

Frequency of Depression among Active Cancer Patients

Falak Shahab^{1*} and Aiman Majid¹

¹Liaquat National Hospital and Medical College, Karachi, Pakistan

ABSTRACT

Background: Cancer patient experiences more psychological and emotional stress. Cancer patients tend to come across depression and many other psychiatric disorders more frequently due to the uncertainty of treatment outcomes, the devitalizing nature of cancer progression, and side effects of treatment.

Objective: To determine the frequency of depression among active cancer patients.

Material and Methods: This cross-sectional study was carried out in Oncology Department, Liaquat National Hospital, Karachi, Pakistan. The study enrolled 113 patients of any gender aged between 20 to 75 years. The clinical and demographic characteristics of study participants were collected and recorded in predesigned proforma. Depression was diagnosed as per the PHQ-9 Questionnaire. "0" point was labeled as Not at all. The patient was labeled with positive depression when the score was more than 4. Descriptive statistics were calculated and stratification was done using Chi-Square test considering p-value ≤ 0.05 as significant.

Results: There were 25.7% male and 74.3% female patients. The mean age was 48.67 ± 12.17 years. The majority (58.4%) of patients presented with breast cancer. 7.1% of patients were found with stage I, 22.1% with stage II, 31% with stage III, and 39.8% with stage IV cancer. In our study, the mean PHQ-9 score was 7.70 ± 6.23 . A total of 64.6% of patients were found with depression. A significant association of depression was observed with diabetes mellitus ($p=0.039$) while no significant association was found with gender, cancer type, cancer stage, treatment duration, and other characteristics.

Conclusion: In this study, depression with high prevalence (64.6%) was observed among patients with active cancer patients. Diabetes mellitus was observed as a significant risk factor for depression among study populations.

Keywords: Frequency, depression, active cancer, anxiety.

INTRODUCTION

Cancer is a chronic illness characterized by irregular and chaotic cell formation, which can spread to adjacent tissues or distant organs through a process known as metastasis. This illness is distinguished by its tumor cells' capacity to grow and infect many body places [1]. Cancer is currently the world's second leading cause of death and one of the most important public health issues [2, 3]. The most common cancers are breast, lung, colorectal, prostate, and skin. Depending on their diagnosis, cancer patients get specific treatment choices such as surgery, radiotherapy, and chemotherapy [4].

When someone is diagnosed with cancer, they may feel emotional reactions such as anxiety, rage, and sadness, as well as other mental health issues [5]. This illness has gradually increased over the previous century as a result of population aging and changes in habits and lifestyle, such as a high incidence of smoking, alcohol misuse, an unhealthy diet, and a sedentary lifestyle, among other variables [6]. According to estimates from the World Health Organization, there will be 9.9 million deaths and 18.1 million new cases of cancer worldwide in 2020 (excluding non-melanoma skin cancer). Additionally, more than 25.7 million people will require palliative care

each year, with advanced cancer accounting for 28.5% of these cases [7].

Depression is defined as a mood disorder in which five or more symptoms appear within the first two weeks of onset [8]. Depression is characterized by loss of pleasure; loss of friendship with family members; loss of inspiration; narrow tolerance to mild vegetative deficiencies like lack of libido, increase or decrease in appetite or weight, asthenia and easy fatigability, sleep disturbance (in 75% of cases), menstrual irregularity, constipation, dry mouth and headache [9]. Cancer patients suffer greatly from the psychological burdens of depression and anxiety, which severely impair their quality of life. Because of the increased morbidity and mortality associated with this psychological disease, it has been identified as one of the dangers to the health of cancer patients [2]. According to WHO depression is anticipated to be one of the leading causes of incapability by 2030 and is the most considerable contributor to overall worldwide disease burden. Compared to the general population cancer patients experience more psychological and emotional stress. According to a recent survey, 20% of patients with cancer had depression compared to 5% in the general population, hence the rate of depression is thought to be 3 times higher in cancer patients than common population [9].

Depressive symptoms are related to poorer adherence to treatment, increased thoughts of death, suicidal attempts, and brief survival time. According to studies depression

*Corresponding author: Falak Shahab, Liaquat National Hospital and Medical College, Karachi, Pakistan, Email: falakshahab14@gmail.com
Received: June 07, 2024; Revised: September 19, 2024; Accepted: October 23, 2024
DOI: <https://doi.org/10.37184/lnjcc.2789-0112.5.20>

is affected by a variety of factors, this includes pain, age, gender, accommodation, education status, marital status, type of cancer, histopathological type, stages of cancer, and different aspects of personality [10].

Depression remained underdiagnosed in cancer patients due to the similarity of symptoms related to cancer treatment like lack of sleep, decreased appetite, and lethargy which could harm a patient's quality of life, devotion to treatment, and ultimately survival [11]. Among cancer patients, anxiety and depression are the most prevalent neuropsychiatric disorders that can be life-threatening [4]. In terms of prevalence, another research revealed that depression in cancer patients is three times more than in the general population [12]. Cancer patients had a 71.8% incidence rate of depression [13]. The rate of depression fluctuates and is not consistent across samples when it comes to the different forms of cancer [14]. Compared to patients with pancreatic cancer (33-50%), patients with oropharyngeal cancer had a higher chance of experiencing depression (22-57%). Lung cancer patients grew from 11 to 44%, whereas breast cancer patients climbed from 1.5 to 46% [15].

This study will determine the frequency of depression among active cancer patients either on curative or palliative treatment. Many studies have been carried out in this regard, but there is less available data in developing countries, especially Pakistan. The study aims to determine the under-recognized patients and also help incorporate psychosocial support programs along with cancer treatment, which would improve the above-mentioned factors and benefit the outcome.

MATERIAL AND METHODS

This cross-sectional study was conducted over 6 months from June to December 2021 in the Oncology Department, Liaquat National Hospital, Karachi, Pakistan. The research proposal was approved by the Research and Ethics Committee of the hospital (ERC#Ref App # 0623-2021-LNH-ERC). Participants were explained about the study purpose and associated risks and benefits of the procedure to obtain their consent. Written and informed consent was obtained from the participants before enrollment in the study.

A total of 113 patients were included in the study. The sample size was calculated using the WHO sample size calculator, considering a 95% confidence level, an 8% margin of error, and a 25% [16] prevalence of depression among active cancer patients. The non-probability consecutive sampling was used for sample selection. Confidentiality of the participants was maintained throughout the study. Their record number was tagged with other serial numbers to conceal the patient's identity and only the principal investigator had the access to original data. The study variables were recorded in the predesigned proforma.

Patients of any gender aged between 20-75 years having any cancer stage at diagnosis, on palliative or curative treatment, and received cancer treatment (including chemotherapy, radiotherapy, hormonal therapy or immunotherapy) were included in the study. Patients with confirmed histopathological analysis of biopsied tissue and having any one condition *i.e.* diagnosed at least 6 months before the start of the research, currently having regional, locally advanced, or metastatic disease, and do not have a complete remission of disease based on imaging (CT scan/MRI), were considered as active cancer patients.

Patients attending follow-up visits in the outpatient department (OPD) were asked to complete the Proforma. For patients admitted from the emergency department, the Proforma was filled out by the ward doctor upon their arrival, whether they were newly diagnosed or already undergoing treatment. Gender, type of cancer, stage of cancer, marital status, financial support, comorbid (DM, HTN, Ischemic heart disease), type of treatment (chemotherapy, radiotherapy, immunotherapy, and surgery), living status (joint family, nuclear family), occupation, education (Illiterate, primary, secondary, intermediate, graduation), monthly income, and residence (urban, rural) were collected on that predesigned Proforma. Patients were assessed for having depressive disorder using The Patient Health Questionnaire (PHQ) which is a self-administered version of the PRIME-MD diagnostic instrument for common mental disorders. The PHQ-9 is a 9-item scale with a score range from 0 to 27 in which "0" point was labeled as Not at all, "1" point was labeled as Several days, "2" point was labeled as More than half the day and "3" point was labeled as Nearly every day. The patient was labeled as depressive when the score was more than 4 and non-depressive if the PHQ-9 score was between 0-4. Urdu version of the questionnaire was used. Confidentiality of patients was assured, and their identity was not exposed at any time during the study. The data was only known to the investigator [17].

Data were analyzed using SPSS version 27. Qualitative variables like type of cancer, stage of cancer (1, 2, 3, or 4), marital status, financial support, comorbid (DM, HTN, Ischemic heart disease), type of treatment (chemotherapy, radiotherapy, immunotherapy, and surgery), living status (joint family, nuclear family), occupation, education (Illiterate, primary, secondary, intermediate, graduation), monthly income, and residence (urban, rural) were expressed as frequency and percentage. Numerical variables such as age were expressed as mean and standard deviation. Effect modifiers such as age, gender, stage, type of cancer, and marital status were controlled through stratification. Post-stratification chi-square test was applied. P-value ≤ 0.05 was taken as statistically significant in all analyses.

RESULTS

Table 1 shows that the mean age of patients was 48.67±12.17 years and 60.0% of them belonged to age > 45 years. A total of 31.7% were male and 68.3% were female patients. 79.6% of patients were married while 67.3% had private financial support. 14.2% of patients were found with diabetes mellitus, 31.9% with hypertension, and 38.1% with ischemic heart disease. There were 63.7% of patients living in the joint family system while 36.3% of patients living in the nuclear family system. 19.5% of patients were government servants while 28.3% had private jobs. The majority (40.7%) of patients have education till graduation while 24.8% of patients have a monthly income <30,000 PKR, 38.1% have an income between 30,000 to 50,000 PKR

Table 1: Frequency distribution of demographic characteristics clinical findings.

Variables	n(%)
Age (Years)	
≤ 45 years	45 (40.0)
> 45 years	68 (60.0)
Gender	
Male	29 (25.7)
Female	84 (74.3)
Marital Status	
Married	90 (79.6)
Unmarried	23 (20.4)
Financial Support	
Private	76 (67.3)
Company	37 (32.7)
Diabetes Mellitus	
Yes	16 (14.2)
No	97 (85.8)
Hypertension	
Yes	36 (31.9)
No	77 (68.1)
Ischemic Heart Disease	
Yes	43 (38.1)
No	70 (61.9)
Living Status	
Joint Family	72 (63.7)
Nuclear Family	41 (36.3)
Occupation	
Government Service	22 (19.5)
Private Job	32 (28.3)
Skill Worker	4 (3.5)
Others	55 (48.7)
Education	
Illiterate	6 (5.3)
Primary	25 (22.1)
Secondary	14 (12.4)
Intermediate	22 (19.5)
Graduate	46 (40.7)
Monthly Income	
<30,000 PKR	28 (24.8)
30,000-50,000 PKR	43 (38.1)
>50,000 PKR	42 (37.2)

Table 2: Frequency distribution of cancer duration, stage and type.

Variables	n(%)
Treatment Duration	
6 Months	38 (33.6)
>6 Months	75 (66.4)
Cancer Stage	
Stage-I	8 (7.1)
Stage-II	25 (22.1)
Stage-III	35 (31)
Stage-IV	45 (39.8)
Type of Cancer	
Breast	66 (58.4)
Colon	17 (15)
Lung	1 (0.9)
Female Genital Tract	5 (4.4)
Others	24 (21.2)

and 37.2% have a monthly income >50,000 PKR.

The majority (58.4%) of the patients presented with breast cancer while 7.1% were found with stage I, 22.1% with stage II, 31% with stage III, and 39.8% with stage IV cancer. A total of 33.6% of patients have had treatment since the last 6 months while 66.4% have treatment duration of more than 6 months. The mean PHQ-9 score was 7.70±6.23 while 64.6% of patients were found with depression. The detailed results are presented in Table 2.

Among depressed patients, 62.5% were in stage I, 76% in stage II, 51.4% in stage III, and 68.9% in stage IV as presented in Table 3.

Table 3 shows a significant association of depression with diabetes mellitus (p=0.039). No significant association of depression was found with gender (p=0.435), age (p=0.667), cancer type (p=0.617), cancer stage (p=0.210), treatment duration (p=0.819), marital status (p=0.059), financial support (p=0.705), hypertension (p=0.754), ischemic heart disease (p=0.260), living status (p=0.842), occupation (p=0.167), education (p=1.000), and monthly income (p=0.908).

DISCUSSION

Table 3: Association of depression with demographics, clinical findings, and cancer parameters.

Variables	Depression		
	Yes n(%)	No n(%)	p-value
Gender			
Male	17(58.6)	12(41.4)	0.435**
Female	56(66.7)	28(33.3)	
Age			
≤ 45 years	28(62.2)	12(37.8)	0.667**
> 45 years	45(66.2)	23(33.8)	
Marital Status			
Married	62(68.9)	28(31.1)	0.059**
Un-Married	11(47.8)	12(52.2)	
Financial Support			
Private	50(65.8)	26(34.2)	0.705**
Company	23(62.2)	14(37.8)	

Variables	Depression		
	Yes n(%)	No n(%)	p-value
Diabetes Mellitus			
Yes	14(87.5)	2(12.5)	0.039*
No	59(60.8)	38(39.2)	
Hypertension			
Yes	24(66.7)	12(33.3)	0.754**
No	49(63.6)	28(36.4)	
Ischemic Heart Disease			
Yes	25(58.1)	18(41.9)	0.260**
No	48(68.6)	22(31.4)	
Living Status			
Joint Family	47(65.3)	25(34.7)	0.842**
Nuclear Family	26(63.4)	15(36.6)	
Occupation			
Government Service	12(54.5)	10(45.5)	0.167**
Private Job	18(56.3)	14(43.8)	
Skill Worker	4(100)	0(0)	
Others	39(70.9)	16(29.1)	
Education			
Illiterate	4(66.7)	2(33.3)	1.000**
Primary	16(64)	9(36)	
Secondary	9(64.3)	5(35.7)	
Intermediate	14(63.6)	8(36.4)	
Graduation	30(65.2)	16(34.8)	
Monthly Income			
<30,000 PKR	19(67.9)	9(32.1)	0.908**
30,000-50,000 PKR	27(62.8)	16(37.2)	
>50,000 PKR	27(64.3)	15(35.7)	
Duration of Cancer			
6 Months	24(63.2)	14(36.8)	0.819**
>6 Months	49(65.3)	26(34.7)	
Stages of Cancer			
Stage-I	5(62.5)	3(37.5)	0.210**
Stage-II	19(76)	6(24)	
Stage-III	18(51.4)	17(48.6)	
Stage-IV	31(68.9)	14(31.1)	
Type of Cancer			
Breast	45(68.2)	21(31.8)	0.617**
Colon	9(52.9)	8(47.1)	
Lung	1(100)	0(0)	
Female Genital Tract	4(80)	1(20)	
Others	14(58.3)	10(41.7)	

Fisher Exact Test was applied

P-value ≤ 0.05 considered as Significant.

* Significant at 0.01 levels.

**Not Significant at 0.05 levels.

In oncological settings, depression is significant since it is a mental illness that affects the health of cancer patients. The purpose of this study was to ascertain the prevalence of depression among cancer patients who are currently receiving treatment. According to research, depression disorders are associated with cancer, with data indicating that 42.6% of cancer patients have depressive disorders [18, 19]. Another study found that the frequency of clinically diagnosed depression across all cancer patients was comparable to previous data on the prevalence of depression among patients with advanced cancer [20]. These findings are consistent

with other research showing a significant frequency of anxiety and sadness among cancer patients [21]. Our study results for depression were approximately similar to these studies. In our study, the depression was 64.6% among active cancer patients. Another study found that the amount of depression in cancer patients was similar to earlier research (66.72%) [21], but greater than research from Addis Ababa [22], and Iran [23] and a meta-analysis by Krebber *et al.* [24]. This disparity may result from differences in the research populations about the forms of cancer, the screening method, or other sociodemographic factors and depression severity taken into account.

However, numerous conclusions on the prevalence of depression in cancer patients have been drawn from research conducted in the setting of Pakistan [25]. According to a recent study, 58% of Pakistani cancer patients also suffer from depression [26]. According to different research, 61% of Pakistani cancer patients had varied degrees of despair [27]. Another study found that about half of respondents (52%) reported having symptoms of depression [28]. Although the prevalence of depression has been reported by all research, there may be several explanations for the modest variation in the percentage of cancer patients who report having depression that is revealed in different studies.

While assessing the risk factors of depression among cancer patients, different factors including age, economic status, type of family, duration as well as stage of cancer were assessed. The results statistics of a study [25], pointed out that the young patients had more depression. Additionally, they found that each increase in age of one year results in a 13.5-point rise in depression. These findings confirm the conclusions of earlier research carried out in Pakistan. According to research by M. Umair (2013), the age of respondents and their degree of depression were related, and the majority of depressed patients were fairly young, falling between the ages of 25 and 42 [29].

According to the findings of research [25], economic position is highly connected with depression in cancer patients. These findings are also consistent with the results of numerous earlier investigations. Previous research has shown that low socioeconomic level is a possible risk factor for depression among cancer patients. Hashmi and her colleagues performed a study on 100 cancer cases identified in the outpatient department of Karachi's private and public sector teaching hospitals, and they discovered that about 70% of patients were experiencing financial difficulties due to treatment costs. Furthermore, the statistical study revealed a favorable correlation between cancer and financial problems ($p < 0.050$) [30].

Another study [25] found that those in extended families had a lower depression index than those in nuclear households. As a result, family support demonstrated

a strong association between depression and coping mechanisms, with a larger variability of 42.1%. Another research found that together with other variables, social or familial support has an important role in reducing sadness and anxiety in cancer patients [31].

According to Jadoon *et al.* study, one of the key reasons for depression among cancer patients is the disease's prolonged duration [32]. In terms of the stage of cancer as a risk factor/predictor of depression, the findings of a study found that with one stage rise in the disease, there is a large increase in depression (52.3%) [25]. The results were corroborated by another study, which found that stage three had a higher prevalence of depression than stages one and two [27].

It is interesting to note that male patients had a lower likelihood of depression than female patients. While our findings are consistent with other research [2, 33], it is also possible that fewer male patients than female patients were included in our analysis. Another study found that women were 56% more likely than men to be diagnosed with depression [34]. Our findings aligned with earlier research indicating that female cancer patients are more likely than male cancer patients to get a diagnosis of depression, particularly serious depressive disorders [35].

The overall observation that even in healthy women, the prevalence of clinical depression is higher than in males may be reflected in the gender difference [36]. The gender gap may also be caused by genetic differences, hormonal fluctuations, and other co-occurring medical and psychological problems. The gender gap has also been connected to women's overreporting of depressed symptoms [37]. Therefore, more care should be given to the diagnosis and treatment of clinical depression in female cancer patients, particularly in those who have metastasized.

A study [34] found that hospitalized cancer patients (both as a group and according to sex stratification) with advanced comorbidities had a higher likelihood of receiving a depression diagnosis. This conclusion has been supported by previous research [38]. Patients with co-existing medical comorbidities may have a greater prevalence of depression and a worse quality of life, according to a substantial body of research [39].

Therefore, depression may compound to poor quality of life and possibly death in cancer patients with severe medical comorbidities [39]. To enhance the quality of life and lower the risk of death, this idea advocates for enhanced monitoring, cautious identification, and efficient treatment of patients with metastatic cancer who have major comorbidities [40]. Individualized cancer care plans have been recommended by the National Academy of Medicine in the past. Psychosocial monitoring for depression is also mandated as the standard of care for cancer patients according to the National Comprehensive Cancer Network recommendations [41]. Consequently,

especially when a patient is hospitalized, healthcare professionals should have well-defined protocols in place for assessing and addressing the psychological needs of cancer patients. Indeed, there have been new recommendations to offer hospitalized patients at high risk for depression both pharmaceutical and non-pharmacologic antidepressant interventions.

Cancer patients have advanced illness, which raises their chance of death, increase their propensity to consider suicide, and lower their quality of life in general. Major depressive disorder is also more likely to develop in these patients. Thus, knowing the predicted variables can help with prompt and appropriate depression assessment as well as successful treatments. At the time of admission, healthcare professionals should routinely evaluate cancer patients for depression, especially those who fall into higher risk categories including women, people of color, and patients with several comorbidities. Together, patients and providers may collaborate on evidence-based pharmaceutical therapies and psychosocial support. Prior research has demonstrated that most screening instruments, even widely used and validated instruments like the Beck Depression Inventory, are good at ruling out depression in patients who are not depressed but ineffective in diagnosing depression in cases when depression is present. This might be because depression symptoms are misdiagnosed as adverse reactions to cancer therapies. Regardless of the stage or severity of their disease, routine depression screening and early access to specialist psychiatric therapy may be helpful for cancer patients.

Our study's primary sample size restriction was its tiny size. The study's nonrandomized design and single-center experience are two further drawbacks. Because the study was done in an urban setting, it is possible that the findings cannot be applied to broader demographics. The study's limitations included not monitoring the patients' clinical presentations, which might lead to overrating or inaccurate depression screening techniques as well as Inpatients and Outpatients data were not separately labeled because of which the intensity of depression can vary and cannot be measured. The study's scope was constrained by the fact that some cancer patients exhibit more severe symptoms and functional deficits more immediately than others. Therefore, longitudinal research and cohort study designs tailored to particular cancer diagnoses are more appropriate for supplying sufficient mental health outcomes and depression predictors in cancer patients.

CONCLUSION

Depression in cancer patients is markedly different from patients of other diseases or depression in healthy individuals. The study results showed a high prevalence of depression in our active cancer patients and it is significantly associated with diabetes mellitus. Further, depression was observed in cancer patients irrespective

of cancer stage, cancer type, gender, age, treatment duration, and other demographic characteristics.

ETHICS APPROVAL

Ethical exemption was obtained from the Institutional Review Committee of, Liaquat National Hospital, Karachi (Ref App # 0623-2021-LNH-ERC). All procedures performed in studies involving human participants were following the ethical standards of the institutional and/ or national research committee and the Helsinki Declaration.

CONSENT FOR PUBLICATION

Written informed consent was taken from the participants.

AVAILABILITY OF DATA

The data set may be acquired from the corresponding author upon a reasonable request.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

Declared none.

AUTHORS' CONTRIBUTION

FS: Study concept, manuscript designing, critical reviewing, data collection and analysis. AM: result interpretation, critical review and revision of the initial draft.

REFERENCES

- Gontijo Garcia GS, Meira KC, de Souza AH, Guimarães NS. Anxiety and depression disorders in oncological patients under palliative care at a hospital service: a cross-sectional study. *BMC Palliat Care* 2023; 22(1): 116. DOI: <https://doi.org/10.1186/s12904-023-01233-1>
- Habimana S, Biracyaza E, Mpunga T, Nsabimana E, Kayitesi F, Nzamwita P, *et al.* Prevalence and associated factors of depression and anxiety among patients with cancer seeking treatment at the Butaro Cancer Center of Excellence in Rwanda. *Front Public Health* 2023; 11: 972360. DOI: <https://doi.org/10.3389/fpubh.2023.972360>
- Global Burden of Disease 2019 Cancer Collaboration. Cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life years for 29 cancer groups from 2010 to 2019: a systematic analysis for the global burden of disease study 2019. *JAMA Oncol* 2022; 8: 420-44. DOI: <https://doi.org/10.1001/jamaoncol.2021.6987>
- Ayalew M, Deribe B, Duko B, Geleta D, Bogale N, Gemechu L, *et al.* Prevalence of depression and anxiety symptoms and their determinant factors among patients with cancer in Southern Ethiopia: a cross-sectional study. *BMJ Open* 2022; 12: e051317. DOI: <https://doi.org/10.1136/bmjopen-2021-051317>
- Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, DMV AJ, *et al.* Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021; 71: 209-49. DOI: <https://doi.org/10.3322/caac.21660>
- Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, *et al.* Global cancer statistics 2020: Globocan estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021; 71: 209-49. DOI: <https://doi.org/10.3322/caac.21660>
- Worldwide Hospice Palliative Care Alliance (WHPCA), World Health Organization (WHO). *Global Atlas of Palliative Care*. 2nd ed. 2020.
- Santomauro DF, Mantilla Herrera AM, Shadid J, Zheng P, Ashbaugh C, Pigott DM, *et al.* Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. *Lancet* 2021; 398: 1700-12. DOI: [https://doi.org/10.1016/S0140-6736\(21\)02143-7](https://doi.org/10.1016/S0140-6736(21)02143-7)
- Arasteh M, Seyedoshohadaei SA. Comparison of prevalence of depression in cancer patients treated with chemotherapy and radio chemotherapy in the hospital Tohid Sanandaj. *Med Sci* 2019; 23(95): 24-9.
- Yan X, Chen X, Li M, Zhang P. Prevalence and risk factors of anxiety and depression in Chinese patients with lung cancer: a cross-sectional study. *Cancer Manag Res*. 2019; 11: 4347-56. DOI: <https://doi.org/10.2147/CMAR.S202119>
- Adjei Boakye E, Osazuwa-Peters N, Mohammed K, Challapalli S, Buchanan P, Burroughs T, *et al.* Prevalence and factors associated with diagnosed depression among hospitalized cancer patients with metastatic disease. *Soc Psychiatry Psychiatr Epidemiol* 2019; 55(1): 15-23. DOI: <https://doi.org/10.1007/s00127-019-01763-1>
- Niedzwiedz CL, Knifton L, Robb KA, Katikireddi SV, Smith DJ. Depression and anxiety among people living with and beyond cancer: a growing clinical and research priority. *BMC Cancer*. 2019; 19: 943. DOI: <https://doi.org/10.1186/s12885-019-6181-4>
- Alonso J, Benjet C, Chiu WT, Florescu S, Girolamo G De, Gureje O, *et al.* Socio-economic variations in the mental health treatment gap for people with anxiety, mood, and substance use disorders: results from the WHO world mental health (WMH) surveys. *Psychol Med* 2019; 48: 1560-71. DOI: <https://doi.org/10.1017/S0033291717003336>
- Govina O, Vlacho E, Kalemikerakis I, Papageorgiou D, Kavga A, Konstantinidis T. Factors associated with anxiety and depression among family caregivers of patients undergoing palliative radiotherapy. *Asia Pac J Oncol Nurs* 2019; 6: 283-91. DOI: https://doi.org/10.4103/apjon.apjon_74_18
- Riedl D, Schüßler G. Factors associated with and risk factors for depression in cancer patients - A systematic literature review. *Transl Oncol* 2022; 16: 101328. DOI: <https://doi.org/10.1016/j.tranon.2021.101328>
- Wondimagegnehu A, Abebe W, Abraha A, Teferra S. Depression and social support among breast cancer patients in Addis Ababa, Ethiopia. *BMC Cancer* 2019; 19(1). DOI: <https://doi.org/10.1186/s12885-019-6007-4>
- Spitzer RL, Kroenke K, Williams JBW. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary care evaluation of mental disorders. Patient health questionnaire. *JAMA* 1999; 282: 1737-44. DOI: <https://doi.org/10.1001/jama.282.18.1737>
- Lee Y, Lin P, Lin M, Wang C, Lu H, Chen Y. Morbidity and associated factors of depressive disorder in patients with lung cancer. *Cancer Manag Res* 2019; 11: 7587-96. DOI: <https://doi.org/10.2147/CMAR.S188926>
- Yan R, Xia J, Yang R, Lv B, Wu P, Chen W, *et al.* Association between anxiety, depression, and comorbid chronic diseases among cancer survivors. *J Psychol Soc Behav Dimens Cancer* 2019; 28: 1269-77. DOI: <https://doi.org/10.1002/pon.5078>
- Caruso R. Depressive spectrum disorders in cancer: prevalence, risk factors and screening for depression: a critical review. *Acta Oncol* 2017; 56(2): 146-55. DOI: <https://doi.org/10.1080/0284186X.2016.1266090>
- Baraki AG, Tessema GM, Demeke EA. High burden of depression among cancer patients on chemotherapy in university of gondar

- comprehensive hospital and felege hiwot referral hospital, northwest Ethiopia. *PLoS One* 2020; 15: e0237837. DOI: <https://doi.org/10.1371/journal.pone.0237837>
22. Alemayehu M, Deyessa N, Medihin G, Fekadu A. A descriptive analysis of depression and pain complaints among patients with cancer in a low income country. *PLoS One* 2018; 13(3): e0193713. DOI: <https://doi.org/10.1371/journal.pone.0193713>
 23. Nikbakhsh N. Prevalence of depression and anxiety among cancer patients. *Caspian J Inter Med* 2014; 5(3): 167-70.
 24. Krebber A. Prevalence of depression in cancer patients: a meta-analysis of diagnostic interviews and self-report instruments. *Psycho-Oncol* 2014; 23(2): 121-30. DOI: <https://doi.org/10.1002/pon.3409>
 25. Alvi AS, Sajid IU, Ashraf M, Tarar MA, Bilal H. Depression among cancer patients: risk factors and coping mechanism. *J Liaq Uni Med Health Sci* 2022; 21(01): 27-32. DOI: <https://doi.org/10.22442/jlumhs.2022.00816>
 26. Mushtaq R, Ansar A, Bibi A, Khurram H, Ali J, Islam A, *et al.* Frequency of depression among cancer patients. *Pak Inst Med Sci* 2017; 13: 83-7.
 27. Chiragh S, Shah IA, Jameel A. Anxiety and depression in cancer patients - a survey in medical oncology department of a tertiary care hospital. *J Post grad Med Inst* 2020; 34: 37-40.
 28. Dogar IA, Azeem MW, Kiran M, Hussain I, Mehmood K, Hina I. Depression and anxiety in cancer patients in outpatient department of a tertiary care hospital in Pakistan. *Pak J Med Sci* 2009; 25: 734-37.
 29. Umair M. Frequency of depression and anxiety among cancer patients and their determinants - a study at oncology units of public and private sector, tertiary care, hospitals of District Lahore. *Pak J Med Sci* 2013; 7: 200-3.
 30. Hashmi A, Tauseef U, Ahmed SI, Mubeen SM, Ghaffar N, Mehmood R. Depression in cancer patients attending outpatients department of tertiary care hospitals of Karachi. *Ann Abbassi Shaheed Hosp Khi Med Dent Coll* 2013; 18: 101-5.
 31. Naz S, Kamran F. Depression and anxiety as predictors of perceived quality of life in breast cancer survivors. *J Dow Uni Health Sci* 2016; 10: 87-91.
 32. Jadoon NA, Munir W, Shahzad MA, Choudhry ZS. Assessment of depression and anxiety in adult cancer outpatients: a cross-sectional study. *BMC Cancer* 2010; 10: 594. DOI: <https://doi.org/10.1186/1471-2407-10-594>
 33. Sarfraz M, Waqas H, Ahmed S, Rurush-Asencio R, Mushtaque I. Cancer-Related stigmatization, quality of life, and fear of death among newly diagnosed cancer patients. *Omega J Death Dying* 2022; 302228221140650. DOI: <https://doi.org/10.1177/00302228221140650>
 34. Adjei Boakye E, Osazuwa-Peters N, Mohammed KA, Challapalli S, Buchanan P, Burroughs TE, *et al.* Prevalence and factors associated with diagnosed depression among hospitalized cancer patients with metastatic disease. *Soc Psychiatry Psychiatr Epidemiol* 2020; 55: 15-23. DOI: <https://doi.org/10.1007/s00127-019-01763-1>
 35. Walker J. Prevalence, associations, and adequacy of treatment of major depression in patients with cancer: a cross-sectional analysis of routinely collected clinical data. *Lancet Psychiat* 2014, 1(5): 343-50. DOI: [https://doi.org/10.1016/S2215-0366\(14\)70313-X](https://doi.org/10.1016/S2215-0366(14)70313-X)
 36. Pratt LA, Brody D. Depression in the U.S. household population, 2009-2012. *NCHS Data Brief* 2014; 172: 1-8.
 37. Romans SE. Gender differences in the symptoms of major depressive disorder. *J Nerv Ment Dis* 2007; 195(11): 905-11. DOI: <https://doi.org/10.1097/NMD.0b013e3181594cb7>
 38. Hung MS, Chen IC, Lee CP, Huang RJ, Chen PC, Tsai YH, Yang YH. Incidence and risk factors of depression after diagnosis of lung cancer: a nationwide population-based study. *Medicine* 2017; 96(19): e6864. DOI: <https://doi.org/10.1097/MD.0000000000006864>
 39. Kang HJ. Comorbidity of depression with physical disorders: research and clinical implications. *Chonnam Med J* 2015; 51(1): 8-18. DOI: <https://doi.org/10.4068/cmj.2015.51.1.8>
 40. Shao Z, Richie WD, Bailey RK. Racial and ethnic disparity in major depressive disorder. *J Racial Ethn Health Disparities* 2016; 3(4): 692-705. DOI: <https://doi.org/10.1007/s40615-015-0188-6>
 41. National Comprehensive Cancer Network (NCCN). NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines). Available from: <https://www.nccn.org/professionals/physicians/guidelines.asp>