BMJ Open

Prevalence of psychological distress and associated factors among Omani women diagnosed with breast cancer: A cross-sectional study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-073967
Article Type:	Original research
Date Submitted by the Author:	23-Mar-2023
Complete List of Authors:	Al-Fahdi, Amal ; Sultan Qaboos Comprehensive Cancer Center Al-Siyabi, Wedad ; Sultan Qaboos Comprehensive Cancer Care and Research Center Al-Yafai, Entesar ; Sultan Qaboos Comprehensive Cancer Care and Research Center Al-Khatri, Mariya ; Sultan Qaboos University College of Medicine and Health Science Chan , Moon ; Sultan Qaboos University College of Medicine and Health Science, Family Medicine & Public Health Al-Azri, Mohammed; Sultan Qaboos University, Family Medicine and Public Health;
Keywords:	Depression & mood disorders < PSYCHIATRY, Anxiety disorders < PSYCHIATRY, Breast tumours < ONCOLOGY, Risk Factors

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Prevalence of psychological distress and associated factors among Omani women diagnosed with breast cancer: A cross-sectional study

Amal Al-Fahdi[1], Wedad Al-Siyabi[2], Entesar Al-Yafai[3], Mariya Al-Khatri[4], Moon Fai Chan[5], Mohammed Al-Azri[6*]

Author affiliations

[1]Director of Holistic Care, Sultan Qaboos Comprehensive Cancer Care and Research Centre, Muscat, Oman. E-mail: a.alfahdi@cccrc.gov.om

[2]Clinical Psychologist, Sultan Qaboos Comprehensive Cancer Care and Research Centre, Muscat, Oman. E-mail: wedad93.alsiyabi@gmail.com

[3]Sociology and social work, Sultan Qaboos Comprehensive Cancer Care and Research Centre, Muscat, Oman. E-mail: e.alyafai-1@cccrc.gov.om

[4]College of Medicine and Health Sciences, Sultan Qaboos University. E-mail: s126445@student.squ.edu.om

[5]Department of Family Medicine and Public Health, College of Medicine and Health Sciences, Sultan Qaboos University, Muscat, Oman. E-mail: moonf@squ.edu.om ORCID: 0000-0002-2899-3118

[6]Department of Family Medicine and Public Health, College of Medicine and Health Sciences, Sultan Qaboos University, Muscat, Oman.

* Correspondence to Dr Mohammed Al-Azri; mhalazri@squ.edu.om

ORCID: 0000-0002-6136-4081

ABSTRACT

Objectives To identify the prevalence of anxiety and depression among Omani women diagnosed with breast cancer (BC) and to determine associations with sociodemographic factors.

Design A cross-sectional, self-administered survey was conducted between September 2021 and June 2022.

Setting The Sultan Qaboos Comprehensive Cancer Care and Research Centre.

Participants Adult Omani women recently diagnosed with BC during the study period.

Tools Arabic version of the Hospital Anxiety and Depression Scale (HADS). Sociodemographic and clinical information was obtained from the participants and their medical hospital records.

Results: A total of 190 Omani women diagnosed with BC were invited to the study of which 171 participated (response rate: 90.0%). The mean age was 50.3 ± 10.9 years. Overall, 52.3% of participants had been diagnosed with BC at stages III or IV and 28.9% had metastasis. A total of 29 women (17.0%) exhibited depressive symptoms (HADS-D score: ≥8), while 37 (21.6%) exhibited anxiety symptoms (HADS-A score: ≥8). Women with anxiety were almost 15-times more likely to have depressive symptoms than those without anxiety (odds ratio [OR]: 14.87, p <0.001). Younger women were less likely to exhibit depressive symptoms compared to older women (≤39 vs. ≥60 years, p = 0.050; 40–59 vs. ≥60 years, p = 0.005). Women at the school/diploma education level were less likely to have depressive symptoms compared to those at college/university level (OR: 0.19, p = 0.017).

Conclusions: More than half of the women surveyed had been diagnosed at an advanced stage, with up to 21.6% presenting with symptoms of psychological distress. Healthcare professionals in Oman and in low- and middle-income countries (LMICs) should consider additional screening for anxiety and depression in this patient group and encourage BC patients to disclose emotional information during consultations, particularly for patients aged ≥60 years.

Keywords: Depression & mood disorders; Anxiety disorders; Breast tumours; Risk Factors

Word count:

Abstract: 291 words

Main text: 2914 words

Strengths and limitations of this study

- This is the first study conducted in Oman to identify the prevalence of anxiety and depression and related sociodemographic factors among Omani women diagnosed with breast cancer.
- More than half of the participated women were diagnosed with BC at an advanced stage.
- 17% of the participated women exhibited depressive symptoms and 21.6% exhibited anxiety symptoms.
- Younger women were less likely to exhibit depressive symptoms than older women and those with school/diploma level were less likely to exhibit depressive symptoms than women at college/university level.
- Results could be subject to errors related to recall, response, and/or personal bias due to the cross-sectional study design and self-administered nature of the data collection tool. Additionally, as a single-centre study, the generalisability of the results is limited. However, because the centre is a large, specialised cancer care centre, patients are referred from all over the country.

BACKGROUND

Breast cancer (BC) is the most frequently diagnosed type of cancer among women worldwide, with an estimated 2.3 million new patients diagnosed globally each year, representing 10% of all cancer diagnoses and approximately 15% of all cancer-related deaths among women [1]. Despite global efforts to improve early detection and diagnosis, nearly one-third of all women with BC have either regional or distant metastasis at the time of diagnosis, most of whom reside in low- and middle-income countries (LMICs) [2]. Despite the relatively low incidence rate in comparison to more developed countries, the mortality rate from BC in LMICs remains high [3]. Almost half of all women diagnosed with BC in LMICs are under the age of 50, with a median age of 49–52 years, as compared to women in more developed countries for whom the median age is 63 years [3, 4].

Emotional distress in cancer patients is an important concern for healthcare practitioners as it reduces the patients' quality of life, negatively impacts compliance with medical treatment, and carries an elevated risk of mortality [5]. Thus, emotional distress has been recognized as the sixth vital sign in cancer care alongside blood pressure, pulse, temperature, respiratory rate, and pain [6]. The US National Cancer Centre Network (NCCN) defines psychological distress as "a multifactorial unpleasant emotional experience of a psychological (cognitive, behavioural, emotional), social, and/or spiritual nature that may interfere with the ability to cope effectively with cancer, its physical symptoms and its treatment". In particular, patients diagnosed with BC have been found to be at greater risk of developing psychological distress, such as depression or anxiety, which lowers their quality of life and increases mortality [7-9].

The overall prevalence of psychological distress among BC patients is reported to be between 8–24% [10]. In particular, the risk of depression increases in women with newly diagnosed BC, although this can depend on the stage of BC at the time of diagnosis and the modality of treatment [11]. It has been found that BC patients are more likely to experience depression and anxiety at the time of diagnosis and during treatment, but that this improves over the time [12]. Furthermore, several sociodemographic variables have been found to increase the risk of depression and anxiety among BC patients, with younger, less educated, low-income, and divorced/widowed women more likely to suffer from these conditions compared to their respective counterparts [12-14].

In Oman, BC remains the most commonly diagnosed cancer, accounting for 12.8% of all cancers and 21.2% of cancers affecting Omani woman. The incidence of BC in Oman almost doubled from 13.6 patients per 100,000 women in 1996 to 26.9 in 2015 [15]. Omani women are usually diagnosed with BC at a relatively young age (median age: 49 years) and more advanced stage (i.e., stages III or IV), with a low five-year survival rate (63%) [16]. Many Omani women diagnosed with BC experience a concerning degree of psychological distress which can manifest in various ways, including anxiety, depression, fatigue, sexual concerns, social isolation, difficulty concentrating, and self-blame [17, 18]. However, to our knowledge, no previous study has yet been conducted to determine the prevalence of psychological distress among Omani women diagnosed with BC. Our aim was therefore to identify the prevalence of anxiety and depression among Omani women diagnosed with BC and to determine associations with sociodemographic factors.

METHODS

Tools of measurement

The Hospital Anxiety and Depression Scale (HADS) is a widely used, 14-item scale to determine the prevalence of self-reported symptoms of anxiety (using the HADS-A subscale) and depression (using the HADS-D subscale) in non-psychiatric patients. Previous research confirms that the tool demonstrates satisfactory psychometric properties in assessing symptom severity and caseness of anxiety disorders and depression in the general population, as well as among patients attending primary care settings, cognitively-intact nursing home residents, and cancer patients [19-21]. Correlations between the two subscales have been found to vary from 0.40 to 0.74 (mean: 0.56), while the Cronbach's alpha reliability of the HADS-A and HADS-D subscales vary from 0.68 to 0.93 (mean: 0.83) and from 0.67 to 0.90 (mean: 0.82), respectively [20]. Score range from 0 to 21 for each subscale, and the scale distinguishes between mild symptoms (scores of ≥8) and severe symptoms (scores of ≥11) for both depression and anxiety [20].

A cut-off score of ≥8 was deemed optimal for the best sensitivity and specificity (80%), with a predictive validity for identification of approximately 70% for both the HADS-A and HADS-D subscales in most studies, including among BC patients [20-23]. Risk scores above these specific HADS cut-offs have proven useful in identifying anxious and depressive states among cancer patients during clinical practice at various stages in the disease trajectory [21]. For the purposes of

the present study, a previously validated Arabic-language version of the HADS tool was utilised. Reported Cronbach's alpha values for the translated HADS-A and HADS-D subscales are 0.83 (95% confidence interval [CI]: 0.79–0.88) and 0.77 (95% CI: 0.7–0.83), respectively [24].

Site of the study and patient recruitment

The Sultan Qaboos Comprehensive Cancer Care and Research Centre (SQCCCRC) is a new, governmental, comprehensive cancer centre located in Muscat, the capital city of Oman. The centre integrates patient care with research, teaching, and learning and provides evidenced-based, patient-centred care [25]. The centre receives referred patients diagnosed with cancer from all hospitals located throughout the country and provides comprehensive treatment (i.e., surgery, radiotherapy, chemotherapy, hormonal therapy, etc), palliative care, and psychological care to patients diagnosed with all types of cancer, including BC.

All adult Omani women aged ≥18 years who had been diagnosed with BC during the study period (from September 2021 to June 2022) were identified from the electronic medical record system. The names of potential participants and the dates of their next appointment/visit to the centre's day care units, outpatient clinics, or admission to wards were identified. Women who met the inclusion criteria were invited to participate in the study. Only women who agreed to participate and who did not have current psychological or psychiatric illness or who were not currently taking any psychotropic medications were included in the study. Women who were admitted due to complications such as febrile neutropenia or those in obvious distress or pain were excluded from the study.

Woman who agreed to participate in the study were given the translated HADS to complete. For illiterate women, the questionnaire was introduced and completed by a research assistant during face-to-face interviews. Sociodemographic information was obtained directly from the participants. Additional clinical information was collected from the hospital medical record system, including time since BC diagnosis, age at diagnosis, stage at diagnosis, modality of BC treatment (i.e., hormonal therapy, radiation therapy, immunotherapy, surgery, chemotherapy, etc.), and the presence of any co-existing morbidities.

Sample size calculation

The sample size required for the present study was calculated for a single proportion of a finite population of 2,000 BC patients and at an absolute precision of 10% using nMaster sample size software, version 2.0 (Christian Medical College, Vellore, India). We considered the prevalence of psychological distress, anxiety, and depression in Omani women with BC to be approximately 25% based on earlier literature. For a confidence level of 95%, the minimum number required for this study was calculated to be 170 patients.

Statistical analysis

The data analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 23.0 (IBM Corp., Armonk, New York, USA). The level of significance was set at 5%. Descriptive statistics were used to describe the basic sociodemographic characteristics and clinical outcomes of the participants, including percentages, means, and medians. HADS-D and HADS-A scores were used to assess the prevalence of self-reported depressive and anxiety symptoms, respectively, for each participant; those with scores of ≥8 were considered to have depressive or anxiety symptoms, respectively. A univariate analysis was conducted to compare sociodemographic factors among patients with and without depressive or anxiety symptoms using a χ^2 and/or Fisher's exact tests. Multivariate logistic regression was applied, and odds ratios (ORs) were used to determine risk factors associated with depressive symptoms after adjusting for sociodemographic and clinical factors.

Ethical considerations

The study was approved by the Medical Research and Ethics Committee of the College of Medicine and Health Sciences, Sultan Qaboos University (MREC #2501). All participants signed a written consent form prior to taking part in the study. Potential participants were informed that participation in the study was optional and would not affect the medical care they received from SQCCCRC.

RESULTS

Basic characteristics of the study sample

Table 1 shows the patients' sociodemographic characteristics and clinical outcomes. Of the 190 women invited to take part in the study, a total of 171 agreed to participate (response rate: 90.0%). The average age was 50.3 years (standard deviation: ±10.9 years), ranging from 24.0 to 85.0 years. The majority were married (n = 128, 74.9%) and unemployed (n = 130, 76.0%). Almost one-quarter (n = 38, 22.2%) were illiterate, while 31.0% (n = 53) had a college/university-level education. The majority had children (n = 146, 85.4%) and financial support (n = 160, 93.6%). Most women (n = 80, 52.3%) had been diagnosed with BC at stages III or IV and 28.9% (n = 44) had metastasis. In terms of clinical outcomes, 29 patients (17.0%) exhibited depressive symptoms (HADS-D ≥8), while 37 patients (21.6%) had anxiety symptoms (HADS-A ≥8).

Factors associated with depression

Table 2 shows the sociodemographic and clinical factors associated with depressive symptoms among the sample of surveyed BC patients. In the univariate analysis, no significant association was found between depressive symptoms and marital status (single vs. widow/divorced, $p = 0.989$; married vs. widow/divorced, $p = 0.989$), education level (illiterate vs. college/university, $p = 0.537$; school/diploma vs. college/university, $p = 0.084$), employment status ($p = 0.824$), having children ($p = 0.577$), and financial support ($p = 0.693$). However, patients who were younger were significantly less likely to exhibit depressive symptoms compared to older patients (≤39 vs. ≥60 years, $p = 0.005$; 40–59 vs. ≥60 years, $p = 0.005$). In terms of clinical characteristics, no significant associations were found between depressive symptoms and stage of cancer at diagnosis (stage I vs. IV, $p = 0.782$; stage II vs. IV, $p = 0.597$; stage III vs. IV, $p = 0.597$) or the presence of metastasis ($p = 0.503$); however, there was a significant association between depressive symptoms and anxiety status ($p < 0.001$).

In the multivariate analysis, all sociodemographic and clinical factors were included to adjust for each other, except for stage of cancer at diagnosis and presence of metastasis due to >10% missing data. According to a Hosmer-Lemeshow goodness-of-fit test, the model was a good fit ($\chi^2 = 7.527$, $p = 0.376$), with a predictive power of 81.3% (sensitivity: 72.4%, specificity: 83.1%). The logistic regression model showed that those aged 40–59 years were 0.25-times less likely to have

depressive symptoms than patients aged ≥60 years (OR: 0.25, $p = 0.042$). In terms of education level, women at the school/diploma level were 0.19-times less likely to have depressive symptoms than those at college/university level (OR: 0.19, $p = 0.017$). Finally, those with anxiety symptoms were 14.8-times more likely to have depressive symptoms compared to those without anxiety (OR: 14.87, $p < 0.001$).

DISCUSSION

To our knowledge, this is the first study conducted in Oman to identify the prevalence of anxiety and depression and related sociodemographic factors among Omani women diagnosed with BC. Concerningly, over half of the participants in this study had been diagnosed with BC at later stages (i.e., stages III or IV). A previous study conducted in Oman similarly showed that up to 33.5% of Omani women diagnosed with BC presented with more advanced disease [16]. Indeed, many of the women reported experiencing psychological distress after becoming aware of possible BC signs or symptoms which hindered them from seeking early medical help [16]. Prior research has indicated that Omani women with BC may experience several emotional barriers which hinder early medical help-seeking behaviour, such as fear of a BC diagnosis, being worried about what the doctor might find, fear of cancer-related mortality, and concerns related to the hospital setting and the thought of undergoing medical procedures [16, 26]. Suqri *et al.* reported that delays in cancer diagnosis and presentation often occur during the help-seeking interval between the appraisal of symptoms and consulting a doctor [27].

Utilising a HADS cut-off score of ≥8, 17.0% of Omani women with BC in the present study were considered to have depression, while 21.6% had anxiety. A study conducted among Malaysian women diagnosed with BC observed similar prevalence rates of these conditions (19.1% and 24.1%, respectively) [28]. In previous research, Omani women diagnosed with BC reported devastating psychological distress immediately after their diagnosis, including fear of death, concern over treatment side-effects, and worries related to how the disease could affect their offspring, and their work or family commitments, as well as concern over the possibility of social stigma or adverse reactions from family members and members of the community [18].

In the current study, women with anxiety symptoms were almost 15-times more likely to have depressive symptoms than those without anxiety; as such, women diagnosed with BC could benefit from routine screening to rule out pre-existing psychological morbidity [29]. The prevalence of depression was also more frequent among women who had been diagnosed with BC at more advanced stages; this is likely as result of their awareness of their poorer prognosis compared with patients who are diagnosed at an earlier stage [30]. A study conducted in Greece similarly found that women diagnosed with BC at stage IV were 1.9-times more likely to experience depressive symptoms compared to patients diagnosed at stages I or II [31]. Furthermore, more advanced BC might require more aggressive treatment which often involves unpleasant side-effects, such as hair loss, disfigurement, decreased libido, and nausea, all of which could affect the patient's body image and therefore increase the risk of emotional distress [32, 33].

We also observed that older patients were significantly more likely to exhibit depressive symptoms compared to younger patients. This contradicts findings from a study conducted in Syria which showed that younger women with BC suffered more frequently from anxiety and depression compared to older women [34]. Indeed, younger women in Oman are reportedly more likely to have anxiety symptoms because of their fear of adverse effects relating to perceived attractiveness and femininity as a result of the side-effects of cancer treatment [35]. However, older BC patients in Germany were found to be 1.2-times more likely to experience both depressive and anxiety symptoms compared to younger patients [36]. In general, older cancer patients are more likely to report depression compared to younger patients because of lack of energy, increased sleep disturbances, decreased interest in activity, and the co-existence of other conditions, such as cardiovascular disease, stroke, diabetes, and hearing or visual impairments, all of which are more frequent in older age [30, 34].

More highly educated women in our study were more likely to report depressive symptoms compared to those who had not attended college or university. This finding could be attributed to the fact that more educated individuals are more likely to be aware of adverse cancer outcomes and treatment side-effects [37]. A recent study conducted in Sweden similarly observed that higher education levels were associated with greater levels of anxiety in cancer patients [38]. On the other hand, other studies conducted elsewhere have indicated that less educated women are up to four

times more likely to experience anxiety compared to those with a higher-level degree [31, 38]. Researchers have suggested that one possible reason for this could be because more educated women have better access to information regarding cancer prognosis and treatment compared to less educated women, a factor which might offer some reassurance [31]. Further research is recommended to determine how education level might play a role in various forms of psychological distress among BC patients.

This study has certain limitations. First, as a cross-sectional study based on a sample of participants with specific characteristics and self-reported measures, the results could be subject to errors related to recall, response, and/or personal bias. Second, although most of the data were collected using self-administered questionnaires, the questionnaire was completed for illiterate women by the research assistants during face-to-face interviews; therefore, we cannot rule out the possibility of subjective bias on the part of the interviewers for these datapoints. Finally, the study was conducted among women with BC attending a single centre in Oman, potentially affecting the generalisability of the results. However, patients attending SQCCCRC are often referred from other regions of Oman which could minimise this limitation.

CONCLUSION

In conclusion, this study identified the prevalence of anxiety and depression among Omani women diagnosed with BC to be 17.0% and 21.6%, respectively, with more than half of the participants presenting with advanced stages of BC. Considering the high prevalence of psychological distress noted in this study, decision-makers in Oman and in LMICs should consider implementing routine screening for anxiety and depression to maintain the psychological wellbeing of BC patients. Moreover, additional health education initiatives to improve symptom recognition and early medical help-seeking behaviours are required to minimise delays in BC diagnosis among women in Oman and in LMICs. Oncologists should encourage women diagnosed with BC—particularly older women, those with additional comorbidities, and those diagnosed at a more advanced stage—to disclose emotional information during consultations. This would allow for the early detection of anxiety and depression and ensure that such patients are referred for appropriate psychological and psychiatric support.

Acknowledgements

The authors would like to thank the participants for having taken part in the study and the authorities at SQCCCRC for allowing this study to be conducted.

Contributions

All authors contributed to the study conception and design. Data collection was performed by Wedad Al-Siyabi, Entesar Al-Yafai and Mariya Al-Khatri. Data analyses were performed by Moon Fai Chan. The first draft of the manuscript was written by Mohammed Al-Azri and Amal Al-Fahdi and all authors commented on previous versions of the manuscript. All authors read and approved the final version of the manuscript.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests

The authors have no conflicts of interest associated with the material presented in this paper.

Consent to participate statement

Written informed consent was obtained from the participants included in this study.

Patient consent for publication

Not required.

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

Ethics approval statement

This research was performed in line with the principles of the revised Declaration of Helsinki. Ethical approval was granted by the Medical Research and Ethics Committee of the College of Medicine and Health Sciences at Sultan Qaboos University, Muscat, Oman (MREC #2501).

Data availability statement

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

REFERENCES

1 Sung H, Ferlay J, Siegel RL, *et al.* Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021;**71**:209–49. doi:10.3322/caac.21660

2 Facione NC, Miaskowski C, Dodd MJ, *et al.* The self-reported likelihood of patient delay in breast cancer: new thoughts for early detection. *Prev Med* 2002;**34**:397–407. doi:10.1006/pmed.2001.0998

3 Ghoncheh M, Pournamdar Z, Salehiniya H. Incidence and mortality and epidemiology of breast cancer in the world. *Asian Pac J Cancer Prev* 2016;**17**:43–6. doi:10.7314/APJCP.2016.17.S3.43

4 Albeshan SM, Mackey MG, Hossain SZ, *et al.* Breast cancer epidemiology in Gulf Cooperation Council countries: a regional and international comparison. *Clin Breast Cancer* 2018;**18**:e381–92. doi:10.1016/j.clbc.2017.07.006

5 Cardoso G, Graca J, Klut C, *et al.* Depression and anxiety symptoms following cancer diagnosis: a cross-sectional study. *Psychol Health Med* 2016;**21**:562–70. doi:10.1080/13548506.2015.1125006

6 Fradgley EA, Bultz BD, Kelly BJ, *et al.* Progress toward integrating distress as the sixth vital sign: a global snapshot of triumphs and tribulations in precision supportive care. *J Psychosoc Oncol Res Pract* 2019;**1**:e2. doi:10.1097/or9.0000000000000002

7 McFarland DC, Shaffer KM, Tiersten A, *et al.* Physical symptom burden and its association with distress, anxiety, and depression in breast cancer. *Psychosomatics* 2018;**59**:464–71. doi:10.1016/j.psym.2018.01.005

8 Li J, Zhang F, Wang W, *et al.* Prevalence and risk factors of anxiety and depression among patients with breast cancer: a protocol for systematic review and meta-analysis. *BMJ Open* 2021;**11**:e041588. doi:10.1136/bmjopen-2020-041588

9 Integrated Cancer Center Netherlands. [Working group guidelines: screening for psychosocial distress, v2.0]. *Integraal Kankercentrum Nederland (INKL)*, 2017. https://www.venvn.nl/media/2ocnee0g/detecteren-behoefte-psychosociale-zorg.pdf (accessed 17 Mar 2023).

10 Krebber AMH, Buffart LM, Kleijn G, *et al.* Prevalence of depression in cancer patients: a meta-analysis of diagnostic interviews and self-report instruments. *Psychooncology* 2014;**23**:121–30. doi:10.1002/pon.3409

11 Phoosuwan N, Lundberg PC. Psychological distress and health-related quality of life among women with breast cancer: a descriptive cross-sectional study. *Support Care Cancer* 2022;**30**:3177–86. doi:10.1007/s00520-021-06763-z

12 Costanzo ES, Lutgendorf SK, Mattes ML, *et al.* Adjusting to life after treatment: distress and quality of life following treatment for breast cancer. *Br J Cancer* 2007;**97**:1625–31. doi:10.1038/sj.bjc.6604091

13 Wong-Kim EC, Bloom JR. Depression experienced by young women newly diagnosed with breast cancer. *Psychooncology* 2005;**14**:564–73. doi:10.1002/pon.873

14 Fafouti M, Paparrigopoulos T, Zervas Y, *et al.* Depression, anxiety and general psychopathology in breast cancer patients: a cross-sectional control study. *In Vivo* 2010;**24**:803–10.

15 Al-Lawati JA, Al-Zakwani I, Fadhil I, *et al.* Cancer incidence in Oman (1996–2015). *Oman Med J* 2019;**34**:271–3. doi:10.5001/omj.2019.55

16 Al-Azri M, Al-Baimani K, Al-Awaisi H, *et al.* Knowledge of symptoms, time to presentation and barriers to medical help-seeking among Omani women diagnosed with breast cancer: a cross-sectional study. *BMJ Open* 2021;**11**:e043976. doi:10.1136/bmjopen-2020-043976

17 Al-Azri MH, Al-Awisi H, Al-Rasbi S, *et al.* Coping with a diagnosis of breast cancer among Omani women. *J Health Psychol* 2014;**19**:836–46. doi:10.1177/1359105313479813

18 Al-Azri M, Al-Awisi H, Al-Rasbi S, *et al.* Psychosocial impact of breast cancer diagnosis

among Omani women. *Oman Med J* 2014;**29**:437–44. doi:10.5001/omj.2014.115

19 Djukanovic I, Carlsson J, Årestedt K. Is the Hospital Anxiety and Depression Scale (HADS) a valid measure in a general population 65-80 years old? A psychometric evaluation study. *Health Qual Life Outcomes* 2017;**15**:193. doi:10.1186/s12955-017-0759-9

20 Bjelland I, Dahl AA, Haug TT, *et al.* The validity of the Hospital Anxiety and Depression Scale: an updated literature review. *J Psychosom Res* 2002;**52**:69–77. doi:10.1016/S0022-3999(01)00296-3

21 Annunziata MA, Muzzatti B, Bidoli E, *et al.* Hospital Anxiety and Depression Scale (HADS) accuracy in cancer patients. *Support Care Cancer* 2020;**28**:3921–6. doi:10.1007/s00520-019-05244-8

22 Mitchell AJ, Meader N, Symonds P. Diagnostic validity of the Hospital Anxiety and Depression Scale (HADS) in cancer and palliative settings: a meta-analysis. *J Affect Disord* 2010;**126**:335–48. doi:10.1016/j.jad.2010.01.067

23 Maass SWMC, Roorda C, Berendsen AJ, *et al.* The prevalence of long-term symptoms of depression and anxiety after breast cancer treatment: a systematic review. *Maturitas* 2015;**82**:100–8. doi:10.1016/j.maturitas.2015.04.010

24 Terkawi A, Tsang S, Alkahtani G, *et al.* Development and validation of Arabic version of the Hospital Anxiety and Depression Scale. *Saudi J Anaesth* 2017;**11**:S11–8. doi:10.4103/sja.SJA_43_17

25 Al Farai A, Al Moundhri M, Panaro F. Launching of the Sultan Qaboos Comprehensive Cancer Care and Research Center (SQCCCRC) in the Sultanate of Oman to manage HBP type of cancers. *Hepatobiliary Surg Nutr* 2022;**11**:338–9. doi:10.21037/hbsn-2022-03

26 Al-Azri M, Al-Awaisi H. Exploring causes of delays in help-seeking behaviours among symptomatic Omani women diagnosed with late-stage breast cancer: a qualitative study. *Eur J Oncol Nurs* 2022;**61**:102229. doi:10.1016/j.ejon.2022.102229

27 Al Suqri M, Al-Awaisi H, Al-Moundhri M, *et al.* Symptom perceptions and help-seeking behaviours of Omani patients diagnosed with late-stage colorectal cancer: a qualitative study. *Asian Pac J Cancer Prev* 2021;**22**:427–35. doi:10.31557/APJCP.2021.22.2.427

28 Saniah AR, Zainal NZ. Anxiety, depression and coping strategies in breast cancer patients on chemotherapy. *Malays J Psychiatry* 2010;**2**:21–6.

29 Vahdaninia M, Omidvari S, Montazeri A. What do predict anxiety and depression in breast cancer patients? A follow-up study. *Soc Psychiatry Psychiatr Epidemiol* 2010;**45**:355–61. doi:10.1007/s00127-009-0068-7

30 Silva S, Bártolo A, Santos IM, *et al.* Towards a better understanding of the factors associated with distress in elderly cancer patients: a systematic review. *Int J Environ Res Public Health* 2022;**19**:3424. doi:10.3390/ijerph19063424

31 Tsaras K, Papathanasiou IV, Mitsi D, *et al.* Assessment of depression and anxiety in breast cancer patients: prevalence and associated factors. *Asian Pac J Cancer Prev* 2018;**19**:1661–9. doi:10.22034/APJCP.2018.19.6.1661

32 Beisecker A, Cook MR, Ashworth J, *et al.* Side effects of adjuvant chemotherapy: perceptions of node-negative breast cancer patients. *Psychooncology* 1997;**6**:85–93. doi:10.1002/(SICI)1099-1611(199706)6:2<85::AID-PON247>3.0.CO;2-T

33 Rodrigues Guedes TS, Dantas de Oliveira NP, Holanda AM, *et al.* Body image of women submitted to breast cancer treatment. *Asian Pac J Cancer Prev* 2018;**19**:1487–93. doi:10.22034/APJCP.2018.19.6.1487

34 Soqia J, Al-Shafie M, Agha LY, *et al.* Depression, anxiety and related factors among Syrian breast cancer patients: a cross-sectional study. *BMC Psychiatry* 2022;**22**:796. doi:10.1186/s12888-022-04469-y

35 Al-Riyami A, Abdulhadi NN, Al-Azri M. Understanding the perceptions of Omani women regarding life after a breast cancer diagnosis. *Sultan Qaboos Univ Med J* 2020;**20**:e360–7. doi:10.18295/squmj.2020.20.04.013

36 Engelhard J, Bleicher L, Kostev K. Prevalence of depression and anxiety and their risk factors in women with breast cancer in German primary care. *Value Heal* 2015;**18**:PA431. doi:10.1016/j.jval.2015.09.1025

37 Chung J, Ju G, Yang J, *et al.* Prevalence of and factors associated with anxiety and depression in Korean patients with newly diagnosed advanced gastrointestinal cancer. *Korean J Intern Med* 2018;**33**:585–94. doi:10.3904/kjim.2016.108

38 Arvanitou E, Nikoloudi M, Tsoukalas N, *et al*. Factors associated with anxiety and depression in cancer patients: demographic factors and the role of demoralization and satisfaction with care. *Psychooncology* 2023 [Online ahead of print]. doi:10.1002/pon.6115

Table 1. Sociodemographic characteristics and clinical outcomes (N = 171)

Characteristic/outcome	n (%)
Age (years)	
≤39	21 (12.3)
40–59	119 (69.6)
≥60	31 (18.1)
Mean ± SD	50.3 ± 10.9
Education level	
Illiterate	38 (22.2)
School/diploma	80 (46.8)
College/university	53 (31.0)
Marital status	
Single	15 (8.8)
Married	128 (74.9)
Widow/divorced	28 (16.3)
Employment	
Employed	32 (18.7)
Unemployed	130 (76.0)
Retired	9 (5.3)
Have children	
No	25 (14.6)
Yes	146 (85.4)
Financial support	
Yes	160 (93.6)
No	11 (6.4)
Stage at diagnosis[a]	
I	34 (22.2)
II	39 (25.5)
III	39 (25.5)
IV	41 (26.8)
Metastatic cancer[b]	
Yes	44 (28.9)
No	108 (71.1)
Depressive symptoms	
Yes (HADS-D ≥8)	29 (17.0)
No	142 (83.0)
Anxiety symptoms	
Yes (HADS-A ≥8)	37 (21.6)
No	134 (78.4)

a, 18 missing; b, 19 missing; HADS-A, Hospital Anxiety and Depression Scale, anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale, depression subscale; SD, standard deviation

Table 2. Associations between depressive symptoms and sociodemographic characteristics and clinical outcomes (N = 171)

Characteristic	Depressive symptoms		Univariate analysis OR (*p* value)	Multivariate analysis~ OR (*p* value)
	Yes (HADS-D ≥8) (n = 29)	No (n = 142)		
Age (years)				
≤39	2 (6.9)	19 (13.4)	0.19 (0.050*)[d]	0.29 (0.258)
40–59	16 (55.2)	103 (72.5)	0.28 (0.005*)	0.25 (0.042*)
≥60^	11 (37.9)	20 (14.1)		
Education level				
Illiterate	10 (34.5)	28 (19.7)	1.36 (0.537)	0.40 (0.256)
School/diploma	8 (27.6)	72 (50.7)	0.93 (0.084)	0.19 (0.017*)
College/university^	11 (37.9)	42 (29.6)		
Marital status				
Single	1 (3.4)	14 (9.9)	0.33 (0.403)[d]	0.67 (0.792)
Married	23 (79.3)	105 (73.9)	1.01 (0.989)	1.54 (0.530)
Widow/divorced^	5 (17.3)	23 (16.2)		
Employment status				
Employed	5 (17.2)	27 (19.0)	0.89 (0.824)	0.65 (0.586)
Unemployed/retired^	24 (82.8)	115 (81.0)		
Have children				
No	3 (10.3)	22 (15.5)	0.63 (0.577)[d]	0.77 (0.796)
Yes^	26 (89.7)	120 (84.5)		
Financial support				
Yes	28 (96.6)	132 (93.0)	2.12 (0.693)[d]	1.13 (0.920)
No^	1 (3.4)	10 (7.0)		
Stage at diagnosis[a]				
I	5 (22.7)	29 (22.1)	0.84 (0.782)	
II	5 (22.7)	34 (26.0)	0.71 (0.597)	
III	5 (22.7)	34 (26.0)	0.71 (0.597)	
IV^	7 (31.8)	34 (26.0)		
Metastatic cancer[b]				
Yes	8 (34.8)	36 (27.9)	1.38 (0.503)	
No^	15 (65.2)	93 (72.1)		
Anxiety symptoms				
Yes (HADS-A ≥8)	19 (65.5)	18 (12.7)	13.09 (<0.001*)	14.87 (<0.001*)
No^	10 (34.5)	124 (87.3)		

a, 18 missing; b, 19 missing; c, Chi-square test; d, Fisher's exact test; HADS-A, Hospital Anxiety and Depression Scale, anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale, depression subscale; OR, odds ratio; ^, Reference point; ~, Logistic (enter) regression, Hosmer and Lemeshow test: Chi-square = 7.527, $p = 0.376$; sensitivity: 72.4%, specificity: 83.1%, overall: 81.3%; Nagelkerke R square = 0.390; *, Significant at $p < 0.05$.

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page and line number
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1, lines 1 to 2 Page 2, lines 4 to 5
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2, lines 1 to 24
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 4, line 1 to page 5, line 11
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5, lines 9 to 11
Methods			
Study design	4	Present key elements of study design early in the paper	Page 6, line 14 to 22
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6, lines 5 to 12
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 6, line 14 to 22.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	N/A
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 5, line 14 to page 6 line 3.
Bias	9	Describe any efforts to address potential sources of bias	Page 6, line 17 to 22.
Study size	10	Explain how the study size was arrived at	Page 7, line 25 to 30.
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 7, line 1 to 7.
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 7, lines 9 to 20.
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Page 7, lines 9 to 20.
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 8, lines 1 to 11.
		(b) Give reasons for non-participation at each stage	N/A

		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 8, line 1 to 11.
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	Page 8, line 13 to page 9, line 5.
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
		(*b*) Report category boundaries when continuous variables were categorized	Page 8, line 27 to page 9 line 5.
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 8, line 27 to page 9 line 5.
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 9, line 7 to 11.
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 11, line 8 to 16.
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 9, line 7 to page 11, line 30.
Generalisability	21	Discuss the generalisability (external validity) of the study results	N/A
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 12, lines 28 to 29.

N/A= Not applicable.

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Prevalence of psychological distress and associated factors among Omani women diagnosed with breast cancer: a single-centre, cross-sectional study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-073967.R1
Article Type:	Original research
Date Submitted by the Author:	28-Aug-2023
Complete List of Authors:	Al-Fahdi, Amal ; Sultan Qaboos Comprehensive Cancer Center Chan , Moon ; Sultan Qaboos University College of Medicine and Health Science, Family Medicine & Public Health Al-Siyabi, Wedad ; Sultan Qaboos Comprehensive Cancer Care and Research Center Al-Yafai, Entesar ; Sultan Qaboos Comprehensive Cancer Care and Research Center Al-Khatri, Mariya ; Sultan Qaboos University College of Medicine and Health Science Al-Azri, Mohammed; Sultan Qaboos University, Family Medicine and Public Health;
Primary Subject Heading:	Oncology
Secondary Subject Heading:	Oncology
Keywords:	Depression & mood disorders < PSYCHIATRY, Anxiety disorders < PSYCHIATRY, Breast tumours < ONCOLOGY, Risk Factors

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Prevalence of psychological distress and associated factors among Omani women diagnosed with breast cancer: a single-centre, cross-sectional study

Amal Al-Fahdi[1], Moon Fai Chan[2], Wedad Al-Siyabi[3], Entesar Al-Yafai[4], Mariya Al-Khatri[5], Mohammed Al-Azri[6*]

Author affiliations

[1]Director of Holistic Care, Sultan Qaboos Comprehensive Cancer Care and Research Centre, Muscat, Oman. E-mail: a.alfahdi@cccrc.gov.om

[2]Department of Family Medicine and Public Health, College of Medicine and Health Sciences, Sultan Qaboos University, Muscat, Oman. E-mail: moonf@squ.edu.om. ORCID: 0000-0002-2899-3118

[3]Clinical Psychologist, Sultan Qaboos Comprehensive Cancer Care and Research Centre, Muscat, Oman. E-mail: wedad93.alsiyabi@gmail.com

[4]Sociology and Social Work, Sultan Qaboos Comprehensive Cancer Care and Research Centre, Muscat, Oman. E-mail: e.alyafai-1@cccrc.gov.om

[5]College of Medicine and Health Sciences, Sultan Qaboos University. Muscat, Oman. E-mail: s126445@student.squ.edu.om

[6]Department of Family Medicine and Public Health, College of Medicine and Health Sciences, Sultan Qaboos University, Muscat, Oman.

* Correspondence to Prof. Mohammed Al-Azri; mhalazri@squ.edu.om

ORCID: 0000-0002-6136-4081

ABSTRACT

Objectives To determine the prevalence of psychological distress (i.e., anxiety and depressive symptoms) among Omani women diagnosed with breast cancer (BC) and to investigate associations with sociodemographic factors.

Design A cross-sectional, self-administered survey was conducted between September 2021 and June 2022.

Setting Sultan Qaboos Comprehensive Cancer Care and Research Centre (Muscat, Oman).

Participants Adult Omani women diagnosed with BC during the study period.

Outcome measures Data regarding anxiety and depressive symptoms were collected using an Arabic version of the Hospital Anxiety and Depression Scale (HADS). Sociodemographic and clinical information was obtained from the participants and their hospital medical records.

Results: 190 Omani women diagnosed with BC were invited to participate in the study, of whom 171 participated (response rate: 90.0%). The mean age was 50.3 ± 10.9 years. 52.3% of participants had been diagnosed with BC at stages III or IV and 28.9% had metastasis. 29 women (17.0%) exhibited depressive symptoms (HADS-D score: ≥8), while 37 (21.6%) exhibited anxiety symptoms (HADS-A score: ≥8). Women with anxiety symptoms were almost 15-times more likely to have depressive symptoms than those without anxiety symptoms (odds ratio [OR]: 14.87, p <0.001). Younger women were less likely to exhibit depressive symptoms than older women (≤39 vs. ≥60 years, $p = 0.050$; 40–59 vs. ≥60 years, $p = 0.005$). Women at the school/diploma education level were less likely to have depressive symptoms than those at college/university level (OR: 0.19, $p = 0.017$).

Conclusions: More than half of the women surveyed had been diagnosed at an advanced stage, with up to 21.6% presenting with symptoms of anxiety and depression. Healthcare professionals in Oman should consider additional screening for anxiety and depressive symptoms in this group and encourage patients with BC to disclose emotional information during consultations, particularly for those aged ≥60 years.

Keywords: Depression; Anxiety; Breast Cancer; Risk Factors; Oman

Word counts

Abstract: 303 words; **Main text:** 2,914 words

Strengths and limitations of this study

- Symptoms of depression and anxiety were assessed using a previously validated, translated version of a widely used screening tool found to have high internal consistency, sensitivity, and specificity in other Arab patient populations.
- A power analysis was conducted to determine the sample size.
- Results could be subject to errors related to recall, response, and/or personal bias due to the cross-sectional study design and the self-administered nature of the data collection tool.
- Although the study was conducted in a large, specialized cancer care centre treating patients referred from all over the country, the generalizability of the results is limited due to the single-centre setting.

INTRODUCTION

Breast cancer (BC) is the most frequently diagnosed type of cancer among women worldwide, with an estimated 2.3 million new patients diagnosed globally each year, representing 10% of all cancer diagnoses and approximately 15% of all cancer-related deaths among women [1]. Despite global efforts to improve early detection and diagnosis, nearly one-third of all women with BC have either regional or distant metastasis at the time of diagnosis, most of whom reside in low- and middle-income countries (LMICs) [2]. Despite the relatively low incidence rate in comparison to more developed countries, the mortality rate from BC in LMICs remains high [3]. Moreover, the median age of women diagnosed with BC in LMICs is 49–52 years, as compared to women in more developed countries for whom the median age is 63 years [3,4].

Psychological distress in patients with BC is an important concern for healthcare practitioners as it reduces quality of life, negatively impacts compliance with medical treatment, and carries an elevated risk of mortality [5]. Thus, emotional distress has been recognized as the sixth vital sign in cancer care alongside blood pressure, pulse, temperature, respiratory rate, and pain [6]. The US National Cancer Centre Network defines psychological distress as "a multifactorial unpleasant emotional experience of a psychological (cognitive, behavioural, emotional), social, and/or spiritual nature that may interfere with the ability to cope effectively with cancer, its physical symptoms and its treatment" [7]. In particular, individuals with BC have been found to be at greater risk of developing psychological distress, including symptoms of depression or anxiety, which lowers their quality of life and increases mortality [8,9].

The overall prevalence of psychological distress among individuals with BC is reported to be between 8–24% [10]. In particular, the risk of depression increases in women with newly-diagnosed BC, although this can depend on the stage of BC at the time of diagnosis and the modality of treatment [11]. It has been found that individuals with BC are more likely to experience symptoms of depression and anxiety at the time of diagnosis and during treatment, but that such symptoms improve over the time [12]. Furthermore, several sociodemographic variables have been found to increase the risk of depression and anxiety symptoms among people with BC, with younger, less educated, low-income, and divorced/widowed women more likely to suffer from these conditions compared to their respective counterparts [12,13].

In Oman, BC remains the most commonly diagnosed cancer, accounting for 12.8% of all cancers and 21.2% of cancers affecting Omani woman. Between 1996 and 2015, the incidence of BC in Oman almost doubled from 13.6 to 26.9 patients per 100,000 women [14]. Omani women are usually diagnosed with BC at a relatively young age (median age: 49 years) and more advanced stage (i.e., stages III or IV), with a low five-year survival rate (63%) [15]. Many Omani women diagnosed with BC experience a concerning degree of psychological distress which can manifest in various ways, including as symptoms of anxiety, depression, fatigue, sexual concerns, social isolation, difficulty concentrating, and self-blame [16,17]. However, to our knowledge, no previous study has yet been conducted to determine the prevalence of psychological distress, as measured by symptoms of anxiety and depression, among Omani women diagnosed with BC. Our aim was therefore to identify the prevalence of anxiety and depressive symptoms among a sample of Omani women diagnosed with BC and to determine associations with sociodemographic factors.

METHODS

Study design, setting, and patient recruitment

A cross-sectional, self-administered survey was conducted between September 2021 and June 2022 at the Sultan Qaboos Comprehensive Cancer Care and Research Centre (SQCCCRC), a new, governmental, comprehensive cancer centre located in Muscat, the capital city of Oman. The centre integrates patient care with research, teaching, and learning and provides evidenced-based, patient-centred care [18]. The SQCCCRC receives referred patients diagnosed with cancer from all hospitals located throughout the country and provides comprehensive treatment (i.e., surgery,

radiotherapy, chemotherapy, hormonal therapy, etc.) and palliative and psychological care to patients diagnosed with all types of cancer, including BC.

All adult Omani women aged ≥18 years diagnosed with BC during the study period were identified from the electronic medical record system. The names of potential participants and the dates of their next appointment, visit, or admission to the centre's day care units, outpatient clinics, or wards were identified. Women who met the inclusion criteria were invited to participate in the study. Only women who agreed to participate and those who did not have current psychological or psychiatric illness or not currently taking any psychotropic medications were included in the study. Women who were admitted due to cancer chemotherapy complications or considered to have an oncological emergency, such as febrile neutropenia (defined as an axillary or oral temperature of ≥38.5°C or a sustained temperature of ≥38°C for 1 hour and an absolute neutrophil count [ANC] of <500 cells/mm^3 or an expected ANC decrease to <500 cells/mm^3 in the next 48 hours), or those in obvious pain were excluded from the study [19].

Sample size calculation

The sample size required for the present study was calculated for a single proportion of a finite population of 2,000 patients with BC and at an absolute precision of 10% using nMaster sample size software, version 2.0 (Christian Medical College, Vellore, India). We considered the prevalence of anxiety and depression symptoms among women with BC to be approximately 25% based on an earlier systematic review [20]. For a confidence level of 95%, the minimum number of patients required for this study was calculated to be 170.

Tools of measurement

The Hospital Anxiety and Depression Scale (HADS) is a widely used, 14-item scale to determine the prevalence of self-reported symptoms of anxiety (using the HADS-A subscale) and depression (using the HADS-D subscale) in non-psychiatric patients. The questionnaire comprises seven questions to detect symptoms of anxiety and seven questions to detect symptoms of depression. Although items relating to symptoms of anxiety and depression are interspersed throughout the HADS questionnaire, it is important that these dimensions are scored separately [21]. Previous research confirms that the tool demonstrates satisfactory psychometric properties in assessing symptom severity and caseness for symptoms of anxiety and depression in the general population,

as well as among patients attending primary care settings, cognitively-intact nursing home residents, and cancer patients [21-23]. Correlations between the two subscales have been found to vary from 0.40 to 0.74 (mean: 0.56), while the Cronbach's alpha reliability of the HADS-A and HADS-D subscales varies from 0.68 to 0.93 (mean: 0.83) and from 0.67 to 0.90 (mean: 0.82), respectively [23]. Scores range from 0 to 21 for each subscale, and the scale distinguishes between mild symptoms (scores of ≥8) and severe symptoms (scores of ≥11) for both depressive and anxiety symptoms [23].

As such, a cut-off score of ≥8 was deemed optimal to ensure high sensitivity and specificity of 80%, given that previous studies have identified that the HADS-A and HADS-D subscales have a predictive validity of approximately 70% for the identification of symptoms of both anxiety and depression, including among individuals with BC [22-24]. Risk scores above these specific HADS cut-offs have proven useful in identifying symptoms of anxious and depression among individuals with cancer in clinical practice at various stages in the disease trajectory [22]. For the purposes of the present study, a previously validated Arabic-language version of the HADS tool was utilised. Reported Cronbach's alpha values for the translated HADS-A and HADS-D subscales are 0.83 (95% confidence interval [CI]: 0.79–0.88) and 0.77 (95% CI: 0.7–0.83), respectively [25]. The sensitivity and specificity of the Arabic-language version of the HADS tool has been reported to be 79% and 87%, respectively [26].

Women who agreed to participate in our study were given the translated HADS to complete. For illiterate women, the questionnaire was introduced and completed by a research assistant during face-to-face interviews. Sociodemographic information was obtained directly from the participants. Additional clinical information was collected from the centre's electronic medical record system, including time since BC diagnosis, age at diagnosis, stage at diagnosis, modality of BC treatment (i.e., hormonal therapy, radiation therapy, immunotherapy, surgery, chemotherapy, etc.), and the presence of any co-existing morbidities.

Statistical analysis

The data analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 23.0 (IBM Corp., Armonk, New York, USA). The level of significance was set at 5%. Descriptive statistics were used to describe the basic sociodemographic characteristics and clinical outcomes of the participants, including percentages, means, and medians. HADS-D and

HADS-A scores were used to assess the prevalence of self-reported depressive and anxiety symptoms, respectively, for each participant; those with scores of ≥8 in the respective subscales were considered to have depressive or anxiety symptoms, respectively. A univariate analysis was conducted to compare sociodemographic factors among patients with and without depressive or anxiety symptoms using χ^2 and/or Fisher's exact tests. Multivariate logistic regression was applied, and odds ratios (ORs) were used to determine risk factors associated with depressive symptoms after adjusting for sociodemographic factors.

Ethical considerations

The study was approved by the Medical Research and Ethics Committee of the College of Medicine and Health Sciences, Sultan Qaboos University (MREC #2501). All participants signed a written consent form prior to taking part in the study. Potential participants were informed that participation in the study was optional and would not affect the medical care they received from SQCCCRC.

Patient and public involvement

None.

RESULTS

Basic characteristics of the study sample

Table 1 shows the patients' sociodemographic characteristics and clinical outcomes. Of the 190 women with BC invited to take part in the study, a total of 171 agreed to participate (response rate: 90.0%). The average age was 50.3 years (standard deviation: ± 10.9 years), ranging from 24.0 to 85.0 years. The majority were married (n = 128, 74.9%) and unemployed (n = 130, 76.0%). Almost one-quarter (n = 38, 22.2%) were illiterate, while 31.0% (n = 53) had a college/university-level education. The majority had children (n = 146, 85.4%) and received some degree of financial support from either the Ministry of Social Affairs and/or their family members (n = 160, 93.6%). Most women (n = 80, 52.3%) had been diagnosed with BC at stages III or IV and 28.9% (n = 44) had metastasis. In terms of clinical outcomes, 29 patients (17.0%) exhibited depressive symptoms (HADS-D score: ≥8), while 37 patients (21.6%) had anxiety symptoms (HADS-A score: ≥8).

Factors associated with depressive symptoms

Table 2 shows the sociodemographic and clinical factors associated with depressive symptoms among the sample. In the univariate analysis, no significant associations were found between depressive symptoms and marital status (single vs. widowed/divorced, $p = 0.989$; married vs. widowed/divorced, $p = 0.989$), education level (illiterate vs. college/university education level, $p = 0.537$; school/diploma vs. college/university education level, $p = 0.084$), employment status ($p = 0.824$), having children ($p = 0.577$), or financial support ($p = 0.693$). However, patients who were younger were significantly less likely to exhibit depressive symptoms compared to older patients (≤39 vs. ≥60 years, $p = 0.005$; 40–59 vs. ≥60 years, $p = 0.005$). In terms of clinical characteristics, no significant associations were found between depressive symptoms and stage of cancer at diagnosis (stage I vs. IV, $p = 0.782$; stage II vs. IV, $p = 0.597$; stage III vs. IV, $p = 0.597$) or the presence of metastasis ($p = 0.503$); however, there was a significant association between depressive symptoms and anxiety status ($p < 0.001$).

In the multivariate analysis, all sociodemographic and clinical factors were included to adjust for each other, except for stage of cancer at diagnosis and presence of metastasis due to >10% missing data. According to a Hosmer-Lemeshow goodness-of-fit test, the model was a good fit ($\chi^2 = 7.527$, $p = 0.376$), with a predictive power of 81.3% (sensitivity: 72.4%, specificity: 83.1%). The logistic regression model showed that those aged 40–59 years were 0.25-times less likely to have depressive symptoms than patients aged ≥60 years (OR: 0.25, $p = 0.042$). In terms of education level, women at the school/diploma level were 0.19-times less likely to have depressive symptoms than those at the college/university level (OR: 0.19, $p = 0.017$). Finally, those with anxiety symptoms were 14.8-times more likely to have depressive symptoms compared to those without anxiety (OR: 14.87, $p < 0.001$).

DISCUSSION

To our knowledge, this is the first study conducted in Oman to identify the prevalence of anxiety and depressive symptoms and related sociodemographic factors among Omani women diagnosed with BC. Concerningly, over half of the participants in this study had been diagnosed with BC at later stages (i.e., stages III or IV). A previous study conducted in Oman similarly found that 33.5% of Omani women diagnosed with BC presented with more advanced disease [15]. Moreover, many of the women from this study reported experiencing psychological distress after becoming aware

of possible BC signs or symptoms which hindered them from seeking early medical help [15]. Prior research has indicated that Omani women with BC may experience several emotional barriers which hinder early medical help-seeking behaviour, such as fear of a BC diagnosis, being worried about what the doctor might find, fear of cancer-related mortality, and concerns related to the hospital setting and the thought of undergoing medical procedures [15,27]. Suqri *et al.* reported that delays in cancer diagnosis and presentation often occur among Omani individuals during the help-seeking interval between the appraisal of symptoms and consulting a doctor [28].

Utilising HADS cut-off scores of ≥8, 17.0% of Omani women with BC in the present study were considered to have depressive symptoms, while 21.6% had anxiety symptoms. A study conducted among Malaysian women diagnosed with BC observed similar prevalence rates of these conditions (19.1% and 24.1%, respectively) [29]. In previous research, Omani women diagnosed with BC reported devastating psychological distress immediately after their diagnosis, including fear of death, concern over treatment side-effects, and worries related to how the disease could affect their offspring, and their work or family commitments, as well as concern over the possibility of social stigma or adverse reactions from family members and members of the community [17].

In the current study, women with anxiety symptoms were almost 15-times more likely to have depressive symptoms compared to those without anxiety symptoms; as such, women diagnosed with BC could benefit from routine screening to rule out pre-existing psychological morbidity [30]. The prevalence of depressive symptoms was also more frequent among women who had been diagnosed with BC at more advanced stages; this is likely as result of awareness of their poorer prognosis compared with patients who are diagnosed at an earlier stage [31]. A study conducted in Greece similarly found that women diagnosed with stage IV BC were 1.9-times more likely to experience depressive symptoms compared to patients diagnosed with stages I or II BC [32]. Furthermore, more advanced BC might require more aggressive treatment which often involves unpleasant side-effects, such as hair loss, disfigurement, decreased libido, and nausea, all of which could affect the patient's body image and therefore increase their risk of emotional distress [33,34].

We also observed that older patients were significantly more likely to exhibit depressive symptoms compared to younger patients. This contradicts findings from a study conducted in Syria which showed that younger women with BC suffered more frequently from anxiety and depressive

symptoms compared to older women [35]. Indeed, younger women in Oman are reportedly more likely to exhibit anxiety symptoms because of their fear of adverse effects affecting their perceived attractiveness and femininity as a result of the side-effects of cancer treatment [36]. However, older people with BC in Germany were found to be 1.2-times more likely to experience both depressive and anxiety symptoms compared to younger patients [37]. In general, older individuals with BC may be more likely to report depressive symptoms compared to younger individuals because of lack of energy, increased sleep disturbances, decreased interest in activity, and the co-existence of other conditions, such as cardiovascular disease, stroke, diabetes, and hearing or visual impairments, all of which are more frequent in older age [31,35].

More highly educated women in our study were more likely to report depressive symptoms compared to those who had not attended college or university. This finding could be attributed to the fact that more highly educated individuals are more likely to be aware of adverse cancer outcomes and treatment side-effects [38]. A recent study conducted in Sweden similarly observed that higher education levels were associated with a greater frequency of anxiety symptoms in individuals with cancer [39]. On the other hand, other studies conducted elsewhere have indicated that less educated women are up to four times more likely to experience anxiety symptoms compared to those with a higher-level degree [32,39]. Researchers have suggested that one possible reason for this could be because more educated women have better access to information regarding cancer prognosis and treatment compared to less educated women, a factor which might offer some reassurance [32]. Further research is recommended to determine how education level might impact various forms of psychological distress experienced by individuals with BC.

This study has certain limitations. First, as a cross-sectional study based on a sample of participants with specific characteristics and self-reported measures, the results could be subject to errors related to recall, response, and/or personal bias. Second, although most of the data were collected using self-administered questionnaires, the survey was completed on the behalf of illiterate women by the research assistants during face-to-face interviews; therefore, we cannot rule out the possibility of subjective bias on the part of the interviewers for these datapoints. Finally, the study was conducted among women with BC attending a single centre in Oman, potentially affecting the generalisability of the results. However, patients attending SQCCCRC are often referred from other regions of Oman which could minimise this limitation.

CONCLUSION

In conclusion, this study identified the prevalence of anxiety and depressive symptoms among Omani women diagnosed with BC to be 17.0% and 21.6%, respectively, with more than half of the participants presenting with advanced stages of BC. Considering the high prevalence of psychological distress noted in this study, healthcare providers in Oman should improve their capacities for caring for such patients by implementing additional screening for symptoms of anxiety and depression and providing interventions to maintain the psychological wellbeing of individuals with BC. Moreover, additional health education initiatives to improve symptom recognition and early medical help-seeking behaviours are required to minimise delays in BC diagnosis among women in Oman. Healthcare providers should encourage women diagnosed with BC—particularly older women, those with additional comorbidities, and those diagnosed at a more advanced stage—to disclose emotional information during consultations. This would allow for the early detection of anxiety and depressive symptoms and ensure that such patients are referred for appropriate psychological and psychiatric support.

Acknowledgements

The authors would like to thank the participants for having taken part in the study and the authorities at SQCCCRC for allowing this study to be conducted.

Contributors

All authors contributed to the study conception and design. Data collection was performed by Wedad Al-Siyabi, Entesar Al-Yafai, and Mariya Al-Khatri. Data analyses were performed by Moon Fai Chan. The first draft of the manuscript was written by Mohammed Al-Azri and Amal Al-Fahdi, and all authors commented on previous versions of the manuscript. All authors read and approved the final version of the manuscript.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests

The authors have no conflicts of interest associated with the material presented in this paper.

Patient consent for publication

Not required.

Ethics approval and consent to participate

This research was performed in line with the principles of the revised Declaration of Helsinki. Ethical approval was granted by the Medical Research and Ethics Committee of the College of Medicine and Health Sciences at Sultan Qaboos University, Muscat, Oman (MREC #2501). Written informed consent was obtained from the participants included in this study.

Data availability statement

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

REFERENCES

1 Sung H, Ferlay J, Siegel RL, *et al.* Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021;**71**:209–49. doi:10.3322/caac.21660

2 Facione NC, Miaskowski C, Dodd MJ, *et al.* The self-reported likelihood of patient delay in breast cancer: new thoughts for early detection. *Prev Med* 2002;**34**:397–407. doi:10.1006/pmed.2001.0998

3 Ghoncheh M, Pournamdar Z, Salehiniya H. Incidence and mortality and epidemiology of breast cancer in the world. *Asian Pacific J Cancer Prev* 2016;**17**:43–6. doi:10.7314/APJCP.2016.17.S3.43

4 Albeshan SM, Mackey MG, Hossain SZ, *et al.* Breast cancer epidemiology in Gulf Cooperation Council countries: a regional and international comparison. *Clin Breast Cancer* 2018;**18**:e381–92. doi:10.1016/j.clbc.2017.07.006

5 Cardoso G, Graca J, Klut C, *et al.* Depression and anxiety symptoms following cancer diagnosis: a cross-sectional study. *Psychol Health Med* 2016;**21**:562–70.

doi:10.1080/13548506.2015.1125006

6 Fradgley EA, Bultz BD, Kelly BJ, *et al.* Progress toward integrating distress as the sixth vital sign: a global snapshot of triumphs and tribulations in precision supportive care. *J Psychosoc Oncol Res Pract* 2019;**1**:e2. doi:10.1097/or9.0000000000000002

7 Howell D, Olsen K. Distress: the 6th vital sign. *Curr Oncol* 2011;**18**:208–10. doi:10.3747/co.v18i5.790

8 McFarland DC, Shaffer KM, Tiersten A, *et al.* Physical symptom burden and its association with distress, anxiety, and depression in breast cancer. *Psychosomatics* 2018;**59**:464–71. doi:10.1016/j.psym.2018.01.005

9 Integrated Cancer Center Netherlands. [Working group guidelines: screening for psychosocial distress, v2.0]. Integraal Kankercentrum Nederland (INKL), 2017. https://www.venvn.nl/media/2ocnee0g/detecteren-behoefte-psychosociale-zorg.pdf (accessed 17 Mar 2023).

10 Krebber AMH, Buffart LM, Kleijn G, *et al.* Prevalence of depression in cancer patients: a meta-analysis of diagnostic interviews and self-report instruments. *Psychooncology* 2014;**23**:121–30. doi:10.1002/pon.3409

11 Phoosuwan N, Lundberg PC. Psychological distress and health-related quality of life among women with breast cancer: a descriptive cross-sectional study. *Support Care Cancer* 2022;**30**:3177–86. doi:10.1007/s00520-021-06763-z

12 Costanzo ES, Lutgendorf SK, Mattes ML, *et al.* Adjusting to life after treatment: distress and quality of life following treatment for breast cancer. *Br J Cancer* 2007;**97**:1625–31. doi:10.1038/sj.bjc.6604091

13 Fafouti M, Paparrigopoulos T, Zervas Y, *et al.* Depression, anxiety and general psychopathology in breast cancer patients: a cross-sectional control study. *In Vivo* 2010;**24**:803–10.

14 Al-Lawati JA, Al-Zakwani I, Fadhil I, *et al.* Cancer incidence in Oman (1996–2015). *Oman Med J* 2019;**34**:271–3. doi:10.5001/omj.2019.55

15 Al-Azri M, Al-Baimani K, Al-Awaisi H, *et al.* Knowledge of symptoms, time to presentation and barriers to medical help-seeking among Omani women diagnosed with breast cancer: a cross-sectional study. *BMJ Open* 2021;**11**:e043976. doi:10.1136/bmjopen-2020-043976

16 Al-Azri MH, Al-Awisi H, Al-Rasbi S, *et al.* Coping with a diagnosis of breast cancer among Omani women. *J Health Psychol* 2014;**19**:836–46. doi:10.1177/1359105313479813

17 Al-Azri M, Al-Awisi H, Al-Rasbi S, *et al.* Psychosocial impact of breast cancer diagnosis among Omani women. *Oman Med J* 2014;**29**:437–44. doi:10.5001/omj.2014.115

18 Al Farai A, Al Moundhri M, Panaro F. Launching of the Sultan Qaboos Comprehensive Cancer Care and Research Center (SQCCCRC) in the Sultanate of Oman to manage HBP type of cancers. *Hepatobiliary Surg Nutr* 2022;**11**:338–9. doi:10.21037/hbsn-2022-03

19 Scotte F, Simon H, Laplaige P, *et al.* Febrile neutropenia prophylaxis, G-CSF physician preferences: discrete-choice experiment. *BMJ Support Palliat Care* 2021 [Online ahead of print**]**. doi:10.1136/bmjspcare-2021-003082

20 Carreira H, Williams R, Müller M, *et al.* Associations between breast cancer survivorship and adverse mental health outcomes: a systematic review. *J Natl Cancer Inst* 2018;**110**:1311–27. doi:10.1093/jnci/djy177

21 Annunziata MA, Muzzatti B, Bidoli E, *et al.* Hospital Anxiety and Depression Scale (HADS) accuracy in cancer patients. *Support Care Cancer* 2020;**28**:3921–6. doi:10.1007/s00520-019-05244-8

22 Djukanovic I, Carlsson J, Årestedt K. Is the Hospital Anxiety and Depression Scale (HADS) a valid measure in a general population 65-80 years old? A psychometric evaluation study. *Health Qual Life Outcomes* 2017;**15**:193. doi:10.1186/s12955-017-0759-9

23 Bjelland I, Dahl AA, Haug TT, *et al.* The validity of the Hospital Anxiety and Depression Scale: an updated literature review. *J Psychosom Res* 2002;**52**:69–77. doi:10.1016/S0022-3999(01)00296-3

24 Maass SWMC, Roorda C, Berendsen AJ, *et al.* The prevalence of long-term symptoms of depression and anxiety after breast cancer treatment: a systematic review. *Maturitas* 2015;**82**:100–8. doi:10.1016/j.maturitas.2015.04.010

25 Terkawi A, Tsang S, Alkahtani G, *et al.* Development and validation of Arabic version of the Hospital Anxiety and Depression Scale. *Saudi J Anaesth* 2017;**11**:S11–8. doi:10.4103/sja.SJA_43_17

26 Malasi TH, Mirza IA, el - Islam MF. Validation of the Hospital Anxiety and Depression

Scale in Arab patients. *Acta Psychiatr Scand* 1991;**84**:323–6. doi:10.1111/j.1600-0447.1991.tb03153.x

27 Al-Azri M, Al-Awaisi H. Exploring causes of delays in help-seeking behaviours among symptomatic Omani women diagnosed with late-stage breast cancer - A qualitative study. *Eur J Oncol Nurs* 2022;**61**:102229. doi:10.1016/j.ejon.2022.102229

28 Al Suqri M, Al-Awaisi H, Al-Moundhri M, *et al.* Symptom perceptions and help-seeking behaviours of Omani patients diagnosed with late-stage colorectal cancer: a qualitative study. *Asian Pacific J Cancer Prev* 2021;**22**:427–35. doi:10.31557/APJCP.2021.22.2.427

29 Saniah A, Zainal N. Anxiety, depression and coping strategies in breast cancer patients on chemotherapy. *Malays J Psychiatry* 2010;**2**:21–6.

30 Vahdaninia M, Omidvari S, Montazeri A. What do predict anxiety and depression in breast cancer patients? A follow-up study. *Soc Psychiatry Psychiatr Epidemiol* 2010;**45**:355–61. doi:10.1007/s00127-009-0068-7

31 Silva S, Bártolo A, Santos IM, *et al.* Towards a better understanding of the factors associated with distress in elderly cancer patients: a systematic review. *Int J Environ Res Public Health* 2022;**19**:1661–9. doi:10.3390/ijerph19063424

32 Tsaras K, Papathanasiou I V, Mitsi D, *et al.* Assessment of depression and anxiety in breast cancer patients: prevalence and associated factors. *Asian Pac J Cancer Prev* 2018;**19**:1661–9. doi:10.22034/APJCP.2018.19.6.1661

33 Beisecker A, Cook MR, Ashworth J, *et al.* Side effects of adjuvant chemotherapy: perceptions of node-negative breast cancer patients. *Psychooncology* 1997;**6**:85–93. doi:10.1002/(SICI)1099-1611(199706)6:2<85::AID-PON247>3.0.CO;2-T

34 Rodrigues Guedes TS, Dantas de Oliveira NP, Holanda AM, *et al.* Body image of women submitted to breast cancer treatment. *Asian Pac J Cancer Prev* 2018;**19**:1487–93. doi:10.22034/APJCP.2018.19.6.1487

35 Soqia J, Al-shafie M, Agha LY, *et al.* Depression, anxiety and related factors among Syrian breast cancer patients: a cross-sectional study. *BMC Psychiatry* 2022;**22**:1–7. doi:10.1186/s12888-022-04469-y

36 Al-Riyami A, Abdulhadi NN, Al-Azri M. Understanding the perceptions of Omani women regarding life after a breast cancer diagnosis. *Sultan Qaboos Univ Med J* 2020;**20**:e360–7. doi:10.18295/squmj.2020.20.04.013

37 Engelhard J, Bleicher L, Kostev K. Prevalence of depression and anxiety and their risk factors in women with breast cancer in German primary care. *Value Heal* 2015;**18**:PA431. doi:10.1016/j.jval.2015.09.1025

38 Chung J, Ju G, Yang J, *et al.* Prevalence of and factors associated with anxiety and depression in Korean patients with newly diagnosed advanced gastrointestinal cancer. *Korean J Intern Med* 2018;**33**:585–94. doi:10.3904/kjim.2016.108

39 Arvanitou E, Nikoloudi M, Tsoukalas N, *et al*. Factors associated with anxiety and depression in cancer patients: demographic factors and the role of demoralization and satisfaction with care. *Psychooncology* 2023;**32**:712–20. doi:10.1002/pon.6115

Table 1. Sociodemographic characteristics and clinical outcomes (N=171)

Characteristic/outcome	n (%)
Age (years)	
≤39	21 (12.3)
40–59	119 (69.6)
≥60	31 (18.1)
Mean ± SD	50.3 ± 10.9
Median [range]	50.0 [24.0–85.0]
Education level	
Illiterate	38 (22.2)
School/diploma	80 (46.8)
College/university	53 (31.0)
Marital status	
Single	15 (8.8)
Married	128 (74.9)
Widowed/divorced	28 (16.3)
Employment	
Employed	32 (18.7)
Unemployed	130 (76.0)
Retired	9 (5.3)
Have children	
No	25 (14.6)
Yes	146 (85.4)
Financial support	
Yes	160 (93.6)
No	11 (6.4)
Stage at diagnosis[a]	
I	34 (22.2)
II	39 (25.5)
III	39 (25.5)
IV	41 (26.8)
Metastatic cancer[b]	
Yes	44 (28.9)
No	108 (71.1)
Depressive symptoms	
Yes (HADS-D score: ≥8)	29 (17.0)
No	142 (83.0)
Anxiety symptoms	
Yes (HADS-A score: ≥8)	37 (21.6)
No	134 (78.4)

a, 18 missing; b, 19 missing; HADS-A, Hospital Anxiety and Depression Scale, anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale, depression subscale; SD, standard deviation

Table 2. Associations between depressive symptoms and sociodemographic characteristics and clinical outcomes (N=171)

Characteristic	Depressive symptoms		Univariate analysis OR (*p* value)	Multivariate analysis~ OR (*p* value)
	Yes (HADS-D score: ≥8) (n = 29)	No (n = 142)		
Age (years)				
≤39	2 (6.9)	19 (13.4)	0.19 (0.050*)[d]	0.29 (0.258)
40–59	16 (55.2)	103 (72.5)	0.28 (0.005*)	0.25 (0.042*)
≥60^	11 (37.9)	20 (14.1)		
Education level				
Illiterate	10 (34.5)	28 (19.7)	1.36 (0.537)	0.40 (0.256)
School/diploma	8 (27.6)	72 (50.7)	0.93 (0.084)	0.19 (0.017*)
College/university^	11 (37.9)	42 (29.6)		
Marital status				
Single	1 (3.4)	14 (9.9)	0.33 (0.403)[d]	0.67 (0.792)
Married	23 (79.3)	105 (73.9)	1.01 (0.989)	1.54 (0.530)
Widowed/divorced^	5 (17.3)	23 (16.2)		
Employment status				
Employed	5 (17.2)	27 (19.0)	0.89 (0.824)	0.65 (0.586)
Unemployed/retired^	24 (82.8)	115 (81.0)		
Have children				
No	3 (10.3)	22 (15.5)	0.63 (0.577)[d]	0.77 (0.796)
Yes^	26 (89.7)	120 (84.5)		
Financial support				
Yes	28 (96.6)	132 (93.0)	2.12 (0.693)[d]	1.13 (0.920)
No^	1 (3.4)	10 (7.0)		
Stage at diagnosis[a]				
I	5 (22.7)	29 (22.1)	0.84 (0.782)	
II	5 (22.7)	34 (26.0)	0.71 (0.597)	
III	5 (22.7)	34 (26.0)	0.71 (0.597)	
IV^	7 (31.8)	34 (26.0)		
Metastatic cancer[b]				
Yes	8 (34.8)	36 (27.9)	1.38 (0.503)	
No^	15 (65.2)	93 (72.1)		
Anxiety symptoms				
Yes (HADS-A ≥8)	19 (65.5)	18 (12.7)	13.09 (<0.001*)	14.87 (<0.001*)
No^	10 (34.5)	124 (87.3)		

a, 18 missing; b, 19 missing; c, Chi-square test; d, Fisher's exact test; HADS-A, Hospital Anxiety and Depression Scale, anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale, depression subscale; OR, odds ratio; ^, Reference point; ~, Logistic (enter) regression, Hosmer and Lemeshow test: Chi-square = 7.527, $p = 0.376$; sensitivity: 72.4%, specificity: 83.1%, overall: 81.3%; Nagelkerke R square = 0.390; *, Significant at $p < 0.05$.

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page and line number
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1, lines 1 to 2 Page 2, lines 4 to 5
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2, lines 1 to 24
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 4, line 1 to page 5, line 11
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5, lines 9 to 11
Methods			
Study design	4	Present key elements of study design early in the paper	Page 6, line 14 to 22
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6, lines 5 to 12
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 6, line 14 to 22.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	N/A
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 5, line 14 to page 6 line 3.
Bias	9	Describe any efforts to address potential sources of bias	Page 6, line 17 to 22.
Study size	10	Explain how the study size was arrived at	Page 7, line 25 to 30.
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 7, line 1 to 7.
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 7, lines 9 to 20.
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Page 7, lines 9 to 20.
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 8, lines 1 to 11.
		(b) Give reasons for non-participation at each stage	N/A

		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 8, line 1 to 11.
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	Page 8, line 13 to page 9, line 5.
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
		(*b*) Report category boundaries when continuous variables were categorized	Page 8, line 27 to page 9 line 5.
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 8, line 27 to page 9 line 5.
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 9, line 7 to 11.
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 11, line 8 to 16.
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 9, line 7 to page 11, line 30.
Generalisability	21	Discuss the generalisability (external validity) of the study results	N/A
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 12, lines 28 to 29.

N/A= Not applicable.

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.