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Prevalence and determinants of depression and its association with social support among cancer patients: implications for enhancing oncology care

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Abstract

Background Early detection of depression in cancer patients is essential for improving health outcomes. This study assessed the prevalence and determinants of depression among cancer patients and examined its association with social support.

Method A cross-sectional study was conducted at Al Amal Cancer Center, Al-Thawra Hospital, Hodeida City, Yemen (January–March 2023). Data on sociodemographic characteristics, depression (Patient Health Questionnaire, PHQ-9), and social support (Oslo Social Support Scale, OSSS-3) were collected. Multivariate binary logistic regression identified significant depression factors, and Pearson's correlation was used to assess the relationship between social support and depression. A p value of < 0.05 indicated statistical significance.

Results Depression incidence among cancer patients was 55% ($n = 192$). Multivariate analysis revealed that married (AOR = 9.472, $p < 0.001$) and divorced/widowed patients (AOR = 11.649, $p < 0.001$) were more likely to have depression than single individuals were. Higher education (diploma or above) was protective (AOR = 0.071, $p < 0.001$). Elevated lipid levels were linked to a lower depression risk (AOR = 0.189, $p = 0.003$), and a family history of cancer (AOR = 4.239, $p < 0.001$), longer disease duration (> 4 years) (AOR = 3.197, $p = 0.006$), and difficulty in activities (AOR = 8.704, $p < 0.001$) increased depression risk. A significant negative correlation between depression and social support was found ($r = -0.237$, $p < 0.001$).

Conclusion Over half of cancer patients experience depression, which is influenced by marital status, education, and disease-related factors. Social support significantly mitigates depression.

Implications for practice Enhancing social support and integrating mental health assessments by psychiatric professionals in oncology care is essential for improving the emotional well-being and overall quality of life of cancer patients.

Keywords Depression, Social support, Cancer, Patients, PHQ-9, OSSS-3

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Background

Depression is a common health-related issue among cancer patients [1], with an estimated 40.9% in Rwanda [2] 41.2% in Sudan [3] 58.8% in southern Ethiopia [4]. It has been shown to have a detrimental effect on adherence to treatment, the ability to manage symptoms, the length of hospital stay, and survival [5]. The detection of depression among cancer patients may be difficult because of overlapping symptoms such as exhaustion, appetite loss, and sleep disturbances, and the side effects of cancer therapy may further complicate the diagnosis of depression [6]. Early and appropriate investigations to detect depression in cancer patients may lead to improved health outcomes [7]. Hence, health professionals who work with patients with cancer should be qualified to regularly evaluate and investigate depression. This will enable prompt referrals to psychologists for early treatment [8].

Depression in cancer patients can be affected by a variety of socioeconomic factors, such as patient age, sex, occupation, educational level, income, cancer stage, chronic illness, type of cancer, cancer stage, and treatment type [6, 9, 10]. Depression may become more common in the governorate of Hodeida, which is considered the second-largest city in Yemen [11], as a political and economic conflict [12]. Investigations of the factors affecting these patients may prompt more attention from governmental agencies and organizations to arrange more care for these patients. Social support for cancer patients is considered a very important step for improving their health outcomes and involves the assistance and encouragement provided by the family and community [13]. This includes psychological support, educational support, and other forms of assistance that encourage healthy practices at different points in diagnosis and treatment [14].

Research indicates that social support significantly lowers depression scores in cancer patients [10, 15, 16]. However, to the best of our knowledge, there are no data related to the prevalence of depression among cancer patients in Yemen or the association between social support and depression. Thus, this study aimed to assess the level and factors influencing depression among patients with cancer and determine the associations between social support and depression. These results may provide evidence in favor of depression screening and the inclusion of social support for patients with cancer.

Methods

Design, population and setting

A cross-sectional study was conducted among 350 cancer patients at the Al Amal Cancer Center, Al-Thawra Hospital in Hodeida city, Yemen, from January to March 2023. This center is the only location in Hodeida, Yemen, where patients receive free cancer treatment. The center

was opened in 2006 and provides services annually to approximately 3000 cancer patients from the Hodeida Governorate as well as neighboring governorates such as Al Mahwit and Hajjah.

Sample size calculation and sampling method

The sample size was calculated via the OpenEpi website (http://www.openepi.com/Menu/OE_Menu.htm). For a population of 3,000, with a 50% response distribution, 5% precision, and 95% confidence interval, the required sample size was determined to be 341. Among the 400 surveys distributed, 350 were returned, resulting in an 87.5% response rate. A convenience sampling method was used to select the participants.

Inclusion and exclusion criteria

All cancer patients aged >18 years in the center were included in the study if they had been receiving cancer therapy for more than six months and agreed to participate. Patients with psychiatric or mental diseases were excluded from the study.

Study tool and data collection

The data were collected in three parts after reviewing the previous studies [17–23]. The first part consisted of the participants' sociodemographic characteristics, including age, sex, body mass index (BMI), employment status, marital status, living conditions, level of education, insurance, smoking, chronic illness history, family history of cancer, and depression. The second part is the Patient Health Questionnaire (PHQ-9), a popular 9-item self-report questionnaire used to assess depression symptoms during the previous two weeks [17] that was developed from the Primary Care Evaluation of Mental Disorders Patient Questionnaire (PRIME-MD PQ). It is a comprehensive depression screening tool because its items are in line with the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) for the diagnosis of major depressive disorders [18]. This tool is effective owing to its brief nature, ease of use for patients, and ease of scoring and interpretation [19].

The patients were asked nine questions related to problems in the last two weeks, with four alternative responses ranging from 0 to 3 (0, not at all; 1, a few days, 2 more than half of the days; and 3, almost every day). The total score of the tool ranges from 0 to 27, with higher scores indicating higher depression levels. The scores were categorized on the basis of a total score of 10 or higher indicating depression or less than 10 indicating no depression [19, 20].

The third part was the Oslo Social Support Scale (OSSS-3), which assesses the level of social support and contains three questions [21]. The Arabic version was used in this study which was developed by Alshammari

et al. 2023 who established its validity and reliability with Cronbach's alpha of 0.93 [23]. The total score ranged between 3 and 14, with a high score indicating strong social support and a low score indicating weak support. The total scores were categorized as poor (from 3 to 8), moderate (from 9 to 11), or strong (from 12 to 14) [21–24].

With Cronbach's alphas of 0.86 and 0.88, respectively, an Arabic translation of the PHQ-9 has shown validity and reliability in Saudi Arabia [25] and Lebanon [18]. The researcher collected the data by conducting structured interviews with cancer patients shortly after the treatment sessions. Medical and treatment-related data were collected from the patients' medical records. A pilot study involving 30 patients was conducted to evaluate the feasibility of the design, item readability, and questionnaire reliability. The results indicated that the questionnaire was simple to read and comprehend, with a Cronbach's alpha value of 0.806.

Data analysis

Version 27.0 of IBM SPSS Statistics (IBM Corp., Armonk, NY, USA) was used to analyze the data. The participants' characteristics and responses are presented via descriptive statistics, including means, frequencies, percentages, and standard deviations (SDs). When evaluating the relationships between categorical variables, the chi-square

test or Fisher's exact test was applied. To identify independent predictors of depression, multivariate binary logistic regression was used to further analyze all significant factors found in the chi-square test. The correlation between social support and depression scores was ascertained via Pearson's correlation. For every predictor, the association was measured at a 95% confidence interval (CI) via odds ratios. Statistical significance was set at $p < 0.05$.

Results

Table 1 presents the sociodemographic characteristics of the 350 patients. The majority were female (54.9%, $n = 192$), aged 40–60 years (39.1%, $n = 137$), and had a BMI of less than 25 kg/m² (69.4%, $n = 243$). Unemployment was prevalent among patients (78.3%, $n = 274$), and most (93.7%, $n = 328$) lived with their families. With respect to education, a significant proportion of the participants were illiterate (68.9%, $n = 241$). Most patients were single (11.7%, $n = 41$) or nonsmokers (68.0%, $n = 238$), and a large percentage lacked health insurance (67.4%, $n = 236$).

Table 2 outlines the medical history and treatment approaches for the 350 patients. Hypertension was present in 21.8% ($n = 76$) of the patients, diabetes mellitus in 14.9% ($n = 52$), elevated lipids in 6.6% ($n = 23$), angina in 6.9% ($n = 24$), and a history of cerebrovascular accidents (CVA) in 2.9% ($n = 10$). Additionally, 16.3% ($n = 57$) had a family history of cancer, and 10.6% ($n = 37$) had a family history of depression. Breast cancer (20.6%, $n = 72$) and gastrointestinal tract (GIT) cancer (16.0%, $n = 56$) were the most common cancer types. The other types included oral cancer (14.6%, $n = 51$), lung cancer (6.9%, $n = 24$), and liver cancer (5.1%, $n = 18$). The disease duration was predominantly 2–4 years (48.0%, $n = 168$). Most patients received chemotherapy (81.4%, $n = 285$), and 10.9% ($n = 38$) underwent surgery combined with chemotherapy. Problem impact on activities varied from not difficult (22.3%, $n = 78$) to extremely difficult (16.3%, $n = 57$).

The prevalence of depression among patients with cancer was 55% ($n = 192$), whereas 45% ($n = 158$) were not depressed, as shown in Fig. 1.

Table 3 presents the associations between patient characteristics and depression status (PHQ-9 score) in the 350 patients. Depression was more prevalent in patients aged > 60 years than in those aged 40–60 years and < 40 years (72.3% vs. 48.9% vs. 37.3%, $p < 0.001$). Females had higher depression rates than males did (63.5% vs. 44.3%, $p < 0.001$). Divorced/widowed patients were more likely to be depressed than married and single individuals were (73.2% vs. 59.5% vs. 12.8%, $p < 0.001$). Illiteracy was associated with higher depression rates than higher education was (67.2% vs. 34.5%–14.3%, $p < 0.001$). Patients without health insurance had higher depression

Table 1 Cancer patients' sociodemographic data ($N = 350$)

Variable		<i>n</i>	(%)
Age	Less 40	83	(23.7)
	40–60	137	(39.1)
	More than 60	130	(37.1)
Sex	Male	158	(45.1)
	Female	192	(54.9)
BMI class (kg/m ²)	< 25	243	(69.4)
	25–30	56	(16.0)
	> 30	51	(14.6)
Employment status	Employment	76	(21.7)
	Unemployment	274	(78.3)
Marital status	Single	41	(8.7)
	Married	106	(40.5)
	Divorced/widowed	11	(26.8)
Living condition	Family	328	(93.7)
	Alone	22	(6.3)
Educational level	Illiterate	241	(68.9)
	Primary	55	(15.7)
	Secondary	26	(7.4)
	Diploma	3	(0.9)
Insurance	Yes	114	(32.6)
	No	236	(67.4)
	Smoking	Yes	112
No		238	(68.0)

Table 2 Cancer patients’ past medical history and treatment approach

Variable	Count	(%)
Hypertension	Yes	76 (21.8)
	No	272 (78.2)
DM	Yes	52 (14.9)
	No	298 (85.1)
Lipids	Yes	23 (6.6)
	No	327 (93.4)
Angina	Yes	24 (6.9)
	No	326 (93.1)
CVA	Yes	10 (2.9)
	No	339 (97.1)
Family history of cancer	Yes	57 (16.3)
	No	293 (83.7)
Family history of depression	Yes	37 (10.6)
	No	313 (89.4)
Type of cancer	Oral cancer	51 (14.6)
	GIT cancer	56 (16.0)
	Liver cancer	18 (5.1)
	Respiratory cancer	24 (6.9)
	KUB	11 (3.1)
	Genitourinary cancer	32 (9.1)
	Prostate	7 (2.0)
	Breast	72 (20.6)
	Blood cancer	27 (7.7)
	Bone cancer	18 (5.1)
	Brain cancer	7 (2.0)
	Lymph node cancer	27 (7.7)
	Disease duration	< 2 years
2–4 years		168 (48.0)
> 4 years		77 (22.0)
Treatment modality	Chemotherapy	285 (81.4)
	Surgery with chemotherapy	38 (10.9)
	Others (Radiation, surgery, chemoradiotherapy, surgery and radiotherapy)	27 (7.7)
Problem impact on activities	Not difficult at all	78 (22.3)
	Somewhat difficult	159 (45.4)
	Very difficult	56 (16.0)
	Extremely difficult	57 (16.3)

Abbreviations: DM, diabetes mellitus; CVA, cerebrovascular accident; GIT, gastrointestinal tract; KUB, kidney, ureter, and bladder

rates than those with insurance did (62.3% vs. 39.5%, $p < 0.001$). The significant factors included lipid levels (34.8% vs. 56.3%, $p = 0.045$), family history of cancer (73.7% vs. 51.2%, $p = 0.002$), and disease duration > 4 years (70.1% vs. 50.6%–50.5%, $p = 0.010$). Those finding activities extremely difficult had the highest depression rates (77.2% vs. 71.4%–32.1%, $p < 0.001$). Employment status, living status, smoking status, hypertension status, diabetes status, angina status, family history of depression, and treatment modality were not significantly associated with depression.

Table 4 shows the significant factors influencing depression in patients with cancer, as determined via multivariate binary logistic regression analysis. Marital status was a significant factor, with married (AOR = 9.472, $p < 0.001$) and divorced/widowed patients (AOR = 11.649, $p < 0.001$) being more likely to experience depression than single individuals. Higher education levels were protective, with patients with diplomas or higher degrees being less likely to be depressed (AOR = 0.071, $p < 0.001$). Elevated lipid levels were associated with a lower risk of depression (AOR = 0.189, $p = 0.003$). A family history of cancer significantly increased the risk of depression (adjusted odds ratio [AOR] = 4.239, $p < 0.001$). A longer disease duration (> 4 years) was associated with a greater risk of depression (AOR = 3.197, $p = 0.006$). The impact of problems on activities was also significant, with those finding activities extremely difficult and at the highest risk of depression (AOR = 8.704, $p < 0.001$).

Table 5 shows a significant negative correlation between depression and social support among cancer patients. A Pearson’s r value of -0.237 ($p < 0.001$) indicated that higher levels of social support were associated with lower levels of depression. The correlation was significant at the 0.01 level, with a r^2 value of 0.056, suggesting that social support accounted for 5.6% of the variance in depression levels, as shown in Fig. 2.

Discussion

This study aimed to assess the level of depression among cancer patients to provide evidence in favor of depression screening and the inclusion of social support for cancer patients. In this study, over half of the study participants experienced depression, consistent with data from different geographical region, highlighting that depression as a widespread concern among cancer patients [6, 9, 16]. In low- and middle-income countries, high prevalence rates are frequently observed. For instance, in Jordan, depression affects 51.9% of cancer patients and 45% of breast cancer survivors [26, 27]. Among Syrian refugees with cancer in Jordan, rates reach as high as 70.6% [28], while in Sudan, 41.2% of adult chemotherapy patients report depression [3]. In China, a systematic meta-analysis found a depression rate of 55% among adult cancer

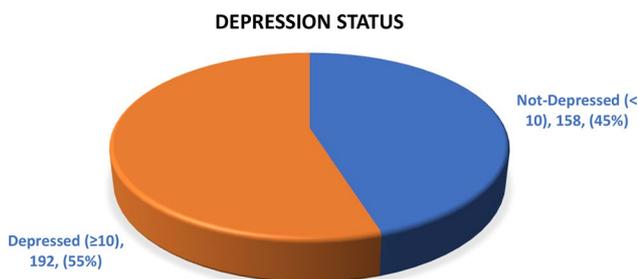


Fig. 1 Prevalence of depression among patients with cancer

Table 3 Association between patient characteristics and depression status

Variable		PHQ-9 Depression Score, n (%)				Chi-square	P value
		< 10		≥ 10			
		Count	(%)	Count	(%)		
Age (Years)	less 40	52	(62.7)	31	(37.3)	28.219	< 0.001*
	40–60	70	(51.1)	67	(48.9)		
	More than 60	36	(27.7)	94	(72.3)		
Sex	Male	88	(55.7)	70	(44.3)	12.953	< 0.001*
	Female	70	(36.5)	122	(63.5)		
Employment status	Employment	40	(52.6)	36	(47.4)	2.198	0.138
	Unemployment	118	(43.1)	156	(56.9)		
Marital status	Single	41	(87.2)	6	(12.8)	41.499	< 0.001*
	Married	106	(40.5)	156	(59.5)		
	Divorced/Died	11	(26.8)	30	(73.2)		
Living status	Family	148	(45.1)	180	(54.9)	0.001	0.976
	Alone	10	(45.5)	12	(54.5)		
Education	Illiterate	79	(32.8)	162	(67.2)	50.841	< 0.001*
	Primary	36	(65.5)	19	(34.5)		
	Secondary	19	(73.1)	7	(26.9)		
	Diploma and above	24	(85.7)	4	(14.3)		
Insurance	Yes	69	(60.5)	45	(39.5)	16.156	< 0.001*
	No	89	(37.7)	147	(62.3)		
Smoking	Yes	56	(50.0)	56	(50.0)	1.569	0.210
	No	102	(42.9)	136	(57.1)		
Hypertension	Yes	27	(35.5)	49	(64.5)	3.401	0.065
	No	129	(47.4)	143	(52.6)		
DM	Yes	18	(34.6)	34	(65.4)	2.733	0.098
	No	140	(47.0)	158	(53.0)		
Lipids	Yes	15	(65.2)	8	(34.8)	4.006	0.045*
	No	143	(43.7)	184	(56.3)		
Angina	Yes	14	(58.3)	10	(41.7)	1.810	0.178
	No	144	(44.2)	182	(55.8)		
Family history of cancer	Yes	15	(26.3)	42	(73.7)	9.746	0.002*
	No	143	(48.8)	150	(51.2)		
Family history of depression	Yes	14	(37.8)	23	(62.2)	0.892	0.345
	No	144	(46.0)	169	(54.0)		
Disease duration	< 2 years	52	(49.5)	53	(50.5)	9.299	0.010*
	2–4 years	83	(49.4)	85	(50.6)		
	> 4 years	23	(29.9)	54	(70.1)		
Treatment modality	Chemotherapy	133	(46.7)	152	(53.3)	2.894	0.235
	Chemo and surgery	17	(44.7)	21	(55.3)		
	Others	8	(29.6)	19	(70.4)		
Problem impact on activities	Not difficult at all	53	(67.9)	25	(32.1)	34.528	< 0.001*
	Somewhat difficult	76	(47.8)	83	(52.2)		
	Very difficult	16	(28.6)	40	(71.4)		
	Extremely difficult	13	(22.8)	44	(77.2)		

Note: asterisk (*) indicates Significant association

Abbreviation: DM, diabetes mellitus; PHQ-9: Patient Health Questionnaire-9; Chemo, chemotherapy

patients [29]. A global review of 128 meta-analyses found depression highest among breast cancer patients in the Eastern Mediterranean (49–51%) and Africa (40%), with somewhat lower rates in other regions [30]. depression among patients with other serious conditions, such as

those on hemodialysis, has reached even higher rates (63%) in the same settings [20].

These results highlight the widespread nature of this challenge among cancer patients worldwide, necessitating holistic mental healthcare provisions in oncology settings. In Yemen, where prolonged war, economic

Table 4 Factors influencing depression in patients with cancer

Variable	Multivariate binary logistic regression [0:<10 point, 1: ≥10]		
		AOR (95% C.I.)	P value
Age (year)	< 40	Reference	
	40–60	1.00 (0.455, 2.202)	0.999
	> 60	1.622 (0.708, 3.719)	0.253
Sex	Male	Reference	
	Female	1.325 (0.711, 2.466)	0.376
Marital status	Single	Reference	
	Married	9.472 (3.353, 26.759)	< 0.001*
	Divorced/widowed	11.649 (2.976, 45.605)	< 0.001*
Education	Illiterate	Reference	
	School	0.481 (0.228, 1.015)	0.055
	Diploma and above	0.071 (0.017, 0.290)	< 0.001*
Insurance	No	Reference	
	Yes	0.620 (0.336, 1.143)	0.126
Lipids	No	Reference	
	Yes	0.189 (0.063, 0.574)	0.003*
Family history of cancer	No	Reference	
	Yes	4.239 (1.872, 9.603)	< 0.001*
Disease duration (years)	< 2 years	Reference	
	2–4 years	0.952 (0.494, 1.836)	0.884
	> 4 years	3.197 (1.403, 7.283)	0.006*
Problem impact on activities	Not difficult at all	Reference	
	Somewhat difficult	2.667 (1.251, 5.682)	0.011*
	Very difficult	6.619 (2.398, 18.271)	< 0.001*
	Extremely difficult	8.704 (3.057, 24.784)	< 0.001*

Table 5 Correlation between depression and social support among cancer patients

Variables	Social support	
Depression	Pearson's r	−0.237**
	p value	< 0.001

**The correlation is significant at the 0.01 level (2-tailed)

instability, and a fragile healthcare system pose additional challenges, high rates of depression among cancer patients may be further compounded by social and environmental stressors beyond the illness itself [31, 32]. According to WHO, approximately 19.5% of Yemen's population suffers from mental health issues, and more than half of the youth report sadness or depressive symptoms [33, 34]. This environment may contribute to the high depression rates observed in this study, as patients face compounded stressors beyond their illness.

This study found that depression among cancer patients have been significantly associated with age (65+), gender (women), marital status (widowed or divorced), lack of education, and absence of health insurance. Additional factors include a family history of cancer, chronic illness, and difficulty performing daily activities. However, employment status, living arrangements, and some medical conditions were not linked to depression.

These findings align with several studies showing that depression in cancer patients is associated with sociodemographic factors. For instance, a systematic review identified 156 factors related to depression, clustered into somatic, psychological, social, and sociodemographic categories [35]. Another review identified 65 factors grouped into sociodemographic, physiological, psychosocial, and disease-related categories [36]. A systematic review and meta-analysis also found that chronic medical comorbidities, pre-existing psychological symptoms, and poor baseline physical and functional status were the most significant contributors to depression and anxiety in older cancer patients [37]. These results highlight the complex interplay of factors influencing depression in cancer patients and underscore the need for healthcare providers to address emotional distress as part of cancer care.

After adjusting for other variables, marital status emerged as a significant factor, with divorced or widowed patients more likely to experience depression than married or single individuals. This may be due to the lack of a close support network, which is crucial for coping with the psychological impact of cancer, particularly in Yemen, where family ties play a central role in emotional well-being. These findings align with previous studies revealing that widowed or divorced are associated with depression among cancer patients [38, 39]. However, other studies have found no significant differences in depression based on marital status [40], possibly reflecting cultural or demographic differences.

This study also found that social support is associated with a lower risk of depression, highlighting the protective effects of strong family and social connections. This finding is consistent with research from Ethiopia, where insufficient social support was linked to higher depression levels among breast cancer patients [41]. However, another study found no association between social support and depression [6], suggesting that the relationship may vary based on cultural, demographic, or socioeconomic contexts. The study also revealed an inverse relationship between lipid levels and depression, with higher lipid levels associated with lower depression. A meta-analysis confirmed this finding, showing that patients with depression had significantly lower LDL-C levels compared to those without depression [42].

Additionally, factors such as a family history of cancer and longer illness duration were associated with higher depression levels. Patients with a longer cancer history may experience cumulative stress, exacerbating depressive symptoms, as indicated by a study linking long cancer duration to increased depression [38]. Furthermore, Higher education was also identified as a protective factor against depression, aligning with studies from developing countries that reported lower depression rates

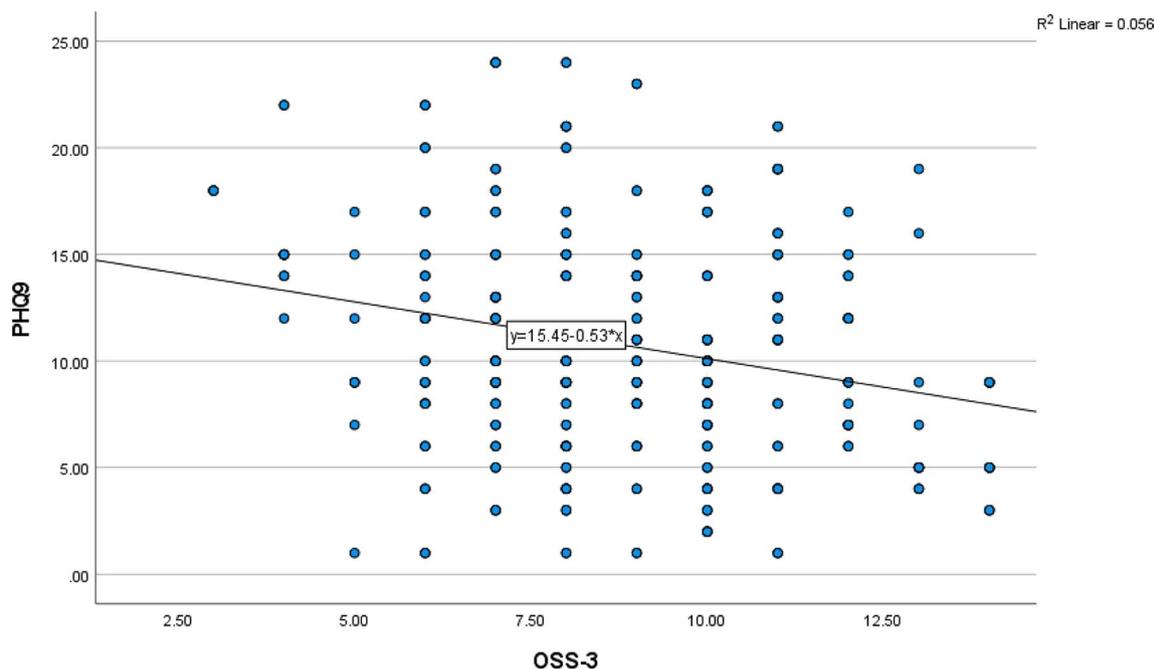


Fig. 2 Correlations between depression and social support among cancer patients

among more educated cancer patients [6]. This relationship may stem from enhanced problem-solving skills, resilience, and access to resources among educated patients, as well as a better understanding of illness and self-care.

These findings underscore the need for a comprehensive approach to managing depression in cancer patients, considering social, psychological, and biological factors. de Mol et al. [43] highlighted the significant influence of individual and sociodemographic characteristics on health-related quality of life among cancer patients. Additionally, the high levels of anxiety and depression observed among bereaved family members of cancer patients highlight the interconnectedness of patient mental health with family and social dynamics [44]. Therefore, identifying personal risk factors is essential for tailoring interventions to meet the specific psychological needs of cancer patients.

The connection between depression and social support is critical for the mental health of cancer patients. Corovid et al. [45] emphasized the crucial role of social support in cancer care, underscoring the need for interventions to address the widespread problem of low social support among patients. Strong social support networks can help alleviate feelings of isolation and distress, foster emotional stability, and enhance psychological resilience. Research shows that various forms of social support contribute to mental wellness during cancer treatment. For example, positive peer support has been linked to lower psychological distress and improved quality of life among cancer patients [46]. Similarly, Liu et al. [47] found that

social support mediates the impact of stressful life events on depression, suggesting that strengthening social support systems could help mitigate depression across age groups.

In Yemen, where cancer care is challenged by war, poverty, and a fragile healthcare system [48], social support remains a crucial factor in reducing depression among cancer patients. This is evidenced by a negative correlation between depression and social support levels. Consequently, psychosocial interventions are essential, as they can help strengthen social support networks and promote improved mental health outcomes for individuals facing the challenges of cancer.

Study implications

Over 50% of cancer patients in this study were found to suffer from depression, highlighting the urgent need for comprehensive mental health care in oncology settings. Depression in cancer patients is influenced by complex interactions between demographic, clinical, and psychosocial factors, requiring tailored, multi-dimensional approaches to care. Key factors identified in this study—such as age, gender, marital status, education, and financial conditions—along with the critical role of social support, highlight areas for targeted interventions.

In resource-limited settings like Yemen, where healthcare infrastructure is fragile, social support networks play a crucial role in alleviating psychological distress. Interventions might include strengthening community-based support groups, engaging families actively in patient care, and leveraging mobile health technologies to provide

remote psychological support. Integrating mental health assessments, counseling, and peer support within routine oncology care could further meet patients' mental health needs.

Given the ongoing conflict and instability in Yemen, such interventions are especially critical. By equipping healthcare providers with tools for psychological assessment, offering regular counseling, and establishing supportive services, oncology practices can enhance both emotional well-being and overall health outcomes for cancer patients.

Study limitations

Despite its valuable insights, this study's methodology has several limitations. The cross-sectional design does not allow for causal inferences, and focusing on only one Yemeni cancer center limits its generalizability. Selecting patients who come to the hospital voluntarily may produce biased results, whereas excluding those with a history of mental disorders might lead to an underestimation of the prevalence of depression. However, this study had a large sample size, the use of standard tools, and pilot testing. They all make the study more dependable as a whole, although it should be noted that caution is warranted when interpreting the findings owing to these drawbacks.

Conclusion

Depression is a prevalent issue among cancer patients, affecting more than half of the study population. Age, sex, marital status, educational attainment, income level, and disease-related factors contributed to the risk. Some notable risk factors include age > 60 years, female sex, being widowed or divorced, having a lower educational level, and the absence of health insurance coverage. A family history of cancer, a longer duration since diagnosis, and difficulty performing activities of daily living increase the likelihood of depression. Conversely, higher educational status and increased lipid levels have been associated with lower rates of depression. Support from friends and relatives helps mitigate depression, which occurs at a lower rate among people with fewer friends. These findings emphasize the need for integrated care that addresses both physical functioning and psychological well-being among cancer patients. Future research, especially longitudinal studies, is needed to explore how depression evolves throughout cancer treatment and to assess the long-term effects of social support on mental health and quality of life.

Acknowledgements

We would like to thank all patients who participated in this study.

Author contributions

S.A. conceptualized the study, curated data, performed formal analysis, acquired funding, conducted investigations, developed methodology, administered the project, validated findings, and wrote the original draft. A.M.H. conducted formal analysis and interpretation of data and contributed to the writing– review and editing. M.A.Z., H.E.E.-G., E.P., and B.S. contributed to methodology and writing– review and editing. H.I.M. was involved in investigation, methodology, and writing– review and editing. M.H.A. and A.H. contributed to methodology and writing– review and editing. H.A. also contributed to methodology and writing– review and editing. All authors read and approved the final manuscript.

Funding

No source of funding.

Data availability

The data are available at request from the corresponding author.

Declarations

Ethical approval

This study received ethical approval from the Hodeida University Research Ethics Committee (Approval No. 912/2022) and was also approved by the managers of the cancer center. Participants were fully informed about the study's objectives and their voluntary participation. Informed consent was obtained from all participants, with assurances provided regarding the confidentiality of their information and the voluntary nature of their involvement. The study was conducted in accordance with the principles outlined in the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Received: 29 September 2024 / Accepted: 6 March 2025

Published online: 12 March 2025

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