International Journal of Women's Health

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

Fear of Cancer Recurrence and Its Association with Depressive Symptoms Among Adult Omani Female Breast Cancer Survivors

Shawana Masad Al Harrasi[1], Huda Al-Awaisi[2], Muna Al Balushi[2], Laila Al Balushi[2], Suad Al Kharusi[3]

[1]Oman College of Health Sciences-South Batinah Branch, Rustaq, South Batinah, Oman; [2]Sultan Qaboos Comprehensive Cancer Care and Research Center, Muscat, Oman; [3]National Oncology Center, Royal Hospital, Ministry of Health, Muscat, Oman

Correspondence: Shawana Masad Al Harrasi, Oman College of Health Sciences-South Batinah Branch, P.O. Box: 228, Burj Al Rada, Rustaq, 329, Oman, Tel +96899367472, Email shawana.alharrasi@ochs.edu.om

Purpose: This study assessed the prevalence of depressive symptoms and fear of cancer recurrence (FCR) among Omani female breast cancer survivors. It also examined the predictive effect of FCR on the presence of depressive symptoms in this population.

Patients and methods: A cross-sectional study was conducted from June 2020 to December 2021 among adult Omani female breast cancer survivors recruited from the National Oncology Center at Royal Hospital and the oncology clinic at Sultan Qaboos University Hospital in Muscat, Oman. Depressive symptoms and FCR were measured using validated Arabic versions of the 9-item Patient Health Questionnaire (PHQ-9) and 30-item Concerns About Recurrence Scale. A PHQ-9 score of ≥5 was used to indicate the presence of depressive symptoms.

Results: A total of 154 women participated, with a mean age of 41.7 ± 6.7 years. Overall, 53.2% reported depressive symptoms and the mean PHQ-9 score was 5.78 ± 4.41. Most reported low to moderate levels of fear in the overall fear (83.8%), health worries (60.4%), and role worries (57.1%) domains. Higher educational attainment was associated with increased scores across all FCR domains (p <0.05). An inverse association was observed between age and womanhood worries (p <0.05), while monthly family income was associated with overall fear, health worries, and death worries (p = 0.002, 0.018, and 0.041, respectively). Employment status was associated with overall fear (p = 0.010). Depressive symptoms were positively correlated with all FCR dimensions (p <0.05). However, only overall fear (p = 0.003) and womanhood worries (p = 0.018) remained significant predictors of depressive symptoms in the multiple logistic regression analysis.

Conclusion: Omani female breast cancer survivors exhibited varying degrees of FCR, with a notable association between FCR dimensions and the presence of depressive symptoms. Specific FCR domains, particularly overall fear and womanhood worries, independently predicted depressive symptoms.

Keywords: psychological distress, oncology survivorship, mental health outcomes, Arab populations, quality of life, Oman

Introduction

Globally, breast cancer is the most common cancer among women, accounting for 23.8% of all female cancers in 2022.[1] The worldwide incidence is 46.8 cases per 100,000 women, with 2.7 million new cases expected by 2030.[1,2] In Oman, breast cancer similarly ranks as the most frequently diagnosed cancer among women, with an incidence of 34.0 per 100,000 women.[2] The International Agency for Research on Cancer projects a 24.8% increase in new breast cancer cases in Oman between 2022 and 2030.[2] Nonetheless, advances in early detection and timely treatment have improved survival rates.[3–5] In Oman, the 5-year survival rate rose from 64% to 78% between 1996 and 2008.[6] These improvements can be attributed to better detection methods, treatment availability, public awareness, and health care access.[7]

Despite these advances, breast cancer patients face considerable psychological challenges, including persistent fear of cancer recurrence (FCR) during survivorship.[8,9] This is typically defined as the fear or worry that cancer may return or advance in the same part or in another location within the body.[10] A substantial body of research identifies FCR as

Received: 19 May 2025
Accepted: 27 July 2025
Published: 21 August 2025

a common concern among survivors,[9,11–18] with depressive symptoms also presenting a major burden.[8,19–21] In the literature, FCR has been associated with various factors, including age, education, marital status, income, employment, ethnicity, and cancer stage and severity.[14,15,17,18,22,23] Moreover, many survivors experience depressive symptoms, adversely affecting their quality of life and cognitive, physical, emotional, and role functioning.[8,15,16,19,20,24] Importantly, a positive correlation between FCR and depression has been identified.[23]

While international evidence highlights the influence of psychological well-being on the quality of life of cancer survivors, research in the Omani context remains limited. One qualitative study by Al-Azri et al identified fear of death and psychological distress among recently diagnosed Omani women,[25] but did not focus on survivors or explore FCR specifically. As such, this study aimed to assess the presence of these psychological concerns and their associations among Omani breast cancer survivors. The findings are expected to support clinical practice by identifying unmet psychological needs and informing survivorship care to enhance quality of life. The specific study objectives were to: 1) assess the prevalence and severity of FCR and depressive symptoms; 2) examine the influence of selected sociodemographic and clinical factors on FCR; and 3) investigate the predictive effect of FCR domains on depressive symptoms.

Methods

Study Design and Setting

A cross-sectional study was conducted between June 2020 and December 2021 at the National Oncology Center (NOC) of Royal Hospital and the oncology clinic at Sultan Qaboos University Hospital (SQUH), both located in Muscat, Oman. Established in 2004, the NOC provides comprehensive care and services and was, at the time of the study, the primary cancer center in the country, with a total bed capacity of 78. The oncology clinic at SQUH was the second major provider of diagnostic, therapeutic, and rehabilitative cancer care. In 2021, cancer services at SQUH were discontinued, as all patients were transferred to the newly established Sultan Qaboos Comprehensive Cancer Care and Research Center.

Study Population

The target population consisted of ambulatory female breast cancer survivors who visited the NOC and SQUH oncology clinic during the study period. Eligible participants were Omani women aged 18 years or older with a previous diagnosis of breast cancer (stages 0, I, II, or III). The inclusion criteria required that participants were not undergoing active cancer treatment other than tamoxifen, had no evidence of cancer recurrence (whether at the same site, a new site in either breast, or metastasized to another area of the body), and were fluent in either Arabic or English.

Data Collection Tools

A three-part questionnaire was developed to collect data. The first section gathered the participants' sociodemographic and clinical information, including their age, education level, marital status, employment status, and monthly family income. For disease and health-related information, questions addressed cancer stage, type of treatment, and history of chronic illness. The cancer stage question offered multiple-choice options: stages I, II, or III. In terms of treatment type, the options were: 1) surgery alone; 2) surgery and radiation; 3) surgery and chemotherapy; 4) surgery, radiation, and chemotherapy; and 5) surgery, hormone therapy, and other.

The second section included an Arabic version of the 30-item Concerns About Recurrence Scale (CARS), a widely used instrument to assess the degree and nature of fears of breast cancer recurrence.[26] The first four items assess frequency, distress, consistency, and intensity of overall fear using a 6-point Likert scale, with responses scored from 1 (not at all) to 6 (continuously). The remaining 26 items measure specific recurrence-related fears across four FCR dimensions: health worries, womanhood worries, role worries, and death worries. Responses for these items are scored using a 5-point Likert scale from 0 (not at all) to 4 (extremely).[26] Scores of ≤2, 3–4, and ≥5 for the overall fear domain were considered to indicate low, moderate, and high fear, while scores of 0, 1–2, 2–3, and ≥3 for the other domains were considered to indicate none, low, moderate, and high fear.

The internal consistency of the individual domains has been reported to range from Cronbach's alpha 0.89 to 0.94.[26] Taylor et al also confirmed high internal reliability of the scale, with Cronbach's alpha coefficients of 0.87–0.93.[17] For

the purposes of the present study, the original English-language version of the CARS was forward-translated into Arabic by a professional translator after permission was obtained from the scale's developer. A second independent translator who was blinded to the original English version performed the back-translation. Four experts subsequently evaluated the content validity of the Arabic version. The final translated scale was piloted among the first 20 participants, yielding a Cronbach's alpha of 0.951. These participants were excluded from the final data analysis.

The third section of the questionnaire used the validated Arabic version of the Patient Health Questionnaire (PHQ-9) to assess the presence and severity of depressive symptoms.[27,28] Previous studies have confirmed the reliability and validity of the Arabic PHQ-9 in various Arabic-speaking populations, including Oman, with a Cronbach's alpha of 0.87.[29–32] The PHQ-9 is available to the public and does not require permission for use in scientific research. In this study, scores ≥5 indicated the presence of depressive symptoms, with scores of ≤4, 5–9, 10–15, 15–19, and ≥20 considered to indicate minimal, mild, moderate, moderately severe, and severe depressive symptoms.

Data Collection Procedure

Initially, the research assistants, who are oncology nurses, identified eligible participants during follow-up visits. These participants were invited to a face-to-face session, during which they received an information sheet, a written consent form, and the questionnaire. Participants could choose whether to complete the questionnaire on the same day or return it at their next clinic visit. However, due to precautionary measures during the coronavirus disease 2019 pandemic, an electronic format was subsequently adopted. Eligible participants were sent a link to the online questionnaire, information sheet, and consent form hosted on the SurveyMonkey platform (San Mateo, CA). Respondents had to indicate their agreement to participate by checking a box after reading the information sheet to proceed with the survey.

Statistical Analysis

Data were analyzed using the Statistical Software for the Social Sciences (SPSS) software, version 25 (IBM Corp., Armonk, NY). Descriptive statistics were calculated using means and standard deviations or frequencies and percentages. Correlations between variables were assessed using nonparametric tests, including Spearman's rho, Chi-squared, and Mann–Whitney *U*-tests. Multiple linear regression analysis was conducted to determine the extent to which FCR domains predicted depressive symptoms. A two-tailed p value of <0.05 was considered statistically significant.

Ethical Approval

This study received ethical approval from the Research and Ethical Review and Approval Committee of the Ministry of Health, Oman, as well as the Ethical Review Committee at Sultan Qaboos University Hospital (CSR# 35/2019; SQU-EC /113/19). All study procedures were conducted in line with the principles of the revised Declaration of Helsinki. Informed written consent was obtained from all participants.

Results

Sample Characteristics

A total of 154 adult Omani female breast cancer survivors completed the questionnaire and were included in the analysis. The mean age was 41.7 ± 6.7 years (range: 26–58 years). Nearly half of the women (45.5%) had attained a college-level education, and 54.4% were unemployed. The majority (72.7%) had received surgery, chemotherapy, and radiation therapy as part of their cancer treatment. Additional sociodemographic and clinical characteristics are presented in Table 1.

Overall Prevalence of Depressive Symptoms and Fear of Cancer Recurrence

The mean PHQ-9 score for the entire sample [Table 1] was 5.78 ± 4.41 (range: 0–26), with more than half of the participants (53.2%) reporting the presence of depressive symptoms. The prevalence of FCR, including mean scores and proportions of participants reporting fear across the five domains, is presented in Table 2. Overall, 63.6% of participants reported some degree of FCR, defined as a score of ≥2.0 in the overall fear domain. Fewer women reported fear in the specific FCR domains, including health worries (39.6%), womanhood worries (22.1%), role worries (27.3%), and death

Table 1 Characteristics of Adult Omani Women Breast Cancer Survivors (N = 154)

Characteristic	**n (%)**
Age in years	
Mean ± SD	41.72 ± 6.72
Range	26–58
Education level	
Up to grade 9	22 (14.3)
Grades 10–12	62 (40.2)
College or university	70 (45.5)
Number of years of education, mean ± SD	11.9 ± 1.63
Marital status	
Single	16 (10.4)
Married	126 (81.8)
Divorced	8 (5.2)
Widowed	4 (2.6)
Employment status	
Employed	70 (45.5)
Not employed	84 (54.5)
Monthly family income in OMR	
<500	49 (31.8)
500–999	43 (27.9)
1000–1499	37 (24.0)
1500–1999	16 (10.4)
≥2000	9 (5.8)
Chronic illnesses	
0	113 (73.4)
1	29 (18.8)
≥2	12 (7.8)
Cancer stage at diagnosis	
I	51 (33.1)
II	66 (42.9)
III	37 (24.0)

(*Continued*)

Table 1 (Continued).

Characteristic	n (%)
Type of cancer treatment	
Surgery alone	4 (2.6)
Surgery and radiation	6 (3.9)
Surgery and chemotherapy	9 (5.8)
Surgery, radiation, and chemotherapy	112 (72.7)
Surgery, radiation, and hormone therapy	23 (14.9)
Depressive symptoms*	
No	72 (46.8)
Yes	82 (53.2)
Mean PHQ-9 score ± SD (range)	5.78 ± 4.41 (0–26)
Severity of depressive symptoms†	
Minimal	72 (46.8)
Mild	58 (37.7)
Moderate	19 (12.3)
Moderately severe	3 (1.9)
Severe	2 (1.3)

Notes: *Assessed using the Arabic version of the PHQ-9. A score threshold of ≥5 was considered to indicate the presence of depressive symptoms. †Scores of ≤4, 5–9, 10–14, 15–19, and ≥20 were considered to indicate minimal, mild, moderate, moderately severe, and severe depressive symptoms.
Abbreviations: OMR, Omani riyals; PHQ-9, 9-item Patient Health Questionnaire; SD, standard deviation.

Table 2 Prevalence of Fear of Cancer Recurrence* Among Adult Omani Women Breast Cancer Survivors (N = 154)

Domain	Mean Score ± SD	Fear of Cancer Recurrence, n (%)	
		No	Yes†
Overall fear	2.55 ± 1.54	56 (36.4)	98 (63.6)
Health worries	1.35 ± 1.06	93 (60.4)	61 (39.6)
Womanhood worries	0.82 ± 0.93	120 (77.9)	34 (22.1)
Role worries	1.03 ± 0.91	112 (72.7)	42 (27.3)
Death worries	0.98 ± 1.29	106 (68.8)	48 (31.2)

Notes: *Assessed using a translated Arabic version of the 30-item Concerns of Recurrence Scale. The four items in the overall fear domain were measured on a 6-point Likert scale from 1 (not at all) to 6 (continuously). The remaining 26 items in the other domains were measured on a 5-point Likert scale from 0 (not at all) to 4 (extremely). †A score threshold of ≥2.0 was considered to indicate some degree of fear of cancer recurrence.
Abbreviation: SD, standard deviation.

https://doi.org/10.2147/IJWH.S541449

worries (31.2%). Based on mean scores, participants reported absent-to-low levels of womanhood worries (0.82 ± 0.93) and death worries (0.98 ± 1.29) and low-to-moderate levels of health worries (1.35 ± 1.06) and role worries (1.03 ± 0.91). The mean score for the overall fear domain was 2.55 ± 1.54, indicating a low-to-moderate level of overall FCR.

Severity of Fear of Cancer Recurrence

While the previous section focused on the presence or absence of FCR, this section provides a more detailed breakdown of fear severity. In terms of overall fear, 57.8% of participants reported low fear, 26.0% reported moderate fear, and 16.2% reported a high degree of fear. Across specific domains, the greatest proportion of participants reporting high fear was in the health worries (21.4%) and death worries (20.8%) domains, whereas only 7.1% reported high fear in the womanhood worries and role worries domains.

Low-to-moderate levels of fear were common in the health worries (53.9%) and role worries (57.1%) domains. In contrast, most women reported absent-to-low levels of fear in the womanhood worries (77.9%) and death worries (68.9%) domains. Overall, 39.6% of women reported moderate-to-high fear in the health worries domain, while 27.2% of women reported moderate-to-high fear in the role worries domain. The distribution of FCR severity across various domains is presented in Table 3. Each of the specific FCR domains significantly correlated with overall fear (p <0.01 each).

Correlations Between Fear of Cancer Recurrence and Participant Characteristics

The results of the univariate analysis are presented in Table 4, revealing several significant correlations between participant characteristics and FCR dimensions. Positive correlations were found between the number of years of education and all FCR dimensions. Age was negatively correlated with womanhood worries (r = −0.173; p = 0.033). Monthly family income was positively correlated with overall fear (χ^2 = 17.10; p = 0.002), health worries (χ^2 = 11.95; p = 0.018), and death worries (χ^2 = 9.95; p = 0.041). Employment status was also significantly correlated with overall fear (U = 2237.5; p = 0.010), with unemployed participants higher levels of overall fear.

No clinical characteristics were found to correlate with any of the FCR domains. However, PHQ-9 depressive symptom scores were positively correlated with all FCR dimensions: overall fear (r = 0.350), health worries (r = 0.337), womanhood worries (r = 0.396), role worries (r = 0.352), and death worries (r = 0.311), with all correlations being statistically significant (p <0.01 each).

Predictive Effect of Fear of Cancer Recurrence on Depressive Symptoms

The results of the multiple regression analysis are presented in Table 5. The analysis revealed that FCR accounted for 23.1% of the variation in depressive symptoms, with the model being a statistically significant predictor of depressive symptoms ($F_{(5148)}$ = 8.869; p <0.001). Among the specific FCR dimensions, overall fear (B = 0.894) and womanhood

Table 3 Severity of Fear of Cancer Recurrence* Among Adult Omani Women Breast Cancer Survivors (N = 154)

Domain	Severity of Fear,†,‡ n (%)			
	None	Low	Moderate	High
Overall fear	–	89 (57.8)	40 (26.0)	25 (16.2)
Health worries	38 (24.7)	55 (35.7)	28 (18.2)	33 (21.4)
Womanhood worries	81 (52.6)	39 (25.3)	23 (15.0)	11 (7.1)
Role worries	55 (35.7)	57 (37.0)	31 (20.1)	11 (7.1)
Death worries	74 (48.1)	32 (20.8)	16 (10.3)	32 (20.8)

Notes: *Assessed using a translated Arabic version of the 30-item Concerns of Recurrence Scale. †Scores of ≤2, 3–4, and ≥5 for the overall fear domain were considered to indicate low, moderate, and high fear. ‡Scores of 0, 1–2, 2–3, and ≥3 for the other domains were considered to indicate none, low, moderate, and high fear.

Table 4 Associations Between Fear of Cancer Recurrence and Sociodemographic and Clinical Characteristics of Adult Omani Women Breast Cancer Survivors (N = 154)

Variable	Overall Fear	Health Worries	Womanhood Worries	Role Worries	Death Worries
	r*				
Age	−0.018	−0.064	−0.173†	−0.123	−0.044
Number of years of education	0.288‡	0.213‡	0.181†	0.212‡	0.197†
PHQ-9 score	0.350‡	0.337‡	0.396‡	0.352‡	0.311‡
	χ^2 or U (*p* value)‖				
Marital status	2.25 (0.522)	6.25 (0.100)	2.04 (0.564)	0.96 (0.812)	5.59 (0.133)
Monthly family income	17.10 (0.002)‡	11.95 (0.018)†	8.88 (0.064)	9.92 (0.066)	9.95 (0.041)†
Employment status	2237.5 (0.010)‡	2470.5 (0.090)	2708.5 (0.390)	2569.5 (0.18)	2682.5 (0.320)
Cancer stage at diagnosis	0.211 (0.900)	0.597 (0.742)	5.457 (0.065)	0.287 (0.867)	1.209 (0.546)
Chronic illnesses	0.267 (0.875)	1.370 (0.504)	0.747 (0.688)	0.783 (0.676)	0.480 (0.787)
Type of cancer treatment	4.993 (0.288)	4.512 (0.341)	3.585 (0.465)	2.137 (0.771)	3.307 (0.508)

Notes: *Calculated using Spearman correlation coefficient. †Statistically significant at p <0.05. ‡Statistically significant at p <0.01. ‖Calculated using Chi-squared and Mann–Whitney *U*-tests.
Abbreviation: PHQ-9, 9-item Patient Health Questionnaire.

worries (B = 1.463) were significant predictors of depressive symptoms (p <0.05). In contrast, health worries (B = −0.659; p = 0.397), role worries (B = 1.427; p = 0.051), and death worries (B = −0.934; p = 0.075) did not reach statistical significance.

Discussion

This is the first study to assess the FCR, its predictive factors, and its relationship with depressive symptoms among breast cancer survivors in Oman. The majority of participants (83.8%) reported low-to-moderate levels of overall FCR, with 63.6% experiencing some degree of overall fear. These findings are consistent with previous studies on the

Table 5 Multiple Logistic Regression Model* Predicting Depressive Symptoms From Domains of Fear of Cancer Recurrence

Predictor	B (SE)	β	t value	*p* value	95% CI
Constant	2.706 (0.705)	–	3.838	<0.001†	1.313–4.099
Overall fear	0.894 (0.300)	0.312	2.977	0.003†	0.301–1.488
Health worries	−0.659 0.776)	−0.158	−0.849	0.397	−2.191–0.874
Womanhood worries	1.463 (0.612)	0.309	2.389	0.018†	0.253–2.673
Role worries	1.427 (0.726)	0.293	1.966	0.051	−0.008–2.861
Death worries	−0.934 (0.520)	−0.273	−1.794	0.075	−1.962–0.095

Notes: *Model summary: R = 0.480, R^2 = 0.231, adjusted R^2 = 0.205, SE = 3.934, Durbin–Watson statistic = 1.991; $df_{(5,\ 148)}$ = 8.869, p <0.001. The dependent variable was the summing score of depressive symptoms. †Considered statistically significant at p <0.05.
Abbreviations: CI, confidence interval; SE, standard error.

psychological burden of recurrence-related fears among cancer survivors. For instance, Taylor et al observed low-to-moderate levels of FCR among African American breast cancer survivors, with approximately 67% reporting some degree of fear of recurrence.[17] Similarly, Asian American breast cancer survivors exhibited low-to-moderate levels of FCR both at baseline (67.2%) and one year later (59.9%), with 88.2% at baseline and 84% one year later reporting some level of fear.[33] These results suggest that FCR is a common psychological concern across diverse survivor populations, highlighting the need for comprehensive psychological support and interventions that can be applied across different cultural contexts.

Interestingly, the current study found that physical health-related fears, including concerns about control and possible future treatments, were more pronounced among Omani female breast cancer survivors compared to role-related fears or womanhood-related fears.[17] This pattern, where fears related to health and death are stronger than those related to womanhood and role aspects, has also been observed in earlier studies.[17,34] In the Omani context, cultural and religious factors may have influenced how the participants perceived womanhood and role-related concerns. Research indicates that Muslim breast cancer patients often exhibit strong spiritual well-being, with Islamic faith positively contributing to coping strategies and psychological adjustment to a breast cancer diagnosis.[35,36] Spirituality is considered a vital element for many cancer survivors in managing the uncertainty and psychological distress associated with their condition.[13,36] Moreover, the presence of larger social networks with strong family ties, common in Arab communities, has been shown to significantly improve quality of life and psychological well-being following a breast cancer diagnosis.[35,37]

This family support system could also influence role-related aspects of FCR. In Arab cultures, women with breast cancer may receive assistance from their family members in managing household chores and daily routines, which can help them preserve their identities and roles until they gradually become self-reliant.[38] Almegewly et al highlighted the experience of 18 Saudi women with past histories of breast cancer, noting that these women refused to refer to themselves as "survivors" due to their ability to maintain their normal activities and roles.[39] Regardless, it is important to acknowledge that 27.2% and 22.1% of participants in the current study experienced moderate-to-high levels of fear regarding role-related and womanhood concerns, respectively. This underscores the need for further research to explore sociocultural and religious influences on FCR among cancer survivors in such communities.

Our study also revealed significant associations between FCR and several sociodemographic factors, with participants who were employed, had higher family incomes, and had more years of education reporting greater fear across all FCR dimensions. This finding contradicts several previous studies investigating predictors of FCR.[10,34,40,41] For example, an Iranian study showed that cancer patients with lower levels of education experienced higher levels of FCR.[40] Similarly, less educated breast cancer survivors in the Netherlands reported higher levels of FCR compared to those with tertiary educations.[41] However, Lopes et al argued that breast cancer survivors with higher income and education levels might experience greater concerns about cancer and health, along with more negative self-evaluations.[42]

A possible explanation for this discrepancy is that wealthier and more educated survivors might have better access to health information, leading to heightened awareness of potential disease risks and, consequently, greater fear of recurrence. In the Omani context, this may be influenced by increasing health literacy among more educated individuals, which could contribute to greater awareness, and thus greater concern, about cancer recurrence. Nonetheless, evidence regarding the influence of socioeconomic factors on FCR remains inconsistent, highlighting the need for further investigation, particularly with attention to cultural background.[15]

In terms of age, the results of this study are consistent with earlier research indicating younger survivors tend to report higher levels of FCR.[14,15,17,22,23,34,43,44] Lebel et al, for instance, found that younger North American women exhibited significantly greater FCR across all CARS domains compared to older women.[44] Several factors may contribute to this trend. A breast cancer diagnosis is often more unexpected in early adulthood, and younger women may have had limited experience navigating disease-related challenges or coping with chronic illness and health care systems.[17,44] Moreover, many younger women may be raising young children, thus experiencing heightened anxiety related to the possibility of death and the emotional impact on their families.[17,41] Indeed, mothers with cancer, regardless of their age, may experience guilt at the thought of potentially leaving their children behind and missing out on seeing them grow up.[44] This study did not examine the number or ages of the participants' children as possible influences on FCR. As such, these variables should be considered in future studies.

None of the clinical factors investigated in the present study were significantly associated with FCR. This finding is consistent with several previous studies,[11,16,33,41] although not all.[10,12,22,43] Liu et al found an association between FCR and stage II breast cancer, but not with type of treatment received.[22] On the other hand, Bahçeli and Küçük reported significantly higher FCR among breast cancer survivors who did not receive radiotherapy and chemotherapy.[10] In contrast, undergoing chemotherapy was significantly associated with FCR among breast cancer survivors in Denmark[12] and with dysfunctional FCR five to six years post-treatment in Germany.[43] These inconsistent findings emphasize the need for further research to examine potential associations between FCR and clinical or disease-related variables.

In the present study, over half of the participants (53.2%) reported depressive symptoms. This aligns with a prior systematic review that found that the prevalence of depression among breast cancer survivors ranged from 1% to 56%, with no major differences between Asian and Western populations.[21] Depression during the treatment phase may stem from fears of death and disease recurrence.[20] A significant positive correlation between FCR and depressive symptoms was found in the current analysis, with nearly one-quarter of the variance in depressive symptoms explained by FCR. This supports previous research showing a strong link between FCR and depressive symptoms,[16,17,24] and highlights the importance of integrating comprehensive psychological assessment and interventions into routine cancer management.[17] In addition to FCR, other factors such as sleep disturbances have also been linked to depressive symptoms in cancer survivors and should be considered in future studies addressing broader determinants of psychological well-being in this population.[45]

Implications for Clinical Practice and Research

The findings of this study provide important insights for clinicians in identifying breast cancer survivors who may be at greater risk of FCR and depressive symptoms. A better understanding of the nature and contributing factors of FCR in Omani women can support the development of culturally validated screening tools to identify those in need of psychological support and intervention and to implement effective, individualized care plans. These plans should address several survivorship concerns, including bodily symptoms, FCR, physical and psychological well-being, lifestyle, medication management, reproductive health, and appropriate referrals.[13] Such plans are crucial for providing prompt, continuous support tailored to the long-terms needs of each survivor.[13] Moreover, translating these research findings into practical formats, for instance by developing digital resources or tools for clinicians, could enhance the usefulness of these results for clinical practice.

In addition, this study also offers groundwork for further exploration of FCR and its relationship with psychological concerns such as depression, anxiety, and dysfunctional fear, taking into account cultural factors. Longitudinal research following Omani breast cancer survivors over time is needed to identify both risk and protective factors associated with FCR and depressive symptoms, as well as effective coping strategies. A more comprehensive understanding of these factors may facilitate the development of empirical screening programs and targeted interventions for this patient group.

Study Limitations

Despite the importance of the study findings, some limitations in the design and analysis should be considered when interpreting the results. The cross-sectional nature of the study means that causal relationships between FCR and the factors studied cannot be inferred. Therefore, future research is recommended to investigate the predictive factors of FCR and its association with the psychological well-being of breast cancer survivors utilizing longitudinal designs. Another limitation is the small sample size and use of a convenience sampling approach, which may limit the generalizability of the results to all breast cancer survivors. Furthermore, as this study was conducted at a single center in Oman with a focus on Omani women, the findings may not fully capture the diversity of breast cancer survivors across different contexts. To strengthen the external validity of these results, future research should consider incorporating multi-national, multi-center, and multi-ethnic samples.

Moreover, this study did not examine several important factors that have been shown to be associated with FCR in other studies, including number of children, time since cancer diagnosis, and level of family support. Further studies are recommended to include variables. In addition, future research should assess the influence of religion and spirituality on FCR. Finally, the use of a single scale to measure FCR is another limitation. It is recommended that future studies use more than one scale to assess the level of FCR and its dimensions.

Conclusion

This study provides evidence that over half of Omani breast cancer survivors experience some degree of FCR. Specific FCR domains, particularly overall fear and womanhood worries, independently predicted depressive symptoms. The findings also highlight the need for further research into predictive factors of FCR, as well as the importance of effective psychological assessment and interventions to support the well-being of cancer survivors.

Acknowledgments

The authors extend their gratitude to the personnel at the Sultan Qaboos Comprehensive Cancer Care and Research Center and NOC for their support in facilitating this study. Sincere thanks are also due to all of the women who participated in this research.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Bray F, Laversanne M, Sung H, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2024;74(3):229–263. doi:10.3322/caac.21834
2. Global Cancer Observatory. Lyon: international agency for research on cancer, world health organization. 2022. Available from: https://gco.iarc.fr/en. Accessed May 4, 2025.
3. Maajani K, Jalali A, Alipour S, Khodadost M, Tohidinik HR, Yazdani K. The global and regional survival rate of women with breast cancer: a systematic review and meta-analysis. *Clin Breast Cancer*. 2019;19(3):165–177. doi:10.1016/j.clbc.2019.01.006
4. Coleman MP, Quaresma M, Berrino F, et al. Cancer survival in five continents: a worldwide population-based study (Concord). *Lancet Oncol*. 2008;9(8):730–756. doi:10.1016/S1470-2045(08)70179-7
5. Al-Shamsi HO, Abdelwahed N, Abyad A, et al. Breast cancer in the Arabian Gulf countries. *Cancer*. 2023;15(22):5398. doi:10.3390/cancers15225398
6. Kumar S, Burney IA, Al-Ajmi A, Al-Moundhri MS. Changing trends of breast cancer survival in Sultanate of Oman. *J Oncol*. 2011;2011:316243. doi:10.1155/2011/316243
7. Sonkin D, Thomas A, Teicher BA. Cancer treatments: past, present, and future. *Cancer Genet*. 2024;286–287:18–24. doi:10.1016/j.cancergen.2024.06.002
8. Zhao G, Okoro CA, Li J, White A, Dhingra S, Li C. Current depression among adult cancer survivors: findings from the 2010 behavioral risk factor surveillance system. *Cancer Epidemiol*. 2014;38(6):757–764. doi:10.1016/j.canep.2014.10.002
9. Ankersmid JW, Lansink Rotgerink FK, Strobbe LJA, van Uden-Kraan CF, Siesling S, Drossaert CHC. Relations between recurrence risk perceptions and fear of cancer recurrence in breast cancer survivors. *Breast Cancer Res Treat*. 2022;195(2):117–125. doi:10.1007/s10549-022-06684-3
10. Bahçeli PZ, Küçük BY. Fear of cancer recurrence in women with breast cancer: a cross-sectional study after mastectomy. *Med Rec*. 2022;4(3):315–320.
11. Chirico A, Vizza D, Valente M, et al. Assessing the fear of recurrence using the cancer worry scale in a sample of Italian breast cancer survivors. *Support Care Cancer*. 2022;30(3):2829–2837. doi:10.1007/s00520-021-06718-4
12. Ellegaard MB, Grau C, Zachariae R, Bonde Jensen A. Fear of cancer recurrence and unmet needs among breast cancer survivors in the first five years: a cross-sectional study. *Acta Oncol*. 2017;56(2):314–320.
13. King R, Stafford L, Butow P, Giunta S, Laidsaar-Powell R. Psychological experiences of breast cancer survivors: a meta-review. *J Cancer Surviv*. 2024;18(1):84–123.
14. Lim E, Humphris G. The relationship between fears of cancer recurrence and patient age: a systematic review and meta-analysis. *Cancer Rep*. 2020;3(3):e1235.
15. Simard S, Thewes B, Humphris G, et al. Fear of cancer recurrence in adult cancer survivors: a systematic review of quantitative studies. *J Cancer Surviv*. 2013;7(3):300–322. doi:10.1007/s11764-013-0272-z
16. Sun H, Yang Y, Zhang J, et al. Fear of cancer recurrence, anxiety and depressive symptoms in adolescent and young adult cancer patients. *Neuropsychiatr Dis Treat*. 2019;15:857–865. doi:10.2147/NDT.S202432
17. Taylor TR, Huntley ED, Sween J, et al. An exploratory analysis of fear of recurrence among African-American breast cancer survivors. *Int J Behav Med*. 2012;19(3):280–287. doi:10.1007/s12529-011-9183-4
18. Tewari A, Chagpar AB. Worry about breast cancer recurrence: a population-based analysis. *Am Surg*. 2014;80(7):640–645. doi:10.1177/000313481408000716
19. Abu-Helalah M, Al-Hanaqta M, Alshraideh H, Abdulbaqi N, Hijazeen J. Quality of life and psychological well-being of breast cancer survivors in Jordan. *Asian Pac J Cancer Prev*. 2014;15(14):5927–5936.
20. Reyes-Gibby CC, Anderson KO, Morrow PK, Shete S, Hassan S. Depressive symptoms and health-related quality of life in breast cancer survivors. *J Womens Health*. 2012;21(3):311–318.
21. Zainal NZ, Nik-Jaafar NR, Baharudin A, Sabki ZA, Ng CG. Prevalence of depression in breast cancer survivors: a systematic review of observational studies. *Asian Pac J Cancer Prev*. 2013;14(4):2649–2656.
22. Liu Y, Pérez M, Schootman M, Aft RL, Gillanders WE, Jeffe DB. Correlates of fear of cancer recurrence in women with ductal carcinoma in situ and early invasive breast cancer. *Breast Cancer Res Treat*. 2011;130(1):165–173. doi:10.1007/s10549-011-1551-x
23. Zhang X, Sun D, Qin N, Liu M, Jiang N, Li X. Factors correlated with fear of cancer recurrence in cancer survivors: a meta-analysis. *Cancer Nurs*. 2022;45(5):406–415. doi:10.1097/NCC.0000000000001020

24. Kypriotakis G, Deimling GT, Piccinin AM, Hofer SM. Correlated and coupled trajectories of cancer-related worries and depressive symptoms among long-term cancer survivors. *Behav Med*. 2016;42(2):82–92.
25. 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(6):437–444.
26. Vickberg SMJ. The Concerns About Recurrence Scale CARS: a systematic measure of women's fears about the possibility of breast cancer recurrence. *Ann Behav Med*. 2003;25(1):16–24.
27. Spitzer RL, Williams JB, Kroenke K, et al. Utility of a new procedure for diagnosing mental disorders in primary care. The PRIME-MD 1000 study. *JAMA*. 1994;272(22):1749–1756. doi:10.1001/jama.1994.03520220043029
28. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606–613.
29. Becker S, Al Zaid K, Al Faris E. Screening for somatization and depression in Saudi Arabia: a validation study of PHQ in primary care. *Int J Psychiatry Med*. 2002;32(3):271–283.
30. AlHadi AN, AlAteeq DA, Al-Sharif E, et al. An Arabic translation, reliability, and validation of patient health questionnaire in a Saudi sample. *Ann Gen Psychiatry*. 2017;16(1):32–40. doi:10.1186/s12991-017-0155-1
31. Daradkeh TK, Eapen V, Ghubash R. Mental morbidity in primary care in Al Ain (UAE): application of the Arabic translation of the PRIME-MD (PHQ) version. *German J Psychiatry*. 2005;8:32–35.
32. Al-Busaidi Z, Bhargava K, Al-Ismaily A, et al. Prevalence of depressive symptoms among university students in Oman. *Oman Med J*. 2011;26 (4):235–239. doi:10.5001/omj.2011.58
33. Ashing KT, Cho D, Lai L, et al. Exploring characteristics, predictors, and consequences of fear of cancer recurrence among Asian-American breast cancer survivors. *Psychooncology*. 2017;26(12):2253–2260. doi:10.1002/pon.4350
34. van den Beuken-van Everdingen MHJ, Peters ML, de Rijke JM, Schouten HC, van Kleef M, Patijn J. Concerns of former breast cancer patients about disease recurrence: a validation and prevalence study. *Psychooncology*. 2008;17(11):1137–1145. doi:10.1002/pon.1340
35. Al-Natour A, Al Momani SM, Qandil AMA. The relationship between spirituality and quality of life of Jordanian women diagnosed with breast cancer. *J Relig Health*. 2017;56(6):2096–2108. doi:10.1007/s10943-017-0370-8
36. Khodaveirdyzadeh R, Rahimi R, Rahmani A, Ghahramanian A, Kodayari N, Eivazi J. Spiritual/religious coping strategies and their relationship with illness adjustment among Iranian breast cancer patients. *Asian Pac J Cancer Prev*. 2016;17(8):4095–4099.
37. Kroenke CH, Kwan ML, Neugut AI, et al. Social networks, social support mechanisms, and quality of life after breast cancer diagnosis. *Breast Cancer Res Treat*. 2013;139(2):515–527. doi:10.1007/s10549-013-2477-2
38. Hammoudeh W, Hogan D, Giacaman R. From a death sentence to a disrupted life: palestinian women's experiences and coping with breast cancer. *Qual Health Res*. 2016;27(4):487–496. doi:10.1177/1049732316628833
39. ALmegewly W, Gould D, Anstey S. Hidden voices: an interpretative phenomenological analysis of the experience of surviving breast cancer in Saudi Arabia. *J Res Nurs*. 2019;24(1–2):122–132. doi:10.1177/1744987118809482
40. Aghdam AM, Rahmani A, Nejad ZK, Ferguson C, Mohammadpoorasl A, Sanaat Z. Fear of cancer recurrence and its predictive factors among Iranian cancer patients. *Indian J Palliat Care*. 2014;20(2):128–133. doi:10.4103/0973-1075.132632
41. Custers JAE, Gielissen MFM, de Wilt JHW, et al. Toward an evidence-based model of fear of cancer recurrence for breast cancer survivors. *J Cancer Surviv*. 2017;11(1):41–47. doi:10.1007/s11764-016-0558-z
42. Lopes JV, Bergerot CD, Barbosa LR, et al. Impact of breast cancer and quality of life of women survivors. *Rev Bras Enferm*. 2018;71 (6):2916–2921. doi:10.1590/0034-7167-2018-0081
43. Heidkamp P, Breidenbach C, Hiltrop K, et al. Individual courses and determinants of fear of cancer recurrence in long-term breast cancer survivors with and without recurrence. *Support Care Cancer*. 2021;29(12):7647–7657. doi:10.1007/s00520-021-06329-z
44. Lebel S, Beattie S, Arès I, Bielajew C. Young and worried: age and fear of recurrence in breast cancer survivors. *Health Psychol*. 2013;32 (6):695–705. doi:10.1037/a0030186
45. Liu H. Association between sleep duration and depression: a Mendelian randomization analysis. *J Affect Disord*. 2023;335:152–154. doi:10.1016/j.jad.2023.05.020