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The psychological health of patients diagnosed with cancer in Iraq during the COVID-19 pandemic: A single center study

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Abstract

Objective: The objective of this study was to assess the psychological health status of patients diagnosed with cancer in Iraq during the COVID-19 pandemic. The study aim was to measure the prevalence of depression, anxiety, and stress among patients diagnosed with cancer. Secondary aims were to assess the association between depression, anxiety, and stress with sociodemographic characteristics, cancer-specific characteristics, patients' experience in healthcare visit, risk perception towards COVID-19, and health concern during the outbreak.

Methods: A cross-sectional study was conducted between September 1, 2020 and December 1, 2020 at an Oncology clinic in Baghdad. Included in the study were two hundred patients diagnosed with cancer. Data collected included: demographic variables (age, gender, residential location, marital status, education, employment status), clinical characteristics and cancer-specific parameters (duration since cancer diagnosis, cancer type, treatment duration, clinic visits frequency), experience during the pandemic (skipping or postponing treatment or periodical tests, suffering from new body pain, fear of acquiring the infection, fear of health deterioration), as well as psychological health status (depression, anxiety, stress). Pain, risk perception towards COVID-19, and health concern were measured using categorical Likert scale with responses being no, sometimes, and often. The psychological health status was measured by the "Depression, Anxiety, and Stress Scale" (DASS-21). Cut-off scores of the DASS-21 greater than 9, 7, and 14 represent a positive screen of depression, anxiety, and stress, respectively.

Results: The prevalence of patients who screened positive for depression was 22.0%, anxiety 22.0%, and stress 13.5%. The prevalence of depression, anxiety and stress were significantly more in those who had university or higher education (34.3%, p-value <0.0001; 32.3%, p-value <0.0001; 19.2%, p-value = 0.02 respectively). Those were four times more likely to have depression and two times more likely to have anxiety than participants who had school education (OR = 4.40 CI [1.98–9.77], p-value <0.0001; OR = 2.55 CI [1.15–5.65], p-value = 0.02, respectively). The prevalence of anxiety was significantly the highest in the age group 16–39 years (40.9%) compared to 22.3% in the age group 40–64 years and 10.3% in the group ≥65 years (p-value = 0.02). Patients ≥65 years of age were less likely to develop anxiety compared to younger patients (OR = 0.44 CI [0.22–0.89],

p-value = 0.02). As for the patients' experience in healthcare visit, 66 patients (33.0%) skipped or postponed their treatment or tests due to the outbreak. Around (8%) sometimes suffered from new body pain. Those who sometimes suffered from new body pain had significantly more depression than patients who did not suffer new pain or often had new pain (50.0% vs. 15.0% vs. 28.1% respectively, p-value = 0.002). Those were two times more likely to be depressed (OR = 2.18 CI [1.29–3.68], p-value = 0.003). Around (50%) of the patients were often afraid that their health would deteriorate during the outbreak. Those were significantly more depressed (31.7%, p-value = 0.002), anxious (30.7%, p-value <0.0001) and stressed (21.8%, p-value = 0.002) than those who did not have fear of losing their health and were two times more likely to have anxiety and stress.

Conclusion: These findings, especially the association between developing new pain and depression, raised concerns regarding the psychological health in patients diagnosed with cancer during COVID-19 pandemic. It is crucial to implement psychological health screening for patients diagnosed with cancer during the pandemic to help prevent any psychological health problems. The DASS-21 could be used as a screening tool for distress in these patients.

KEYWORDS
anxiety, cancer, chemotherapy, COVID-19, depression, Iraq, pandemic, psycho-oncology, psychological health, stress

1 | INTRODUCTION

Since its inception in December 2019, the novel coronavirus disease (COVID-19) is spreading rapidly both locally and internationally.[1,2] In only a span of a month, the disease caused by the virus was announced a public health emergency by the World Health Organization (WHO) and was declared a pandemic by March 2020.[3,4] The escalating global morbidity and mortality of COVID-19 has raised significant public health concerns.[5] Between September and November 2020, reported COVID-19 cases across Iraq continued to rise with a regular average of 2,500 daily reported cases. The number of individuals who have contracted the virus as of 5 December 2020 were 564,200 cases, with a number of deaths that has reached to a total of 12,432.[6]

In terms of emotions and cognition, the uncertainty of COVID-19 affected people psychologically and mentally. People were worried about getting sick, how long the pandemic would last, and what the future would bring.[7,8] According to the Centers for Disease Control and Prevention (CDC), some groups; in particular, patients diagnosed with cancer, may be more vulnerable to the psychological and mental effects of coronavirus, and they may react more strongly to the stress of this crisis.[9,10]

Patients diagnosed with cancer and survivors had a lot to deal with before the COVID-19 pandemic began. Under usual circumstances, they are prone to psychological consequences associated with their condition.[11] Their diagnosis and treatment are major stressors that contribute to serious health problems such as loss of appetite and insomnia, as well as psychological problems, such as anxiety and depression.[12–14] They often feel worried about their future, the influence of their treatment on their lives, the side effects of their treatment, new body pain that they may feel, and the fear that their cancer will return or get worse.[15–17] Indeed, cancer-related distress and intense unpleasant emotions that interfere with functioning have been listed as common negative consequences of their diagnosis.[18] Compared with general populations, patients diagnosed with cancer are at a higher risk of psychological and mental health problems.[19]

Now, the stress of their weakened immune system, the increased risk of exposure to the virus and the risk of the infectious respiratory disease,[20,21] the uncertainty about the duration of the pandemic, and the fear of postponing their treatments cause additional anxiety for them. During this pandemic, they are finding it difficult to cope with their cancer condition.[22–24] In addition to their preexisting psychological burden, the challenges are great for them in the specific context of COVID-19, especially because cancer has a considerable share (20%) in COVID-19 mortality rate.[25] In addition, previous studies have shown the possible effects of COVID-19-related anxiety on decision-making processes such as postponement of surgical procedures and chemotherapy.[26] Patients with cancer are more susceptible to the COVID-19 pandemic due to immunosuppression induced by both their illness and the treatments they have undergone. This causes them fear and anxiety, and as a result, it can influence their treatment decisions.[27] Some patients postpone their follow-up appointments, chemotherapy treatments, or scheduled procedures and surgeries because they believe hospitals pose a risk of disease transmission.[27,28] Moreover, it has been reported that having a higher frequency of worrying about

cancer management due to COVID-19, having a higher frequency feeling of overwhelming psychological pressure from COVID-19, and having a higher level of fatigue and pain were the predominant risk factors for mental health problems in cancer patients.[29]

In light of the above, we hypothesized that patients diagnosed with cancer are at risk of not just having adverse physical outcomes from COVID-19 pandemic, but they are also vulnerable to psychological problems such as depression, anxiety, and stress. The objective of this study was to assess the psychological health status of patients diagnosed with cancer in Iraq during the COVID-19 pandemic. The study aim was to measure the prevalence of depression, anxiety, and stress among patients diagnosed with cancer. The secondary aims were the association between depression, anxiety, and stress with sociodemographic characteristics, cancer-specific characteristics, and patients' experience in healthcare visit, risk perception towards COVID-19, and health concern during the outbreak.

2 | METHODOLOGY

2.1 | Study design and participants

A cross-sectional study was conducted between 1 September 2020 and 1 December 2020 at an Oncology clinic in Baghdad to assess the psychological health of patients diagnosed with cancer visiting the clinic during the COVID-19 pandemic. Two hundred participants were included in the study. These were patients already diagnosed with cancer and are following up their treatment or are performing check-up visits at the clinic during the period of COVID-19 pandemic. The clinic is located in Baghdad. It treats patients with solid malignancies coming from all over Iraq. The clinic is connected to a laboratory and imaging center offering advanced computerized tomography (CT) scan, magnetic resonance imaging (MRI), and positron emission tomography (PET) scan.

2.2 | Inclusion/exclusion criteria

Included in the study were all patients already diagnosed with cancer and are receiving their treatment or are performing check-up visits at the clinic during the data collection period between 1 September 2020 and 1 December 2020.

Excluded from the study were patients with known mental health problems or those who were being treated with psychotropic medications. Also excluded were patients diagnosed with advanced or metastatic cancer.

2.3 | Data collection

Participants completed the survey during their visit to the clinic. A questionnaire was used to collect the data. A nurse informed the patients about the study and explained to them details about it. An informed consent was presented to them where the nurse read it and explained it to them. The nurse then handed the patients the questionnaire where they self-reported their replies to the questions. Data collected included demographic variables such as age, gender, residential location, marital status, education, and employment status. Data pertaining to loosing appetite and sleeping problems defined as lack of sleep, insomnia, or irregular sleep during the pandemic were collected. Data about the patients' clinical characteristics and cancer-specific parameters such as duration since cancer diagnosis, cancer type, duration of treatment, and frequency of clinic visits were recorded. Data regarding patients' experience in healthcare visit, risk perception towards COVID-19, and health concern during the pandemic were also recorded. These consisted of skipping or postponing treatment or periodical tests due to COVID-19 pandemic, suffering from new body pain, fear of acquiring the infection or spreading it to relatives, and fear of health deterioration during the outbreak. Pain, risk perception towards COVID-19, and health concern were measured using categorical Likert scale with responses being no, sometimes, and often. Furthermore, their psychological health status (depression, anxiety, and stress) during the pandemic was recorded. The latter was measured using a validated scale: the "Depression, Anxiety, and Stress Scale (DASS-21)". The scale has been demonstrated to be a reliable and valid measure for assessing mental health status in patients and general population though it was not validated in Iraq.[30] The Internal Consistency Reliability (Cronbach's Coefficient α) of the DASS-21 was 0.91 for depression, 0.80 for anxiety and 0.84 for stress.[31] It represents a psychometrically viable tool when assessing distress in patients diagnosed with cancer. Items on the depression scale assess symptoms of dysphoric mood while those on the anxiety scale measure symptoms pertaining to physiological hyperarousal, and items on the stress scale evaluate negative affectivity.[32] The score for each item ranges from zero (did not apply to me at all) to three (applied to me very much or most of the time).

The total depression subscale score was divided into normal (0–9), mild depression (10–13), moderate depression (14–20), severe depression (21–27), and extremely severe depression (28–42). The total anxiety subscale score was divided into normal (0–7), mild anxiety (8–9), moderate anxiety (10–14), severe anxiety (15–19), and extremely severe anxiety (20–42). The total stress subscale score was divided into normal (0–14), mild stress (15–18), moderate stress (19–25), severe stress (26–33), and extremely severe stress (34–42).[30]

2.4 | Ethical considerations

The study was approved by the Institutional Review Board of Iraqi health authorities under the number (14082020OR). Written informed consent was obtained from all participants.

2.5 | Statistical analysis

The Statistical Package for Social Sciences (SPSS version 24) was used for data management and analyses. Bivariate analyses were conducted using the Chi square test or Fisher's exact test (as appropriate) for categorical variables (comparing depression, anxiety and stress with respect to demographics, loss of appetite, sleeping problems clinical characteristics, cancer-specific parameters, experience in healthcare visit, risk perception towards COVID-19, and health concern) while student's t-test or one-way analysis of variance (ANOVA) were used for continuous variables (depression, anxiety and stress scores). Categorical variables were presented as number and percent whereas continuous variables were presented as mean and standard deviation. Furthermore, multivariate logistic regression was carried out to identify the predictors of depression, anxiety, and stress. Results were presented as odds ratios (OR) with 95% confidence intervals (CI). p-value <0.05 indicated statistical significance.

3 | RESULTS

A total of 200 patients were included in the present study of which (69.5%) were in the age group between 40 and 64 years. The percentage of females was (91.5%). The majority of patients resided in Baghdad (83.0%), were married (79.5%), and unemployed (63.5%). Most of the patients had breast cancer (71.0%) while 6.5% had colon cancer (Table 1).

Using the pre-defined cut-off scores for the DASS-21 to measure depression (score>9), anxiety (score>7) and stress (score>14), the prevalence of patients who screened positive for depression was 22.0%, anxiety 22.0%, and stress 13.5%. As a comorbidity, 29 (14.5%) of the participants had both depression and anxiety. The overall mean scores were 5.36 ± 7.99, 4.32 ± 6.35, and 7.19 ± 8.5 for depression, anxiety, and stress respectively. Of the 44 patients who had depression, 16 (36.4%) had moderate depression, 7 (15.9%) had severe depression, and 7 (15.9%) had extremely severe depression. Of the 44 patients who had anxiety, 19 (43.2%) showed moderate anxiety, 5 (11.4%) had severe anxiety, and 9 (20.4%) had extremely severe anxiety. Of the 27 patients who had stress, 6 (22.2%) had moderate stress, 8 (29.6%) had severe stress and 4 (14.8%) had extremely severe stress (Figure S1).

Regarding the association between patients' demographic characteristics and psychological distress, using the Chi square test, the prevalence of depression was significantly the highest in the age group 16-39 years (36.4%) compared to (23.0%) in the age group 40-64 years and (10.3%) in the group ≥65 years (OR = 0.46 CI [0.24–0.87]) (p-value = 0.02) (Table 2).

Similarly, the prevalence of anxiety was significantly the highest in the age group 16-39 years (40.9%) compared to 22.3% in the age group 40-64 years and 10.3% in the group ≥65 years (OR = 0.41 CI [0.21–0.79]) (p-value = 0.02). Using one-way ANOVA, the mean depression, anxiety and stress scores were significantly higher in the age group 16–39 years compared to the other age groups (p-value = 0.001 for depression and anxiety scores, p-value = 0.003 for anxiety score) (Table 2). Using the student's t-test, the mean age for

TABLE 1 Patients' socio-demographic characteristics

Characteristics Total sample number		Number (percent) 200
Age (years)	16–39	22 (11.0%)
	40–64	139 (69.5%)
	≥65	39 (19.5%)
Gender	Male	17 (8.5%)
	Female	183 (91.5%)
Residency governorate	Baghdad	166 (83.0%)
	Others	34 (17.0%)
Marital status	Single/divorced/widowed	41 (20.5%)
	Married	159 (79.5%)
Education level	School	101 (50.5%)
	University and high education	99 (49.5%)
Employment status	Employed	73 (36.5%)
	Unemployed	127 (63.5%)
Cancer type	Breast cancer	142 (71.0%)
	Colon cancer	13 (6.5%)
	Others	45 (22.5%)

TABLE 2 Association between demographic characteristics and the psychological impact of the COVID-19 outbreak

Variable		Depression						Anxiety						Stress					
		No	Yes	p-value	OR [95% CI]	Score	p-value	No	Yes	p-value	OR [95% CI]	Score	p-value	No	Yes	p-value	OR [95% CI]	Score	p-value
Age (years)	16–9 (n = 22)	14 (63.6%)	8 (36.4%)	0.02[a]	0.46 [0.24– 0.87]	10.36 ± 11.83	0.001[a]	13 (59.1%)	9 (40.9%)	0.02[a]	0.41 [0.21– 0.79]	8.64 ± 10.35	0.001[a]	17 (77.3%)	5 (22.7%)	0.26	0.53 [0.25– 1.14]	12.09 ± 10.65	0.003[a]
	40–64 (n = 139)	107 (77.0%)	32 (23.0%)			5.31 ± 7.39		108 (77.7%)	31 (22.3%)			4.19 ± 5.83		120 (86.3%)	19 (13.7%)			7.21 ± 8.41	
	≥65 (n = 39)	35 (89.7%)	4 (10.3%)			2.72 ± 6.13		35 (89.7%)	4 (10.3%)			2.36 ± 3.72		36 (92.3%)	3 (7.7%)			4.36 ± 6.05	
Gender	Male (n = 17)	13 (76.5%)	4 (23.5%)	1.00	0.91 [0.28– 2.94]	5.12 ± 6.29	0.92	13 (76.5%)	4 (23.5%)	1.00	0.91 [0.28– 2.94]	4.00 ± 5.43	0.83	15 (88.2%)	2 (11.8%)	1.00	1.19 [0.26– 5.51]	7.29 ± 7.99	0.96
	Female (n = 183)	143 (78.1%)	40 (21.9%)			5.38 ± 8.15		143 (78.1%)	40 (21.9%)			4.35 ± 6.45		158 (86.3%)	25 (13.7%)			7.18 ± 8.57	
Residency governorate	Baghdad (n = 166)	126 (75.9%)	40 (24.1%)	0.11	0.42 [0.14– 1.27]	5.53 ± 8.23	0.51	128 (77.1%)	38 (22.9%)	0.50	0.72 [0.28– 1.87]	4.43 ± 6.58	0.58	143 (86.1%)	23 (13.9%)	1.00	0.83 [0.27– 2.57]	7.21 ± 8.74	0.96
	Others (n = 34)	30 (88.2%)	4 (11.8%)			4.53 ± 6.77		29 (82.4%)	6 (17.6%)			3.76 ± 5.16		30 (88.2%)	4 (11.8%)			7.12 ± 7.39	
Marital status	Single/ divorced/ widowed (n = 41)	28 (68.3%)	13 (31.7%)	0.09	0.52 [0.24– 1.12]	8.05 ± 10.41	0.06	30 (73.2%)	11 (26.8%)	0.40	0.71 [0.32– 1.57]	5.46 ± 8.64	0.20	33 (80.5%)	8 (19.5%)	0.21	0.56 [0.23– 1.39]	9.56 ± 10.76	0.10
	Married (n = 159)	128 (80.5%)	31 (19.5%)			4.67 ± 7.13		126 (79.2%)	33 (20.8%)			4.03 ± 5.62		140 (88.1%)	19 (11.9%)			6.58 ± 7.74	

Note: The results are of univariate analysis.

Abbreviation: OR, odds ratio.

[a]Indicates statistical significance.

depression was 49.45 ± 11.78 years (p-value = 0.005), while that for anxiety 49.93 ± 12.67 years (p-value = 0.01), and for stress 49.63 ± 12.29 years (p-value = 0.05).

Regarding the professional characteristics, the prevalence of depression, anxiety and stress were significantly more in those who had university or higher education (34.3%, OR = 4.76 CI [2.20–10.32], p-value <0.0001; 32.3%, OR = 3.54 CI [1.70–7.39], p-value <0.0001; 19.2%, OR = 2.76 CI [1.15–6.65], p-value = 0.02 respectively). Anxiety prevalence and score were significantly higher in the employed compared to the unemployed (31.5% vs. 16.5% respectively, p-value = 0.01; 5.56 ± 7.54 vs. 3.61 ± 5.47, p-value = 0.04). Moreover, 20 patients (10.0%) lost appetite during the outbreak of which (45.0%) had depression and (50.0%) had anxiety. The prevalence of depression was significantly higher in patients with appetite loss compared to those without appetite loss (45.0% vs. 19.4%, p-value = 0.02). The rate of anxiety was also higher in patients with appetite loss in comparison to those without appetite loss (5.0% vs. 18.9%, p-value 0.003). Patients who had sleeping problems experienced more depression than those who slept regularly (48.1% vs. 17.9% respectively, OR = 4.25 CI [1.82–9.94], p-value <0.0001). Similarly, those who had sleeping problems were more anxious than those who did not experience sleeping problems (51.9% vs. 17.3% respectively, OR = 5.13 CI [2.19–12.03], p-value <0.0001) (Table 3).

Regarding cancer characteristics, most of the patients 131 (65.5%) were diagnosed more than 12 months ago and the majority had breast cancer (70.5%). Around (67%) were taking treatment for more than 12 months and (75%) visited the clinic every two months. There was no statistically significant association between these characteristics and the development of psychological problems (Table S1).

As for the patients' experience in healthcare visit, 66 patients (33.0%) skipped or postponed their treatment or tests due to the outbreak. Around (8%) of the patients sometimes suffered from new body pain during the outbreak. Those who sometimes suffered from new body pain had significantly more depression than patients who did not suffer new pain or often had new pain (50.0% vs. 15.0% vs. 28.1% respectively, OR = 2.33 CI [1.41–3.86], p-value = 0.002) (Table S2).

A total of 108 patients (54.0%) often expressed fear of acquiring COVID-19. Those had significantly more depression (31.5%, OR = 1.79 CI [1.05–3.04], p-value = 0.03) and anxiety (31.5%, OR = 2.42 CI [1.40–4.20], p-value = 0.002) compared to those who were not afraid or were sometimes afraid. Likewise, 115 patients (57.5%) often had fear of acquiring COVID-19 and spreading it to their relatives. Of those, (33.9%) had depression, (33.0%) had anxiety, and (21.7%) had stress. Around (50%) of the patients were often afraid that their health would deteriorate during the outbreak. Those were significantly more depressed (31.7%, OR = 2.37 CI [1.33-4.23], p-value = 0.002), anxious (30.7%, OR = 33.11 CI [1.70–5.70], p-value <0.0001) and stressed (21.8%, OR = 2.32 CI [1.17–4.61], p-value = 0.002) than those who did not have fear of losing their health (Table S3).

The results of multivariate logistic regression which included all the variables in the univariate analysis showed that patients with university or higher education were four times more likely to have depression than those who had school education (OR = 4.40 CI [1.98–9.77], p-value <0.0001). Those who lost appetite were three times (OR = 3.28 CI [1.17–9.23], p-value = 0.02) more likely to have depression while those who and suffered from new body pain were two times more likely to be depressed (OR = 2.18 CI [1.29–3.68], p-value = 0.003). On the other hand, patients ≥65 years of age were less likely to develop anxiety compared to younger patients (OR = 0.44 CI [0.22–0.89], p-value = 0.02). Patients with higher education level and those who had fear of health deterioration during the outbreak were two times more likely to have anxiety while those who had sleeping problems were four times more likely to experience anxiety. Regarding stress, fear of health deterioration was a significant factor for developing stress (OR = 2.32 CI [1.17–4.61], p-value = 0.02) (Table 4).

4 | DISCUSSION

Patients diagnosed with cancer undergoing active treatment have the highest level of concern of getting infected by COVID-19.[33] Furthermore, patients diagnosed with cancer are considered a higher risk-group and have specific recommendations against COVID-19. All of this causes psychological depression, anxiety, and stress among them.[34–36] In this cross-sectional study, we assessed the psychological health status (depression, anxiety, and stress) of patients diagnosed with cancer in Iraq during the COVID-19 pandemic. Moreover, we assessed the association between depression, anxiety, and stress with sociodemographic characteristics, cancer-specific characteristics, patients' experience in healthcare visit, risk perception towards COVID-19, and health concern during the outbreak.

We found that the prevalence of depression was 22.0%, anxiety 22.0% while that of stress was 13.5%. Similarly, in a recently published study of patients diagnosed with cancer in China during the COVID-19 pandemic, patients reported adverse psychiatric symptoms with the highest percentages accounted for depression (23.4%), anxiety (17.7%), and post-traumatic stress disorder (9.3%).[29] In another study carried out by Kennedy et al. who evaluated the psychological impact of COVID-19 pandemic on patients diagnosed with cancer, their caregivers, and health care workers in Singapore, it was reported that the prevalence of anxiety level among patients diagnosed with cancer was (19.1%).[33] In another study which was a systematic review and meta-analysis, Hongping et al. reported that among patients diagnosed with cancer during the COVID-19 pandemic, the pooled prevalence of anxiety was 52.94% in 9 studies, and the pooled prevalence of depression was 43.25% in 6 studies.[37] Our study reported much lower prevalence results compared to that reported by Hongping et al. This may be interpreted by the fact that the results of Hongping et al. show a high level of heterogeneity, which means that the prevalence of anxiety and depression is quite different in the included studies. Heterogeneity

TABLE 3 Association between professional, appetite & sleeping parameters and the psychological impact of the COVID–19 outbreak

Variable		Depression						Anxiety						Stress					
		No	Yes	p-value	OR [95% CI]	Score	p-value	No	Yes	p-value	OR [95% CI]	Score	p-value	No	Yes	p-value	OR [95% CI]	Score	p-value
Education level	School (n = 101)	91 (90.1%)	10 (9.9%)	<0.0001[a]	4.76 [2.20–10.32]	2.83 ± 5.29	<0.0001[a]	89 (88.1%)	12 (11.9%)	<0.0001[a]	3.54 [1.70–7.39]	2.77 ± 4.36	<0.0001[a]	93 (92.1%)	8 (7.9%)	0.02[a]	2.76 [1.15–6.65]	4.63 ± 6.94	<0.0001[a]
	University/ Higher education (n = 99)	65 (65.7%)	34 (34.3%)			7.94 ± 9.38		67 (67.7%)	32 (32.3%)			5.90 ± 7.59		80 (80.8%)	19 (19.2%)			9.80 ± 9.17	
Employment status	Employed (n = 73)	53 (72.6%)	20 (27.4%)	0.16	0.62 [0.31–1.22]	6.77 ± 9.20	0.06	50 (68.5%)	23 (31.5%)	0.01[a]	0.43 [0.22–0.85]	5.56 ± 7.54	0.04[a]	62 (84.9%)	11 (15.1%)	0.62	0.81 [0.36–1.86]	8.47 ± 9.09	0.11
	Unemployed (n = 127)	103 (81.1%)	24 (18.9%)			4.55 ± 7.13		106 (83.5%)	21 (16.5%)			3.61 ± 5.47		111 (87.4%)	16 (12.6%)			6.46 ± 8.10	
Lost appetite during outbreak	No (n = 180)	145 (80.6%)	35 (19.4%)	0.02[a]	3.39 [1.30–8.81]	5.10 ± 8.03	0.17	146 (81.1%)	34 (18.9%)	0.003[a]	4.29 [1.66–11.13]	3.89 ± 6.16	0.004[a]	155 (86.1%)	25 (13.9%)	1.00	0.69 [0.15–3.15]	6.99 ± 8.64	0.32
	Yes (n = 20)	11 (55.0%)	9 (45.0%)			7.70 ± 7.44		10 (50.0%)	10 (50.0%)			8.20 ± 6.93		18 (90.0%)	2 (10.0%)			9.00 ± 7.09	
Sleeping problems during outbreak	No (n = 173)	142 (82.1%)	31 (17.9%)	<0.0001[a]	4.25 [1.82–9.94]	4.64 ± 7.52	0.001[a]	143 (82.7%)	30 (17.3%)	<0.0001[a]	5.13 [2.19–12.03]	3.66 ± 5.84	0.005[a]	153 (88.4%)	20 (11.6%)	0.06	2.68 [1.01–7.13]	6.59 ± 8.19	0.01[a]
	Yes (n = 27)	14 (51.9%)	13 (48.1%)			10.00 ± 9.45		13 (48.1%)	14 (51.9%)			8.52 ± 7.90		20 (74.1%)	7 (25.9%)			11.04 ± 9.61	

Note: The results are of univariate analysis.

Abbreviation: OR, odds ratio.

[a]Indicates statistical significance.

TABLE 4 Multivariate logistic regression for depression, anxiety, and stress

	Variable	Odds ratio (OR)	95% confidence interval	p–value
Depression	Age	0.46	0.18–1.06	0.05
	Gender	1.20	0.30–4.79	0.80
	Residency governorate	0.45	0.12–1.68	0.24
	Marital status	0.61	0.24–1.59	0.31
	Education level	4.40	1.98–9.77	<0.0001[a]
	Employment status	1.31	0.57–3.05	0.53
	Lost appetite during outbreak	3.28	1.17–9.23	0.02[a]
	Sleeping problems during outbreak	2.29	0.57–9.18	0.24
	Duration since cancer diagnosis	2.01	0.24–16.72	0.52
	Cancer type	0.70	0.42–1.17	0.18
	Duration of treatment	0.75	0.09–6.38	0.80
	Fear of acquiring COVID–19	0.55	0.17–1.78	0.32
	Fear of acquiring COVID–19 and spreading it to relatives	1.50	0.43–5.27	0.52
	Fear of health deterioration during outbreak	1.75	0.72–4.28	0.22
	Suffering from new body pain	2.18	1.29–3.68	0.003[a]
	Skipped or postponed treatment or tests due to outbreak	1.17	0.49–2.78	0.73
	Frequency of visiting clinic	0.56	0.24–1.31	0.18
Anxiety	Age	0.44	0.22–0.89	0.02[a]
	Gender	1.30	0.32–5.30	0.72
	Residency governorate	1.09	0.34–3.49	0.89
	Marital status	0.66	0.24–1.78	0.41
	Education level	2.55	1.15–5.65	0.02[a]
	Employment status	0.66	0.29–1.53	0.33
	Lost appetite during outbreak	3.31	0.79–13.80	0.10
	Sleeping problems during outbreak	4.31	1.71–10.84	0.002[a]
	Duration since cancer diagnosis	0.67	0.18–2.57	0.56
	Cancer type	0.96	0.60–1.55	0.86
	Duration of treatment	2.59	0.60–11.23	0.20
	Fear of acquiring COVID–19	0.81	0.27–2.44	0.71
	Fear of acquiring COVID–19 and spreading it to relatives	1.79	0.54–5.87	0.34
	Fear of health deterioration during outbreak	2.30	1.20–4.42	0.01[a]
	Suffering from new body pain	1.36	0.69–2.69	0.37
	Skipped or postponed treatment or tests due to outbreak	0.65	0.26–1.62	0.36
	Frequency of visiting clinic	0.96	0.42–2.21	0.92
Stress	Age	0.58	0.25–1.37	0.21
	Gender	2.72	0.44–16.68	0.28
	Residency governorate	0.81	0.22–2.96	0.75
	Marital status	0.56	0.19–1.65	0.29
	Education level	2.06	0.69–6.09	0.19
	Employment status	1.26	0.47–3.35	0.65
	Lost appetite during outbreak	0.12	0.02–1.04	0.05

TABLE 4 (Continued)

Variable	Odds ratio (OR)	95% confidence interval	p–value
Sleeping problems during outbreak	7.42	0.69–33.20	0.05
Duration since cancer diagnosis	1.92	0.22–16.81	0.56
Cancer type	0.98	0.70–1.70	0.95
Duration of treatment	0.33	0.04–2.91	0.32
Fear of acquiring COVID–19	0.38	0.07–2.06	0.26
Fear of acquiring COVID–19 and spreading it to relatives	2.79	0.49–15.91	0.25
Fear of health deterioration during outbreak	2.32	1.17–4.61	0.02[a]
Suffering from new body pain	0.61	0.27–1.37	0.23
Skipped or postponed treatment or tests due to outbreak	1.28	0.47–3.46	0.63
Frequency of visiting clinic	1.06	0.39–2.90	0.91

[a]Indicates statistical significance.

between studies may be due to differences in many factors such as the severity of cancer, cancer treatment status, the prevalence of COVID-19 in different countries or regions, or how patients diagnosed with cancer are treated in different regions. Compared to previous studies about the psychological health of patients diagnosed with cancer before COVID-19, Song and Li et al. found that the prevalence of depression, anxiety and post-traumatic stress disorder (PTSD) was 13%, 10.2%, and 1.4%, respectively, among 2279 patients diagnosed with cancer from nine medical centers in China.[38] Moreover, meta-analyses of 15 studies found that the estimated prevalence of depression among patients diagnosed with cancer prior to COVID-19 varied across treatment settings (5%–16% in outpatients, 4%–14% in inpatients, 4 to 11% in mixed outpatient and inpatient samples.[39] Regarding anxiety, a systematic review and meta-analysis study found that, anxiety among patients diagnosed with cancer recorded (19%) before COVID-19.[40] Regarding stress, it was reported in the literature that, the estimated prevalence of stress among patients diagnosed with cancer was found to be 6·4% before COVID-19.[41] This further indicates that the current COVID-19 pandemic added an extra burden for patients diagnosed with cancer, increasing their mental health problems.

In our study, we reported that (36.4%) had moderate depression, (15.9%) had severe depression and (15.9%) had extremely severe depression, (43.2%) showed moderate anxiety, (11.4%) had severe anxiety, and (20.4%) had extremely severe anxiety, (22.2%) had moderate stress, (29.6%) had severe stress, and (14.8%) had extremely severe stress. In comparison to that, a study carried out by Letaief-Ksontini et al., reported that the incidence of depression under novel coronavirus pandemic in patients diagnosed with cancer was 29.7%. 18 patients (66.7%) had mild depression, seven patients (25.9%) had moderate depression, and two patients (7.4%) had severe depression. They also reported that the incidence of anxiety was 69.2%. Of those patients with anxiety, 42 patients (66.7%) were experiencing mild anxiety, 12 patients (19%) had moderate anxiety,

and 9 patients (14.3%) had severe anxiety.[42] These results in our study and in other studies provided evidence of high rates of depression, anxiety, and stress among patients diagnosed with cancer during the COVID-19 pandemic. If left untreated, these problems in patients diagnosed with cancer can lead to destructive consequences including decreased treatment adherence, decreased survival rate, and poor quality of life.[11,12,43]

Our multivariate analysis showed that the significant factors for developing depression were higher education, loss of appetite, and suffering new body pain. Regarding anxiety, we found that the significant factors for developing anxiety were younger age, higher education, sleeping problems, and fear of health deterioration. As for stress, our multivariate analysis showed that the significant factor for developing stress was fear of health deterioration.

We found loss of appetite was a significant factor for developing depression. In a study carried out by Ammar et al., they reported that loss of appetite and mood swings have become quite common during COVID-19 pandemic, especially lockdown periods.[44] The association between loss of appetite and psychological distress among patients diagnosed with cancer have been already reported in many studies.[13,14,45] This can be explained by the fact that depression-related appetite loss is associated with hypoactivation of insular regions that support monitoring the body's physiological state. Importantly, the interactions among these regions also contribute to individual differences in the depression-related appetite changes.[46]

In our study, we reported that around 8% of the patients sometimes suffered from new body pain during the outbreak. Those had significantly more depression than patients who did not suffer new pain or often had new pain (50% vs. 15% vs. 28.1% respectively, p-value = 0.002). Similarly Wang et al. reported that body pain was a predominant risk factor for mental health problems in patients diagnosed with cancer during COVID-19 pandemic.[29] These finding suggest that during the pandemic, stressors like new body pain in patients diagnosed with cancer contribute to more depression than in

patients who did not suffer new pain or often had new pain. This may be interpreted by the fact that new pain meant deterioration of the health status and thus meant the need for hospitalization or doctor follow-up and clinic visit, and during the pandemic this was not always accessible and it created a burden to the patient due to the fear of getting infected if they had to visit the medical clinics or to be hospitalized.[47] On the contrary, in a study carried out by Letaief-Ksontini et al. they found no significant relationship between depression and suffering from body pain.[42]

In our study, the prevalence of anxiety (40.9%, *p*-value = 0.02) was significantly the highest in the age group 16–39 years. This association of anxiety with younger age can be explained by the fact that younger age patients diagnosed with cancer are more emotionally sensitive to a diagnosis of cancer than that in older groups.[48] Moreover, younger individuals experience intense social stressors but lack the necessary coping mechanisms, whereas people acquire increased wisdom as they age.[49] Another interpretation can be that younger patients diagnosed with cancer have higher rates of anxiety because they are socially more active and they go daily to work therefore this adds to their anxiety and fear of getting infected.[50] Our results were opposite to what was reported by Wang el al. where lower levels of anxiety were significantly associated with younger age.[29] On the other side, Santini et al. reported that the older population of patients diagnosed with cancer was significantly associated with greater risk of depression and anxiety during COVID-19 pandemic.[51] Similarly, Yildirim et al. reported that depression and anxiety levels were higher in elderly patients.[52] This may be related to the information that the elderly population is at a much higher risk of COVID-19 infection, in addition to the age-related precautions and warnings by the government which causes this group to be in an anxious and depressed mood.[53]

In our study, those who had sleeping problems experienced more anxiety than those who slept regularly. Similarly, Wang et al. reported that those who had good sleep quality were associated with lower risk of anxiety.[29] This can be explained by the fact that sleep disturbances were always regarded as associated with depression and anxiety.[54] Moreover, recently there has been a great deal of evidence suggesting that sleep disturbances precede depression.[55–57]

Regarding the professional characteristics, we found that higher education was a significant factor for developing depression and anxiety This can be interpreted by the fact that those with higher education have more knowledge of the higher risk of serious complications if infected by COVID-19 virus and the underlying fear of how the potential healthcare-capacity issues will interfere with the optimal treatment of their disease.[58] Highly educated individuals may be more anxious and stressed about adhering to COVID-19 safety recommendations than those with low levels of education.[59] On the contrary, Patni et al. reported that graduates and postgraduates were able to deal with the pandemic in a better way thereby resulting in lower incidence of anxiety and depression.[60] Knowledge and education level can influence perception of COVID-19, thus affecting one's psychological status.[61]

Moreover, we found that fear of health deterioration was a significant factor for developing anxiety and stress. Singer et al. reported a significant association between distress and fear of worsening of cancer symptoms and health deterioration in patients diagnosed with cancer during COVID-19 pandemic.[62] This is due to the fact that patients diagnosed with cancer experience fear due to the significant number of stressors related to the COVID-19 pandemic, which are associated with increased psychological symptoms like anxiety and depression.[63]

4.1 | Study limitations

This study can be evaluated in light of its strengths and limitations. To our knowledge, this is one of the first studies conducted in Baghdad to investigate the prevalence of depression, anxiety, and stress on patients diagnosed with cancer during the COVID-19 outbreak. On the other hand, the current study had several limitations. First, the causality in variables cannot be established due to the nature of cross-sectional design. For an in-depth understanding of the effects of mental health issues in patients diagnosed with cancer during the COVID-19 pandemic, future longitudinal studies are needed. Second, psychological problems among patients diagnosed with cancer during this pandemic were assessed using self-reported questionnaires. In follow-up studies, we suggested the use of psychiatric interviews administered by psychiatrists to provide more information on the significant factors of mental health issues. Third, the study participants were predominantly females and breast cancer patients. This makes it less possible to generalize the outcomes to other populations. Finally, patients diagnosed with cancer having serious mental health problems may avoid attending clinics for cancer treatment; thus, it is possible that we may have underestimated the prevalence of mental health problems in those patients during this pandemic.

4.2 | Clinical implications

This is one of the first screening studies carried out in Baghdad to evaluate the psychological health problems and associated factors among patients with various types of cancer during COVID-19 pandemic. The findings of this study, show that the groups of patients that are in higher risk for developing psychological distress are those who had university or higher education, those in the age group 16–39 years, those who have appetite loss, those suffering from new body pain, those with sleeping problems, and those having fear of health deterioration. It is crucial to implement systematic psychological health screening for all patients after cancer diagnosis. The DASS-21 could be used as a screening tool for distress in these patients. During a pandemic outbreak, psychological health care attention and resources should be placed as a priority for patients diagnosed with cancer in order to help them to cope and prevent the decline of their psychological health status.

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CONFLICT OF INTEREST

There are no actual or potential competing interests to disclose in relation to this article.

ETHICS STATEMENT

The study was approved by the Institutional Review Board of Iraqi health authorities under the number (14082020OR). Written informed consent was obtained from all participants.

AUTHOR CONTRIBUTION

All the authors contributed equally to this paper.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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