The Mental Health Status of Inpatients with Newly Diagnosed Hematological Cancer during the COVID-19 Pandemic: A Comparison Study

COVID-19 Pandemisinde Yeni Tanı Konulan Hematolojik Kanserli Yatan Hatanların Ruhsal Durumu: Bir Karşılaştırma Çalışması

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ABSTRACT

Objective: This study is intended to evaluate the mental health statuses of hematological cancer (HC) inpatients diagnosed during the COVID-19 pandemic compared to the statuses of patients diagnosed with HC before the pandemic.

Methods: A cross-sectional survey collected the mental health measurements of 77 inpatients with HC between March and May 2021 in Ankara, Turkey. The levels of depression, generalized anxiety, distress, sleep disorder, health anxiety, trait anxiety, corona phobia, and resilience in HC patients newly diagnosed during the pandemic (n=38) and before the pandemic (n=39) were compared. We then explored the relationships between predictive factors and cancer patients' mental health statuses.

Results: Compared to HC patients diagnosed before the pandemic, depression (63.2% vs. 35.9%, *p*=0.017) and sleep disorder (67.8% vs. 38.5, *p*=0.016) were significantly higher, while comparison, generalized anxiety (57.9% vs. 38.5%, *p*=0.088) and distress (60.5% vs. 38.5%, p=0.053) were higher in a non-significant trend in patients newly diagnosed with HC during the pandemic. In contrast, health anxiety was more common in patients diagnosed before the pandemic (53.8% vs. 31.6%, *p*=0.048). Among the newly diagnosed patients, women had more generalized anxiety symptoms than men (76.5% vs. 42.9%, *p*=0.037). Being newly diagnosed increased the risk of more severe symptoms of depression (odds ratio [OR]: 3.178, *p*=0.036) and sleep disorders (OR: 4.73, *p*=0.018) but lowered the risk of health anxiety (OR: 0.14, *p*=0.003).

Conclusion: Our data indicate that patients with HC are vulnerable to mental health problems during the COVID-19 pandemic. This vulnerability is higher in newly diagnosed HC patients than in patients diagnosed before the pandemic.

Keywords: hematological malignancy, psychological impact, SARS-CoV-2, pandemic, depression, resilience

ÖZET

Amaç: Bu çalışma, COVID-19 pandemisi sırasında tanı alan hematolojik kanser (HK) hastalarının ruhsal durumlarının, pandemi öncesinde HK tanısı alan hastalarla karşılaştırılmasını amaçlamıştır.

Yöntem: Yetmiş yedi hematolojik kanser tanısıyla yatarak tedavi gören hastanın ruhsal durumları, Mart-Mayıs 2021 döneminde kesitsel bir yöntemle değerlendirilmiştir. Pandemide yeni tanı HK tanısı konulmuş 38 hasta ile pandemiden önce HK tanısı konulmuş 39 hastanın depresyon, yaygın kaygı, distres, uyku bozuklukları, sağlık kaygısı, sürekli kaygı, koronofobi ve dayanıklılık düzeyleri karşılaştırılmıştır.

Bulgular: Yeni tanı konulmuş HK hastalarında, pandemi öncesi HK tanı konulmuş hastalara göre depresyon (%63.2'ye karşı %35.9, p=0.017) ve uyku bozuklukları (%67.8'e karşı %38.5, p=0.016) anlamlı oranda daha fazla iken, yaygın kaygı (%57.9'ye karşı %38.5, p=0.088) ve distres (%60.5'e karşı %38.5, p=0.053) anlamlı olmayan fakat anlamlı olmaya meyilli oranda daha yüksekti. Aksine, sağlık kaygısı pandemi öncesi HK tanısı konulmuş hastalarda anlamlı oranda daha sıktı (%53.8'e karşı %31.6, p=0.048). Yeni tanı konulmuş HK hastalarından kadınlarda erkeklere oranla daha fazla yaygın kaygı belirtileri mevcuttu (%76.5'e karşı %42.9, p=0.037). Yeni HK tanısı almış olanlarda, daha şiddetli depresyon (Odds Oranı [OO]: 3.178, p=0.036) ve uyku bozukluğu (OO: 4.73, p=0.018) riski bulunurken, daha düşük sağlık kaygısı riski (OO: 0.14, p=0.003) olduğu belirlenmiştir.

Sonuç: Bulgularımız, HK tanısı almış bireylerin COVID-19 pandemisi boyunca ruh sağlığı problemlerine daha yatkın olduğunu göstermektedir. Bu yatkınlığın HK tanısı yeni konulmuş bireylerde daha fazla olduğu söylenebilir.

Anahtar Sözcükler: hematolojik kanser, ruhsal etkilenme, SARS-CoV-2, pandemi, depresyon, dayanıklılık

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INTRODUCTION

COVID-19, an infection caused by the SARS-CoV-2 virus, was first detected in China in December 2019. This fast-spreading and potentially fatal infection seriously threatened public health and caused radical changes in healthcare systems worldwide. It has been reported that there is a significant increase in the risk of morbidity and mortality due to COVID-19 infection in patients with cancer (1). Among patients with cancer, it has been shown that advanced age and the presence of hematological cancer (HC) are associated with the increased severity of COVID-19 infection (2). During the COVID-19 pandemic, it has been noticed that there has been a decrease in hospital visits, reduced length of hospital stays, disruptions in treatment processes, and increased fear of death in patients with cancer (3-5). Furthermore, the initiation of immunosuppressive therapy in patients with newly diagnosed cancer has sometimes been avoided or postponed due to pandemic conditions (6).

For most patients, the period of cancer diagnosis and subsequent treatment is a most stressful situation that is often accompanied by psychological issues. It is known that the prevalence of mental disorders is higher in patients diagnosed with cancer than in healthy individuals for many reasons, such as pain, suffering, or death coming to mind with a cancer diagnosis, uncertainties about disease progression and recurrences, and symptoms related to cancer itself or its treatments (7, 8). In addition to these predisposing factors, the presence of the COVID-19 pandemic has led to an increase in the prevalence of mental disorders in hematological cancer patients (4).

It has been stated that the COVID-19 pandemic has caused a high incidence of mental disorders, even in the general population (9). Considering that patients with hematological cancer are more likely to experience psychological distress, studies conducted during the pandemic have confirmed that mental disorders are common in hematological cancer patients. Indeed, in the studies conducted on hematological cancer patients during the COVID-19 pandemic, it was found that 33-42% of patients were affected by depression, 25-36% by anxiety, and 43-49% by distress (3, 4, 10).

It has been determined that there is limited literature on the mental health of newly diagnosed hematological cancer patients. Therefore, in this study, we aimed to evaluate the mental health status of inpatients with newly diagnosed hematological cancer who initiated chemotherapy during the COVID-19 pandemic by comparing them with patients diagnosed with hematological cancer before the pandemic. To address this gap, using well-validated screening tools, we estimated and compared the prevalence of depression, generalized anxiety, sleep disorders, and health anxiety in hematological cancer patients newly diagnosed during the pandemic and patients diagnosed before the pandemic. We also analyzed the association between clinical, sociodemographic, and biochemical factors with psychological symptoms. Then, we explored the relationship between cancer patients' mental health status and predictive factors.

METHODS

Study design and sampling

We conducted a cross-sectional survey of inpatients with hematological cancer between 15 March 2021 and 1 May 2021, when a curfew was imposed in Turkey due to the COVID-19 pandemic. Consecutive inpatients diagnosed with leukemia, lymphoma, and multiple myeloma at the Ankara City Hospital in Ankara, Turkey, were enrolled in the study. Inclusion criteria were: ≥18 years of age, receiving chemotherapy or immunotherapy, no history of psychiatric disorders, no diagnosis of dementia, and having signed their informed consent to participate in the study. Ineligible patients included those who were non-Turkish speaking or illiterate. Patients were divided into two groups: those diagnosed with hematological cancer before the COVID-19 pandemic (before March 2020, hereafter referred to as patients with pre-existing hematological cancer) and those newly diagnosed during the pandemic (from March 2020 to May 2021). In addition, the newly diagnosed patients were undergoing their first hospitalization for chemotherapy. In addition, patients who had been hospitalized for at least 14 days in order not to be diagnosed with a short-term transient mental disorder were included in the study.

Data were collected with questionnaires containing questions about sociodemographic and cancer-related information and the history of the disease. The survey took approximately 20-25 minutes to complete. The study method was compliant with the STROBE checklist. The flow model diagram of the recruitment process is shown in Figure. The study was conducted according to the Declaration of Helsinki and approved by the Ethics Committee of Ankara City Hospital on 24.02.2021 (decision number E2-21-176).
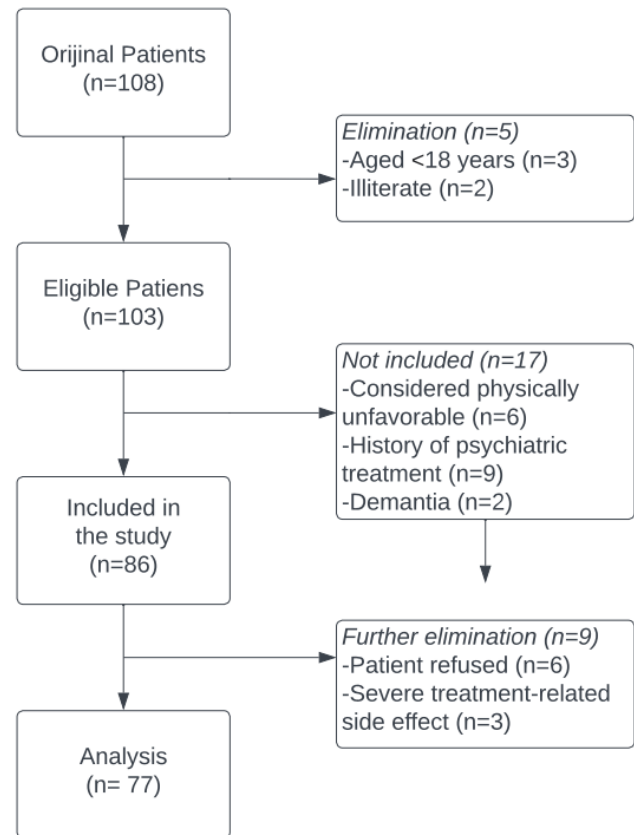

Figure 1. Patients flow diagram

Measurement tools and outcomes

The 20-item questionnaire consisted of questions regarding potentially influential factors, including demographic (age, gender, marital status, occupation, education level, average income in the year), clinical information (cancer type, time since cancer diagnosis, treatment for hematologic cancer, blood test results on day of hospitalization, number of treatment days, total number of hospitalization). The respondents were also asked whether they had a past or current mental disorder, a chronic disease, or a COVID-19 infection.

We focused on depression and anxiety symptoms, insomnia, health anxiety, trait anxiety, coronaphobia, and resilience for all participants, using the Turkish version of validated measurement tools (11-15). The Hospital Anxiety Depression Scale (HADS), the Short Health Anxiety Inventory (SHAI; 18 items), the Pittsburgh Sleep Quality Index (PSQI), the State-Trait Anxiety Inventory-Trait version (STAI-T), the COVID-19 Phobia Scale (C19P-SE), and the Brief Resilience Scale (BRS) were used to assess the mental status of participants.

The HADS is a well-validated scale to assess generalized anxiety and depression symptoms for use in medically ill populations (16). It consists of two separate scales, with seven items for each scale. HADS has been used frequently in patients with hematologic cancer (17). The total score for anxiety and depressive symptoms ranges from 0 to 21, and the current study used a cut-off score of 7 for each scale (18).

The Short Health Anxiety Inventory is a reliable and valid assessment tool for assessing health anxiety (19). The use of SHAI was suggested by a variety of medical populations (20). Its short version of the scale, SHAI, comprises 18 items highly correlated with the full scale. The scoring of the SHAI is between 0 and 3 for each item (a score of 0-54), and a high score indicates a high level of health anxiety. A score of 18 and above was defined as a health anxiety disorder (21).

The PSQI is a reliable tool quickly applied to evaluate sleep disorders among cancer patients (22). It is a 19-item self-rating questionnaire, and scored 0-21.

Higher scores indicate poorer sleep quality. Therefore, tool developers determined that a score above five is generally considered a sleep disorder (22).

The STAI-T is a self-report rating scale that quantifies trait anxiety (23). STAI-T measures an individual's tendency to experience anxiety, that is, to determine more stable, long-term anxiety (24). STAI-T consists of 20 items, each a four-point Likert type, and total scores range from 20 (low anxiety) to 80 (high anxiety). There is no cut-off score for this scale.

The C19P-S is developed and validated to assess the levels of coronaphobia (25). It is a self-reported questionnaire consisting of 20 items, each a five-point Likert type and four subscales (psychological, psychosomatic, economic, and social). The total score ranges from 20 to 100 points, and a higher score indicates a higher level of coronaphobia. There is no cut-off score for this scale.

The BRS is a self-report rating scale that assesses psychological resilience (26). The BRS focuses on the ability to recover from stress and adversity. It consists of six items, and responses are scored on a 5-point Likert scale from strongly disagree (1 point) to strongly agree (5 points). There is no cut-off score for this scale; the higher the BRS score, the more resilient the respondent is.

On the first day of hospitalization, routine blood tests, such as white blood cell (WBC), hemoglobin (Hb), neutrophil (N), lymphocyte (L), platelet (P) counts, erythrocytes sedimentation rate (ESR), C-reactive protein (CRP) and procalcitonin (PCT), were recorded. In addition, the systemic immune-inflammation index (SII), neutrophil-to-lymphocyte ratio (NLR), and platelet-to-lymphocyte ratio (PLR) were calculated. SII was calculated as platelet count × neutrophil count /lymphocyte count, NLR was obtained by dividing the absolute neutrophil count by the absolute lymphocyte count, and PLR was calculated as the ratio of absolute platelet count to absolute lymphocyte count.

 Statistics

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) 25.0. Descriptive statistics were calculated for all demographic and clinical data, including means with standard deviation (SD), median with ranges for all continuous data, and proportions for discrete and nominal data. The distribution of variables was analyzed by Kolmogorov-Smirnov and Shapiro-Wilk tests. Differences in sociodemographic and clinical characteristics between the two groups (diagnosed before the pandemic vs. newly diagnosed during the pandemic) were also compared with a chi-square, student t-test, or Mann-Whitney test, where appropriate. Spearman correlation analysis was conducted to assess the relationship between mental health symptoms.

We used Cohen's *d,* Cramer's *V, and* Pearson's *r* to measure effect sizes. The significance level was set at α = 0.05, and all tests were 2-tailed.

Binary logistic regression analysis was performed to determine potential risk factors for mental health symptoms. The association between each risk factor and the outcome was presented as an odds ratio (OR) and 95% confidence intervals (CI).

RESULTS

Demographic and clinical characteristics of the participants

Seventy-seven inpatients were enrolled at the Ankara City Hospital Hematology Unit in Ankara. Of the 77 participants, 38 (49.4%) were newly diagnosed with hematological cancer during the COVID-19 pandemic, and 39 (50.6%) had been diagnosed before the pandemic. Among those newly diagnosed with HC during the pandemic, the mean age was 53.35 years (SD=15.69); 21 (55.3%) were men, and 17 (44.7%) were women. The distribution of those in the newly diagnosed group was as follows: leukemia 18 (47.4%), lymphoma 13 (34.2%), and multiple myeloma 7 (18.4%). Most of the newly diagnosed patients were aged ≥65 (n=11, [28.9%]), married (n=29, [76.3%]), educated at elementary school (n=21, [55.3%]), not working (n=17, [44.7%]), and did not have a chronic disease other than hematological cancer (n=26, [68.4%]). Among those diagnosed with HC before the pandemic, the mean age was 56.03 years (SD=15.29); 26 (66.7%) were men, and 13 (33.3%) were women. The distribution of those diagnosed before the pandemic group was as follows: leukemia was 24 (61.5%), lymphoma was 9 (23.2%), and multiple myeloma was 6 (15.4%). Most of this group patients were aged ≥65 (n=14, [35.9%]), married (n=33, [84.6%]), educated at elementary school (n=23, [59%]), retired (n=18, [46.2%]), and did not have a chronic disease other than hematological cancer (n=20, [51.3%]).

There were no significant differences between the two groups in terms of demographic and clinical variables, except for disease duration (p = 0.002) and the number of hospitalizations (p < 0.001). Moreover, it was found that there were no differences between groups in terms of those infected with COVID-19 (18.4% vs. 21.1%, p=0.817). Compared to patients diagnosed before the pandemic, the only significant difference in newly diagnosed patients was that they had higher CRP levels (p = 0.017) in all blood tests. Detailed demographic, clinical, and biochemical characteristics data are presented in Table 1.

Table 1. Sociodemographic, clinical and biochemical characteristics of patients

Characteristics	Newly-diagnosed HC (n=38)	Pre-existing HC [a] (n=39)	P value[b]
Age, mean (SD)	53.34 (16.17) Range= 18-87	56.03 (15.29) Range= 22-83	0.457
Age groups, n (%)			
<45	10 (26.3)	8 (20.5)	
45-54	10 (26.3)	8 (20.5)	
55-64	7 (21.1)	9 (23.1)	
≥65	11 (28.9)	14 (35.9)	
Gender, n (%)			0.305
Men	21 (55.3)	26 (66.7)	
Women	17 (44.7)	13 (33.3)	
Education, n (%)			0.157
Uneducated	-	2 (5.1)	
Elementary school	21 (55.3)	23 (59)	
Collage	13 (34.2)	6 (15.4)	
Undergraduate or higher	4 (10.5)	8 (20.5)	
Marital Status, n (%)			0.358
Married	29 (76.3)	33 (84.6)	
Unmarried[c]	9 (23.7)	6 (15.4)	
Working Status, n (%)			0.185
Working	10 (26.3)	5 (12.8)	
Not working	17 (44.7)	16 (41.0)	
Retired	11 (28.9)	18 (46.2)	
Personal income			0.842
< 5,000 TL	29 (76.3)	29 (74.4)	
≥5000 TL	9 (23.7)	10 (25.6)	
Diagnosis, n (%)			0.439
Leukemia	18 (47.4)	24 (61.5)	
Lymphoma	13 (34.2)	9 (23.1)	
Multiple Myeloma	7 (18.4)	6 (15.4)	
Disease duration[d], mean (SD)	1.29 (0.61)	36.28 (65.35)	**0.002**
Treatment, n (%)			
Chemotherapy	23 (60.5)	31 (79.5)	0.069
Steroid	13 (34.2)	14 (35.9)	0.945
Number of hospitalization, median (IQR)	1 (1-1)	3 (3-5)	**<0.001**
Having a chronic disease			
Yes	12 (31.6)	19 (48.7)	0.165
No	26 (68.4)	20 (51.3)	
COVID-19 cases, n (%)			
Yes	7 (18,4)	8 (21.1)	0.817
No	31 (81.6)	31 (78.9)	
Blood Tests			
CRP, mg/L, median (IQR)	26.0 (10.0-78.0)	10.0 (6.0-27.5)	**0.017**
ESR, mm/h, median (IQR)	46.5 (22.0-80.0)	31.0 (15.0-52.0)	0.095
PCT, ng/ml, median (IQR)	0.095 (0.053-0.17)	0.09 (0.04-0.19)	0.650
SII, median (IQR)	296 (22.8-1438)	441 (30.7-926.6)	0.874
NLR, median (IQR)	2.8 (0.8-6.1)	3.1 (1.1-8.1)	0.542
PLR, median (IQR)	123.3 (25.0-326.8)	172.1 (37.4-396.6)	0.498

All significant *P values* are in bold./[a] Pre-existing HC = Diagnosed with HC before the pandemic, [b] t-test and Mann-Whitney test for continuous variables and the chi-squared test for categorical variables, [c] unmarried category included single, widowed, and divorced participants, [d] months
Abbreviations: HC: Hematological cancer CRP, C-reactive protein; ESR, erythrocytes sedimentation rate; PCT, procalcitonin; SII, systematic immune-inflammation index; NLR, neutrophil-lymphocyte ratio; PLR, platelet-lymphocyte ratio.

Mental health outcomes

Overall, 49.4%, 48.1%, 51.9%, and 42.8% of all the patients reported depression, generalized anxiety, sleep disorder, and health anxiety, respectively.

According to HADS scores, the mean HADS-Total (HADS-T) score was 16.16 (SD = 7.23) in patients with newly diagnosed HC and 12.44 (SD = 7.49) in patients with pre-existing HC (p = 0.031, Cohen's d = 0.50). There was a non-significant trend for newly diagnosed patients to have higher rates of generalized anxiety and distress (generalized anxiety: %57.9 vs. 38.5%, p = 0.088, Cramer's V = 0.91; distress: 60.5% vs. 38.5%, p= 0.053, Cramer's V = 0.22). Among newly diagnosed patients, women had more generalized anxiety symptoms than men (76.5% vs. 42.9%, p = 0.037, Cramer's V = 0.34).

The newly diagnosed patients indicated a higher prevalence of depression (63.2% vs. 35.9%, p = 0.019, Cohen's d = 0.55) than patients with pre-existing HC.

Patients with pre-existing diagnoses had significantly higher levels of health anxiety (SHAI) compared to the newly diagnosed (53.8% vs. 31.6%, p = 0.048, Cramer's V = 0.23). In addition, a considerable proportion of the newly diagnosed patients had sleep disorders (67.8%), and there was a significant difference between groups (p = 0.016, Cramer's V = 0.27). However, there were no significant differences between groups in terms of trait anxiety (p=0.093), coronaphobia (p=0.180), and resilience (p=0.096). Comparisons of patients with newly diagnosed and pre-existing HC in terms of mental health outcomes are presented in Table 2.

Table 2. Comparison of the groups in terms of mental health outcomes

Variables	Newly-diagnosed HC (n=38)	Pre-existing HC (n=39)	Total (n=77)	P value[a]
HADS-T				
Mean, (SD)	16.16 (7.23)	12.44 (7.49)	14.27 (7.55)	**0.031**
Distress (≥14), no (%)	23 (60.5)	15 (38.5)	38 (49.4)	0.053
HADS-A				
Mean, (SD)	7.58 (4.75)	6.08 (3.92)	6.82 (4.38)	0.134
Anxiety (≥7), no (%)	22 (57.9)	15 (38.5)	37 (48.1)	0.088
HADS-D				
Mean, (SD)	8.58 (4.18)	6.28 (4.25)	7.42 (4.35)	**0.019**
Depression (≥7), no (%)	24 (63.2)	14 (35.9)	38 (49.4)	**0.017**
SHAI				
Mean, (SD)	16.87 (7.83)	17.97 (9.29)	17.43 (8.56)	0.574
Health anxiety (≥18), no (%)	12 (31.6)	21 (53.8)	33 (42.8)	**0.048**
PSQI				
Median, (IQR)	7.0 (4.75-10.25)	5.0 (3.0-9.0)	6.0 (4.0-10.0)	0.150
Sleep disorder (≥5), no (%)	25 (67.8)	15 (38.5)	40 (51.9)	**0.016**
STAI-T				
Mean, (SD)	45.35 (9.98)	41.62 (9.24)	43.45 (9.73)	0.093
C19P-S				
Mean, (SD)	47.05 (17.02)	42.36 (13.25)	44.68 (15.31)	0.180
BRS				
Mean, (SD)	18.84 (4.16)	20.51 (4.51)	19.69 (4.40)	0.096

All significant *P values* are in bold. [a] t-test or Mann-Whitney test for continuous variables and the chi-squared test for categorical variables
Abbreviations: HADS-T, Hospital Anxiety and Depression Scale-Total score; HADS-A, Hospital Anxiety and Depression Scale-Anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale- Depression subscale; SHAI, Short Health Anxiety Inventory; PSQI, Pittsburg Sleep Quality Index; STAI-T, State-Trait Anxiety Inventory-Trait; C19P-S, COVID-19 Phobia Scale; BRS, Brief Resilience Scale.

Mental health outcomes were significantly correlated with each other, except for coronaphobia. For instance, patient anxiety symptoms were significantly related to high depressive symptoms (p = <0.001, Pearson's r = 0.610), health anxiety (p = <0.001, Pearson's r = 0.544), sleep problems (p = <0.001, Pearson's r = 0.474), trait anxiety (p = <0.001, Pearson's r = 0.608), coronaphobia (p = 0.019, Pearson's r = 0.268), and low resilience (p = <0.001, Pearson's r = -0.489).

High levels of depressive symptoms were significantly associated with health anxiety (p = <0.001, Pearson's r = 0.535), trait anxiety (p = <0.001, Pearson's r = 0.597), sleep problems (p = <0.001, Pearson's r = 0.440), and low resilience (p = <0.001, Pearson's r = -0.489). The relationships between mental health outcomes are presented in Table 3.

Table 3. Spearmans's correlation coefficients for mental health variables

Variables	HADS-T	HADS-A	HADS-D	SHAI	PSQI	STAI-T	C19P-S	BRS
HADS-T	1.000	.892**	.902**	.602**	.513**	.671**	.244*	-.549**
HADS-A	.892**	1.000	.610**	.544**	.474**	.608**	.268*	-.495**
HADS-D	.902**	.610**	1.000	.535**	.440**	.597**	.188	-.489**
SHAI	.602**	.544**	.535**	1.000	.554**	.464**	.110	-.486**
PSQI	.513**	.474**	.440**	.554**	1.000	.528**	.168	-.565**
STAI-T	.671**	.608**	.597**	.464**	.528**	1.000	.365**	-.537**
C19P-SE	.244*	.268*	.188	.110	.134	.365**	1.000	-.181
BRS	-.549**	-.495**	-.489**	-.486**	-.565**	-.537**	-.181	1.000

* p<0.05, **p<0.01 (2-tailed)
Abbreviations: HADS-T, Hospital Anxiety and Depression Scale-Total score; HADS-A, Hospital Anxiety and Depression Scale-Anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale- Depression subscale; SHAI, Short Health Anxiety Inventory; PSQI, Pittsburg Sleep Quality Index; STAI-T, State-Trait Anxiety Inventory-Trait; C19P-S, COVID-19 Phobia Scale; BRS, Brief Resilience Scale.

The logistic regression analysis of this study indicated that being a newly diagnosed HC increased the risk of more severe symptoms of depression (odds ratio [OR], 3.18; 95% CI 1.08-9.40, p= 0.036) and sleep disorders (OR, 4.73; 95% CI, 1.30-17.22, p=0.018), but decreased the risk of health anxiety (OR, 0.14; 95% CI, 0.04-0.50, p=0.003).

In addition, patients with more trait anxiety were at risk for more severe sleep disorders (OR, 1.12; 95% CI, 1.04-1.20, p=0.003) and health anxiety (OR, 1.08; 95% CI, 1.01-1.16, p=0.025). It was also found that increasing age and lower resilience score are associated with a higher risk of depression (OR, 1.04; 95% CI, 1.01-1.09, p=0.017; OR, 0.81; 95% CI, 0.71-0.93, p=0.003, respectively). All logistic regression results are presented in Table 4 in detail.

Table 4. Risk factors for depression, sleep disorders, and health anxiety by logistic regression analyses.

Model No	Variable	β	OR	95% CI	*P* value
	Depression (HADS-D)				
	Diagnosis				
Model 1	Pre-existing HC		1	Reference	
	Newly-diagnosed with HC	1.105	3.02	1.03 - 8.84	**.044**
	Resilience (BRS)	-0.207	0.81	0.71 - 0.93	**.003**
	Age	0.048	1.05	1.01 - 1.09	**.017**
	Health Anxiety (SHAI)				
	Diagnosis				
Model 2	Pre-existing HC		1	Reference	
	Newly-diagnosed with HC	-2.001	0.14	0.04 - 0.50	**.003**
	Presence of sleep disorder[a]	1.492	4.45	1.19 - 16.65	**.027**
	Trait Anxiety (STAI-T)	0.078	1.08	1.01-1.16	**.025**
	Sleep Disorder (PSQI)				
	Diagnosis				
Model 3	Pre-existing HC		1	Reference	
	Newly-diagnosed with HC	1.555	4.73	1.30- 17.22	**.018**
	Presence of health anxiety[b]	1.488	4.43	1.17 - 16.74	**.028**
	Trait Anxiety (STAI-T)	0.109	1.12	1.04 - 1.20	**.003**

[a]Presence of sleep disorder [No=reference]; [b] Presence of health anxiety [No=reference]
Abbreviations: HADS-D, Hospital Anxiety and Depression Scale- Depression subscale; SHAI, Short Health Anxiety Inventory; PSQI, Pittsburg Sleep Quality Index; STAI-T, State-Trait Anxiety Inventory-Trait; BRS, Brief Resilience Scale.

DISCUSSION

This study was carried out between March and May 2021, when the COVID-19 pandemic disrupted the healthcare system in Turkey, and mortality rates were observed to peak due to COVID-19 infection. The results showed that hematological cancer patients were significantly affected mentally during the pandemic. During this period, when the number of hospitalizations decreased, except for those due to COVID-19 infection, the hospitalization of cancer patients for chemotherapy continued as much as possible. However, the fear of contracting COVID-19 disease in the hospital or while traveling to the hospital may have caused difficulties in the regular follow-up and treatment of these patients. As a result, this difficult period of the pandemic is thought to have predisposed those with hematological cancer diagnoses to mental symptoms. In our study, depression, generalized anxiety, insomnia, and health anxiety were found in approximately half of all HC patients. Compared to the rates presented in studies conducted with hematological cancer patients pre-pandemic, these rates seem to be significantly higher (27-29).

To our knowledge, this is the first study in Turkey to compare the mental health status of patients newly diagnosed with hematological cancer during the COVID-19 pandemic and those diagnosed before the pandemic. Among newly diagnosed patients, depression (63.2% vs. 35.9%) and sleep disorders (67.8% vs. 38.5%) were significantly higher. The non-significant trend for generalized anxiety (57.9% vs. 38.5%) and distress (52.6% vs. 33.3%) was also defined in newly diagnosed patients compared to those diagnosed before the pandemic. In contrast, health anxiety was more common in those diagnosed before the pandemic (53.8% vs. 31.6%). In addition, newly diagnosed female patients were more prone to anxiety disorders than newly diagnosed male patients, which is consistent with the literature (17). Moreover, all mental health outcomes, except for coronaphobia, were found to correlate with each other.

We observed that being newly diagnosed with hematological cancer during the pandemic was associated with a greater risk of depression. It was determined that newly diagnosed patients had a risk of depression three times greater than that of those patients with pre-existing hematological cancer. Previous studies have reported that patients with newly diagnosed hematological cancer were depressed at a rate of one-fifth to one-third in the early period (30). In our study, the rate of depression was found to be 63% higher in inpatients newly diagnosed and receiving their first chemotherapy. Depression rates were 31% in outpatients with lymphoma during the pandemic (10). One of the reasons for the high rates of depression in our study may be social isolation due to the presence of a curfew at the time of the study; there is a known risk factor for depression (31). Another reason may be the higher risk of COVID-19 transmission in the hospital and the stress created by the threat of encountering a situation that will interrupt the treatment, such as abrupt discontinuation of chemotherapy, delay of treatment, or reduction of treatment intensity due to contracting COVID-19.

As expected, the results indicated that higher resilience levels were significantly associated with lower levels of depression. Resilience may have a substantial protective effect on depression and is a positive resource for coping with depression in cancer patients (32, 33). In previous studies, cancer patients who reported lower resilience suffered from depression (34-36). Resilience may also have helped patients with fewer of the pandemic's adverse psychological effects (37). Moreover, age was associated with depressive symptoms; we found that the risk of depression increased with age.

Similarly, other studies have shown that old age is associated with depression in hematological cancer patients (38). However, some studies have shown a relationship between youth and depression (39).

Elderly patients may be more prone to depression than younger and middle-aged patients due to factors such as having more chronic diseases, needing the care of relatives, decreased social support, reduced mobility and having experienced more negative life events (39, 40).

Like depression, sleep disorders were associated with new diagnoses of hematological cancer during the pandemic. Newly diagnosed patients had a five times higher risk of sleep disorders than patients diagnosed before the pandemic. Similar to our results, a pre-pandemic study by Castelli et al. (2022) found that 74.1% of newly diagnosed hematological cancer had sleep disorders (41). Being diagnosed with a new hematological cancer is one of the most stressful events a person can endure. Facing a new hematological cancer diagnosis, uncertainty about its treatment and prognosis, and being hospitalized in an inexperienced clinic may have triggered sleep disorders in these patients (41, 42). Our study also showed that a high level of health anxiety was one of the factors leading to sleep disorders. In a survey conducted during the pandemic, fear of COVID-19 was a strong predictor of health anxiety (43), and this fear may trigger sleep disturbances. Consistent with the literature, it has been determined that high-trait anxiety is one of the main factors affecting sleep quality negatively (44, 45). Hematological cancer patients with high trait anxiety levels perceive their condition as frightening, which may cause them to experience more anxiety (46).

Among those newly diagnosed with hematological cancer, women had significantly higher anxiety levels than men. Regardless of the time since diagnosis, it is known that women with hematological cancer have a higher rate of anxiety symptoms than men (27, 47). Similar to our study, Bergerot et al. 's study (2015) showed that the anxiety rate was 59% in women and 40% in men in the early period of cancer treatment (17). Men may find their experiences less threatening in the early period (48).

Rates of health anxiety are higher among those diagnosed before the pandemic than those newly diagnosed during the pandemic (53.8% vs. 31.6%). In addition, they were being diagnosed before the pandemic was also found to be a risk factor for health anxiety. Studies on health anxiety in patients with hematological cancer are very few in the literature, and health anxiety was mainly investigated in solid cancer patients (49). The higher rates of health anxiety diagnosed before the pandemic may be having to be more hospitalized, struggling with drug side effects for a more extended period, having a long experience of pain, and worrying about future disease recurrence, progress, or mortality. We also identified two variables associated with increased health anxiety: trait anxiety and sleep disorders. Trait anxiety is strongly associated with somatic symptoms and significantly affects a person's self-evaluation of health and well-being (50). As we mentioned before, there is a strong relationship between sleep disorders and health anxiety in hematological cancer patients – we found that sleep disorders increase the risk of health anxiety by about 4.5 times.

This study has several limitations. First of all, all patients were from a single institution, and the relatively small sample size may restrict the generalization of our findings. Second, the study did not include a longitudinal follow-up, which we argue is necessary as cancer patients' mental health symptoms may change during the pandemic. Therefore, follow-up studies are needed. Third, self-reported mental health symptoms were assessed using screening tools, which do not constitute a clinical diagnosis of a mental disorder. However, the screening tools were very validated. Hence, these results must be interpreted with caution.

Despite these limitations, our study has several strengths. First, patients who had never been diagnosed or treated for a mental disorder were included in the study. Thus, the effect of a pandemic and having a new hematological cancer diagnosis on the patient's mental status could be better determined. Similarly, patients hospitalized for at least 14 days in order not to be diagnosed with temporary mental symptoms were included in the study. Comparing the mental symptoms of those newly diagnosed with hematological cancer during the pandemic and those diagnosed before it allowed us to understand which patients experienced more mental symptoms during the COVID-19 pandemic and the factors affecting it. Consequently, the limited literature on the mental states of newly diagnosed hematological cancer patients during the pandemic may make the current findings meaningful.

CONCLUSION

Our data indicate that patients with hematological cancer are vulnerable to mental health problems during the COVID-19 pandemic. It can be said that this vulnerability is higher in newly diagnosed hematological cancer patients than in those diagnosed before the pandemic. The findings are notable because depressive symptoms during hematological cancer diagnosis are associated with shorter survival (30). Therefore, it is essential to awareness among cancer care clinicians about mental symptoms and regularly monitor the mental well-being of hematologic cancer patients. Perhaps, the presence of mental symptoms in newly diagnosed hematological cancer patients should be accepted as a parameter that affects the response to cancer treatment, and appropriate psychosocial and biological interventions should be applied to these patients. Our findings may help develop interventions that reduce the vulnerability to adverse psychological effects by identifying risk factors for hematologic cancer patients under pandemic conditions.

Conflict of interest
The authors declared no conflict of interest.

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