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Knowledge, attitude and practice regarding clinical and self breast examination among radiology professionals

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Aim: This study aims to assess the knowledge, attitudes and practices of radiology professionals in Jordan in regard to breast cancer (BC) screening. Methods: An IRB approved, online-based study was carried out in Jordan. The participants were radiologists (n = 8) and radiographers (n = 64). Results: The results showed that although 61.8% of participants were knowledgeable about BC prevention, only 65.7% (n = 48) of respondents performed breast self-examinations (BSE) on themselves, 28.7% (n = 21) underwent clinical breast examination (CBE) and 15.1% (n = 5) underwent either diagnostic or screening mammography. Conclusion: Radiology professionals are generally aware of the benefits of BC screening and its ability to facilitate early diagnosis of BC. Although some practitioners advise their relatives to perform BSEs and attend CBE, low percentages of respondents performed BSEs themselves or undergo CBE.

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Keywords: breast screening • breast self-examinations • clinical breast examination

Breast cancer (BC) is the most common cancer in women worldwide [1] as well as the second leading cause of cancer deaths in Jordan [2]. Since the 1970s, the 5-year survival rate in Jordan has risen from 50 to 80%, mainly due to the improvement in diagnostic techniques and technologies that are associated with BC [3,4]. However, higher death rates exist among low socio-economic sectors and certain ethnic groups [5]. Early detection is challenging as BC can be asymptomatic [6]. Detection of BC in its early stages can be achieved by different methods, including routine breast self-examination (BSE) and clinical breast examination (CBE) and mammography.

Screening mammography has been found to significantly reduce BC mortality rates in women aged between 50 and 74 years [7]. In addition, mammography is a valuable diagnostic tool; mammography can detect many smaller cancers, thus increasing the net benefit to the population as a whole [8]. Although mammography uses radiation, it uses much lower dose than ionizing modalities such as computed tomography or nuclear medicine (scintimammography), both rarely used for BC imaging, but higher than nonionizing examinations such as ultrasound or magnetic resonance imaging [9]. Mammography can either be performed when symptoms are present, called diagnostic mammography, or on healthy asymptomatic patients, called screening mammography. Early detection provides more effective treatment options with an overall better prognosis [10,11]. Screening is estimated to have saved \$1.5 bn in treatment costs in the USA [12].

BSE is a personal physical test, where women are encouraged to palpate their own breasts each month on the second week of their menstrual cycle to feel for any changes. BSE helps to alert women to any abnormalities in the breasts [13]. Regular BSE makes women more aware of their breasts, leading to a higher chance of detecting any changes in the breast tissue, thus leading to an earlier diagnosis of BC [14].

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CBE is designed to find BC at an early stage before metastasizing, thus increasing the survival chances. CBE performed by a trained healthcare provider involves a physical examination of the breasts and underarm. CBE is a low-cost test that could improve the detection of BC. CBE can form part of routine, periodic examinations, especially for women <50 and more than 69 years of age, for moderate- and high-risk women and for women who have had a BC [15].

The 'Jordan Breast Cancer Program' has published a set of guidelines for women in Jordan to follow. These guidelines include monthly BSE for all women postpuberty. Breast Screening in Jordan is a biennial mammography for women from 40 to 49 years and annually for women above the age of 50 years [16]. The Jordan Breast Cancer Program provides CBE free to women above the age of 40 years. The mammogram is provided at a subsidized cost of \$42 USD. A 20% discount is applied on multiple investigations, which include mammograms for the members of cancer care program [17]. The combination of these discounts and free services aims to reduce the barriers for women from all socio-economic backgrounds.

Although there are two studies examining knowledge, attitudes and practice among radiologists and whether or not they undergo breast-screening themselves [18,19], these studies have been limited to radiologists and did not include radiographers [19]. To the best of our knowledge, this is the first study to assess the level of knowledge, attitude and practice among radiology professionals (radiologists who interpret the imaging scans and radiographers who perform the scans) in performing BSE, CBE and mammograms on themselves and their relatives in Jordan. Additionally, this work aims to determine the barriers and enablers of BSE, CBE and mammography for radiologists and radiographers.

Materials & methods

This cross-sectional study based on quantitative methodology was conducted over approximately in April of 2018. The study was an online-based survey (Google survey) carried out in Jordan. Eligible participants of the study were radiologists and radiographers, and these were recruited using two nonprobability sampling techniques; convenience and snowball sampling. A total of 72 respondents were recruited. Power analysis using Cohen's formula (1992) indicated that a sample of 72 would give a 90% chance of detecting correlations in \pm 0.223 at <0.05 level.

Instruments & materials

Data were collected via a questionnaire consisting of 26 questions. The questionnaire was distributed among eight radiologists and 64 radiographers via a combination of social media and print. A printed version of the questionnaire was given out in King Abdullah Universal Hospital, Al-Ramtha and Royal Medical Services, Amman; the study sample was selected using the nonprobability convenience sample. The 26 questions were of multiple-choice type and short answer questions, divided into five parts.

In the first part, participants had to provide their age, hometown, gender, specialty in radiology, workplace and job type. The second part inquired about their experience in radiology department and in mammography in particular. The third part was designed to test participants' general knowledge on how common BC is in Jordan, and its symptoms. The fourth part was designed to explore attitudes in advising patients undergoing BSE, CBE and mammography and the accurate time for performing each investigation. The final part enquired of participants whether they had ever undergone any BSE, CBE or mammography themselves or recommended them to their relatives. Multiple-choice questions were used in section 1 and short answer questions were implemented for sections 2, 3, 4 and 5.

Statistical analysis

Responses were transferred to an electronic spreadsheet for analysis; each was numerically coded to be entered SPSS (IBM Corp., released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY, USA: IBM Corp.) For statistical analysis, data were analyzed using the χ^2 test, a one-way ANOVA, and the independent samples *t*-test; p-values ≤ 0.05 were considered significant.

Results

Characteristics of the participants are shown in Tables 1 and 2. The age of the respondents ranged from 22 to 59 years with a mean of 28 years. Most were female radiographers working fulltime in a public hospital and all were from Jordan. In total there were 56 females and 16 males, most of them working in public hospitals (n = 37), university hospitals (n = 22) and some in the private sector (n = 13).

| Table 1. Personal and professional information about participants. | | | | | | |
|--|--------------------------|---------------|----------------|--|--|--|
| Characteristics | | Frequency (n) | Percentage (%) | | | |
| Age | <25 | 40 | (55.6%) | | | |
| | 25–35 | 20 | (27.8%) | | | |
| | 36–40 | 6 | (8.3%) | | | |
| | More than 40 | 6 | (8.3%) | | | |
| Sex | Males | 16 | (22.2%) | | | |
| | Females | 56 | (77.8%) | | | |
| dof | Radiologist | 8 | (11.1%) | | | |
| | Radiographer | 64 | (88.9%) | | | |
| Speciality | Breast imaging | 5 | (6.9%) | | | |
| | Cardiovascular radiology | 6 | (8.3%) | | | |
| | Musculoskeletal | 12 | (16.7%) | | | |
| | Other | 49 | (68.1%) | | | |
| Workplace | University hospital | 22 | (30.6%) | | | |
| | Private hospital | 13 | (18.1%) | | | |
| | Public hospital | 37 | (51.4%) | | | |
| Job type | Full time | 45 | (62.5%) | | | |
| | Part time | 27 | (37.5%) | | | |
| | 6–10 h | 4 | (5.6%) | | | |
| | 11–15 h | 1 | (1.4%) | | | |

| Table 2. Experience in mammography, in particular, the number of mammograms done or read yearly. | | | | | | | |
|--|----------|---------------|----------------|--|--|--|--|
| Questions | Answers | Frequency (n) | Percentage (%) | | | | |
| Do you read/do mammograms | No | 32 | (44.4%) | | | | |
| | Yes | 40 | (55.6%) | | | | |
| How many mammograms do you read per year | 0–240 | 66 | (91.7%) | | | | |
| | 241–480 | 2 | (2.8%) | | | | |
| | 481–960 | 1 | (1.4%) | | | | |
| | 961–1200 | 3 | (4.2%) | | | | |
| For how many years have you been reading or performing mammograms | 0–5 | 67 | (93.1%) | | | | |
| | 6–10 | 4 | (5.6%) | | | | |
| | 11–15 | 1 | (1.4%) | | | | |

The group of respondents had a high knowledge of breast examinations. As expected, 95.8% (n = 69) of respondents believed that BSE was important for early diagnosis, with only three respondents believing the opposite. A total of 87.5% of respondents believed correctly that BC was one of the most common causes of death in Jordan. 51.4% (n = 37) correctly stated that cancers could be treated in its early stages with only surgery and 48.6% believed that BC could not be treated in its early stages with surgery alone. Surprisingly, numerous respondents did not choose the exact symptoms that could raise BC concerns properly, with only 12.5% (n = 9) knowing all of the correct symptoms (Table 3).

BSE, CBE and mammography together were recommended to relatives by 15.1% (n = 11) of participants and 84.9% did not recommend BSE, CBE and mammography. Advising patients to perform BSE once a month was recommended by 69.4% (n = 50) while 'once every 2 months' was recommended by 20.8% (n = 15) and 9.7% (n = 7) advised twice a month. Only 30.6% (n = 22) would correctly direct patients to do breast examination on day 5–7 of the menstrual period [20]; 45.8% (n = 33) of respondents indicated that they would direct their patients to do examination immediately after menstruations and 19.4% (n = 14) indicated they would not recommend it any particular time during the cycle. The independent sample t-test indicated that females would advise patients to undergo self-breast examination and mammography more often than males (μ = 1.50, SD = 0.713; p = 0.026 < 0.05).

Table 4 summarizes the frequency of responses regarding whether the participants performed breast screening or not. The majority of respondents, including men, 65.7% (n = 48), do not perform BSE, while 34.2% (n = 25)

| Table 3. Frequency distribution of knowledge in frequency of breast cancer. | | | | |
|--|------------|------------|--|--|
| Question | Yes | No | | |
| Breast self-examination is important for early diagnosis | 69 (95.8%) | 3 (4.2%) | | |
| Breast cancer is among the three most common causes of death impacting females in Jordan | 63 (87.5%) | 9 (12.5%) | | |
| Can patients with early stage breast cancer be treated with only surgery | 37 (51.4%) | 35 (48.6%) | | |
| What could raise concern in breast cancer cases? | | | | |
| Nipple inversion | 42 (58.3%) | | | |
| Ulceration | 20 (27.8%) | | | |
| Focal nodularity | 28 (38.9%) | | | |
| Asymmetry with other breast | 30 (41.7%) | | | |
| Skin swelling | 30 (41.7%) | | | |
| Knew all the correct symptoms † | 9 (12.5%) | | | |
| The correct answers are in bold. [†] Respondents had to choose all five symptoms to consider the answer to be right. | | | | |

said they do on themselves. Of those who do not, 29.2% (n = 21) said that they do not have time; 26.4% (n = 19) indicated that they lacked the technique of doing it; and 2.8% (n = 2) stated that they assumed that it was not a beneficial procedure. With CBE, 28.7% (n = 21) underwent this examination and the other 71.2% (n = 52) never did for several reasons including 25.0% (n = 18) not having enough training, 15.3% (n = 11) not having enough time, 12.5% (n = 9) being afraid of actually finding a cancer and 4.2% (n = 3) 'seeing no benefit'. Two respondents thought that at under the age of 40 no CBE is needed.

With mammographic examination, 15.1% (n = 5) underwent a mammogram. Mammography every 2 years was recommended by 38.9% (n = 28), 48.6% (n = 35) suggested a yearly program of mammography and 12.5% (n = 9) advised twice a year after the age of 40.

None of the variables had significant effect on performing breast examination.

Discussion

Breast screening is one of the most efficient ways to detect lumps or masses before they start to metastasize [15]. BSE is simple, noninvasive and does not require much time [21]. Many studies worldwide have discussed the role of healthcare providers [21], students [20] and teachers [22] in routine emphasis of breast examinations (self, clinical and mammograms).

Previous work highlights the need for promotion of BC screening and more research about the topic in the Arab world. Although recent years show a slight increase in research in this area, further research is still needed if BC screening is to achieve earlier detection and the consequent increased treatment options. More research is needed to identify and mitigate the barriers associated with different populations in Arab countries before culturally appropriate, socially acceptable, effective intervention strategies can be recommended [14]. Healthcare professionals, including radiologists and radiographers, carry the responsibility of improving the society's health by being a direct source of accurate knowledge of breast examinations. In addition to that, they are also responsible for increasing awareness of BC to the public [23]. This awareness includes giving the public the ability to recognize and differentiate any changes in breast shape, size or skin texture. Furthermore, healthcare professionals are encouraged to improve the patient's awareness and attendance at breast screening. One way to do so is to model that behavior themselves. These healthcare professionals also carry the responsibility of changing public behaviors to reduce risk of cancer such as avoiding exposure to tobacco products, maintaining a healthy weight, staying physically active throughout life, and consuming a healthy diet, as these activities can substantially reduce one's lifetime risk of developing, or dying from, cancer [18]. Since radiology professionals might have a considerable influence on their patients and friends, they should have high level of awareness and knowledge regarding breast screening [24].

The overall results from this study suggest good knowledge about BC and the importance of its early diagnosis (87.5%). The majority of participants understood that early detection is important in diagnoses and that BC is one of the three most common cancers affecting Jordanian women. However, only 12.5% chose all of the symptoms (nipple inversion, ulceration, focal nodularity, asymmetry with other breast, skin swelling) as important BC signs and symptoms, which raises concerns regarding early BC detection.

| Table 4. Association between personal information and practice performing breast examinations. | | | | | | |
|--|---|------------|--|------------|---|------------|
| Variables | BSE | | СВЕ | | Mammography | |
| | Yes % (n) | No % (n) | Yes % (n) | No % (n) | Yes % (n) | No % (n) |
| Age | | | | | | |
| <25 | 30% (12) | 70% (28) | 18.1% (13) | 37.5% (27) | 7.4% (2) | 51.9% (14) |
| 25–35 | 9.7% (7) | 18.1% (13) | 5.6% (4) | 22.2% (16) | 0.0% (0) | 14.7% (4) |
| 35–40 | 2.8% (2) | 5.6% (4) | 4.2% (3) | 4.2% (3) | 3.7% (1) | 0.0% (0) |
| More than 40 | 5.6% (4) | 2.8% (2) | 1.4% (1) | 6.9% (5) | 3.7% (1) | 18.5% (5) |
| | x ² = 3.101, df = 3 p-value = 0.376 | | x ² = 2.743 df = 3 p-value = 0.433 | | x ² = 6.530 df = 3 p-value = 0.088 | |
| Gen der | | | | | | |
| Males | 11.1% (8) | 11.1% (8) | 8.3% (6) | 13.9% (10) | 3.7% (1) | 18.5% (5) |
| Females | 23.6% (17) | 54.% (39) | 20.8% (15) | 56.9% (41) | 11.1% (3) | 66.7% (18) |
| | x ² = 2.118df = 1 p-value = 0.124 | | x2 = 0.691 df = 1 p-value = 0.534 | | x ² = 0.021df = 1 p-value = 1 | |
| Job | | | | | | |
| Radiologist | 1.4% (1) | 9.7% (7) | 5.6% (4) | 5.6% (4) | 0.0% (0) | 11.1% (3) |
| Radiographer | 33.3% (24) | 55.6% (40) | 23.6% (17) | 65.3% (47) | 14.8% (4) | 74.1% (20) |
| | x ² = 1.961df = 1 p-value = 0.158 | | x ² = 1.891 df = 1 p-value = 0.220 | | x ² = 0.587, df = 1 p-value = 0.605 | |
| Speciality | | | | | | |
| Breast imaging | 2.8% (2) | 4.2% (3) | 2.8% (2) | 4.2% (3) | 0.0% (0) | 3.7% (1) |
| Cardiovascular radiology | 2.8% (2) | 5.6% (4) | 2.8% (2) | 5.6% (4) | 0.0% (0) | 3.7% (2) |
| Musculoskeletal radiology | 6.9% (5) | 9.7% (7) | 5.6% (4) | 11.1% (8) | 0.0% (0) | 7.4% (2) |
| Other | 22.2% (16) | 45.8% (33) | 18.1% (13) | 50.0% (36) | 100.0% (4) | 70.4% (19) |
| | x ² = 0.414df = 3 p-value = 0.937 | | x ² = 0.600 df = 3 p-value = 0.896 | | x ² = 0.817df = 3 p-value = 0.847 | |
| Work location | | | | | | |
| University hospital | 12.5% (9) | 18.1% (13) | 9.7% (7) | 20.8% (15) | 7.4% (2) | 44.4% (12) |
| Private hospital | 5.6% (4) | 12.5% (9) | 8.3% (6) | 9.7% (7) | 0.0% (0) | 7.4% (2) |
| Public hospital | 16.7% (12) | 34.7% (25) | 11.1% (11) | 40.3% (29) | 7.4% (2) | 33.3% (9) |
| | x ² = 0.482 df = 1 p-value = 0.624 | | x ² = 2.910 df = 2 p-value = 0.233 | | x ² = 0.450 df = 2 p-value = 0.799 | |
| Job type | | | | | | |
| Full time | 19.4% (14) | 43.1% (31) | 16.7% (12) | 45.8% (33) | 11.1% (3) | 48.1% (13) |
| Part time | 15.3% (11) | 22.2% (16) | 12.5% (9) | 25.0% (18) | 3.7% (1) | 37.0% (10) |
| | x ² = 0.547df = 2 p-value = 0.761 | | x ² = 0.363 df = 1 p-value = 0.547 | | x ² = 0.48 2df = 1 p-value = 0.624 | |

Although female participants had good knowledge about breast examinations, low rates of practice in both BSE and CBE were seen. Overall, only 30.4% of the study participants performed BSE and 26.3% visited doctors to have CBE. The low rates of CBE and BSE among radiology professionals in Jordan may be suggestive of inadequate emphasis on the importance of primary prevention in the radiographers and radiologists' curricula during education. In spite of the effort toward improving health education in the developing countries, it has been realized that in other medical domains, healthcare professionals, including nurses, are not adequately educated about cancer risk factors, risk assessment or cancer prevention [25]. This shortcoming in education may result in some difficulties in performing BSE. A case–control study was performed by Hassan *et al.* [26] to identify knowledge and practice BSE among nursing students. They found that only 52% of nursing students were able to perform BSE, which is similar to current study results. Therefore, educational intervention regarding BC and the significance of screening for BSE are vital steps in enhancing early detection [27]. The main purpose of the educational programs is to change radiology professionals behavior as they target their existing beliefs, which is an active way of developing screening practices [28].

Awareness campaigns about BC are considered effective educational methods as they increase women's motivation and improve the physicians' awareness and attitudes [29]. Previous studies stated that health care providers' education may help them to be more aware and sensitive to the customs and beliefs of Muslims [30]. BC screening could be promoted by using survivors from BC to educate women [31] and to change the typical view for cancer as a fatal disease to a chronic disease that can be defeated. Then women will be encouraged to undergo breast screening driven by the hope that they may survive a potential cancer [32]. The participation and interest of men in BC screening is also important as they may play a key role in saving Arab women's lives by encouraging and supporting breast examinations [31]. Therefore, men should play more of a role in encouraging and supporting breast examinations.

Several studies have noted that cancer prevention education is often absent from medical curricula [33]. Accordingly, producing and sharing evidence-based learning resources and including these in medical and allied curricula would be an important step in bridging the information gap. Based on the current data, it appears that there is a need for continuing professional education programs in radiology. Emphasis should be laid on CBE in undergraduate and postgraduate courses, especially for radiographers as they are mostly involved in patient care and education.

The largest proportion of study participants mentioned that time was the main obstacle that prevented them from doing these examinations. This finding agreed with other studies demonstrating that the responsibilities of working women forced them to postpone their own health affairs for the sake of their family members [34]. A potential solution would be for employers to help organize CBE in the place of employment, thus helping to overcome one of the barriers.

Although the current study showed that radiologists and radiographers aware of the benefits of mammogram screening, only one out of nine participants above 40 years underwent mammography. There may be several reasons for the low compliance. Dibble *et al.* [35] also reported factors such as mammography-induced pain and discomfort in addition to radiation exposure during a mammogram as reasons for not attending. Another explanation is that women may have the fear of being diagnosed with cancer. An addition consideration for medical personal is that they may be reserved about showing their breasts to their colleagues, which was a common finding. The strongest factor that could affect attendance at mammography is that study respondents did not believe that they would be susceptible to BC. Therefore, programs for radiologists and radiographers, especially for those who do not believe they may be diagnosed with BC, should be encouraged. Through such programs, awareness of screening as well as the importance of early diagnosis and prompt treatment should be emphasized.

Using self-reported data presents a number of limitations. First, mammography, CBE and BSE performance were self-reported, whereas certainly CBE and mammography data can be extracted with more validity via medical record review. Any voluntary survey is potentially subject to some selection bias [36]. Moreover, most of the study participants were younger than 40 years, which could affect the mammography screening results. Future work will focus on assessing the knowledge, attitude and practice of radiology professionals. We can set a standard and compare the knowledge and attitude in nonprofessional groups.

Our findings are in agreement with the findings from a previous study done among general practitioners in Australia [37]; their lack of knowledge of some aspects of BC is problematic. Not having the correct information may lead them to provide incorrect information to the patients about BC. In the UK, a study of general practitioner's knowledge about BC risk factors showed that more than half of the participants were able to correctly identify BC symptoms as compared to 12.5% in our study [38]. Therefore, we recommend more continuing professional education for radiographers and radiologists on BSE, CBE and screening.

Further work is needed to encourage radiologists and radiographers to undertake breast examination assessment courses in order to learn BSE and encourage them to visit doctors to perform both CBE and mammography.

Conclusion

This is the first study in Jordan that assesses the knowledge, attitudes and practice of radiologists and radiographers about breast examinations. The results demonstrate that radiologists and radiographers are aware of the benefits of BC screening and its ability to facilitate early diagnosis of BC. They advise relatives to undertake screening. However, there was a low incidence of participation in BSE, CBE and mammography. Time, knowledge and social factors were barriers. Information on how to perform BSE, and time to undergo CBE should be considered as priority interventions in this workforce.

Summary points

- Radiology professionals carry responsibility of improving the society's health by being a direct source of accurate knowledge of breast examinations.
- Radiology professionals can have a considerable influence on their patients and friends therefore should have high level of awareness and knowledge regarding breast screening.
- Radiology professionals are aware of the benefits of breast cancer screening and its ability to facilitate early diagnosis of breast cancer.
- Only 30.4% of the study participants performed breast self-examinations (BSE), and 26.3% visited doctors to have clinical breast examination (CBE).
- Time, knowledge and social factors are major barriers facing radiology professionals in breast examinations.
- Information on how to perform BSE, and time to undergo CBE should be considered as priority interventions in this workforce.
- This study recommends more continued professional education for radiology professionals on BSE, CBE and mammographic screening.

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Ethical disclosure

The authors state that they have obtained appropriate institutional review board approval or have followed the principles outlined in the Declaration of Helsinki for all human or animal experimental investigations. In addition, for investigations involving human subjects, informed consent has been obtained from the participants involved under the ethics no. (261/2018).

Author contributions

Guarantor of integrity of entire study, M Rawashdeh; study concepts/study design or data acquisition or data analysis/interpretation, all authors; data collection, M Rawashdeh; manuscript drafting or manuscript revision for important intellectual content, all authors; approval of final version of submitted manuscript, all authors; literature research, M Rawashdeh; study design, all authors; statistical analysis, M Rawashdeh and manuscript editing, all authors.

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