

Breast Cancer Knowledge and Screening Practice and Barriers Among Women in Madinah, Saudi Arabia

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Abstract A breast screening program may help to reduce cancer mortality rates among women. However, the use of the screening program by women in Madinah city is low, and studies examining its practice and barriers of low uptake are sparse. To identify breast cancer knowledge, practice and screening barriers among women attending primary health centers (PHC) in Madinah, Saudi Arabia. A primary health center-based cross-sectional study was performed in Madinah city in 2015. A multistage stratified cluster sample was obtained and included 465 women (15 years and older) from five PHC. Data concerning socio-demographics, knowledge about breast cancer, and practice and barriers of mammography use were collected using a structured questionnaire. The mean age of the studied 465 women was 34.9 ± 12.2 years. Of these women, 27.7 and 38.5 % received mammography and performed breast self-examination, respectively. A high level of poor knowledge about breast cancer was detected in the overall studied women and those who never received a mammography, particularly knowledge related to the risk factors of breast cancer. The most important predictors of the barriers to mammography were incorrect beliefs about mammography and its procedures. A

belief that mammography is painful was significantly associated with a 56 % reduction in its use (OR = 0.44; 95 % CI = 0.22–0.88). The high levels of poor knowledge about cancer breast observed in this study reflect the need for greater efforts to increase breast awareness education.

Keywords Breast cancer · Screening · Health behavior · Information seeking behavior · Early detection of cancer · Preventive health services · Madinah · Saudi Arabia

Introduction

Breast cancer is by far the most frequent cancer in women worldwide. It is one of the leading causes of cancer mortality in women and constitutes 15 % of female cancer deaths [1]. The incidence rates of breast cancer are increasing in most countries at a younger age than ever before, and these changes are usually greatest where the rates had been previously low [2].

In Saudi Arabia, while it had once been presumed that the incidence of breast cancer in women was low, more recent data has indicated that breast cancer has become a significant disease in this community, as it is elsewhere in the world [3]. According to the Saudi Cancer Registry, 1994–2007, female breast cancer has been the most common cancer among Saudi women for 14 consecutive years [4].

Breast cancer is affected by multiple risk factors, including family history/genetic background, which accounts for approximately 15 % of all breast cancer cases [5]; hormonal exposures, such as an early age at menarche, late age at menopause, fewer number of children and nulliparity; late age at first birth; little or no breastfeeding; and long-term use of hormone replacement therapy [6–10]. A high breast density and a history of benign proliferative breast disease have also been shown to be significant markers of breast cancer risk [11, 12].

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Regular mammogram screening has been used to detect breast cancer at early stages and has been shown to be effective in reducing breast cancer deaths [13]. High participation rates are essential for the success and effectiveness of any organized cancer screening program. This requires effective recruitment and retention strategies. A screening program for breast cancer was established in Madinah city in 2009 as a collaboration between the Ministry of Health (MOH) and Taibah Screening Center (TSC), which is a not-for-profit, non-governmental organization that specializes in early detection of diseases. The main objectives of the center were early detection of breast cancer, cancer cervix, cancer colon and prostate, as well as health education and increasing awareness about cancer among population in Madinah city. Primary health care (PHC) staff were oriented and briefed on the screening program and were encouraged to refer patients to TSC for screening. However, the utilization of the screening programs in Saudi Arabia is very low and reported by previous studies to be 3–8 % [14, 15]. A review of the literature showed a lack of data about attitude and barriers of cancer screening. From this perspective, this study aimed to assess knowledge about breast cancer among women attending PHC centers in Madinah city, as potential determinants of the use of screening. In addition, this study aimed to assess the practice and perceived barriers of mammography screening among the studied women.

Methods

Study Design

The present study is a cross-sectional study analyzing data obtained from 465 women attending primary health care centers in Madinah city, Saudi Arabia, to assess the knowledge, practice, and barriers of breast cancer screening among them.

Sampling Procedures

A multistage, stratified cluster sampling procedure was used. The PHC centers in Madinah city have been defined in strata according to its geographic location. Next, in each stratum, PHCs were selected according to the probability proportional to size (PPS) cluster sampling technique, based on the average number of female attendants in each PHC center. In the selected five primary health centers, a systematic sampling approach was used to select the study subjects (patients and companions). Each selected center was visited on multiple days and at various times of the day.

The sample of this study was calculated on the assumption that the prevalence of good knowledge regarding breast cancer among women attending PHC centers was 50 %, and there was an assumed precision of 4 % and a confidence interval of 95 %. The study included any female aged 15 years or more

who attended the center as a patient or a companion at the time of the research team visit.

Data Collection

The data were collected from selected participants by the research team using a pre-tested structured questionnaire. The questionnaire included socio-demographic data, knowledge questions on breast cancer, and data related to the practice and perceived barriers towards breast cancer screening. Participants were informed about the purpose and scope of the research, and they were given verbal consent prior to completing the questionnaire. In addition, no one was obliged to participate in the study. Ethical considerations were also taken to ensure the confidentiality and privacy of the collected data. Finally, the Deanship of Scientific Research Ethics Committee at Taibah University, Madinah, Saudi Arabia, approved the study protocol.

Study Variables

The knowledge variables were based on 21 closed questions, including questions about the risk factors of cancer breast (15 questions) and its clinical picture (5 questions), and the last question was about the sources of information. Knowledge about breast cancer was assessed individually and by its categorization as good, fair, and poor according to the knowledge score given for each of its components. Good knowledge was defined as more than 75 % correct answers, fair knowledge was between 50–75 %, and poor knowledge was less than 50 %. The practice of breast cancer screening, including mammography, breast self-examination (BSE), and clinical examination was collected. The study questionnaire also included questions about the obstacles and barriers preventing women from undergoing a mammography. The included barrier items ($n = 11$) were scored as follows: 1 = totally disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = totally agree. To examine the most important barriers (predictors) preventing women from receiving mammography, each barrier item was recorded as the following: “totally agree” and “agree” = 1, whereas “totally disagree,” “disagree,” and neutral = 0.

The socio-demographic data included age in years (recoded as <40, 40–50, and >50), nationality (Saudi vs. non-Saudi), marital status (single, married, widow, and divorced), educational level (illiterate, basic education, university, and higher), occupation (housewife vs. employed), family income categorized as low, middle, and high (monthly income of <5000, 5000–20,000, and >20,000 Saudi Riyals, respectively), family history and friend’s history of breast cancer (yes vs. no).

Statistical Analysis

Data were presented using frequencies, means, and standard deviations as appropriate. The practice of breast cancer

screening (mammogram and SBE) was assessed and compared according to the subjects’ characteristics. Knowledge about breast cancer was also assessed among all subjects as well as by their practice of different breast cancer screening using appropriate statistical tests. The criteria of significance were considered at a *p* value of ≤0.05. Furthermore, the barrier items preventing women from practicing mammography were assessed according to the five scores using predictive logistic regression models based on stepwise regression with a *p* value of 0.10 as an entry criterion and a *p* value of 0.15 as an exclusion criterion. The studied items were entered into the regression model as follows: totally agree and agree = 1, whereas totally disagree, disagree, and neutral = 0.

Results

Of the studied 465 women, there were 129 (27.7 %) women who reported that they ever received a mammography during their life. Of those 129 women, 68 (52.7 %) had a mammography during the study year, 29 (22.5 %) had a mammography within the last year, and 32 (24.8 %) had a mammography 2 years before. Among the recommended age group for mammography, 43.2 % of women aged 40–50 years and 60 % of women above the age of 50 years reported that they ever had a mammogram. Of the 38.5 % (179 out of 465 women) studied women who reported performing breast self-examination (BSE), only 50 women (27.9 %) practiced BSE monthly. Of the remaining 286 women who never performed a BSE, 197 (69 %) reported that they did not know the BSE method. The percentage of women who reported that they ever had a clinical examination was 18.9 % (88 out of 465 women).

Table 1 presents the socio-demographic data of the studied women. The mean age of the examined women was 34.9 ± 12.2 years, of these women 75.7 % were Saudi. More than half of the studied women were married (55.3 %) and did not work (housewife) (66 %), and about half of them (50.5 %) reported having less than a university education. About three-fourths of the studied women were of middle-class income (77.2 %). Of the studied women, 17.6 and 12 % reported that they had a positive family and friend history with regard to breast cancer, respectively.

Table 2 shows the distribution of the studied women who had ever had a mammography according to their socio-demographic characteristics. The higher significant proportion of women who ever had a mammography was among women >50 years old (60 %), Saudi (31 %), employed (39.2 %), highly educated (37.1 %), high family income (40.3 %), and those who reported a family history (35.4 %, and friend history (44.6 %) of breast cancer.

Table 3 presented the percent of correct answers provided by the studied women regarding their knowledge about breast cancer. The percentage of women who reported correct answers

Table 1 Characteristics of the studied women

| Characteristics ^a | N = 465 |
|----------------------------------|---------------------|
| Age in years, mean ± SD (range) | 34.9 ± 12.2 (15–82) |
| Age | |
| <40 | 330 (71.0) |
| 40–50 | 95 (20.4) |
| >50 | 40 (8.6) |
| Nationality | |
| Saudi | 352 (75.7) |
| Non-Saudi | 113 (24.3) |
| Marital status | |
| Single | 257 (55.3) |
| Married | 157 (33.7) |
| Widow and divorced | 51 (11.0) |
| Educational level | |
| Illiterate | 58 (12.5) |
| Basic | 232 (50.0) |
| University and higher | 175 (37.5) |
| Occupation | |
| Housewife | 307 (66.0) |
| Employee | 158 (34.0) |
| Family income | |
| Low | 40 (8.7) |
| Middle | 370 (79.5) |
| High | 55 (11.8) |
| Family history of breast cancer | |
| Yes | 82 (17.6) |
| No | 383 (82.4) |
| Friends history of cancer breast | |
| Yes | 56 (12.0) |
| No | 409 (88.0) |
| Practice of mammogram | |
| Yes | 129 (27.7) |
| No | 336 (72.3) |

^aData are presented by the mean ± SD or by *n* (%)

was less than 50 % with regard to the knowledge about the risk factors of breast cancer. The lowest percentage of correct answers was with regard to knowledge related to the association of old age (8 %), total duration of breast feeding (9 %), total duration of breast feeding of less than 2 years (13.7 %), and cigarette smoking (17.1 %) with an increased risk of breast cancer. However, the correct answers of the studied women for knowledge related to the clinical picture of breast cancer exceeded 50 %, with the highest proportion of correct answers for “breast mass” (85 %) and “breast pain” (60 %) representing a clinical manifestation of breast cancer. One-hundred fifty-four women (33.1 %) knew about breast cancer from the Internet. Other reported sources of knowledge about breast cancer were from lectures (20.2 %), television (18.1 %), books and magazines (14.6 %), and family and friends (14.1 %).

Table 2 Breast cancer screening (mammogram) among the studied women according to their socio-demographic characteristics

| Socio-demographic characteristics | Mammogram | | <i>p</i> value |
|-----------------------------------|--------------------------|-------------------------|----------------|
| | Yes (<i>n</i> = 129) | No (<i>n</i> = 336) | |
| Age in years | | | |
| <40 | 64 (19.9) | 266 (80.1) | <.0001* |
| 40–50 | 41 (43.2) | 54 (46.8) | |
| >50 | 24 (60.0) | 16 (40.0) | |
| Nationality | | | |
| Saudi | 109 (31.0) | 243 (69.0) | 0.01* |
| Non-Saudi | 20 (17.7) | 93 (82.3) | |
| Marital status | | | |
| Single | 73 (28.4) | 184 (71.6) | 0.47 |
| Married | 39 (24.8) | 118 (75.2) | |
| Widow and divorced | 17 (33.3) | 34 (66.7) | |
| Educational level | | | |
| Illiterate | 11 (18.9) | 47 (81.1) | 0.03* |
| Less than university | 60 (25.8) | 172 (74.2) | |
| University and higher | 65 (37.1) | 110 (62.9) | |
| Occupation | | | |
| Housewife | 75 (24.4) | 232 (75.6) | 0.02* |
| Employed | 54 (39.2) | 104 (60.8) | |
| Family income | | | |
| Low | 10 (25.0) | 30 (75.0) | 0.001* |
| Middle | 95 (26.0) | 275 (74.0) | |
| High | 24 (40.3) | 31 (60.0) | |
| Family history of breast cancer | | | |
| Yes | 29 (35.4) | 53 (64.6) | 0.09 |
| No | 100 (26.1) | 283 (73.9) | |
| Friends history of cancer breast | | | |
| Yes | 25 (44.6) | 31 (55.4) | 0.002* |
| No | 104 (25.4) | 305 (74.6) | |

* Significant

Table 4 presents the level of knowledge of breast cancer among the studied women. The level of knowledge was low among all of the studied women in which 61.9 % of them were found to have poor knowledge about breast cancer overall. However, the women's knowledge about the clinical picture of breast cancer was relatively better compared to their overall knowledge as well as their knowledge about the risk factors of breast cancer. A comparison of the studied women's knowledge by their practice of mammography showed that poor and fair knowledge were significantly higher among women who had never had a mammography, particularly for overall knowledge (78 and 80 % vs. 32 and 20 %) and knowledge related to the risk factors of cancer breast (68.7 and 80.8 % vs. 31.3 and 19.2 %).

Table 5 presents the barrier predictors preventing the studied women from receiving a mammography. According to the predictive regression analysis, the most important obstacle predictors were "Belief that mammography is painful procedure,"

Table 3 Knowledge of the studied women about breast cancer (*n* = 465)

| | Correct answer, <i>n</i> (%) ^a |
|---|---|
| Risk factors of breast cancer | |
| Total duration of breast feeding <2 years | 42 (9.0) |
| Cigarette smoking | 82 (17.6) |
| Obesity | 206 (44.3) |
| Had first child after 30 years | 236 (50.8) |
| Have no children | 179 (38.5) |
| Age >70 years | 37 (8.0) |
| Early menarche (<12 years) | 64 (13.7) |
| Late menopause (>55 years) | 109 (23.4) |
| Antibiotics | 148 (31.8) |
| Oral contraceptives | 251 (54.0) |
| High dose of vitamins | 84 (18.1) |
| Hormonal replacement therapy | 239 (51.4) |
| Calcium therapy | 238 (51.2) |
| Iron therapy | 227 (48.8) |
| Vitamin D | 217 (46.7) |
| Clinical picture of cancer breast | |
| Breast mass | 395 (85.0) |
| Nipple discharge | 262 (56.3) |
| Nipple ulcers | 243 (52.3) |
| Changes in color of breast skin | 278 (59.8) |
| Painless breast lumps | 279 (60.0) |
| Sources of knowledge | |
| Reading | 68 (14.6) |
| TV | 84 (18.1) |
| Lectures | 94 (20.2) |
| Family and friends | 65 (14.1) |
| Internet | 154 (33.1) |

^a Percentages are rounded

"Belief that women are exposed to more radiation," "bad communication with mammography personnel," and "Belief that mammography is shameful for women." The first two predictors showed a significantly increased probability of not receiving a mammography among the studied women. They were found to reduce the practice by approximately 56 % ($\beta = -.82$) and 48 % ($\beta = -.064$), respectively. The other two predictors also appeared to have reduced mammography among the studied women, although this finding was not significant. According to their estimated β coefficients, the reduction was estimated to be 45 % for the third item and 35 % for the fourth item.

Discussion

The results of this study revealed that women attending PHC in Madinah, Saudi Arabia, had a moderate level of practice of breast cancer screening. In this study, the percentage of

Table 4 Level of knowledge of breast cancer among women by their practice of breast cancer screening

| | Poor knowledge <i>n</i> (%) | Fair knowledge <i>n</i> (%) | Good knowledge <i>n</i> (%) | <i>p</i> value |
|---|--------------------------------|--------------------------------|--------------------------------|----------------|
| Total knowledge about breast cancer | | | | |
| All subjects | 288 (61.9) | 159 (34.2) | 18 (3.9) | |
| Mammogram | | | | |
| Yes | 93 (32.0) | 32 (20.0) | 4 (22.4) | 0.02* |
| No | 195 (78.0) | 127 (80.0) | 14 (77.6) | |
| Knowledge about risk factors of cancer breast | | | | |
| All subjects | 317 (68.2) | 146 (31.4) | 2 (0.4) | |
| Mammogram | | | | |
| Yes | 100 (31.3) | 28 (19.2) | 1 (50.0) | 0.01* |
| No | 217 (68.7) | 118 (80.8) | 1 (50.0) | |
| Knowledge about clinical picture of breast cancer | | | | |
| All subjects | 166 (35.7) | 142 (30.5) | 157 (33.8) | |
| Mammogram | | | | |
| Yes | 49 (38.0) | 37 (26.0) | 43 (27.4) | 0.79 |
| No | 117 (62.0) | 105 (74.0) | 114 (72.6) | |

* Significant

women who had ever had a mammography and performed BSE was 27.7 and 38.5 %, respectively. When the analysis was restricted to women aged 40 and more years, women who had ever had a mammography were 57 %, and those who had ever performed BSE were 33.9 %. These findings are higher than results obtained in other similar studies [14, 15]. A low prevalence of breast cancer screening was reported among Saudis women aged 15 years or more who attended primary health centers in the Riyadh region. Of the studied 719 women, 23.1 % reported that they practiced BSE, and 14.8 % reported that had ever had a mammography [15]. A very low proportion of women who had ever had mammograms (5 %) was reported in an earlier study performed on a cohort of 1315 Saudi adult women attending primary health care centers in the Al Hassa region [14], and the results were dependent on educational and occupational levels. Similar low proportions of mammography use were also reported in other African [16,

17] and Asian [18] studies. In a subsequent study, the prevalence mammography screening use was 13.2 % among the studied 447 Malaysian women [18].

A higher proportion of women who received a mammogram in this study was found among women aged 50 years and above. The guidelines for breast cancer screening as recommended by the consortium of American medical organizations, including the American Cancer Society, stipulates that between the ages of 40 and 49 years, women should undergo mammography every year or two; women older than 50 years should have an annual mammogram [19]. Furthermore, the results from a previous study showed that women who are most likely to benefit from mammography are those aged 50 to 69 years due to the high prevalence of low breast density [20]. Mammography is known to facilitate early detection and treatment of breast cancer, which is responsible for lower mortality rates [21].

Table 5 Barriers of breast cancer screening among the studied women

| Barrier items | β coefficient ^a (OR; 95 % CI) | Score test | SE | <i>p</i> value |
|--|---|------------|------|----------------|
| 1- Belief that mammography is a painful procedure | -0.82 (0.44; 0.22–0.88) | 9.2 | 0.35 | 0.002*** |
| 2- Belief that women are exposed to more radiation | -0.64 (0.52; 0.27–0.98) | 5.9 | 0.33 | 0.01*** |
| 3- Poor communication with the mammography personnel | -0.54 (0.58; 0.25–1.34) | 1.6 | 0.42 | 0.16 |
| 4- Belief that mammography is shameful for women | -0.44 (0.64; 0.34–1.20) | 1.9 | 0.36 | 0.19 |

SE standard error, OR odd ratio, CI confidence interval

^a Beta-coefficient of the predictive regression model

*** Statistically significant

The study results revealed that education, income, and employment in professional jobs significantly increased the use of mammography among the studied women. Educated women are also more likely to benefit from messages concerning breast cancer knowledge and methods of prevention and are thus more likely to learn about mammography. Furthermore, higher education, a high socio-economic level and professional jobs were significantly associated with higher knowledge scores about breast cancer in several studies [22, 23]. In addition, this study revealed that women who have had a family or friend with breast cancer received mammography screening significantly more than other women. West et al. also reported similar results [24]. The higher level of anxiety among women with a family history of breast cancer may be translated into a higher level of mammography awareness and practice.

The practice of BSE in this study (38.5 %) was also much higher than that reported in a similar Saudi study [25] performed in the Qassim region on 300 adult women, in which 18.7 % women reported that they practiced BSE, and a majority (57 %) of whom had started performing it within the previous year. A similar rate to that detected in the Qassim study was also reported in a recent Kuwait study in which 21 % of the studied 520 adult women attending PHC had practiced BSE monthly [26]. However, the reason for the poor practice of BSE was not clearly discussed in previous studies, and it is out of the scope of this study. In our study, the percentage of women who had ever performed a BSE among mammography-practicing women was approximately 72.1 % (93 out of 127 mammography-practicing women in this study). This area of research will be an interesting area to investigate in subsequent studies.

The low level of knowledge observed in this study about breast cancer was consistent with findings obtained in other similar studies [14–18, 25, 26]. Our study showed that less than 50 % of the studied women were aware of the risk factors of breast cancer. However, the proportion of women who knew the warning signs of breast cancer was relatively high. Breast mass and breast pain was encountered as a warning sign by 85 and 60 % of the studied women, respectively, whereas a study performed in the UK indicated that 70 % of women were aware of a “lump” as warning sign of breast cancer [23]. In contrast to these findings, other studies have documented very poor knowledge about the warning signs of breast cancer among participating women [27].

In the present study, the level of poor knowledge was significantly higher among women who had never had a mammogram. The percentage of poor knowledge was 78 and 68.7 % among women who had not received mammography for overall knowledge and knowledge-related breast cancer risk factors, respectively. Similarly, significant lower knowledge scores were reported among women who had never had a mammography and clinical breast examination performed [28].

The results of the predictive regression model revealed that the poor perception of women about mammography and its

procedures is the most important barrier preventing its practice. Incorrect beliefs about mammography being a painful procedure and the exposure of women to more radiation were the predicting barriers in this study. These two predictors were found to increase the probability of not practicing mammography by approximately 56 % (OR = 0.44; 95 % CI = 22–88) and 48 % (OR = 0.52; 95 % = 0.27–0.98), respectively. To a lesser extent, bad communication with mammography personnel (OR = 0.58; 95 % CI = 0.25–1.34) and the perception of mammography as being shameful (OR = 0.64; 95 % CI = 0.34–1.20) were found to play a role in reducing the use of mammography in this study. However, other studies have examined other factors that are not related to women’s beliefs about mammography. Of these factors, the husband’s nationality, regular checkups, and encouragement from family members and physicians were significant predictors of mammography use [28]. Another recent study reported that the tertiary level of education is the only predictor increasing awareness and practice of breast cancer screening, with an odds ratio of 1.43 (95 % CI = 1.12–2.18) [29]. Age has also been found to play an important role in mammography practice. The OR was 3.94, (95 % CI = 1.61–9.66) among women aged 50–59 years and 6.91 (95%CI = 2.28–20.94) among those aged 60 years and older [18]. Similar significant findings were also found in this study, where the odds ratio was 6.30 (95 % CI = 3.10–12.4) for women aged 50 years and older. In addition, in this study, higher education, a high family income, and positive family and friend history of breast cancer were found to be positively associated with the practice of mammography among the studied women.

The strengths of this study included that the study questionnaire was comprehensive and addressed nearly all knowledge items as well as a wide range of personal and belief barrier factors. The study questionnaire has also been validated by a specialist in this field, including a radiologist, oncologist and an epidemiologist. To the best of our knowledge, this study is the first study to investigate the knowledge, practice, and barriers of breast cancer screening in the Madinah region in Saudi Arabia. Moreover, the use of a predictive regression model helped to examine and quantify the most important barriers implicated in non-practicing mammography participants among the studied women. The dissemination of these findings to the Taibah Screening Center (TSC) will help to understand the current situation and to plan for different breast awareness and health education programs to correct some inaccurate beliefs that prevent women in Madinah from attending this screening center.

However, the limitations of this study should not be overlooked. Self-selection bias may have been a limiting factor in this study because all of the women were selected from primary health centers, which should not attract women from different educational and family income sectors from attending. However, due to the socio-demographic distributions observed in this study, the sample appeared to be representative, and this factor appeared to have no role in the study findings.

In conclusion, the practice of mammography among women attending PHC in Madinah was relatively high, particularly among women aged >40 years, compared with other Saudi cities and similar Arabic regions. However, the high levels of poor knowledge about breast cancer observed in this study reflect the need for additional future efforts via health education programs targeted at women through various media, including leaflets, television, and radio. In addition, health education should be channeled through women-friendly agencies/organizations, such as hospital antenatal and postnatal clinics, religious organizations, and feminist organizations. Finally, additional studies are needed in the area of BSE and clinical examination to study the reasons for such low levels of knowledge about breast cancer with the aim of increasing breast awareness education in this conservative community.

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Compliance with Ethical Standards Ethical considerations were also taken to ensure the confidentiality and privacy of the collected data. In addition, no one was obliged to participate in the study. Finally, the Deanship of Scientific Research Ethics Committee at Taibah University, Madinah, Saudi Arabia, approved the study protocol. Participants were informed about the purpose and scope of the research, and they were given verbal consent prior to completing the questionnaire.

Conflict of Interest The authors declare that they have no competing interests.

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