

ORIGINAL RESEARCH

PERIOPERATIVE MEDICINE

Prevalence of depression and anxiety among patients with breast cancer in Jeddah, Saudi Arabia

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ABSTRACT

Background & objective: Receiving a cancer diagnosis was often the most challenging part of the entire procedure for many survivors of primary or recurrent breast cancer. The aim of this study was to examine the prevalence of depression and anxiety among patients with breast cancer in Jeddah, Saudi Arabia.

Methodology: A cross-sectional survey study was conducted in Jeddah, Saudi Arabia between November 2024 and February 2025 to examine the prevalence of depression and anxiety among female patients diagnosed with breast cancer, with the use of Generalized Anxiety Disorder Scale-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9).

Results: A total of 137 breast cancer patients were included in the analysis. Anxiety levels were distributed among patients as follows: 46 (33.6%) had mild anxiety, 50 (36.5%) had moderate anxiety, and 41 (29.9%) experienced severe anxiety. Depression severity varied, with 11 (8.0%) reporting mild symptoms, 54 (39.4%) experiencing moderate depression, 42 (30.7%) having moderately severe depression, and 30 (21.9%) suffering from severe depression. The GAD-7 mean score was (12.6 ± 4.9) out of 21, and PHQ-9 mean score was (15.8 ± 5.21) out of 27. Patients who underwent radiotherapy had significantly higher odds of experiencing depression (AOR = 3.27, 95% CI: 1.17-9.10, P = 0.02) and nearly significant association with anxiety (AOR = 3.14, 95% CI: 0.99-10.01, P = 0.05). Additionally, surgery showed a borderline protective association with anxiety (AOR = 0.29, 95% CI: 0.08-1.01, P = 0.05).

Conclusion: Depression and anxiety are common psychological illnesses among females with breast cancer. Psychological intervention should be directed towards high-risk patients. Psychological support programs should be facilitated for these patients in order to improve their clinical outcomes.

Abbreviations: GAD-7: Generalized Anxiety Disorder Scale-7, PHQ-9: Patient Health Questionnaire-9

Keywords: Anxiety; Breast cancer; Depression; Saudi Arabia

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1. INTRODUCTION

Breast cancer is a serious public health issue and the primary cause of cancer-related deaths among women

globally.¹ It is projected that there would be 17 million cancer deaths and 27 million new cancer cases worldwide in 2030.² In a population of 33,554,333, Saudi Arabia reported 10,518 cancer-related fatalities

and 24,485 new cancer cases in 2018.³ Compared to 20% in industrialized nations, over 50% of breast cancer cases in Saudi Arabia are diagnosed at an advanced stage.³ Although death rates are frequently lower in high-income nations because of improved access to early detection and treatment, high-income countries generally have higher incidence rates than low- and middle-income ones.⁴

Regarding the variables that raise the risk of breast cancer, they can be linked to genetic, hormonal, and environmental, which is the primary risk factor for disease and shows a higher frequency in women over 50.⁵ Different cancer therapies and drugs are available, including radiation therapy and surgery to treat a particular tumor or part of the body, as well as chemical treatments like immunotherapy, chemotherapy, and targeted therapy. The adverse effects of cancer treatments are numerous. Adverse effects may differ between medications and treatment modalities, as well as between individuals.⁶⁻⁹

It is possible for the diagnosis itself to contribute to or worsen poor mental health.^{10,11} Receiving a cancer diagnosis was often the most challenging part of the entire procedure for many survivors of primary or recurrent breast cancer.¹² Anxiety and depression are common psychological illnesses among patients diagnosed with cancer in both inpatients and outpatients' settings.¹³ According to previous review articles, anxiety symptoms are widespread and last throughout the course of cancer therapy in individuals with newly diagnosed breast cancer.¹⁴⁻¹⁶ According to another analysis, after receiving a breast cancer diagnosis, more than 22% of women have depressed symptoms.¹⁶ The aim of this research was to examine the prevalence of anxiety and depression among female patients diagnosed with breast cancer in Saudi Arabia.

2. METHODOLOGY

A cross-sectional survey study was conducted in Jeddah, Saudi Arabia between November 2024 and February 2025 to examine the prevalence of depression and anxiety among female patients diagnosed with breast cancer.

The study population for this research comprised of female patients diagnosed with breast cancer. The inclusion criteria for this research were adult female patients, aged above 18, and currently living in Saudi Arabia. This research did not exclude eligible patients based on the stage of their disease, socioeconomic status, or type of their cancer therapy.

The convenience sampling technique was utilized in this research. The research participation link was circulated through social media platforms including Facebook and

WhatsApp. The research inclusion criteria were mentioned in the invitation letter. Patients who meet the inclusion criteria were invited to take part in this research.

This research examined female cancer patients' demographics characteristics including their marital status, nationality, monthly income, education level, smoking status, and disease status. Besides, this research examined patients' cancer therapy, and disease profile (comorbidities, disease duration, and metastasis). The prevalence rates of depressed and anxious symptoms were established using a cut-off point as advised by the developers of the PHQ-9 and GAD-7 scales and utilized in previous research.¹⁷⁻²⁰ Depressive symptomatology will be characterized by a total score of 15 or above on the PHQ-9 instrument, signifying moderately severe or severe depression.²¹ Anxiety symptomatology will be characterized using the GAD-7 instrument, with a total score of 15 or higher signifying severe anxiety symptoms.²² A higher score indicates a more depressed and anxious severe case.

2.1. Statistical analysis

The Statistical Package for the Social Sciences (SPSS) software, version 29 was used to analyse the data for this research. Categorical variables were summarized as frequency and percentage, and means \pm standard deviation (SD) were utilized to express continuous variable such as the GAD-7 and PHQ-9 score. Based on the literature, the scores were categorized into four categories, then the severe category in both scores were used to define the dummy variables for multiple logistic regression analyses. The findings of the regression analysis were presented as adjusted odds ratio (AOR) with its corresponding 95% confidence interval. The level of significance was defined as p-value less than 0.05.

RESULTS

A total of 137 breast cancer patients were included in the analysis. Among those, 93 (67.9%) were married, 21 (15.3%) were single, 12 (8.8%) were divorced, and 11 (8.0%) were widowed. The majority were Saudi nationals ($n=99$, 72.3%), while 38 (27.7%) were non-Saudi. Regarding monthly income, 69 (50.4%) had more than 7500 SAR monthly income, and 25 patients (18.2%) had less than 2500 SAR monthly. Most of participants (65, 47.4%) having a bachelor degree, followed by 28 participants having a high school degree (20.4%). Regarding the smoking status, only 10 patients currently smoking (7.3%), and 111 patients (81.0%) never smoked. A round half of the patients were in the first and second stage of their disease. Additional details about demographic characteristics are provided in Table 1.

Table 1: Demographic characteristics among breast cancer patients

Demographic characteristics		N (%)
Marital status	Single	21(15.3)
	Married	93(67.9)
	Divorced	12(8.8)
	Widowed	11(8.0)
Nationality	Non-Saudi	38(27.7)
	Saudi	99(72.3)
Monthly income	Less than 2500 SAR	25(18.2)
	2500-5000 SAR	22(16.1)
	5000-7500 SAR	21(15.3)
	More than 7500 SAR	69(50.4)
Education level	Primary school or less	19(13.9)
	High school	28(20.4)
	Diploma	11(8.0)
	Bachelor	65(47.4)
	Post graduate	14(10.2)
Smoking status	Non-Smoking	111(81.0)
	Previous smoking	16(11.7)
	Currently smoking	10(7.3)
Disease stage	Unknown	35(25.5)
	1 st degree	34(24.8)
	2 nd degree	34(24.8)
	3 rd degree	16(11.7)
	4 th degree	18(13.1)

SAR: Saudi Arabia Riyal; Data presented as n (%)

Table 2: Distribution of cancer therapy modalities among breast cancer patients

Cancer therapy	N (%)
Surgery	93 (67.9)
Chemotherapy	83 (60.6)
Radiotherapy	81 (59.1)
Target therapy	22 (16.1)
Immunotherapy	20 (14.6)
Hormonal therapy	72 (52.6)
Unknown	15 (10.9)

The below table presents the cancer therapies received by the patients. Surgery was performed in 93 (67.9%) patients, while 44 (32.1%) didn't undergo surgery. Chemotherapy was administered to 83 (60.6%) patients.

Table 3: Comorbidities, disease duration, and mental health in breast cancer patients

Variables		N (%)
Comorbidities	Diabetes mellitus	31 (22.6)
	Hypertension	35 (25.5)
	Cardiovascular diseases	7 (5.1)
	Respiratory	11 (8.0)
	Dyslipidemia	24 (17.5)
	Others	78 (56.9)
Disease duration	Less than 6 months	33 (24.1)
	6-12 month	39 (28.5)
	1-2 years	31 (22.6)
	More than 2 years	34 (24.8)
Metastasis		14 (10.2)
Diagnosed with anxiety		23 (16.8)
Diagnosed with depression		14 (10.2)

Furthermore, a total of 81 patients (59.1%) were given radiotherapy, and target therapy was the least common, with only 22 patients (16.1%). Additional details about cancer therapy modalities are provided in Table 2.

The most common comorbidities were hypertension (25.5%), diabetes mellitus (22.6%), and dyslipidemia (17.5%). Disease duration varied, with 39 (28.5%) patients having the cancer for 6-12 months and 34 (24.8%) for more than 2 years. The majority of patients (89.8%) didn't have metastases (Table 3).

The most commonly reported issues were feeling tired or having little energy, with 32 (23.4%) experiencing it nearly every day and 67 (48.9%) on several days. sleep disturbances were also prevalent, with 21 (15.3%)

Table 4: The GAD-7 and PHQ-9 categories

Depression and anxiety status classification		N (%)
GAD-7	Mild	46 (33.6)
	Moderate	50 (36.5)
	Severe	41 (29.9)
PHQ-9	Mild	11 (8.0)
	Moderate	54 (39.4)
	Moderately severe	42 (30.7)
	Severe	30 (21.9)

GAD-7: Generalized Anxiety Disorder Scale-7
 PHQ-9: Patient Health Questionnaire-9
 Data presented as n (%)

Table 5: Factors associated with anxiety and depression

Factors		PHQ-9		GAD-7	
		AOR (95%CI)	P value	AOR (95%CI)	P value
Marital status	Single	Reference		Reference	
	Married	1.32 (0.38-4.56)	0.665	0.95 (0.25-3.63)	0.937
	Divorced	3.09 (0.45-21.48)	0.253	1.20 (0.18-8.14)	0.849
	Widowed	0.95 (0.12-7.38)	0.960	0.10 (0.00-2.02)	0.132
Income	< 2500 SAR	Reference		Reference	
	2500-5000 SAR	1.60 (0.34-7.42)	0.551	0.63 (0.13-3.07)	0.565
	5000-7500 SAR	1.57 (0.36-6.92)	0.552	0.54 (0.11-2.59)	0.438
	> 7500 SAR	1.14 (0.26-5.03)	0.858	0.62 (0.13-2.81)	0.532
Nationality	Non-Saudi	Reference		Reference	
	Saudi	0.85 (0.27-2.66)	0.782	1.26 (0.38-4.21)	0.704
Education level	Primary school or less	Reference		Reference	
	High school	1.32 (0.30-5.80)	0.714	0.65 (0.13-3.25)	0.595
	Diploma	3.91 (0.55-27.64)	0.171	1.72 (0.23-13.02)	0.601
	Bachelor	1.96 (0.40-9.51)	0.403	1.20 (0.21-6.71)	0.836
	Post graduate	1.12 (0.16-7.70)	0.907	0.45 (0.04-4.65)	0.500
Smoking	Non-Smoking	Reference		Reference	
	Previous smoking	1.82 (0.44-7.43)	0.405	1.27 (0.30-5.33)	0.743
	Currently smoking	0.84 (0.18-4.01)	0.826	2.55 (0.51-12.75)	0.255
Disease stage	Unknown	Reference		Reference	
	1 st degree	0.41 (0.11-1.55)	0.188	1.54 (0.37-6.38)	0.550
	2 nd degree	0.53 (0.13-2.07)	0.358	1.29 (0.29-5.74)	0.739
	3 rd degree	0.21 (0.04-1.10)	0.065	0.24 (0.03-2.07)	0.196
	4 th degree	0.89 (0.19-4.16)	0.883	1.29 (0.27-6.26)	0.752
Surgery	No	Reference		Reference	
	Yes	0.44 (0.14-1.34)	0.149	0.29 (0.08-1.01)	0.051
Chemotherapy	No	Reference		Reference	
	Yes	2.57 (0.92-7.17)	0.073	2.14 (0.70-6.50)	0.181
Radiotherapy	No	Reference		Reference	
	Yes	3.27 (1.17-9.10)	0.023	3.14 (0.99-10.01)	0.053
Target	No	Reference		Reference	
	Yes	0.35 (0.11-1.18)	0.091	0.48 (0.12-1.89)	0.291
Immunotherapy	No	Reference		Reference	
	Yes	1.28 (0.36-4.49)	0.704	2.46 (0.63-9.65)	0.198
Hormonal therapy	No	Reference		Reference	
	Yes	1.17 (0.45-3.01)	0.744	0.73 (0.25-2.13)	0.566

*GAD-7: Generalized Anxiety Disorder Scale-7; PHQ-9: Patient Health Questionnaire-9; SAR: Saudi Arabia Riyal
Data presented as median (range); P < 0.05 considered as significant*

reporting trouble sleeping nearly every day. Loss of interest or pleasure in activities affected 16 (11.7%) nearly every day, while 48 (35.0%) experienced it on several days. feelings of depression or hopelessness were reported by 7 (5.1%) nearly every day, and 45 (32.8%) on several days. Additional details about PHQ-9 score are provided in Table S-1.

Feeling nervous or anxious was reported by 48 (35.0%) on several days and 9 (6.6%) nearly every day. Excessive worrying was common, with 59 (43.1%) worrying too much on several days and 13 (9.5%) nearly every day. Trouble relaxing affected 52 (38.0%) on several days, while 15 (10.9%) experienced it nearly every day. Irritable was also considerable, with 19 (13.9%) feeling

easily annoyed more than half the days and 18 (13.1%) nearly every day. additional details about GaD-7 score are provided in Table S-2.

Anxiety levels were distributed among patients as follows: 46 (33.6%) had mild anxiety, 50 (36.5%) had moderate anxiety, and 41 (29.9%) experienced severe anxiety. Depression severity varied, with 11 (8.0%) reporting mild symptoms, 54 (39.4%) experiencing moderate depression, 42 (30.7%) having moderately severe depression, and 30 (21.9%) suffering from severe depression. The GAD-7 mean score was (12.6 ± 4.9) out of 21, and PHQ-9 mean score was (15.8 ± 5.21) out of 27 (Table 4).

Patients who underwent radiotherapy had significantly higher odds of experiencing depression (AOR = 3.27, 95% CI: 1.17-9.10, $p=0.02$) and nearly significant association with anxiety (AOR=3.14, 95% CI: 0.99-10.01, $P = 0.05$). Additionally, surgery showed a borderline protective association with anxiety (AOR = 0.29, 95% CI: 0.08-1.01, $P =0.05$). Additional details about factors associated with anxiety and depression are provided in Table 5.

4. DISCUSSION

This study aimed to examine the prevalence of anxiety and depression among female patients diagnosed with breast cancer in Saudi Arabia. In this study, a round half of the patients were in the first and second stage of their disease. The most prevalent malignancy among Saudi women and the Saudi populace at large is breast cancer. Even while 72% of them report relative 5-year survival, this is still a slightly lower number than in Western nations.^{23,24} Low screening rates and a comparatively large percentage of presentations in advanced stages (12.5%) are likely the causes of a decreased survival rate.²³ Furthermore, according to the ministry report, Saudi women are more likely than US women to receive a diagnosis at an advanced stage of their illness (57.3% of cases are regional or distant metastatic breast cancers, compared to 37% of US women.²⁵ The majority of the Saudi Arabian data that is currently available relates to women's and health professionals' attitudes regarding screening as well as their knowledge and views of it.²⁶

In this study, surgery was performed in 93 (67.9%) patients. The two most common methods of breast surgery are either breast-conserving surgery (lumpectomy) or complete removal of the breast (mastectomy), which is typically followed by breast reconstruction. A lumpectomy involves removing the breast tumor along with a margin of healthy tissue. "No ink on tumor" refers to the absence of tumor cells near the tissue edge, which is the recommended margins status.²⁷ Research indicates that lumpectomy plus

irradiation and complete mastectomy are comparable in terms of overall survival (OS) and relapse-free rates.²⁸ The presence of diffuse microcalcifications (suspicious or malignant-appearing), diseases that cannot be included by local excision with a tolerable cosmetic outcome, and ATM (ataxia-telangiectasias mutated) mutations (biallelic inactivation) are among the conditions that preclude breast-conserving surgery.²⁷

In this study, chemotherapy was administered to 83 (60.6%) of the patients. Alkylating agents, antimetabolites, and tubulin inhibitors are among the families of cytotoxic drugs that make up breast cancer chemotherapy.²⁹ Cyclophosphamide is a nitrogen mustard alkylating agent that breaks DNA strands.³⁰ Anthracyclines (doxorubicin, daunorubicin, epirubicin, and idarubicin) work by inducing DNA intercalation, which inhibits macromolecular biosynthesis.³⁰ Taxanes, such as docetaxel and paclitaxel, bind to microtubules and stop them from disassembling, which causes cell cycle arrest and apoptosis.³¹ Furthermore, a total of 81 (59.1%) patients were given radiotherapy. Since Röntgen's discovery of the X-ray in 1895, radiation therapy has been utilized to treat cancer.³² The entire breast or a section of it (after breast-conservative surgery), the chest wall (following mastectomy), and the local lymph nodes are exposed to high-energy radiation.³³

A history of anxiety or depression, a younger age at diagnosis, a lack of social support, burdensome somatic symptoms, ongoing cancer treatment, certain medication treatments, concerns about death and disease recurrence, altered body image,³⁴ and changes in femininity, sexuality, and attractiveness,³⁵ are risk factors for anxiety and depression in women with breast cancer. During but not after treatment, adjuvant chemotherapy may raise the risk of anxiety, depression, or both.³⁶

Effective methods of identifying patients who are at risk for psychological distress are essential, as depression and anxiety are common diagnoses after breast cancer.³⁷ In the already taxing emotional state following a breast cancer diagnosis, they compound the challenges brought on by a number of social and familial issues that worsen the disease as well as therapeutic approaches like mastectomy and chemotherapy.³⁸ Additionally, psychological distress (depression and anxiety symptoms) has been linked to increased mortality risk and worse physical function.^{39,40} The prevalence of depression in our study was 30.7% of the patients found having moderately severe depression, and 30 (21.9%) suffering from severe depression, which is less than the finding of study enrolled 74 patients diagnosed with breast cancer in the general surgery clinic at King Abdulaziz University Hospital in Jeddah, Saudi Arabia it was 36.5%,⁴¹ and lower than the findings of other studies, which ranged between 49.2% and 68.7%.^{42,43}

Our study Around 29.9% of the patients experienced severe anxiety. Which is comparable with the pervious study done in general surgery clinic at King Abdulaziz University Hospital in Jeddah, Saudi Arabia measures generalized anxiety disorder (GAD) prevalence was 24.3% is lower than that of other studies,⁴¹ which ranged between 48.6% and 73.3%.^{42,43} We hypothesize that the reason our study's results were lower than those of previous articles was because the questionnaire's timing varied depending on the period between diagnosis and management stage, which may have affected respondents' responses.

When undergoing radiation therapy, the patient must lie alone on a table with a large machine overhead, which can cause anxiety, fear, and a sense of isolation. Radiation therapy side effects are also problematic; in the United States, approximately 350,000 cancer patients receive radiation therapy annually, and cancer patients often report fears of the treatment (such as being "burned," or causing sterility, sickness, or vomiting.⁴⁴ Additionally, 60% of patients experience significant anxiety before treatment, and 80% of them after.⁴²

Previous study found that among 1346 patients receiving radiation therapy for head and neck cancer, 46% experienced emotional distress, 26% experienced anxiety, 9% experienced depression, and 27% experienced claustrophobia. Women were significantly more likely to experience emotional distress, depression, and anxiety ($P < 0.001$).⁴⁵ Anxiety is listed as one of the common systemic toxicities of radiation treatment, along with pain, fatigue, and anorexia.⁴⁶ Therefore, it is possible that the anxiety observed in our patients was a side effect of the radiation.

In our study, surgery showed a borderline protective association with anxiety (AOR = 0.29, 95% CI 0.08-1.01, $P = 0.05$). Previous studies showed the psychological dysfunction rate among patients who had surgery for breast cancer ranged from 30 to 47%. There was no discernible difference between patients who had modified radical mastectomy and those who had breast-conserving surgery.⁴⁷

It is important to identify depression in breast cancer patients because it has significant effects on the course and prognosis of the disease.⁴⁴

Research has shown that psychological factors, such as stress and depression, can affect a person's overall quality of life and the course of their illness after receiving a cancer diagnosis. For these patients, concurrent psychiatric counseling will improve their quality of life, and psychiatric therapy for cancer patients should aim to increase resilience in addition to treating depression, anxiety, and stress.⁴⁴

5. CONCLUSION

Depression and anxiety are common psychological illnesses among females with breast cancer. Psychological intervention should be directed towards high-risk patients. Psychological support program should be facilitated for the patients in order to improve their clinical outcomes.

6. Data availability

The numerical data generated during this research is available with the authors.

7. Ethical approval

This study was approved by the Institutional Review Board (IRB) at Fakeeh College for Medical Sciences (Approval No: 530/IRB/2023).

8. Conflict of interest

All authors declare that there was no conflict of interest.

9. Funding

The study utilized the hospital resources only, and no external or industry funding was involved.

10. Authors' contribution

LAH: Conceptualization, investigation, methodology, resources, validation, writing- original draft, writing – review and editing.

HMA, SMA, RTS, AKA: Investigation, resources, validation, writing- original draft, writing – review and editing.

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Instructions:
Over the last 2 weeks, how often have you been bothered by any of the following problems?

		Not at all	Several days	More than half the days	Nearly every day
1	Little interest or pleasure in doing things	0	1	2	3
2	Feeling down, depressed, or hopeless	0	1	2	3
3	Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4	Feeling tired or having little energy	0	1	2	3
5	Poor appetite or overeating	0	1	2	3
6	Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7	Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8	Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9	Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

Developer Reference:
Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues.

Table S-1: Patient Health Questionnaire=Depression (PHQ-9)

Instructions:
Please read each statement and select from "Not at all" to "Nearly every day" to indicate how much statement applied to you over the past two weeks.

		Not at all	Several days	More than half the days	Nearly every day
1	Feeling nervous, anxious or on edge	0	1	2	3
2	Not being able to stop or control worrying	0	1	2	3
3	Worrying too much about different things	0	1	2	3
4	Trouble relaxing	0	1	2	3
5	Being so restless that it is hard to sit still	0	1	2	3
6	Becoming easily annoyed or irritable	0	1	2	3
7	Feeling afraid as if something awful might happen	0	1	2	3

Developer Reference:
Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing general anxiety disorder: the GAD-7. Archives of internal medicine, 166(10), 1092-1097.

Table S-2: Generalised Anxiety Disorder Assessment (GAD-7)