




BMJ Open Prevalence of depression and anxiety symptoms and their determinant factors among patients with cancer in southern Ethiopia: a cross-sectional study

Mohammed Ayalew ¹, Bedilu Deribe,¹ Bereket Duko ,^{1,2} Dereje Geleta,³ Netsanet Bogale,⁴ Lalisa Gemechu,⁵ Achamyesh Gebretsadik,³ Asres Bedaso ^{1,6}

To cite: Ayalew M, Deribe B, Duko B, *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:10.1136/bmjopen-2021-051317

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-051317>).

Received 17 March 2021
Accepted 22 December 2021



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to
Mohammed Ayalew;
mameayale@gmail.com

ABSTRACT

Objective The study was aimed to assess the prevalence of depression and anxiety symptoms and their determinant factors among patients with cancer attending follow-up at Hawassa University Comprehensive Specialized Hospital cancer treatment centre, Ethiopia.

Design Institution-based cross-sectional study design was implemented.

Setting Patients with cancer at Hawassa University Comprehensive Specialized Hospital cancer treatment centre from October 2019 to December 2019.

Participants Randomly selected 415 patients with cancer who had follow-up at cancer treatment centre.

Main outcome measures Anxiety and depression symptoms were assessed using Hospital Anxiety and Depression Scale.

Result The prevalence rates of depression and anxiety symptoms were found to be 244 (58.8%) and 249 (60.0%), respectively. Older age (>50 years) (AOR (adjusted OR)=2.24, 95% CI=1.14 to 4.40), being unemployed (AOR=1.96, 95% CI=1.08 to 3.56), advanced stage of cancer such as stage III (AOR=5.37, 95% CI=1.34 to 21.45) and stage IV (AOR=4.55, 95% CI=1.12 to 18.44), comorbid psychotic symptoms (AOR=1.67, 95% CI=1.07 to 2.61) and eating problem in the past 2 weeks (AOR=6.16, 95% CI=1.98 to 19.11) were independent factors significantly associated with depressive symptoms. In addition, cancer stage such as stage II (AOR=3.92, 95% CI=1.07 to 14.36) and stage IV (AOR=5.04, 95% CI=1.44 to 17.59) and comorbid psychotic symptoms (AOR=1.73, 95% CI=1.12 to 2.66) were significantly associated with anxiety symptoms.

Conclusion Depression and anxiety symptoms among patients with cancer were considerably high. Age, occupation, cancer stage, comorbid psychotic symptoms and eating problem were determinant factors of depressive symptoms among patients with cancer. Moreover, cancer stage and comorbid psychosis were determinants of anxiety symptoms. Healthcare professionals working in the oncology unit need to conduct routine screening and treatment of depression and anxiety symptoms for patients with cancer.

INTRODUCTION

Nowadays, cancer is one of the world's most serious public health agendas and the second

Strengths and limitations of this study

- We use standardised questionnaires to assess dependent variables and this study also provides valuable baseline data in the area.
- The study is cross-sectional, and direction of association between depression and anxiety and related factors could not be established.
- Some of the physical symptoms due to the cancer itself or its treatment may have an impact on the magnitude of depression or anxiety.
- Risk of biased responses such as social desirability bias by which patients either exaggerate or minimise the symptoms of depression and anxiety for some reason.

leading cause of death.¹ In 2018, the WHO estimated that cancer caused approximately 18 million new cases and 9.6 million deaths worldwide.² Breast, lung, colorectal, prostate and skin cancer are the most common causes of cancer death. According to their diagnosis, patients with cancer undergo unique treatment modalities, such as surgery, radiation and chemotherapy.³

When a person is diagnosed with cancer, they are more likely to experience adverse mental health outcomes such as depression and anxiety.^{4,5} Depression and anxiety are the two most prevalent and debilitating neuropsychiatric disorders caused by physical illnesses like cancer.⁶ Depression and anxiety are both psychological and physiological disturbances characterised by a set of physical, emotional and behavioural elements.⁷

Patients with cancer initially experience shock or denial, followed by emotional chaos, nervousness, lack of concentration, difficulty falling asleep, loss of appetite, irritability and intrusive thoughts about the future.⁸ Anxiety and depression are frequent emotional reactions to

a cancer diagnosis and are deemed normal. Some patients, however, have an overpowering reaction that interferes with their everyday activities,⁹ and high levels of signs and symptoms can last for weeks, months or even years.¹⁰ These are due to perceived threats such as loss of body functions, changes in appearance, disruption of family and life plans, death, diminished quality of life, recurrence or progression of the disease, and the occurrence of unpleasant symptoms such as pain, nausea, and fatigue.^{8,11}

According to a recent study conducted in the UK, depression and anxiety affect approximately 20% and 10% of patients with cancer, respectively, compared with 5% and 7% of the general population.¹² Furthermore, depression is the most studied psychiatric disorder in patients with cancer, with prevalence ranging from 3% to 58%.^{13–16} However, according to a previous study, nearly three-fourths (73%) of these depressed patients with cancer do not receive appropriate psychiatric intervention, and only 5% seek mental health professional help.¹⁷ Early detection and treatment of depression and anxiety in patients with cancer, on the other hand, results in a reduction in disease progression, increased survival rates, lower medical costs and improved quality of life.^{18,19}

Almost two-thirds of patients with cancer have significant levels of anxiety and depression, which impair individuals' quality of life²⁰ and increase their risk of suicide.²¹ Furthermore, untreated depression and anxiety have significant negative consequences, including altered treatment decision-making,²² non-compliance with treatment, extended recovery times and¹⁰ increased intensity of pain.²³ Depression has been shown to be underdiagnosed and under-recognised in clinical practice,²⁴ owing to the complex nature and inter-relationship between cancer and depression in patients with cancer.^{25,26}

Despite the fact that depression and anxiety are the most common complications in patients with cancer, they are frequently overlooked.²⁷ Furthermore, the psychosocial requirements of patients with cancer, whether they have a mental illness history or not, are frequently overlooked during cancer therapy, which is primarily focused on addressing somatic symptoms and side effects. Earlier detection and improved treatment of cancer make people live longer with cancer.²⁸ As far as our knowledge is concerned, there is a scarcity of explicit data showing evidence in the Ethiopian context in general, and in the study area in particular, regarding the mental health problems of people living with cancer. Therefore, the objective of this study was to assess the prevalence of depression and anxiety symptoms in Ethiopian patients with cancer, as well as to identify various influencing factors for depression and anxiety symptoms.

METHODS AND MATERIALS

Study design and setting

From October to December 2019, an institution-based cross-sectional study design was used at Hawassa University Comprehensive Specialized Hospital (HUCSH) cancer treatment centre. The hospital is the only one

in the region that provides cancer care, and it is now constructing one of Ethiopia's largest cancer treatment centres.

Study subjects

Randomly selected patients diagnosed with cancer and who have follow-up at outpatient department of oncology unit.

Inclusion and exclusion criteria

Those adult (≥ 18 years) patients diagnosed with any form or type of cancer were included in the study. However, patients who are unable to give proper information or critically ill patients at the time of interview and those with a history of mental disorder were excluded from the study.

Sampling and data collection

The required sample size was determined using single population proportion formula:

$(Z_{\alpha/2})^2 \times p \times (1-p) / d^2$, where n is the sample size, z is the standard normal score set at 1.96, d is the desired degree of accuracy and p is the estimated proportion of the target population. By taking $p=50\%$, $Z_{\alpha/2}=1.96$ and $w=5\%$, the computed sample size was 384; and by taking 10% non-response rate, the total sample size computed was 422. Systematic random sampling technique was used for this study. Patients with cancer who were visiting HUCSH cancer clinic during the study period and who fulfilled the inclusion criteria were included in the study until the final study sample size was reached.

Data were collected by three oncology nurses who had received 2 days of intense training on data collection methodologies and instruments. In 5% of the sample, a pretest was conducted to identify potential problems with the data collecting tools, as well as to assess the consistency of the questionnaires and the performance of the data collectors. During data collection, supervision was maintained, and each questionnaire was checked for completeness on a daily basis by the supervisor.

Variables and measurements

Data were collected by using interviewer-administered structured questionnaire. It consists of independent variables such as sociodemographic characters, clinical related factors of patients and healthy lifestyle-related factors (nutritional status, body mass index (BMI), substance use, etc), and dependent variables (depression and anxiety). The questionnaire is developed in English and translated to local language (Amharic), and the Amharic version was used to collect the data.

The Hospital Anxiety and Depression Scale (HADS) was used to assess the dependent variables anxiety and depression. It consists of two subscales, anxiety and depression.²⁹ The HADS consists of 14 items: 7 items for the anxiety subscale (HADS anxiety) and 7 for the depression subscale (HADS depression). Each item is scored on a response scale with four alternatives ranging between 0 and 3.³⁰ Item scores were summed to provide subscaled

scores of anxiety and depression, ranging between 0 and 21, and total summed score ranging from 0 to 42. A higher score represents higher symptoms of anxiety or depression.³¹ Recommended cut-off scores are 8–10 for doubtful cases and ≥ 11 for definite cases.²⁹

The Eastern Cooperative Oncology Group (ECOG) Scale was used to measure the patient's performance status. This scale captures patient-derived functional status data on a scale of 0–4. An ECOG score of 2–4 indicates a poor performance status, whereas a score of 0–1 indicates a good performance status. Researchers have confirmed the validity of the ECOG Chinese version in assessing the performance status of Chinese patients with cancer.³²

The five-item Psychosis Screening Questionnaire (PSQ-5) was used to assess the presence of psychotic symptoms in the past year.³³ The PSQ has five probe questions enquiring about mania, thought insertion, paranoia, strange experiences and hallucinations. Individuals with psychosis were those who answered yes to one or more psychotic symptoms on the PSQ.³⁴

To assess suicide behaviour, a four-item Suicidal Behaviour Questionnaire Revised (SBQ-R) was used. SBQ-R item 1 taps into lifetime suicidal ideation and attempt; item 2 assesses the frequency of suicidal ideation over the past 12 months; item 3 taps into the threat of suicidal behaviour and item 4 evaluates self-reported likelihood of suicidal behaviour. The sensitivity was 80% and specificity 91%, with a score of 3–18 and cut-off point of ≥ 8 for adult clinical population.³⁵

Level of social support among patients with cancer was assessed using the three-item Oslo Social Support Scale and the scores range from 3 to 14. It is categorised as poor,^{3–8} moderate^{9–11} and strong^{12–14} social support.³⁶

Intensity of cancer pain was assessed using universal pain screening with a 0–10 pain intensity on the Numerical Rating Scale. Pain intensity was categorised as 'none' for a score of 0, 'mild' for a score of 1–3, 'moderate' for a score of 4–6 and 'severe' for a score of 7–10 as reported by the patient.^{37,38}

Nutritional status was assessed using Mini-Nutritional Assessment Short-Form Scale. It is a screening tool to assess malnutrition or risk of malnutrition and consists of six items related to appetite, loss of weight, mobility, mental distress or acute disease, presence of cognitive impairment and BMI.³⁹ A score of 12–14 is considered as normal nutritional status and a score of ≤ 11 indicates malnutrition or risk of malnutrition.⁴⁰

Data processing and analysis

Data were entered to EpiData V.3.1 and exported to SPSS V.24 for Windows for analysis. Descriptive statistics were used to identify distributions of sociodemographic characteristics of study participants. Prevalence of anxiety and depression symptoms was calculated by summing up the HADS and dichotomising the total score into positive or negative for presence of depression or anxiety. Both bivariate and multivariable logistic regression analyses

with 95% CI were used to see the association between independent and outcome variables. During the bivariate analyses, variables with a p value less than 0.20 were entered into a multivariable logistic regression model using an enter method. Finally, those variables which showed statistical significance at $p < 0.05$ and 95% CI in the final model were reported as independently associated with anxiety and depression. The model fitness test was conducted using the Hosmer and Lemeshow goodness-of-fit test.

Patient and public involvement

Patients and the public were not involved in this study, including the recruitment, data collection, analysis, interpretation and dissemination of the results.

RESULT

Sociodemographic characteristics of the patients

A total of 423 patients with cancer were targeted for the study, with 415 participating at a response rate of 98.3%. The mean age of patients is 42.51 (SD ± 14.24) years. The study participants were dominantly Protestant (146, 35.2%) by religion followed by Orthodox Christianity (136, 32.8%). The majority of study subjects (339, 81.7%) were married. A total of 160 (38.6%) participants were unable to read and write, 346 (83.4%) were unemployed and nearly one-third (133, 32.0%) were rural residents (table 1).

Clinical characteristics of the patients

The median time since cancer diagnosis and time to begin treatment are 5 and 3 months, respectively. More than one-third (148, 35.7%) have breast cancer followed by gastrointestinal-related cancer (84, 20.2%); 173 (41.7%) had stage III cancer, 180 (43.4%) had moderate level of pain, 66 (64.1%) of the patients were on chemotherapy and nearly half (195, 47.0%) had moderate social support (table 2).

Prevalence of depression and anxiety symptoms

The prevalence rates of depression and anxiety symptoms among patients with cancer were found to be 58.8% (n=244) and 60% (n=249), respectively, in our study as indicated in figure 1.

Independent predictors of depression and anxiety among patients with cancer

Among many variables included in the bivariate analysis, those variables (occupation, type of cancer, cancer stage, intensity of pain, type of cancer treatment, taking of corticosteroid medication, comorbid medical illness, anxiety, psychosis, malnutrition, eating problems, age and BMI) with $p < 0.25$ were included in the multivariable logistic regression analysis. Only five variables, that is, age > 50 years (adjusted OR (AOR)=2.24, 95% CI=1.14 to 4.40), being unemployed (AOR=1.96, 95% CI=1.08 to 3.56), cancer stage (stage III (AOR)=5.37, 95% CI=1.34 to 21.45) and stage IV (AOR)=4.55, 95% CI=1.12 to 18.44), comorbid

Table 1 Sociodemographic characteristics of patients with cancer at HUCSH, 2019 (n=415)

Variables	Category	Frequency	Percentage
Mean (\pm SD) age in years		42.51 (\pm 14.24)	
Gender	Male	144	34.7
	Female	271	65.3
Religion	Protestant	146	35.2
	Orthodox	136	32.8
	Muslim	125	30.1
	Other	8	1.9
Educational status	Unable to read and write	160	38.6
	Primary education	125	30.1
	Secondary education	79	19.0
	College and above	51	12.3
Marital status	Married	339	81.7
	Single	44	10.6
	Widowed	28	6.7
	Divorced	4	1
Occupation	Employed	69	16.6
	Unemployed	346	83.4
Residence	Urban	282	68.0
	Rural	133	32.0

HUCSH, Hawassa University Comprehensive Specialized Hospital.

psychotic symptoms (AOR=1.67, 95% CI=1.07 to 2.61) and eating problem in the past 2 weeks (AOR=6.16, 95% CI=1.98 to 19.11) were independent factors of depression symptoms among patients with cancer (table 3).

Therefore, older patients (>50 years) were two times more likely to be affected by depression than younger age groups (<30 years), and unemployed patients were nearly two times more likely to be affected by depression than those who were employed. Those patients with advanced stage of cancer (stage III were 5.3 times and stage IV were 4.5 times) were more likely to develop depression than those who had stage I cancer. Furthermore, patients with cancer with comorbid psychotic symptoms and eating problems in the past 2 weeks were 1.6 and 6.1 times more likely to be affected by depression than their counterparts.

In addition, patients with stage II (AOR=3.92, 95% CI=1.07 to 14.36) and IV (AOR=5.04, 95% CI=1.44 to 17.59) cancer are four and five times more likely to be affected by anxiety, respectively, than those patients with stage I cancer. Patients with cancer with comorbid psychosis (AOR=1.73, 95% CI=1.12 to 2.66) were 1.7 times more likely to be affected by anxiety as shown in table 4.

DISCUSSION

The primary aim of this study was to look into the prevalence of anxiety and depression symptomatology among Ethiopian patients with cancer, as well as the risk factors

associated with them. In our study, the prevalence of depression symptoms among patients with cancer was found to be 58.8% (95% CI=54.0% to 63.6%). This finding is similar to the results of a study on patients with cancer conducted in Gondar (58.4%),⁴¹ Pakistan (61.6%)⁴² and the pooled prevalence (54.9%) in China.¹⁰ However, compared with some previous literature, the reported rates of depression in our study were slightly lower than the studies in Bahir Dar and Gondar, Ethiopia (70.8%),⁴³ Rwanda (67.7%)²⁷ and China (66.7%).⁴⁴ On the other hand, our finding is higher than studies by Naser *et al*, in Jordan (23.4%).⁴⁵ This disparity might be attributed to differences in the study populations in terms of cancer types, screening tools used, or other sociodemographic variations and severity of depression taken into account.

Regarding the prevalence of anxiety symptoms in Ethiopian patients with cancer, our finding (60%, 95% CI=55.4% to 64.6%) is higher than studies in Gondar (51%),⁴¹ China (43.5%),⁴⁶ Iran (43.2%),⁴⁷ Jordan (19.9%),⁴⁴ Rwanda (52.1%)²⁷ and Sudan (26.7%).⁴⁸ However, the results presented in this study confirm that patients with cancer suffer from psychological or psychiatric complications. This variation could be due to differences in participants' place of residence, their demographic characteristics, methodological differences of the studies and sample size.

Similar to previous studies,⁴⁹ the finding of this study showed that older age groups were more prone to

Table 2 Clinical characteristics of patients with cancer at HUCSH, 2019 (n=415)

Variables	Category	Frequency	Percentage
Type of cancer	Breast	148	35.7
	Cervical	7	1.7
	Genitourinary	31	7.5
	Gastrointestinal	84	20.2
	Lung	13	3.1
	Lymphoma	51	12.3
	Other	81	19.5
WHO cancer staging (I–IV)	I	15	3.6
	II	54	13.0
	III	173	41.7
	IV	129	31.1
	Unknown	44	10.6
Intensity of pain	None	48	16.6
	Mild	58	14.0
	Moderate	180	43.4
	Severe	129	31.0
Type of treatment	Chemotherapy only	266	64.1
	Surgery only	15	3.6
	Combination therapy	134	32.3
Take corticosteroid medication	Yes	350	84.3
	No	65	15.7
Comorbid chronic medical illness	Yes	65	15.7
	No	350	84.3
Use of substance over the last 3 months	Yes	17	4.1
	No	398	95.9
Performance status (ECOG Scale)	Good	364	87.7
	Poor	51	12.3
Duration of illness	<12 months	355	85.5
	13–36 months	48	11.6
	>37 months	12	2.9
Duration of treatment	<12 months	375	90.4
	13–36 months	31	7.5
	>37 months	9	2.2
Malnutrition	Yes	303	27.0
	No	112	73.0
BMI	Underweight	71	17.1
	Normal weight	282	68.0
	Overweight	46	11.1
	Obese	16	3.9
Eating problem	Yes	393	94.7
	No	22	5.3
Psychosis	Yes	236	56.9
	No	179	43.1
Suicide behaviour	Yes	32	7.7
	No	383	92.3

Continued

Table 2 Continued

Variables	Category	Frequency	Percentage
Social support	Poor	124	29.9
	Moderate	195	47.0
	Strong	96	23.1

BMI, body mass index; ECOG, Eastern Cooperative Oncology Group; HUCSH, Hawassa University Comprehensive Specialized Hospital.

depression. Older patients experience longer disease duration, a higher risk of cancer metastases and more disabilities, all of which contribute to depression.⁵⁰ Another reason could be that older patients have difficulty asking for assistance and communicating with others. Furthermore, worrying about excessive treatment costs and family financial difficulties may be causes of psychological distress.

Findings from previous studies indicated that depressive symptoms are more common in unemployed individuals.⁵¹ Similarly, our result underlined that unemployed patients with cancer are more likely to be affected by depression than their counterparts. Hence, unemployment in combination with cancer exerts overwhelming physical and psychological strain such as depression in an individual.⁵² On the other hand, a substantial number of patients with cancer suffer from psychosomatic and social problems such as tiredness, pain, cognitive deficits, anxiety and depression.⁵³ These enduring physical and psychological effects of cancer or its treatment may be a reason for social and occupational dysfunction including the withholding of employment.⁵⁴

High magnitude of anxiety and depression can be related to end-stage cancer.⁵⁰ In line with this, our study also showed that patients with cancer with advanced disease stages are vulnerable to anxiety. This might be related to the higher levels of physical debilitation and advanced illnesses.⁵⁵ Prevalence of psychiatric disorders mostly varies at different stages of cancer. Despite the fact that adjustment disorders with depressed or anxious moods are more frequent at the early stage of the disease, severe psychiatric complications such as

very severe anxiety and major depression are more common in late stages of cancer.⁵⁶ As a result, patients with late-stage cancer are more likely to be subjected to high doses of chemotherapy or any other anti-cancer treatment, resulting in a loss of appetite. Chemotherapy has been reported to cause severe sadness, anger, anorexia and anxiety in patients with cancer, despite the fact that it frequently enhances survival rates.⁵⁵

Even though depression and psychosis are considered as a separate concept, this study showed that patients with cancer with comorbid psychotic symptoms are more prone to depression. Clinically, this suggests diagnoses such as schizoaffective or mood disorders with psychotic features, in which depressive and psychotic symptoms co-occur. The comorbidity between depression and psychotic disorders is very high, too.⁵⁷ Experiencing psychotic symptoms such as hallucination and delusion induces feelings of fear, hopelessness and helplessness which ends up with depression.⁵⁸ Conversely, depression could have an impact on psychotic symptoms by provoking negative appraisal of external stimuli, consequently increasing psychotic symptoms.⁵⁹ Also, psychosis and depression may result in shared liability that leads both to exist on the same continuum.⁶⁰ However, further research is needed to clarify this complex relationship.

We also found out that depression is more experienced by patients with eating problems such as nausea and vomiting. This is because patients may feel nauseous or vomit the week or day before treatment, as they approach the clinic, or even just thinking about chemotherapy.⁸ Moreover, exposure to high doses of chemotherapeutic and steroid agents induces depressive symptoms such as reduced appetite caused by gastrointestinal side effects like nausea and vomiting.^{61 62}

Symptoms and syndromes of anxiety are present in the majority of patients with psychotic illness,⁶³ and psychotic symptoms are also often reported in patients with affective disorders like anxiety disorders.⁶⁴ Similar to these findings, in our study, patients with comorbid psychotic symptoms are more likely to develop anxiety than their counterparts. As a result, affective dysregulation (anxiety) and reality distortion coexisted within the range of subclinical and clinical expression.⁵⁹

Despite providing valuable baseline data, this study has also some limitations encountered. The study is cross-sectional, and direction of association between depression and anxiety and related factors could not be established. Some of the physical symptoms, which are part of the HADS symptoms list, may have been due to the cancer itself or its treatment rather than due to depression or anxiety. These may have

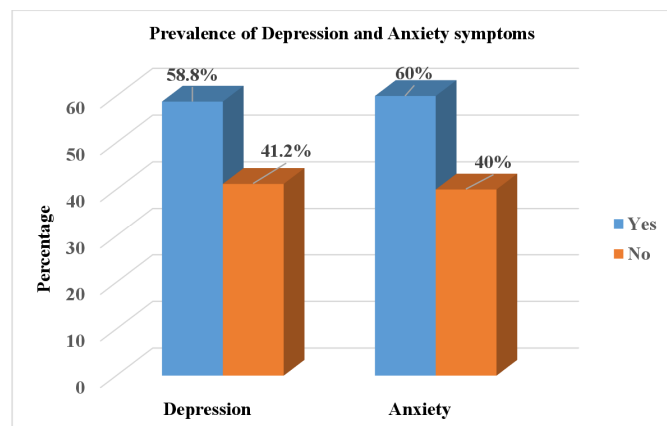


Figure 1 Prevalence of depression and anxiety symptoms among patients with cancer attending HUCSH, southern Ethiopia, 2019 (n=415). HUCSH, Hawassa University Comprehensive Specialized Hospital.

Table 3 Bivariate and multivariable regression analyses on depressive symptoms and associated factors among patients with cancer at HUCSH, 2019 (n=415)

Variables	Category	Depression symptoms				COR (95% CI)	AOR (95% CI)
		Yes		No			
		N	%	N	%		
Age (years)	<30	45	51.1	43	48.9	1	1
	31–50	130	56.8	99	43.2	1.19 (0.73 to 1.96)	1.02 (0.58 to 1.77)
	>50	69	70.4	29	29.6	2.66 (1.46 to 4.84)***	2.24 (1.14 to 4.40)*
Occupation	Employed	34	49.3	35	50.7	1	1
	Unemployed	210	60.7	136	39.3	1.59 (0.95 to 2.67)***	1.96 (1.08 to 3.56)*
Type of cancer	Breast	93	62.8	55	37.2	1	1
	Cervical	3	42.9	4	57.1	0.44 (0.09 to 2.05)	0.42 (0.08 to 2.21)
	Genitourinary	19	61.3	12	38.7	0.93 (0.42 to 2.07)	0.95 (0.39 to 2.31)
	Gastrointestinal	47	56.0	37	44.0	0.75 (0.43 to 1.29)	0.70 (0.36 to 1.36)
	Lung	12	92.3	1	7.7	7.09 (0.89 to 56.07)***	7.61 (0.90 to 64.32)
	Lymphoma	29	56.9	22	43.1	0.78 (0.40 to 1.48)	0.74 (0.34 to 1.63)
	Others	41	50.6	40	49.4	0.60 (0.35 to 1.04)***	0.72 (0.38 to 1.34)
WHO stage of cancer	I	5	33.3	10	66.7	1	1
	II	30	55.6	24	44.4	2.50 (0.75 to 8.30)***	2.87 (0.69 to 11.95)
	III	102	62.0	71	38.0	2.87 (0.94 to 8.76)***	5.37 (1.34 to 21.45)*
	IV	77	60.6	52	39.4	2.96 (0.65 to 9.16)***	4.55 (1.12 to 18.44)*
	Unknown	30	53.5	14	46.5	4.28 (1.23 to 14.91)***	2.11 (0.49 to 8.95)
Intensity of pain	None	32	66.7	16	33.3	1	1
	Mild	36	62.1	22	37.9	0.81 (0.36 to 1.82)	0.76 (0.23 to 2.55)
	Moderate	104	57.8	76	42.2	0.68 (0.35 to 1.33)	0.59 (0.16 to 2.12)
	Severe	72	55.8	57	44.2	0.63 (0.31 to 1.26)***	0.54 (0.15 to 1.98)
Type of treatment	Chemotherapy	154	57.9	112	42.1	1	1
	Surgery	11	73.3	4	26.7	2.00 (0.62 to 6.44)***	2.18 (0.058 to 8.29)
	Combination	79	59.0	55	41.0	1.04 (0.68 to 1.59)	1.01 (0.59 to 1.71)
Take corticosteroid	Yes	198	56.6	46	43.4	0.54 (0.30 to 0.96)	0.42 (0.14 to 1.21)
	No	152	70.8	19	29.2	1	1
Comorbid medical illness	Yes	43	66.2	22	33.8	1.45 (0.83 to 2.53)	1.13 (0.59 to 2.16)
	No	201	57.4	149	42.6	1	1
Anxiety	Yes	154	54.2	95	45.8	1.37 (0.92 to 2.04)***	1.29 (0.83 to 2.03)
	No	90	61.8	76	38.2	1	1
Psychosis	Yes	149	53.1	87	46.9	1.51 (1.02 to 2.24)***	1.67 (1.07 to 2.61)*
	No	95	63.1	84	36.9	1	1
Malnutrition	Yes	185	52.7	118	47.3	0.71 (0.45 to 1.09)***	1.42 (0.81 to 2.47)
	No	59	61.1	53	38.9	1	1
Eating problem	Yes	236	36.4	157	63.6	2.63 (1.07 to 6.41)***	6.16 (1.98 to 19.11)**
	No	8	60.1	14	39.9	1	1
BMI	Underweight	42	59.2	29	40.8	0.48 (0.14 to 1.64)***	0.63 (0.15 to 2.62)
	Normal weight	162	57.4	120	42.6	0.45 (0.14 to 1.43)***	0.47 (0.13 to 1.75)
	Overweight	28	60.9	18	39.1	0.51 (0.14 to 1.86)	0.52 (0.12 to 2.20)
	Obese	12	75.0	4	25.0	1	1

*P<0.05; **p<0.01; ***p<0.001.

AOR, adjusted OR; BMI, body mass index; COR, crude OR; HUCSH, Hawassa University Comprehensive Specialized Hospital.

Table 4 Bivariate and multivariable regression analyses on anxiety symptoms and associated factors among patients with cancer at HUCSH, 2019 (n=415)

Variables	Category	Anxiety symptoms				COR (95% CI)	AOR (95% CI)
		Yes		No			
		N	%	N	%		
Educational status	Not able to read and write	91	56.9	69	43.1	1.17 (0.62, 2.20)	0.98 (0.48 to 1.99)
	Primary	81	64.8	44	35.2	1.63 (0.84 to 3.17)**	1.31 (0.64 to 2.68)
	Secondary	50	63.3	29	36.7	1.53 (0.75 to 3.13)**	1.60 (0.73 to 3.46)
	College or above	27	52.9	24	47.1	1	1
Residence	Urban	177	62.8	105	37.2	1	1
	Rural	72	54.1	61	45.9	0.70 (0.46 to 1.06)**	0.70 (0.43 to 1.12)
Type of cancer	Breast	92	62.2	56	37.8	1	1
	Cervical	4	57.1	3	42.9	0.81 (0.17 to 3.76)	0.69 (0.13 to 3.42)
	Genitourinary	21	67.7	10	32.3	1.27 (0.56 to 2.91)	1.16 (0.47 to 2.84)
	Gastrointestinal	42	50.0	42	50.0	0.60 (0.35 to 1.04)**	0.55 (0.30 to 1.02)
	Lung	6	46.2	7	53.8	0.52 (0.16 to 1.63)	0.38 (0.11 to 1.29)
	Lymphoma	36	70.6	15	29.4	1.46 (0.73 to 2.90)	1.37 (0.62 to 2.98)
	Others	48	59.3	33	40.7	0.88 (0.50 to 1.54)	0.84 (0.45 to 1.56)
Stage of cancer	I	5	33.3	10	66.7	1	1
	II	33	61.1	21	38.9	3.14 (0.94 to 10.48)**	3.92 (1.07 to 14.36)*
	III	100	57.3	73	42.7	2.74 (0.89 to 8.35)**	3.29 (0.97 to 11.09)
	IV	86	67.4	43	32.6	4.00 (1.28 to 12.43)**	5.04 (1.44 to 17.59)*
	Unknown	25	55.8	19	44.2	2.36 (0.77 to 8.98)**	3.35 (0.89 to 12.63)
Take corticosteroid	Yes	215	61.4	31	38.6	1	1
	No	135	52.3	34	47.7	0.68 (0.40 to 1.17)**	0.66 (0.33 to 1.31)
Medical illness	Yes	33	50.8	32	49.2	0.64 (0.37 to 1.08)**	0.61 (0.33 to 1.11)
	No	216	61.7	134	38.3	1	1
Social support	Poor	77	62.1	47	37.9	1.44 (0.84 to 2.48)**	1.68 (0.90 to 3.13)
	Moderate	121	62.1	74	37.9	1.44 (0.88 to 2.36)**	1.52 (0.89 to 2.62)
	Strong	51	53.1	45	46.9	1	1
Depression	Yes	95	55.6	76	44.4	1.36 (0.91 to 2.03)**	1.34 (0.86 to 2.09)
	No	154	63.1	90	36.9	1	1
Psychosis	Yes	152	54.2	84	45.8	1.53 (1.02 to 2.27)**	1.73 (1.12 to 2.66)*
	No	97	64.4	82	35.6	1	1
Age (years)	<30	58	65.9	30	34.1	1	1
	31–50	132	57.6	97	42.4	0.70 (0.42 to 1.17)**	0.87 (0.49 to 1.54)
	>50	59	60.2	39	39.8	0.78 (0.43 to 1.42)	1.12 (0.55 to 2.29)
Eating problem	Yes	239	45.5	154	54.5	1.86 (0.78 to 4.41)**	1.92 (0.73 to 5.00)
	No	10	60.8	12	39.2	1	1

*P<0.05; **p<0.25.

AOR, adjusted OR; COR, crude OR; HUCSH, Hawassa University Comprehensive Specialized Hospital.

an impact on the magnitude of depression or anxiety in this study. This is the first study of its kind in Ethiopia and one of the very few in Africa. Therefore, the study is an important contribution to our knowledge regarding the potential role of depression and anxiety in the treatment of cancer in this area.

CONCLUSIONS

The prevalence of depression and anxiety symptoms among patients with cancer was considerably high. Occupation, cancer stage, comorbid psychotic symptoms, eating problem in the past 2 weeks and patients' age were independent factors of depression symptoms

among patients with cancer. In addition, cancer stage and comorbid psychosis were associated with anxiety symptoms. Perhaps more attention is needed to detect changes in the psychological status of patients with cancer in an effort to reduce the occurrence of depression and anxiety. Continuous screening for symptoms of anxiety and depression is recommended as a necessary approach for good cancer care; on the other hand, after the diagnosis of clinically important psychological disorders, proper treatment interventions must be performed to improve the quality of life of these patients. Also, special attention should be given for patients with cancer with the mentioned risk factors of depression and anxiety.

Author affiliations

¹School of Nursing, Hawassa University College of Medicine and Health Sciences, Hawassa, Ethiopia

²Curtin School of Population Health, Curtin University, Bentley, Perth, Australia

³School of Public Health, Hawassa University College of Medicine and Health Sciences, Hawassa, Ethiopia

⁴Faculty of Medicine, Hawassa University College of Medicine and Health Sciences, Hawassa, Ethiopia

⁵Environmental Health, Hawassa University College of Medicine and Health Sciences, Hawassa, Ethiopia

⁶Australian Centre for Public and Population Health Research, School of Public Health, Faculty of Health, University of Technology Sydney, Ultimo, New South Wales, Australia

Acknowledgements We would like to acknowledge Hawassa University, staff of HUCSH, data collectors and participants for their valuable participation in the study process.

Contributors MA, BDe, BDu, DG, NB, LG, AG and AB were involved in the design and data collection of the study. MA and BDe performed the analysis and write-up of the study. MA prepared the manuscript for publication and all authors critically reviewed the manuscript. MA is responsible for the overall content as guarantor. All authors read and approved the final manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval This study was approved by the Institutional Review Board at the College of Medicine and Health Sciences of Hawassa University (No. IRB/047/11, on 26 February 2019). Permission was also obtained from administrative bodies at HUCSH. Patients were enrolled into the study on a voluntary basis after a thorough explanation about the study. They were informed and obtained verbal consent and interviewed during their visits to the cancer treatment centre. Any information obtained from the patients was kept confidential.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article. All the datasets used and analysed during the current study are available in this manuscript.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Mohammed Ayalew <http://orcid.org/0000-0001-9973-5741>

Bereket Duko <http://orcid.org/0000-0002-4419-0016>

Asres Bedaso <http://orcid.org/0000-0001-7859-0264>

REFERENCES

- 1 WHO. WHO. *Cancer fact sheet [Internet]*. WHO, 2017. www.who.int/mediacentre/factsheets/fs297/en/
- 2 World Health Organization (WHO). *Latest global cancer data : Cancer burden rises to 18. 1 million new cases and 9. 6 million cancer deaths in 2018*. Int Agency Res Cancer, 2018: 13–15.
- 3 Ferlay J, Ervik M, Lam F. *Global cancer Observatory: cancer today*. Lyon: Int Agency Res Cancer, 2020.
- 4 Zhu J, Fang F, Sjölander A, et al. First-onset mental disorders after cancer diagnosis and cancer-specific mortality: a nationwide cohort study. *Ann Oncol* 2017;28:1964–9.
- 5 Walker J, Holm Hansen C, Martin P, et al. Prevalence of depression in adults with cancer: a systematic review. *Ann Oncol* 2013;24:895–900.
- 6 Carroll BT, Kathol RG, Noyes R, et al. Screening for depression and anxiety in cancer patients using the hospital anxiety and depression scale. *Gen Hosp Psychiatry* 1993;15:69–74.
- 7 Ali S, Stone MA, Peters JL, et al. The prevalence of co-morbid depression in adults with type 2 diabetes: a systematic review and meta-analysis. *Diabet Med* 2006;23:1165–73.
- 8 Die Trill M. Anxiety and sleep disorders in cancer patients. *EJC Suppl* 2013;11:216–24.
- 9 Breitbart W. Identifying patients at risk for, and treatment of major psychiatric complications of cancer. *Support Care Cancer* 1995;3:45–60.
- 10 Yang Y-L, Liu L, Wang Y, et al. The prevalence of depression and anxiety among Chinese adults with cancer: a systematic review and meta-analysis. *BMC Cancer* 2013;13:393.
- 11 Donovan KA, Thompson LMA, Jacobsen PB. Pain, Depression, and Anxiety in Cancer. In: *Handbook of pain and palliative care: Biobehavioral approaches for the life course*, 2012: 615–37.
- 12 Pitman A, Suleman S, Hyde N, et al. Depression and anxiety in patients with cancer. *BMJ* 2018;361:k1415.
- 13 Bodurka-Bervers D, Basen-Engquist K, Carmack CL, et al. Depression, anxiety, and quality of life in patients with epithelial ovarian cancer. *Gynecol Oncol* 2000;78:302–8.
- 14 Meyer HAM, Sinnott C, Seed PT. Depressive symptoms in advanced cancer. Part 2. depression over time; the role of the palliative care professional. *Palliat Med* 2003;17:604–7.
- 15 Warmenhoven F, van Rijswijk E, van Weel C, et al. Low prevalence of depressive disorder in ambulatory advanced cancer patients using the schedules for clinical assessment in neuropsychiatry (scan 2.1). *J Affect Disord* 2012;136:1209–11.
- 16 Lloyd-Williams M, Friedman T. Depression in palliative care patients—a prospective study. *Eur J Cancer Care* 2001;10:270–4.
- 17 Walker J, Hansen CH, Martin P, et al. Prevalence, associations, and adequacy of treatment of major depression in patients with cancer: a cross-sectional analysis of routinely collected clinical data. *Lancet Psychiatry* 2014;1:343–50.
- 18 Satin JR, Linden W, Phillips MJ. Depression as a predictor of disease progression and mortality in cancer patients. *Cancer* 2009;115:5349–61.
- 19 Pinquart M, Duberstein PR. Depression and cancer mortality: a meta-analysis. *Psychol Med* 2010;40:1797–810.
- 20 Smith HR. Depression in cancer patients: pathogenesis, implications and treatment (review). *Oncol Lett* 2015;9:1509–14.
- 21 Yousaf U, Christensen M-L, Engholm G, et al. Suicides among Danish cancer patients 1971–1999. *Br J Cancer* 2005;92:995–1000.
- 22 Colleoni M, Mandala M, Peruzzotti G, et al. Depression and degree of acceptance of adjuvant cytotoxic drugs. *Lancet* 2000;356:1326–7.
- 23 Chochinov HM. Depression in cancer patients. *Lancet Oncol* 2001;2:499–505.
- 24 Sharpe M, Strong V, Allen K, et al. Major depression in outpatients attending a regional cancer centre: screening and unmet treatment needs. *Br J Cancer* 2004;90:314–20.
- 25 Carlsen K, Jensen AB, Jacobsen E, et al. Psychosocial aspects of lung cancer. *Lung Cancer* 2005;47:293–300.
- 26 Block SD. Assessing and managing depression in the terminally ill patient. ACP-ASIM End-of-Life Care Consensus Panel. American College of Physicians - American Society of Internal Medicine. *Ann Intern Med* 2000;132:209–18.
- 27 Uwayezu MG, Gishoma D, Sego R, et al. Anxiety and depression among cancer patients: prevalence and associated factors at a Rwandan referral hospital. *Rwanda J Med Heal Sci* 2019;2:118–25.
- 28 Niedzwiedz CL, Knifton L, Robb KA, et al. Depression and anxiety among people living with and beyond cancer: a growing clinical and research priority. *BMC Cancer* 2019;19:1–8.
- 29 Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;67:361–70.
- 30 Bjelland I, Dahl AA, Haug TT, et al. The validity of the hospital anxiety and depression scale. An updated literature review. *J Psychosom Res* 2002;52:69–78.

- 31 Whelan-Goodinson R, Ponsford J, Schönberger M. Validity of the hospital anxiety and depression scale to assess depression and anxiety following traumatic brain injury as compared with the structured clinical interview for DSM-IV. *J Affect Disord* 2009;114:94–102.
- 32 Gao LP WC. Influencing factors of quality of life in cancer patients of initial stages receiving radio- and chemotherapy and its countermeasures. *Nurs J Chin People's Lib Army* 2008;8:10–12.
- 33 Bebbington P. The psychosis screening questionnaire. *Int J Methods Psychiatr Res* 1995;5:11–19.
- 34 Johns LC, Cannon M, Singleton N, *et al*. Prevalence and correlates of self-reported psychotic symptoms in the British population. *Br J Psychiatry* 2004;185:298–305.
- 35 Osman A, Bagge CL, Gutierrez PM, *et al*. The suicidal behaviors Questionnaire-Revised (SBQ-R): validation with clinical and nonclinical samples. *Assessment* 2001;8:443–54.
- 36 Bøen H, Dalgard OS, Bjertness E. The importance of social support in the associations between psychological distress and somatic health problems and socio-economic factors among older adults living at home: a cross sectional study. *BMC Geriatr* 2012;12:1–12.
- 37 El RC, Zaghoul H JJRM. Pain assessment practices in patients with cancer admitted to the oncology floor. *J Hematol Oncol Pharm* 2017;7:109–13.
- 38 Dugashvili G, Van den Berghe L, Menabde G, *et al*. Use of the universal pain assessment tool for evaluating pain associated with TMD in youngsters with an intellectual disability. *Med Oral Patol Oral Cir Bucal* 2017;22:89–94.
- 39 Kaiser MJ, Bauer JM, Ramsch C, *et al*. Validation of the mini nutritional assessment short-form (MNA®-SF): a practical tool for identification of nutritional status. *J Nutr Health Aging* 2009;13:782–8.
- 40 Sobieski D, Professions H, Amella EJ. Assessing nutrition in older adults. Hartford inst Geriatr nursing, New York Univ Rory Meyers coll Nurs 2019.
- 41 Berihun F, Haile S, Abawa M. Archives of depression and anxiety prevalence and correlates of anxiety and depression among cancer patients in the University of Gondar comprehensive specialized Hospital, Northwest Ethiopia. *Arch Depress Anxiety* 2017;3:42–8.
- 42 Dogar IA A, Waqar M, Kiran M. Depression and anxiety in cancer patients in outpatient department of a tertiary care hospital in Pakistan. *Pak J Med Sci* 2009;25:734–7.
- 43 Wondie Y, Mehnert A, Hinz A. The hospital anxiety and depression scale (HADS) applied to Ethiopian cancer patients. *PLoS One* 2020;15:e0243357.
- 44 Hong JS, Tian J. Prevalence of anxiety and depression and their risk factors in Chinese cancer patients. *Support Care Cancer* 2014;22:453–9.
- 45 Naser AY, Hameed AN, Mustafa N, *et al*. Depression and anxiety in patients with cancer: a cross-sectional study. *Front Psychol* 2021;12:585534.
- 46 Yan X, Chen X, Li M, *et al*. 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.
- 47 Hashemi S-M, Hormozi M, Allahyari A, *et al*. The prevalence of depression, anxiety, and stress in patients with breast cancer in Southeast Iran in 2019: a cross-sectional study. *Oncol Clin Pract* 2019;16:104–8.
- 48 Elghazali Bakhiet T, Ali SM, Bakhiet AM. Prevalence of depression and anxiety among adult patients undergoing chemotherapy in Khartoum, Sudan: a cross-sectional study. *J Affect Disord Rep* 2021;6:100218.
- 49 Chen X, Lu W, Zheng Y, *et al*. Exercise, tea consumption, and depression among breast cancer survivors. *J Clin Oncol* 2010;28:991–8.
- 50 Nikbakhsh N, Moudi S, Abbasian SKS. Prevalence of depression and anxiety among cancer patients. *Casp J Intern Med* 2014;5:167–70.
- 51 Kim S-S, Muntaner C, Kim H, *et al*. Gain of employment and depressive symptoms among previously unemployed workers: a longitudinal cohort study in South Korea. *Am J Ind Med* 2013;56:1245–50.
- 52 Ell K, Xie B, Wells A, *et al*. Economic stress among low-income women with cancer: effects on quality of life. *Cancer* 2008;112:616–22.
- 53 Smith T, Stein KD, Mehta CC, *et al*. The rationale, design, and implementation of the American cancer Society's studies of cancer survivors. *Cancer* 2007;109:1–12.
- 54 Taskila T, Lindbohm ML. Factors affecting cancer survivors' employment and work ability. *Acta Oncol* 2007;46:446–51.
- 55 Passik SD, Dugan W, McDonald MV, *et al*. Oncologists' recognition of depression in their patients with cancer. *J Clin Oncol* 1998;16:1594–600.
- 56 Wong-Kim EC, Bloom JR. Depression experienced by young women newly diagnosed with breast cancer. *Psychooncology* 2005;14:564–73.
- 57 Buckley PF, Miller BJ, Lehrer DS, *et al*. Psychiatric comorbidities and schizophrenia. *Schizophr Bull* 2009;35:383–402.
- 58 Krabbendam L, Myin-Germeys I, Bak M, *et al*. Explaining transitions over the hypothesized psychosis continuum. *Aust N Z J Psychiatry* 2005;39:180–6.
- 59 van Rossum I, Dominguez M-de-G, Lieb R, *et al*. Affective dysregulation and reality distortion: a 10-year prospective study of their association and clinical relevance. *Schizophr Bull* 2011;37:561–71.
- 60 Verdoux H, van Os J, Maurice-Tison S, *et al*. Increased occurrence of depression in psychosis-prone subjects: a follow-up study in primary care settings. *Compr Psychiatry* 1999;40:462–8.
- 61 Patten SB, Neutel CI. Corticosteroid-Induced adverse psychiatric effects: incidence, diagnosis and management. *Drug Saf* 2000;22:111–22.
- 62 van Dam FS, Schagen SB, Muller MJ, *et al*. Impairment of cognitive function in women receiving adjuvant treatment for high-risk breast cancer: high-dose versus standard-dose chemotherapy. *J Natl Cancer Inst* 1998;90:210–8.
- 63 Huppert JD, Smith TE. Anxiety and schizophrenia: the interaction of subtypes of anxiety and psychotic symptoms. *CNS Spectr* 2005;10:721–31.
- 64 Olfson M, Lewis-Fernández R, Weissman MM, *et al*. Psychotic symptoms in an urban general medicine practice. *Am J Psychiatry* 2002;159:1412–9.