ISSN: 1607-8322, e-ISSN: 2220-5799 **Anaesthesia, Pain & Intensive Care**
Vol 29(7); October 2025 DOI: 10.35975/apic.v29i7.2953

ORIGINAL RESEARCH **PERIOPERATIVE MEDICINE**

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

Lubna Abdulrahman Hafiz [1] , Hind Mauafaq Aljifri [2] , Shahad Muneer Abdulaal [3*], Rinad Tariq Siddiqi [4] , Asma Khalid Alamoudi [5]

Authors affiliations:

1. Lubna Abdulrahman Hafiz, College of Medicine, Fakeeh College for Medical Sciences, Jeddah, KSA; Email: Lahafiz@fcms.edu.sa
2. Hind Mauafaq Aljifri, College of Medicine, Fakeeh College for Medical Sciences, Jeddah, KSA; Email: Hind.aljifri@gmail.com
3. Shahad Muneer Abdulaal, College of Medicine, Fakeeh College for Medical Sciences, Jeddah, KSA; Email: shahadabdulaal1995@gmail.com
4. Rinad Tariq Siddiqi, College of Medicine, Fakeeh College for Medical Sciences, Jeddah, KSA; Email: Rinad.siddiqi@gmail.com
5. Asma Khalid Alamoudi, College of Medicine, Fakeeh College for Medical Sciences, Jeddah, KSA; Email: asmaalamoudiiiii@gmail.com

***Correspondence**: Shahad Muneer Abdulaal, **Email:** shahadabdulaal1995@gmail.com

ABSTRACT

Background & objective: To accept a cancer diagnosis to the patients by the healthcare professionals, and to it by the patients, often remains the most challenging part of the entire procedure for many survivors of primary or recurrent breast cancer. This study aimed 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 adult female patients aged over 18 years diagnosed with breast cancer. The convenience sampling technique was utilized in this research. The research participation link was circulated through social media platforms, including Facebook and WhatsApp. PHQ-9 and GAD-7 scales were utilized to measure the prevalence of anxiety and depression.

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; 11 (8.0%) reported mild symptoms, 54 (39.4%) experienced moderate depression, 42 (30.7%) had moderately severe depression, and 30 (21.9%) suffered from severe depression. The GAD-7 mean score was (12.6 ± 4.9) out of 21, and the PHQ-9 mean score was (15.8 ± 5.21) out of 27. Patients who underwent radiotherapy had significantly higher odds of experiencing depression (P = 0.02) and a nearly significant association with anxiety (P = 0.05). Additionally, surgery showed a borderline protective association with anxiety (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 program should be facilitated for the patients in order to improve their clinical outcomes.

Abbreviations: GAD-7: Generalized Anxiety Disorder Scale-7, PHQ-9: Patient Health Questionnaire-9, SAR: Saudi Arabian Riyals,

Keywords: Anxiety; Breast cancer; Depression; Saudi Arabia

Citation: Hafiz LA, Aljifri HM, Abdulaal SM, Siddiqi RT, Alamoudi AK. Prevalence of Depression and Anxiety among Patients with Breast Cancer in Jeddah, Saudi Arabia. Anaesth. pain intensive care 2025;29(7):685-693. **DOI:** 10.35975/apic.v29i7.2953

Received: April 17, 2025; **Revised:** April 21, 2025; **Accepted:** April 28, 2025.

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 factors, which are the primary risk factors for the disease and show 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]

The diagnosis itself can 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 inpatient and outpatient 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 symptoms of depression.[16] This research aimed to examine the prevalence of anxiety and depression among female patients diagnosed with breast cancer in Saudi Arabia.

2. METHODOLOGY

2.1. Study design

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.

2.2. Study population and sampling procedure

The study population for this research comprised female patients diagnosed with breast cancer. The inclusion criteria for this study were adult female patients aged over 18 years and currently residing in Saudi Arabia. This research did not exclude eligible patients based on the stage of their disease, socioeconomic status, or type of 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 met the inclusion criteria were invited to take part in this research.

2.3. Study instruments

This research examined female cancer patients' demographic 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 Patient Health Questionnaire 9 (PHQ-9) and Generalized Anxiety Disorder Scale (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.

2.4. Ethical approval

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

2.5. Data analysis

The Statistical Package for the Social Sciences (SPSS) software, version 29 was used to analyze the data for this research. Categorical variables were summarized as frequency and percentage, and the mean and the standard deviation (SD) were utilized to express continuous variables such as the GAD-7 and PHQ-9 scores. Based on the literature, the scores were categorized into four categories; the severe category in both scores was used to define the dummy variables for multiple logistic

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)
	1st degree	34 (24.8)
	2nd degree	34 (24.8)
	3rd degree	16 (11.7)
	4th degree	18 (13.1)

SAR: Saudi Arabia Riyal

regression analyses. The findings of the regression analysis were presented as adjusted odds ratios (AOR) with their corresponding 95% confidence interval. The level of significance was defined as a $P < 0.05$.

3. 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 (Saudi Arabian Riyals) monthly income, and 25 patients (18.2%) had less than 2500 SAR monthly. Most of the participants (65, 47.4%) had a bachelor's degree, followed by 28 participants who had a high school degree (20.4%). Regarding the smoking status, only 10 patients were currently smoking (7.3%), and 111 patients (81.0%) never smoked. Almost half of the patients were in the first and second stages of their disease (Table 1).

Table 2: Cancer therapy modalities used

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)

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

Parameters		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	< 6 months	33 (24.1)
	6-12 month	39 (28.5)
	1-2 years	31 (22.6)
	> 2 years	34 (24.8)
Metastasis	Yes	14 (10.2)
Diagnosed with anxiety	Yes	23 (16.8)
Diagnosed with depression	Yes	14 (10.2)

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

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)	1.00		1.00	
	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)	1.00		1.00	
	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
	More than 7500 SAR	1.14 (0.26-5.03)	0.858	0.62 (0.13-2.81)	0.532
Nationality	Non-Saudi (Reference)	1.00		1.00	
	Saudi	0.85 (0.27-2.66)	0.782	1.26 (0.38-4.21)	0.704
Education level	Primary school or less (Reference)	1.00		1.00	
	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)	1.00		1.00	
	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)	1.00		1.00	
	1st degree	0.41 (0.11-1.55)	0.188	1.54 (0.37-6.38)	0.550
	2nd degree	0.53 (0.13-2.07)	0.358	1.29 (0.29-5.74)	0.739
	3rd degree	0.21 (0.04-1.10)	0.065	0.24 (0.03-2.07)	0.196
	4th degree	0.89 (0.19-4.16)	0.883	1.29 (0.27-6.26)	0.752
Surgery	No (Reference)	1.00		1.00	
	Yes	0.44 (0.14-1.34)	0.149	0.29 (0.08-1.01)	0.051
Chemotherapy	No (Reference)	1.00		1.00	
	Yes	2.57 (0.92-7.17)	0.073	2.14 (0.70-6.50)	0.181
Radiotherapy	No (Reference)	1.00		1.00	
	Yes	3.27 (1.17-9.10)	0.023	3.14 (0.99-10.01)	0.053
Target	No (Reference)	1.00		1.00	
	Yes	0.35 (0.11-1.18)	0.091	0.48 (0.12-1.89)	0.291
Immunotherapy	No (Reference)	1.00		1.00	
	Yes	1.28 (0.36-4.49)	0.704	2.46 (0.63-9.65)	0.198
Hormonal therapy	No (Reference)	1.00		1.00	
	Yes	1.17 (0.45-3.01)	0.744	0.73 (0.25-2.13)	0.566

SAR: Saudi Arabia Riyal; GAD-7: Generalized Anxiety Disorder Scale-7; PHQ-9: Patient Health Questionnaire-9
P < 0.05 considered significant

Table 2 presents the cancer therapies received by the patients. Surgery was performed in 93 (67.9%) patients, while 44 (323.1%) didn't undergo surgery. Chemotherapy was administered to 83 (60.6%) patients. 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 (n= 35, 25.5%), diabetes mellitus (n= 31, 22.6%), and dyslipidemia (n= 24, 17.5%). Disease duration varied, with 39 patients (28.5%) having the cancer for 6-12 months and 34 patients (24.8%) for more than 2 years. The majority of patients (n= 123, 89.8%) didn't have metastasis (Table 3).

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 the PHQ-9 mean score was (15.8 ± 5.21) out of 27, (Table 4).

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%) 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 the PHQ-9 score are provided in Table 5.

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 mood 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 the GaD-7 score are provided in Table 5.

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, around half of the patients were in the first and second stages of their disease. Breast cancer is the most prevalent malignancy among Saudi women and in the Saudi population overall. Although approximately 72% of patients achieve a 5-year survival, this rate remains slightly lower than that reported in Western countries.[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 a Ministry of Health report, Saudi women are more likely to be diagnosed at an advanced stage, with 57.3% of cases being regional or distant metastatic breast cancers, compared to 37% of cases in the United States.[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-telangiesctasia 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

patients (59.1%) were given radiotherapy. Since Röngten'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 many 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 to have moderately severe depression, and 30 (21.9%) suffered from severe depression. which is less than the finding of the study that enrolled 74 patients diagnosed with breast cancer in the general surgery clinic at King Abdulaziz University Hospital in Jeddah, Saudi Arabia, which was 36.5%[41] and lower than the findings of other studies, which ranged between 49.2% and 68.7%.[42,43]

Our study found that approximately 29.9% of patients experienced severe anxiety. This is comparable to a previous study conducted at the General Surgery Clinic of King Abdulaziz University Hospital in Jeddah, Saudi Arabia, which reported a generalized anxiety disorder (GAD) prevalence of 24.3%, though this rate was lower than that reported in 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 that 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] A 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% CI0.08-1.01, p =0.05). A previous study shows the psychological dysfunction rate among patients who had surgery for breast cancer ranged from 30 to 47%, according to multiple studies on the subject. There was no discernible difference between patients who had a modified radical mastectomy (MRM) and those who had breast-conserving surgery (BCS).[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. A psychological support program should be facilitated for the patients in order to improve their clinical outcomes.

7. Data availability

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

8. Ethical considerations

Ethical approval was granted by the institutional ethical committee. Written informed consents were obtained from all of the participants..

9. Conflict of interest

All authors declare that there was no conflict of interest.

10. Funding

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

11. 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.

12. REFERENCES

1. da Silva PA, Riul Sda S. Breast cancer: risk factors and early detection. Rev Bras Enferm. 2011;64(6):1016-21. [PubMed] DOI: 10.1590/s0034-71672011000600005
2. National Cancer Institute - INCA. Breast cancer. 2022. Available from: https://www.gov.br/inca/pt-br/assuntos/cancer/tipos/mama
3. Almutlaq BA, Almuazzi RF, Almuhayfir AA, Alrajhi MA, Alharbi MA, Alsaif AA. Breast cancer in Saudi Arabia and its possible risk factors. J Cancer Policy. 2017;12:83-9. DOI: 10.1016/j.jcpo.2017.03.004
4. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, 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):229-63. [PubMed] DOI: 10.3322/caac.21834
5. Xiong X, Zheng LW, Ding Y, Wang X, Wu X, Fan Z, et al. Breast cancer: pathogenesis and treatments. Signal Transduct Target Ther. 2025;10(1):49. [PubMed] DOI: 10.1038/s41392-024-02108-4
6. Alyami HS, Naser AY, Dahmash EZ, Alrasheed AA, Alyami MH, Alotaibi NF, et al. Clinical and Therapeutic Characteristics of Cancer Patients in the Southern Region of Saudi Arabia: A Cross-Sectional Study. Int J Environ Res Public Health. 2021;18(12):6399. [PubMed] DOI: 10.3390/ijerph18126654
7. Adnan Hameed H, Naser AY, Mudheher Talib N. Clinical and therapeutic characteristics and medical cost of managing cancer patients in Al-Anbar, Iraq: A cross-sectional study. Saudi Pharm J. 2022;30(12):1802-8. [PubMed] DOI: 10.1016/j.jsps.2022.10.009
8. Alyami H, Naser AY, Alyami MH, Banihameem IS, Almusabi M, Alqahtani AM, et al. Clinical and therapeutic characteristics of hospitalized cancer patients in the Najran Region of Saudi Arabia: a cross-sectional study. 2022;12(4):245-54. Full Text DOI: 10.22146/jmpf.78654
9. Kedida BD, Mukacho MM, Alemayehu M, Desalegn M, Kassa M, Terefe B, et al. Women's experiences with breast cancer during diagnosis and therapy, Wolaita, Ethiopia: a qualitative study. BMC Womens Health. 2024;24(1):176. [PubMed] DOI: 10.1186/s12905-024-03016-z
10. Drageset S, Lindstrøm TC, Giske T, Underlid K. "The support I need": women's experiences of social support after having received breast cancer diagnosis and awaiting surgery. Cancer Nurs. 2012;35(6):E39-47. [PubMed] DOI: 10.1097/NCC.0b013e31823634aa
11. Epping-Jordan JE, Compas BE, Osowiecki DM, Oppedisano G, Gerhardt C, Primo K, et al. Psychological adjustment in breast cancer: processes of emotional distress. Health Psychol. 1999;18(4):315-26. [PubMed] DOI: 10.1037//0278-6133.18.4.315
12. Bower JE. Behavioral symptoms in patients with breast cancer and survivors. J Clin Oncol. 2008;26(5):768-77. [PubMed] DOI: 10.1200/JCO.2007.14.3248
13. Naser AY, Hameed AN, Mustafa N, Alwafi H, Dahmash EZ, Alyami HS, et al. Depression and Anxiety in Patients With Cancer: A Cross-Sectional Study. Front Psychol. 2021;12:585534. [PubMed] DOI: 10.3389/fpsyg.2021.585534
14. Lim CC, Devi MK, Ang E. Anxiety in women with breast cancer undergoing treatment: a systematic review. Int J Evid Based Healthc. 2011;9(3):215-35. [PubMed] DOI: 10.1111/j.1744-1609.2011.00221.x
15. Maass SW, Roorda C, Berendsen AJ, Verhaak PF, de Bock GH. The prevalence of long-term symptoms of depression and anxiety after breast cancer treatment: A systematic review. Maturitas. 2015;82(1):100-8. [PubMed] DOI: 10.1016/j.maturitas.2015.04.010
16. Mitchell AJ, Chan M, Bhatti H, Halton M, Grassi L, Johansen C, et al. Prevalence of depression, anxiety, and adjustment disorder in oncological, haematological, and palliative-care settings: a meta-analysis of 94 interview-based studies. Lancet Oncol. 2011;12(2):160-74. [PubMed] DOI: 10.1016/S1470-2045(11)70002-X
17. Alsairafi Z, Naser AY, Alsaleh FM, Awad A, Jalal Z. Mental Health Status of Healthcare Professionals and Students of Health Sciences Faculties in Kuwait during the COVID-19 Pandemic. Int J Environ Res Public Health. 2021;18(4):2209. [PubMed] DOI: 10.3390/ijerph18042203
18. Naser AY, Dahmash EZ, Al-Rousan R, Alwafi H, Alrawashdeh HM, Ghoul I, et al. Mental health status of the general population, healthcare professionals, and university students during 2019 coronavirus disease outbreak in Jordan: A cross-sectional study. Brain Behav. 2020;10(8):e01730. [PubMed] DOI: 10.1002/brb3.1730
19. Naser AY, Alwafi H, Amara NA, Alqatawneh A, Jalal Z, Al-Rousan R, et al. Epidemiology of depression and anxiety among undergraduate students. Int J Clin Pract. 2021;75(9):e14414. [PubMed] DOI: 10.1111/ijcp.14414

20. Alhemedi AJ, Qasaimeh MG, Abdo N, Alzoubi A, Al-Hashimi A, Alzoubi KH. Depression Among University Students in Jordan After the COVID-19 Pandemic: A Cross-Sectional Study. Psychol Res Behav Manag. 2023;16:4237-49. [PubMed] DOI: 10.2147/PRBM.S436293

21. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med. 2001;16(9):606-13. [PubMed] DOI: 10.1046/j.1525-1497.2001.016009606.x

22. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med. 2006;166(10):1092-7. [PubMed] DOI: 10.1001/archinte.166.10.1092

23. Allemani C, Weir HK, Carreira H, Harewood R, Spika D, Wang XS, et al. Global surveillance of cancer survival 1995-2009: analysis of individual data for 25,676,887 patients from 279 population-based registries in 67 countries (CONCORD-2). Lancet. 2015;385(9972):977-1010. [PubMed] DOI: 10.1016/S0140-6736(14)62038-9

24. Chirlaque MD, Salmerón D, Galceran J, Ameijide A, Mateos A, Torrella A, et al. Cancer survival in adult patients in Spain. Results from nine population-based cancer registries. Clin Transl Oncol. 2018;20(2):201-11. [PubMed] DOI: 10.1007/s12094-017-1710-6

25. El Bcheraoui C, Basulaiman M, Wilson S, Daoud F, Tuffaha M, AlMazroa MA, et al. Breast cancer screening in Saudi Arabia: free but almost no takers. PLoS One. 2015;10(3):e0119051. [PubMed] DOI: 10.1371/journal.pone.0119051

26. Al-Alaboud L, Kurashi N. The barriers of breast cancer screening programs among PHHC female physicians. Middle East J Fam Med. 2006;4(5):11-4. Full Text

27. Schnitt SJ, Moran MS, Giuliano AE. Lumpectomy Margins for Invasive Breast Cancer and Ductal Carcinoma in Situ: Current Guideline Recommendations, Their Implications, and Impact. J Clin Oncol. 2020;38(20):2240-5. [PubMed] DOI: 10.1200/JCO.19.03213

28. Fisher B, Anderson S, Bryant J, Margolese RG, Deutsch M, Fisher ER, et al. Twenty-year follow-up of a randomized trial comparing total mastectomy, lumpectomy, and lumpectomy plus irradiation for the treatment of invasive breast cancer. N Engl J Med. 2002;347(16):1233-41. [PubMed] DOI: 10.1056/NEJMoa022152

29. Nabholtz JM, Gligorov J. The role of taxanes in the treatment of breast cancer. Expert Opin Pharmacother. 2005;6(7):1073-94. [PubMed] DOI: 10.1517/14656566.6.7.1073

30. Penel N, Adenis A, Bocci G. Cyclophosphamide-based metronomic chemotherapy: after 10 years of experience, where do we stand and where are we going? Crit Rev Oncol Hematol. 2012;82(1):40-50. [PubMed] DOI: 10.1016/j.critrevonc.2011.04.009

31. Gewirtz DA. A critical evaluation of the mechanisms of action proposed for the antitumor effects of the anthracycline antibiotics adriamycin and daunorubicin. Biochem Pharmacol. 1999;57(7):727-41. [PubMed] DOI: 10.1016/s0006-2952(98)00307-4

32. Grubbé EH. Priority in the Therapeutic Use of X-rays. Radiology. 1993;21(2):156-62. [PubMed]

33. Boyages J. Radiation therapy and early breast cancer: current controversies. Med J Aust. 2017;207(5):216-22. [PubMed] DOI: 10.5694/mja16.01020

34. 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(3):355-61. [PubMed] DOI: 10.1007/s00127-009-0068-7

35. Reich M, Lesur A, Perdrizet-Chevallier C. Depression, quality of life and breast cancer: a review of the literature. Breast Cancer Res Treat. 2008;110(1):9-17. [PubMed] DOI: 10.1007/s10549-007-9706-5

36. Burgess C, Cornelius V, Love S, Graham J, Richards M, Ramirez A. Depression and anxiety in women with early breast cancer: five year observational cohort study. BMJ. 2005;330(7493):702. [PubMed] DOI: 10.1136/bmj.38343.670868.D3

37. Tsaras K, Papathanasiou IV, Mitsi D, Veneti A, Kelesi M, Zyga S, et al. Assessment of Depression and Anxiety in Breast Cancer Patients: Prevalence and Associated Factors. Asian Pac J Cancer Prev. 2018;19(6):1661-9. [PubMed] DOI: 10.22034/APJCP.2018.19.6.1661

38. Dean C, Roberts MM, French K, Robinson S. Psychiatric morbidity after screening for breast cancer. J Epidemiol Community Health. 1986;40(1):71-5. [PubMed] DOI: 10.1136/jech.40.1.71

39. Batty GD, Russ TC, Stamatakis E, Kivimäki M. Psychological distress in relation to site specific cancer mortality: pooling of unpublished data from 16 prospective cohort studies. BMJ. 2017;356:j108. [PubMed] DOI: 10.1136/bmj.j108

40. Faller H, Brähler E, Härter M, Keller M, Schulz H, Wegscheider K, et al. Unmet needs for information and psychosocial support in relation to quality of life and emotional distress: A comparison between gynecological and breast cancer patients. Patient Educ Couns. 2017;100(10):1934-42. [PubMed] DOI: 10.1016/j.pec.2017.05.031

41. Bukhari A, Alammari A, Alharbi M, Alharbi K, Alharbi A, Alharbi M. Prevalence of depression and anxiety among patients with breast cancer: a cross-sectional study. World Fam Med. 2022;20(3):6-14. DOI: 10.5742/MEWFM.2022.952506

42. Chen AM, Daly ME, Vazquez E, Courquin J, Luu Q, Donald PJ, et al. Depression among long-term survivors of head and neck cancer treated with radiation therapy. JAMA Otolaryngol Head Neck Surg. 2013;139(9):885-9. [PubMed] DOI: 10.1001/jamaoto.2013.4072

43. Kriston L, Scholl I, Hölzel L, Simon D, Loh A, Härter M. The 9-item Shared Decision Making Questionnaire (SDM-Q-9). Development and psychometric properties in a primary care sample. Patient Educ Couns. 2010;80(1):94-9. [PubMed] DOI: 10.1016/j.pec.2009.09.034

44. Mungase M, Chaudhury S, Patil AA, Jagtap B, Jain V. Stress, anxiety, depression, and resilience in cancer patients on radiotherapy. Ind Psychiatry J. 2021;30(2):346-52. [PubMed] DOI: 10.4103/ipj.ipj_78_20

45. Pelland ME, Lambert L, Filion E, Boudreau D, Bujold R, Lambert SD. PO-0608: Depression, anxiety and claustrophobia in patients undergoing radiotherapy for head and neck cancer. Radiother Oncol. 2017;123:S317-8. DOI: 10.1016/S0167-8140(17)31045-9

46. Koontz BF. Radiation Therapy Treatment Effects: An Evidence-Based Guide to Managing Toxicity. Demos; 2017.

47. İzci F, İlgün AS, Fındıklı E, Özmen V. Psychiatric Symptoms and Psychosocial Problems in Patients with Breast Cancer. J Breast Health. 2016;12(3):94-101. [PubMed] DOI: 10.5152/tjbh.2016.3041

