge, attitudes, and practices of female students regarding BSE in the context of breast cancer prevention and early detection.

Methods: The cross-sectional study was conducted from March to April 2023 and included 151 female students from the Faculty of Health Studies and the Faculty of Economics and Business University of Sarajevo. The research instrument was a modified questionnaire based on an existing questionnaire from previous research and adapted to the objectives of this study.

Results: The results showed that almost all participants were familiar with BSE, with no significant differences between faculties. Students from the Faculty of Health Studies were more likely to report knowing the right time for BSE (45.1%), while students from the Faculty of Economics and Business were more uncertain and relied more on information from the internet. The main reason for not performing the BSE was a lack of knowledge about the correct technique, which was most frequently stated by economics students. Nevertheless, the majority of participants (91.4%) recognized BSE as an important method for early detection of breast tumors, highlighting the need for further education to strengthen practical skills.

Conclusion: The study found that although most students are aware of the importance of BSE, regular practice is low, mainly due to uncertainty about the correct technique. The results of this study show that there is a need to integrate targeted educational programs into university curricula and health promotion campaigns to reinforce preventive behaviors.

Keywords: Attitude; breast cancer; breast self-examination; female students; global health; health education; knowledge; practice

INTRODUCTION

Breast cancer represents an extremely significant global health challenge, being the most commonly diagnosed form of cancer worldwide. Lack of awareness of early symptoms often delays medical consultation, while breast self-examination (BSE) can help in the early detection of breast cancer (1,2).

In 2020, an estimated 2.26 million cases of breast cancer were reported worldwide, making it the leading cause of

cancer-related death in women. The incidence of breast cancer correlates strongly with human development, with a significant increase expected in regions undergoing economic transition (1). In the Federation of Bosnia and Herzegovina, breast cancer incidence has remained constant with 540 newly diagnosed women per year between 2018 and 2020. It accounts for 6% of all cancer-related deaths in the Federation's population and affects both men and women (3).

Breast cancer affects women worldwide at any age after puberty, with a higher incidence later in life, while about 0.5–1% of cases occur in men. In many countries, national programs emphasize the role of primary and secondary prevention in reducing breast cancer incidence and mortality (4,5). Prevention strategies and health education, including BSE, are crucial for early detection and reduction

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of morbidity and mortality. Screening procedures such as mammography, clinical breast examination, and BSE play a key role in the timely detection of abnormalities and overall breast care, with BSE being particularly effective in raising awareness of breast health and detecting changes early (6,7). Studies conducted among college students suggest that comprehensive education and training programs are needed as part of university curricula to increase understanding of breast cancer and encourage BSE (8).

The previous research has shown that BSE is an important, inexpensive, and easily accessible method for early detection of breast tumors, allowing women to learn about the normal structure of their breasts and detect abnormalities (2,7). Within the healthcare system, nurses play a central role in educating women about BSE, as they must have a thorough knowledge of breast anatomy and structure, as well as cancer risk factors. They inform women about the benefits, risks, and limitations of screening and early detection methods and empower them to take an active role in their breast health (9). Regular BSE screening remains one of the most cost-effective strategies for early detection, especially in developing countries where breast cancer is often diagnosed at an advanced stage and at a younger age. Due to its simplicity, accessibility, and educational potential, it continues to be recommended to raise awareness and facilitate the timely detection of abnormalities (6,10). Previous research examining knowledge, attitudes, and awareness of BSE among female university students shows that although many female students are aware of BSE, there are still gaps in knowledge about proper technique and regular practice (8). Although several studies have investigated the knowledge, attitudes, and practices of BSE among women in different countries, there is no study that specifically compared female students from different faculties in Bosnia and Herzegovina regarding BSE. Our study provides new insights into how academic background influences BSE awareness and practice in this population. This study aims to fill this gap by examining differences in awareness, attitudes, and practices between female students from the Faculty of Health Studies and the Faculty of Economics, University of Sarajevo.

METHODS

The study was designed as a cross-sectional study conducted between March 24 and April 24, 2023, with data collected online through a structured research instrument. The Faculty of Health Studies, University of Sarajevo, and the Faculty of Economics and Business, University of Sarajevo, were intentionally selected to compare students from two different academic domains. The Faculty of Health Studies belongs to the biomedical sciences group, while the Faculty of Economics and Business represents the social sciences. The study involved 151 female students, while male undergraduate and doctoral students were excluded to focus on women's knowledge, attitudes, and practices regarding BSE. One of the limitations of this study is the lack of a formal sample size calculation before data collection.

The questionnaire used in this study is an adapted version of the instrument developed by Asmare et al. (11). Adaptations were made to make the instrument applicable

for female students in Bosnia and Herzegovina. During the adaptation process, some questions were added to capture specific socio-demographic aspects relevant to our population (year of study, type of secondary school, place of residence, parents' education), while some original questions were omitted as they were not applicable in the local context. Questions were also reworded to ensure clearer interpretation and suitability for the student population. All changes were made in consultation with experts in nursing, midwifery, oncology, and public health, who confirmed the content validity of the modified version. Reliability analysis using Cronbach's alpha showed that all questionnaire subscales met the acceptable threshold, with scores above 0.7. These results are slightly lower compared to the original study: "The reliability of the tool on Cronbach's alpha results knowledge = 0.81, attitude = 0.86, and practice = 0.71" (11). For the 18 knowledge-related questions, the Cronbach's alpha coefficient was 0.723; for the 13 attitude-related questions, it was 0.782; and for the 9 practice-related questions, the coefficient was 0.721—all of which exceed the commonly accepted reliability threshold of 0.7, indicating satisfactory internal consistency of the questionnaire.

Participation in the study was voluntary and anonymous. In the introductory section of the questionnaire, participants were informed about the study details, ethical consents, and the fact that the results would be used for research purposes only. By completing and submitting the questionnaire, respondents confirmed their voluntary consent to participate in the research. The data from the questionnaire are fully protected. Permission to conduct the research was obtained from the Ethical board of the Faculty of Health Studies - University of Sarajevo under approval number: 02-1-686-1/23 and from the Ethics Committee of the Faculty of Economics and Business - University of Sarajevo under approval number: 06-2-1298/23.

The analysis was conducted using the IBM Statistical Package for Social Sciences Statistics package for sociological research version 23.0. The results are presented in tabular form using absolute numbers of cases, percentages, arithmetic mean with standard deviation, and range of values depending on the type of data. The questionnaire validation was performed by calculating internal consistency using Cronbach's alpha coefficient, which showed satisfactory scores above 0.7 for all subscales. The distribution of responses was tested using the Shapiro–Wilk test, the results of which indicated that none of the variables met the criteria for normal distribution, so appropriate nonparametric tests were used. To test differences in responses between female students from two faculties, the Mann–Whitney and Chi-square tests were used, while testing the influence of sociodemographic characteristics on knowledge, attitudes, and practices was performed using Spearman's rank correlation coefficient.

The data that support the findings of this study are available from the corresponding author upon reasonable request.

RESULTS

The study included 151 female students from the University of Sarajevo – 71 (47%) from the Faculty of Health Studies

and 80 (53%) from the Faculty of Economics and Business – who completed an online questionnaire between March 24 and April 24, 2023. Health studies students were younger (mean 22.4 ± 3.8 years) than economics and business students (mean 24.3 ± 4.4 years). Most of the economics and business students were in the 5th year (40%), while most health studies students were in the second year (35.2%). The majority of students from both faculties lived in urban areas (Faculty of Health Studies 55%, Faculty of Economics and Business 69%). Most of the students from the Faculty of Economics and Business had completed general secondary school (68%), while most students from the Faculty of Health Studies had completed secondary medical school (61%). No significant differences were observed in parental education level or perceived socioeconomic status, with most students rating their socioeconomic status as satisfactory (Faculty of Health Studies 59%, Faculty of Economics and Business 63%) (Table 1).

Almost all students had previously heard about BSE, with slightly higher awareness among students from the Faculty of Health Studies. Students from both faculties primarily acquired information about BSE through the internet. However, a higher percentage of students from the Faculty of Health Studies, 28.6% of them, heard about BSE through professional literature compared to students from the Faculty of Economics and Business, where only 5.1% of students obtained information from professional literature (Table 2).

A majority of students from both faculties recognized the importance of BSE in the prevention and early detection of breast cancer (Faculty of Health Studies 98.6%, Faculty of Economics and Business 95%). Awareness that early detection improves survival was also high (Faculty of Health Studies 100%, Faculty of Economics and Business 96.3%).

Significant differences were found in the knowledge of risk factors. When asked about a family history of breast cancer, 93% students from Faculty of Health Studies and 60% students from Faculty of Economics and Business answered yes. When asked whether childbirth after the age of 30 years is a risk factor, 40.8% students from Faculty of Health

Studies answered correctly, compared to 12.5% of students from Faculty of Economics and Business. Regarding early puberty as a risk factor, 28.2% of Health Studies students and 7.5% students from Faculty of Economics and Business believed that earlier puberty increased the risk of breast cancer (Table 2).

The recognition of breast cancer symptoms was similar in all faculties. Changes in breast shape or color were detected by 69% of health studies students and 61% of Economics students, while lumps in the breast or armpit were recognized by 82% and 84%, respectively. Nipple discharge and retractions were correctly recognized by 73% of Health Studies students and 56% of Economics and Business students, with a significant difference in “I don’t know” responses (16,9% students from Faculty of Health Studies and 40% students from the Faculty of Economics and Business).

Students from both faculties were most likely to indicate that BSE should be performed once a month, although there was no statistically significant difference between the groups. Health Studies students were more likely to recognize the recommended timing of seven days after menstruation, while economics students were more likely to express uncertainty about the appropriate timing (Table 2).

When asked about the technique, the majority of respondents in both groups stated that BSE was performed by palpation with the palm and three fingers. However, a significant proportion of students in both faculties expressed uncertainty about how the examination should be performed correctly.

The majority of students in both faculties agreed that all women should perform BSE, 87.3% of students from the Faculty of Health Studies and 92.5% of students from the Faculty of Business supported this statement. Similarly, most respondents stated that they were concerned about their breast health, 63.4% of students in the Faculty of Health Sciences and 60.0% students from the Faculty of Business indicated that they care about their breast health (Table 3).

Students from the Faculty of Health Studies (85.9%) and the Faculty of Economics and Business (77.5%) agreed that support programs for the prevention and early detection of breast cancer are necessary, with no significant difference between the groups (Table 3).

Students most frequently reported performing BSE occasionally. The main reason for not performing the exam was a lack of knowledge. Self-examination of the armpit and lymph nodes was practiced by the majority of respondents, while alternate arm raising and examination in front of a mirror was used by a smaller proportion of students. A large proportion of participants had not undergone either a clinical or an ultrasound examination (Table 4).

Self-examination of the armpit and lymph nodes was reported by the majority of students, with 76.1% of health studies students and 67.5% of economics and business students performing this. Alternate arm raising above the head was practiced by 67.6% of Health Studies students and 58.8% of Economics students. The most commonly reported method of self-examination was in front of a mirror, with 44.4% of health studies students and 57.1% of economics students using this method (Table 4).

TABLE 1. Comparative analysis of sociodemographic characteristics (n=151)

Variable	Faculty		Statistical significance of differences
	Faculty of health studies (n=71) (%)	Faculty of economics and business (n=80) (%)	
Age	22.39±3.79	24.3±4.43	Z=-3,300 p=0.001
Study year			
1 st year	5 (7.0)	11 (13.8)	$\chi^2=12,280$ p=0.015
2 nd year	25 (35.2)	14 (17.5)	
3 rd year	15 (21.1)	12 (15.0)	
4 th year	12 (16.9)	11 (13.8)	
5 th year (master's)	14 (19.7)	32 (40.0)	
Completed high school			
Gymnasium	18 (26.9)	48 (67.6)	$\chi^2=54.766$ p=0.001
Technical secondary school	8 (11.9)	21 (29.6)	
Medical secondary school	41 (61.2)	2 (2.8)	

TABLE 2. Knowledge of breast self-examination among students by faculties ($n=151$)

Variables	Faculty of health studies n (%)	Faculty of economics and business n (%)	Total n (%)	χ^2	p
From whom have you previously heard about breast self-examination?					
Doctor	7 (10.0)	8 (10.3)	15 (10.1)	$\chi^2=24.533$	$p=0.001$
Nurse	6 (8.6)	1 (1.3)	7 (4.7)		
Family and friends	9 (12.9)	16 (20.5)	25 (16.9)		
TV/radio	4 (5.7)	13 (16.7)	17 (11.5)		
Newspaper	1 (1.4)	0 (0.0)	1 (0.7)		
Internet	23 (32.9)	36 (46.2)	59 (39.9)		
Professional literature	20 (28.6)	4 (5.1)	24 (16.2)		
Does family history play a role in the development of breast cancer?					
Yes	66 (93.0)	48 (60.0)	114 (75.5)	$\chi^2=22.091$	$p=0.001$
No	1 (1.4)	7 (8.8)	8 (5.3)		
I don't know	4 (5.6)	25 (31.3)	29 (19.2)		

TABLE 3. Attitudes toward breast self-examination among students by faculties ($n=151$)

Variables	Faculty of health studies n (%)	Faculty of economics and business n (%)	Total n (%)	χ^2	p
I believe I perform breast self-examination correctly.					
Strongly disagree	2 (2.8)	7 (8.8)	9 (6.0)	$\chi^2=7.840$	$p=0.098$
Disagree	4 (5.6)	13 (16.3)	17 (11.3)		
Neutral	30 (42.3)	31 (38.8)	61 (40.4)		
Agree	19 (26.8)	14 (17.5)	33 (21.9)		
Strongly agree	16 (22.5)	15 (18.8)	31 (20.5)		
All women should perform breast self-examinations.					
Strongly disagree	3 (4.2)	2 (2.5)	5 (3.3)	$\chi^2=1.872$	$p=0.759$
Disagree	1 (1.4)	0 (0.0)	1 (0.7)		
Neutral	1 (1.4)	1 (1.3)	2 (1.3)		
Agree	4 (5.6)	3 (3.8)	7 (4.6)		
Strongly agree	62 (87.3)	74 (92.5)	136 (90.1)		
Promotional programs for prevention and early detection of breast cancer are necessary.					
Strongly disagree	2 (2.8)	2 (2.5)	4 (2.6)	$\chi^2=7.855$	$p=0.097$
Disagree	0 (0.0)	1 (1.3)	1 (0.7)		
Neutral	4 (5.6)	1 (1.3)	5 (3.3)		
Agree	4 (5.6)	14 (17.5)	18 (11.9)		
Strongly agree	61 (85.9)	62 (77.5)	123 (81.5)		

TABLE 4. Practices of breast self-examination among students by faculties ($n=151$)

Variables	Faculty of health studies n (%)	Faculty of economics and business n (%)	Total n (%)	χ^2	p
Do you perform breast self-examination?					
Yes	27 (38.0)	28 (35.0)	55 (36.4)	$\chi^2=0.986$	$p=0.611$
No	13 (18.3)	20 (25.0)	33 (21.9)		
Occasionally	31 (43.7)	32 (40.0)	63 (41.7)		
If "No," why don't you perform it?					
Fear of discovering change	6 (31.6)	5 (16.7)	11 (22.4)	$\chi^2=2.086$	$p=0.555$
No problems with my breasts	5 (26.3)	8 (26.7)	13 (26.5)		
Not necessary	0 (0.0)	1 (3.3)	1 (2.0)		
I don't know how to do it	8 (42.1)	16 (53.3)	24 (49.0)		
Do you examine the armpit area and lymph nodes?					
Yes	54 (76.1)	54 (67.5)	108 (71.5)	$\chi^2=1.352$	$p=0.163$
No	17 (23.9)	26 (32.5)	43 (28.5)		

Although some differences were observed between faculties in attitudes and practices toward BSE, these were not statistically significant (Tables 3 and 4).

Spearman correlation analysis revealed that the age was positively associated with both knowledge and practice, indicating higher scores in older students, with practice having

a correlation of $\rho = 0.31$ ($p < 0.001$). Students in the Faculty of Health Studies demonstrated greater knowledge than students in the Faculty of Economics and Business. Year of study was positively correlated with knowledge and practice, while place of residence was associated with practice, and type of high school was associated with knowledge. No significant correlations were found between knowledge, attitudes, or practices and other variables, including student attitudes, parental education, or perceived socioeconomic status (Table 5).

DISCUSSION

Students from both faculties demonstrated general awareness of breast cancer and BSE, with the internet being the primary source of information. Health Studies students were more likely to consult professional literature, reflecting curricular differences and structured exposure to health education. These findings align with a study from Damascus University – Syria where social media and the internet accounted for over 50% of information sources, while in Croatia, lectures and professors were the most cited sources (12,13). This suggests that integrating structured health education into non-medical curricula could improve knowledge and early detection practices.

TABLE 5. Comparison of the influence of sociodemographic characteristics on knowledge, attitudes, and practices ($n=151$)

Sociodemographic characteristics	Knowledge score (0–18)	Attitude score (0–13)	Practice score (0–9)
Spearman's rho			
Age			
ro	0.180*	0.092	0.311**
p	0.027	0.262	0.001
n	151	151	151
Faculty			
ro	-0.251**	-0.144	-0.047
p	0.002	0.078	0.565
n	151	151	151
Study year			
ro	0.169*	0.079	0.256**
p	0.038	0.337	0.002
n	151	151	151
Place of residence			
ro	0.066	0.015	0.220**
p	0.418	0.857	0.007
n	151	151	151
Completed high school			
ro	0.195*	0.135	0.104
p	0.022	0.116	0.224
n	138	138	138
Parent's education			
ro	0.001	0.089	0.024
p	0.999	0.278	0.770
n	149	149	149
Socioeconomic status			
ro	0.018	0.107	-0.020
p	0.826	0.190	0.809
n	151	151	151

**Correlation significant at the level of $p < 0.05$. *Correlation significant at the level of $p < 0.01$

Recognition of family history as a risk factor was higher among health studies students (93%) compared to economics and business students (60%), consistent with previous studies indicating that health science students better identify relevant risk factors (14). The lower awareness among non-health students may result from limited exposure to medical content and reliance on informal information sources, highlighting the importance of targeted educational interventions.

Awareness of breast cancer symptoms was relatively high in both groups, with over 80% recognizing lumps and 61–69% detecting changes in breast shape or color. These results are higher than those reported in a study at the College of Bonga in Ethiopia, where only 51% recognized breast lumps as the most common symptom (15). This difference may reflect variations in general health literacy and prior education.

A comparison with a study conducted at the University of Sharjah shows differences in the perceived frequency of BSE (16). While most female students in Sharjah felt that monthly BSE was appropriate, a significant proportion were unsure or felt that it should be performed annually. In our study, the majority of female students in both faculties also recognized monthly BSE as advisable, while a smaller percentage indicated weekly, annual or unsure practices. A study by Fouelifack et al. found that only a minority of participants were aware of the recommended monthly frequency (17). These differences reflect variations in education, health literacy, and access to relevant information among students from different faculties.

Regarding BSE frequency and timing, most students correctly identified monthly examination as advisable, with Health Studies students more accurately reporting the recommended timing seven days after menstruation. This pattern mirrors findings from Raghavan et al. and Čakarun et al., suggesting that curricular exposure in health-related programs improves procedural knowledge. Economics students' uncertainty points to gaps in practical training and underscores the need for structured BSE education in non-medical programs (18,19).

Although a significant proportion of students expressed uncertainty about performing BSE correctly (42.3% Health Studies, 38.8% Economics), the majority recognized its importance (91.5% Health Studies, 91.3% Economics). Similar observations were made in Ethiopia, where 68.3% recognized BSE importance (11). Čakarun et al. consistently reported that more than half of the respondents (51.76%) believed they did not perform BSE correctly (19). The discrepancy between knowledge and confidence highlights the need for supervised practice and hands-on training to enhance competence and reduce uncertainty.

BSE practice was moderate, with occasional self-examination reported by 43.7% of health studies students and 40% of Economics students. Positive correlations with age and year of study suggest that older students and those in higher semesters are more engaged in preventive behaviors. These findings emphasize that increasing awareness alone may be insufficient; practical reinforcement and repeated exposure are crucial to establish regular preventive habits.

BSE is an important breast cancer prevention and early detection tool that helps women detect changes early and

increase personal control over their health. The study highlights the need to integrate BSE education into non-medical curricula to promote preventative behaviors. Universities can do this through special health modules, interactive workshops, and educational campaigns that reach students both inside and outside of health programs. Such initiatives are feasible and can improve knowledge, confidence, and readiness for early detection.

Limiting factors of the study

Although the results provide valuable insights, they cannot be generalized beyond the study population, as the sample was limited to students from only two faculties. The lack of a formal sample size calculation also limits the generalizability of the results. Limitations of this study include potential selection bias due to the online survey format and voluntary participation, which may overrepresent students already interested in health topics.

CONCLUSION

The study showed that the students of both faculties are aware of the importance of BSE for the early detection of breast cancer, but most of them do not perform it regularly. The students of the Faculty of Health Studies showed a higher level of knowledge, especially regarding risk factors, and consulted specialized literature more frequently, while the students of the Faculty of Economics and Business showed greater uncertainty and relied mainly on the Internet. Although awareness of the recommended monthly frequency of BSE was high, many students were unsure of the correct technique, with a lack of knowledge being the main barrier to regular implementation. The implementation of such interventions can guide curriculum development, inform public health strategies, and support breast cancer prevention initiatives beyond Bosnia and Herzegovina. By integrating breast health education into higher education programs and awareness campaigns, these results can contribute to better breast cancer prevention among young women worldwide.

DECLARATION OF INTERESTS

Authors declare no conflicts of interest.

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