

BREAST CANCER SCREENING AWARENESS AMONG TRAINEE DOCTORS OF MULTAN

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Abstract: *This Cross-sectional study was designed to determine the level of awareness of breast cancer screening and early detection techniques among trainee doctors of Multan. This research was conducted at the tertiary care hospital in Multan; from January 2019 to June 2019. The questionnaire included ten awareness questions, yielding a total score of 22. House officers/interns (HOs) and post-graduate trainees (PGRs) were included in the study. Frequencies for categorical variables, median (inter-quartile range) or mean for continuous variables, and Mann Whitney U-test as a test of significant ($p < 0.05$) were used in SPSS for analysis. 328 participants were included. The mean age was 25.5 ± 2.5 years. Half (58.2%, $n=191$) were females, and a half (57.5%, $n=190$) were HOs. Of the PGRs, 66 were of surgery and allied, and 72 were of medicine and allied. The average awareness score was 18.3 ± 1.9 . Most (95.7%, $n=314$) were aware of breast cancer, and nearly two-thirds (69.8%, $n=229$) were aware of its screening protocols. Even though 91.2% ($n=299$) were aware of breast self-examination, only half (46%, $n=151$) knew how to perform it, a third ($n=93$, 28%) recommended it, and a fifth ($n=63$, 19%) recommended screening mammography to female patients regularly. Significantly higher median awareness scores were reported for females as compared to males (19 (3) vs. 18 (3), $p=0.03$), PGRs vs. HOs (19 (2.6) vs. 18 (2), $p=0.02$), and surgical PGRs compared to medicine PGRs (19 (2) vs. 18 (3), $p=0.04$). based on the results it can be concluded that the level of awareness in trainee doctors regarding breast cancer and its early detection techniques was adequate.*

Keywords: Breast self-examination, breast neoplasms, early cancer detection, mammography, mass screening, physicians

Introduction

Breast cancer is the most frequent malignancy among women worldwide and in Pakistan (Sung et al., 2021) (WHO, 2018). It is the most common cause of cancer-related deaths in Pakistan, with a death rate of 28.67 per 100,000 of the population as of 2018 (WHO, 2018). Most patients present with a high grade and a late stage at the time of presentation (Jamal et al., 2014; Khokher et al., 2016; Khurshid et al., 2013). Khaliq et al. reported a 31-128 days gap between a patient's awareness of a sign or symptom of breast cancer and receiving care (Khaliq et al., 2019). In a study done by Shamsi et al., women who had a delay in presentation to a physician for breast cancer, 9.4% of the 499 women had presented to a healthcare provider on initially finding a breast symptom, but no action was taken at that time, contributing to the delay (Shamsi et al., 2020). If the cancer is diagnosed early, it is associated with reduced morbidity and mortality (Davidson et al.,

2013). Therefore, it is prudent to ensure early detection and timely interventions. Two main strategies for early detection include early diagnosis and screening (Naqvi et al., 2016). Early diagnosis is a product of increased awareness regarding the early signs of breast cancer among healthcare workers and the general population (Organisation, 2021). Its components are breast self-examination (BSE), awareness, and clinical breast examination (CBE). On the other hand, screening involves employing tests to detect cancer at a stage even before the occurrence of the symptoms. Mammography and MRI are usually employed for screening, with the latter being reserved for selected high-risk patients only (CDC, 2020).

In Pakistan, with only approximately 20 mammography machines located in major cities and, on average, one district radiologist, mass screening mammography is not practical nor part of national

guidelines (Nishtar et al., 2004). Given the lack of resources here, the mainstay of screening includes breast self-examination and clinical examination, with mammography reserved for high-risk cases or research purposes (Nishtar et al., 2004). Although the evidence does not exist for survival advantage with breast self-examination, it is nevertheless the most cost-effective measure for early diagnosis of breast cancers (Nishtar et al., 2004).

Trainee doctors include house officers (interns, HOs) and post-graduate trainees (PGRs). These doctors frequently work at the primary and secondary healthcare level after completing their training to advance their careers and are usually the first or second healthcare workers who encounter breast cancer patients. Hence, their awareness regarding breast cancer is paramount to facilitate its early detection and community education. The study's main objective was to determine the level of awareness regarding breast cancer screening and early detection techniques among trainee doctors of Multan. A secondary objective was to determine whether the awareness is higher in post-graduate trainees, house officers, and males or females. Other objectives were to determine the practices of the trainees regarding breast self-examination and mammography recommendation and their health-seeking behaviour in case they or someone in their family had a breast-related issue.

Methodology

A cross-sectional study was conducted in all the departments of a tertiary care teaching hospital in Multan from January 2020 to July 2020. Ethical review exemption was obtained since the study involved no intervention. Consecutive non-probability sampling was done. All of the trainees, i.e., house officers (interns, HOs) and post-graduate residents/trainees (PGRs), in the hospital were included in the study. Doctors in teaching or non-training posts were excluded from the study. Sample Size was calculated using the Raosoft application with a confidence level of 95%, a significance level of 5%, a population size of 20,000, and a response distribution of 82% from a previous study by Gul et al. (Gul et al., 2020; Raosoft and Inc, 2004).

A self-administered pre-tested questionnaire was given to consenting participants meeting the above-mentioned criteria, by the principal investigator, with the intention of the trainee filling it out at home (Naqvi et al., 2016). The participant returned it to the investigator within the next two days. Informed consent was obtained from each participant, describing the study's objectives and the assurance of strict confidentiality. No face-to-face interviews

were conducted to protect the identity of those filling in the forms. The questionnaire was piloted on 20 subjects, and questions were refined in consultation with experts in the field.

The questionnaire included demographics, breast cancer and its screening awareness questions, breast-self examination (BSE) and mammography recommendation practices among trainees, and personal health-seeking preferences of female doctors.

Demographic variables included age, marital status, specialty (if any), and training level (HOs or PGRs). It also included the personal and family history of breast cancer and its outcome in the latter case. The following section included ten questions regarding awareness of breast cancer which were similar to, and was marked similarly to, Naqvi et al.'s questionnaire; however, most of the knowledge questions were modified to reflect the awareness of the participants (Naqvi et al., 2016; Naqvi et al., 2018). Each answer had a score of 0 (No), 1 (Yes but unsure), or 2 (Yes) except two questions: category 2 - symptoms and category 6- risk factors, where the questions were open-ended, and answers were marked from 0 to 3 (Naqvi et al., 2016). All scores were added to obtain a total awareness/knowledge score, with 22 being the maximum score. Low awareness/knowledge was considered between scores 8 to 13, adequate from 14 to 18, and excellent from 19 to 22 (Naqvi et al., 2018). The third section included questions regarding BSE and mammography recommendations and the health-seeking preferences of female trainees.

Data were entered and analyzed in SPSS v.20. Missing data was excluded list-wise. In skewed results, age and awareness scores were presented as mean with standard deviation or median and inter-quartile range (IQR). Frequencies with percentages were tabulated for the remaining qualitative variables and awareness score. Since the data was non-parametric, the Mann-Whitney U test was employed to evaluate whether there was a difference in awareness score between males and females, HOs and PGRs, and between surgical and medical specialty PGRs. The significance level was set at 5%. Hence p-value of less than 0.05 was considered significant. The research was conducted according to the principles of the Declaration of Helsinki.

Results

375 questionnaires were distributed to the doctors included in the study. Of these, 347 questionnaires were returned by the participants. Missing data was noted in 19 cases that were excluded list-wise. The final analysis included 328 participants.

The mean age was 25.5±2.5 years. Of these, 58.2% (n-191) were females, and most participants (78.4%, n-257) were single. A little over half (n-190, 57.5%) were house officers (HOs), and 138 (42.1%) were post-graduate trainees (PGRs). Of the PGRs, 66 were of surgery and allied specialty, and 72 were of medicine and allied specialty. The most frequently reported specialties were as follows: 36 (11%) general surgery PGRs, 25 (7.6%) internal medicine, and 13 (4%) PGRs each of pediatrics and gynecology & obstetrics. Of the respondents, 6.7% (22) had a personal history of breast disease; all were benign. 50 (15.2%) reported a family history of breast condition in a relative; of these, 33 had malignant disease and 14 were benign (the remaining 3 respondents were unsure about the diagnosis). The grandmother of 18 respondents suffered from breast condition, the aunt of 16, the mother of 11, the first cousin of 3, and the sister of 2 respondents. Of these, 25 were cured of their disease, 19 had expired, 4 had persistent disease, and 2 had a recurrence.

The frequency of each component scored by the respondents is depicted in Table I. The average awareness score was 18.3±1.9 (12-22), which was adequate. Three participants had a low score; 160 (48.8%) had an adequate score, and 165 (50.3%) had an excellent score. Although 95.7% (n-314) were aware of breast cancer, nearly two-thirds (69.8%, n-229) were aware of its screening protocols. Even though 91.2% were aware of breast self-examination, only half (46%, n-151) knew how to perform it; the most common symptoms and risk factors identified in questions 2 and 6, respectively, are presented in Table II. Painless breast lump was identified by 312 (95.1%) as a common presentation of breast cancer. Among the risk factors, 314 (95.7%) of the doctors reported that breast cancer could be inherited or was part of a genetic syndrome, and almost an equal number (n-312, 95.1%) reported having a personal or family history of breast, ovarian or uterine cancer was a risk factor.

Breast cancer was considered the most common malignancy in Pakistani females by 305 (93%) participants, and 292 (89%) thought that breast cancer could be fatal. However, only a third of the respondents got its lifetime incidence of 1 in 9 correctly (n – 110)(Zaheer et al., 2019). If detected early, three quarter (n-246, 75%) of the participants thought breast malignancy could be cured completely.

As depicted in Table III, only 28% (93) participants recommended breast self-examination, and 19% (63) recommended screening mammography to their female patients regularly, and of those who recommended BSE regularly, 9 (6.5% of males) were male trainees, and 84 (43.9% of females) were female trainees. The most commonly stated reason for not recommending BSE by male trainees was that the patient was of the opposite gender or else shy (91, 66.4%), and by female trainees was that the patient did not present with a breast-related complaint (n – 45, 23.5%). In case they or someone else in their family had a breast lump, the most common reason for any delay in seeking medical attention was shyness or embarrassment (62, 18.9%). If the female doctors in the study noted a breast-related issue, about half (103, 53.9%) would discuss it initially with their doctor, whereas 23% (n-44) would discuss it with their mother. Among the females, a majority (83.7%) preferred getting a clinical breast exam done by a female doctor, and a third (61.7%) preferred a female surgeon if they or someone in their family required breast surgery. Females, PGRs, and surgical PGRs had significantly higher mean ranks of awareness scores than males, HOs, and medicine and allied PGRs, respectively, as shown in Table IV. The score was not significantly different in married and single doctors. Moreover, the positive family and personal history were excluded from the analysis due to the small sample size.

Table I: Awareness and knowledge score of participants

Number	Question	0 = No	1 = Yes, but unsure	1.5 *	2 = Yes**	3 ***
1	Are you aware of breast cancer?	0	14 (4.3)	0	314 (95.7)	0
2	What are the most common symptoms?	0	0	43 (13.1)	91 (27.7)	194 (59.1)
3	Can breast cancer spread to other parts of the body?	10 (3)	9 (2.7)	0	309 (94.2)	0
4	Are you aware of breast cancer treatment?	9 (2.7)	83 (25.3)	0	236 (72)	0
5	Does post-menopausal obesity increase the risk of breast cancer?	83 (25.3)	59 (18)	0	186 (56.7)	0
6	What are the risk factors for breast cancer?	0	0	12 (3.7)	287 (87.5)	29 (8.8)

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7	Are you aware of breast self-examination?	1 (0.3)	28 (8.5)	0	299 (91.2)	0
8	Do you know how to perform breast self-examination?	66 (20.1)	111 (33.8)	0	151 (46)	0
9	Are you aware of breast screening protocols?	12 (3.7)	87 (26.5)	0	229 (69.8)	0
10	Are you aware of mammography?	0	30 (9.1)	0	298 (90.9)	0

* For questions 2 and 6 (symptoms and risk factors), 1.5 score meant one or more answers, both of which are not established risk factors, but are not wrong, or else providing two answers, one of which is an established risk factor and the other is a wrong

** For questions 2 and 6 (symptoms and risk factors), 2 score meant two answers were provided, one of which is an established risk factors according to identified standards and the other is not established but has a likelihood

*** For questions 2 and 6 (symptoms and risk factors), 3 score meant two or more answers, all of which are established risk factors according to identified standards.

Table II: Symptoms and risk factors of breast cancer

Breast cancer symptoms	Frequency
Painless breast lump	312 (95.1)
Nipple retraction or deviation	250 (76.2)
Nipple discharge	219 (66.8)
Change in breast size or shape	169 (51.5)
Axillary lump	159 (48.5)
Breast ulcer	158 (48.2)
Redness or swelling, erythema or cellulitis	116 (35.4)
Painful breast lump	96 (29.3)
Pain in breast/mastalgia	66 (20.1)
Risk factors	Frequency
Inherited, genetic predisposition, genetic syndrome	314 (95.7)
Personal or family history of breast, ovarian or uterine malignancy	312 (95.1)
Use of hormone replacement therapy	288 (87.8)
Late childbirth	265 (80.8)
Early menarche	243 (74.1)
Age over 60 years, or elderly ladies	161 (49.1)
Breast feeding	13 (4)

Table III: Awareness and knowledge regarding screening

Breast self-examination	Frequency (%)*
Is breast self-examination useful for detecting breast cancer early?	325 (99.1)
Correctly identified breast self-examination frequency (monthly)	190 (57.9)
Do you recommend breast self-examination (BSE) to your female patients?	93 (28.4)
What do you think may be the reason for not recommending BSE (n-235)	
Patient was of opposite gender/shyness/socially not acceptable	91 (27.7)
Patient's presentation did not involve breast-related issues	47 (14.3)
I don't know how to perform it	35 (10.7)
Not my specialty	34 (10.4)
Lack of time	20 (6.1)
Not part of patient's management plan	8 (2.4)
Who did you learn breast self-examination from?	
Didactic training and in wards	148 (45.1)
No one	76 (23.2)
Media and internet	39 (11.9)
Doctor/didactic training along with media	32 (9.8)
By yourself	21 (6.4)
Others (Breast care international; family or friends)	12 (3.7)
Mammogram and screening	Frequency (%)

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Do females without any breast symptoms need screening mammography?	217 (66.2)
Can screening lead to decreased mortality?	325 (99.1)
Is mammogram better than ultrasound for screening?	268 (81.7)
Best approach to breast-related symptoms? Triple assessment	269 (82)
Do you offer screening mammogram to asymptomatic females regularly?	44 (13.4)
What modalities can be used for screening?	
Mammogram	314 (95.7)
Breast self-examination	262 (79.9)
Clinical breast exam	234 (71.3)
Ultrasound	219 (66.8)
MRI breast	98 (28)

*It represents the frequency of selecting the answer or the frequency of a positive answer.

Table IV: Comparing mean ranks of groups

Group	Frequency	Median (IQR)*	Mean rank	Mann Whitney U	p-value
Males	137	18 (3)	152	11303	0.03
Females	191	19 (3)	174		
House officers	190	18 (2)	138	11085	0.02
Post-graduate trainees	138	19 (2.6)	190		
Single	257	18 (3)	161	8319	0.5
Married	68	19 (2.9)	163		
Surgery and allied	66	19 (2)	77	1903	0.04
Medicine and allied	72	18 (3)	63		

*IQR - Interquartile range.

Discussion

The trainees included in our study had an adequate overall awareness (18.3±1.9) of breast cancer and its screening. Among a sample of 106 first-year PGRs in India, 59% had satisfactory knowledge about the signs of breast cancer, although 97% identified the risk factors correctly (Bajaj et al., 2021). In a study done by Naqvi et al. in 2016 on the general population, only 55% were aware of breast cancer screening, whereas, in our study, 70% were aware of screening protocols (Naqvi et al., 2018). Genetics or hereditary (n-314, 95.7%) and a personal or family history of breast cancer (n- 312, 95.1%) were trainees' most reported risk factors in the present study. Similarly, Morère et al. reported that heredity/Family history of breast cancer was the most frequently recognized risk factor among physicians in their study (98.1%) (Morère et al., 2018).

Even though 91.2% (n-299) were aware of BSE in our study, only half (46%, n-151) knew how to perform it, a third (n-93, 28%) recommended it, and a fifth (n-63, 19%) recommended screening mammography to female patients regularly. In another study in Saudi Arabia, 370 (93.7%) healthcare professionals were aware of BSE (Heena et al., 2019). In a survey of female students in Karachi that included 909 participants, out of whom 541 were medical students, 71% were aware of BSE, but only 33% performed it (Ahmed et al., 2018). In

2019, 30% of the gynecologists and trainees surveyed in India recommended screening mammography to their patients regularly, which is higher than but similar to our study (Singh et al., 2019). BSE was recommended by 81% of general practitioners in a study by Raza et al. in 2010 in Pakistan, which was much higher than ours, partly because our population was trainees (Raza et al., 2012).

Significantly higher median awareness scores were reported for females, PGRs, and surgical PGRs compared to males, HOs, and medicine PGRs. Singh et al. reported better knowledge of PGRs than house officers (Singh et al., 2019). Similarly, female general practitioners were noted to recommend breast self-examination more frequently (44% vs. 7% of the males) in a previous study (Raza et al., 2012). Moreover, Saeed et al. reported that being examined by a doctor of the opposite gender was a barrier to seeking medical care for breast-related issues due to embarrassment or shyness (Saeed et al., 2021). Most female trainees in our study preferred female doctors for clinical breast exams (83.7%) and as their surgeons (61.7%) if needed.

MRI was less frequently reported as a screening tool in the current study by 28% of the trainees, compared to 55% of the 145 trainees in the study conducted in Quetta in 2010 (Gul et al., 2020).

Conclusion

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Although the awareness and knowledge of participants in our study were adequate, it needs to be even higher, given that breast cancer is the leading cause of cancer mortality in Pakistan (WHO, 2018). Moreover, national guidelines should be in place for patient education and early referral of patients from primary health care. Such should be communicated regularly with healthcare professionals, especially trainees and medical officers, to facilitate early detection of breast cancer.

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References

- Ahmed, A., Zahid, I., Ladiwala, Z., Sheikh, R., and Memon, A. (2018). Breast self-examination awareness and practices in young women in developing countries: A survey of female students in Karachi, Pakistan. *J Educ Health Promot* **7**, 90.
- Bajaj, K., Ravi, A., Thakur, U., Mishra, A., and Khare, S. (2021). Awareness about breast cancer in first-year junior residents at a tertiary care institute in India: A cross-sectional study. *Med J Armed Forces India*. *Med J Armed Forces India* **77**, S208-S214.
- CDC (2020). In "Breast Cancer Screening Guidelines for Women".
- Davidson, A., Chia, S., Olson, R., Nichol, A., Speers, C., Coldman, A., and al, e. (2013). Stage, treatment and outcomes for patients with breast cancer in British Columbia in 2002: a population-based cohort study. *CMAJ Open* **1**, E134-41.
- Gul, P., Mansoor, M., Gul, P., and Arshad, Z. (2020). Breast cancer knowledge and perception among healthcare professionals and senior medical students at Bolan Medical Complex Hospital Quetta, Pakistan. *J Pak Med Assoc* **70**, 2432-2436.
- Heena, H., Durrani, S., Riaz, M., AlFayyad, I., Tabasim, R., Pervez, G., and et, a. (2019). Knowledge, attitudes, and practices related to breast cancer screening among female health care professionals: a cross sectional study. *BMC women's health* **19**, 122.
- Jamal, S., Atique, M., and Khadim, M. (2014). Changing pattern of malignancies: analysis of histopathology based tumour registry data and comparison of three decades at Armed Forces Institute of Pathology, Rawalpindi, Pakistan. *J Pak Med Assoc* **64**, 24-7.
- Khaliq, I., Mahmood, H., Sarfraz, M., Gondal, K., and Zaman, S. (2019). Pathways to care for patients in Pakistan experiencing signs or symptoms of breast cancer. *Breast* **46**, 40-47.
- Khokher, S., Qureshi, M., Mahmood, S., and Sadiq, S. (2016). Determinants of Advanced Stage at Initial Diagnosis of Breast Cancer in Pakistan: Adverse Tumor Biology vs Delay in Diagnosis. *Asian Pac J Cancer Prev* **17**, 759-65.
- Khurshid, A., Faridi, N., Arif, A., Naqvi, H., and Tahir, M. (2013). Breast lesions in adolescents and young women in Pakistan-- a 5 year study of significance of early recognition. *Asian Pac J Cancer Prev* **14**, 3465-7.
- Morère, J., Viguiet, J., Couraud, S., Brignoli-Guibaude, L., Lhomel, C., Pivot, X., and al, e. (2018). Awareness and Misconceptions of Breast Cancer Risk Factors Among Laypersons and Physicians. *Curr Oncol Rep* **20**, 15.
- Naqvi, A. A., Zehra, F., Ahmad, R., and Ahmad, N. (2016). Developing a Research Instrument to Document Awareness, Knowledge, and Attitudes Regarding Breast Cancer and Early Detection Techniques for Pakistani Women: The Breast Cancer Inventory (BCI). *Diseases* **4**, 37.
- Naqvi, A. A., Zehra, F., Ahmad, R., Ahmad, R., Ahmad, N., Yazdani, N., Usmani, S., Younus, I., Badar, S., and Khan, S. J. (2018). Awareness, knowledge and attitude towards breast cancer, breast screening and early detection techniques among women in Pakistan. *J Pak Med Assoc* **68**, 576-586.
- Nishtar, S., Ahmed, A., Bhurgri, Y., Mohamud, K., Zoka, N., Sultan, F., and al, e. (2004). Prevention and control of cancers: National Action Plan for NCD Prevention, Control and Health Promotion in Pakistan. *J Pak Med Assoc* **54**, S45-56.
- Organisation, W. H. (2021). In "Cancer. Screening and early detection."
- Raosoft, and Inc (2004). Seattle. In "Raosoft sample size calculator".
- Raza, S., Sajun, S., and Selhorst, C. (2012). Breast Cancer in Pakistan: Identifying Local Beliefs and Knowledge. *J Am Coll Radiol* **9**, 571-7.
- Saeed, S., Asim, M., and Sohail, M. (2021). Fears and barriers: problems in breast cancer diagnosis and treatment in Pakistan. *BMC Womens Health* **21**, 151.

- Shamsi, U., Khan, S., Azam, I., Usman, S., Maqbool, A., Gill, T., and et, a. (2020). Patient Delay in Breast Cancer Diagnosis in Two Hospitals in Karachi, Pakistan: Preventive and Life-Saving Measures Needed. *JCO Glob Oncol* **6**, 873-883.
- Singh, G., Agarwal, A., Jain, V., and Kumar, P. (2019). Understanding and Practices of Gynaecologists Related to Breast Cancer Screening, Detection, Treatment and Common Breast Diseases: A Study from India. *World J Surg* **43**, 183-191.
- Sung, H., Ferlay, J., Siegel, R., Laversanne, M., Soerjomataram, I., Jemal, A., and al, e. (2021). Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin* **71**, 209-249.
- WHO (2018). In "HEALTH PROFILE: PAKISTAN".
- Zaheer, S., Shah, N., Maqbool, S., and Soomro, N. (2019). Estimates of past and future time trends in age-specific breast cancer incidence among women in Karachi, Pakistan: 2004–2025. *BMC Public Health* **19**, 1001.



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