

Original Article

The Effect of Fatigue on Anxiety, Depression, and Sleep Quality in Patients Undergoing Chemotherapy

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Abstract

Background and Aim: Cancer is a health problem that ranks second among the causes of death in the world and has a high mortality and morbidity rate. The most preferred systemic treatment method in cancer is chemotherapy. Chemotherapy has many side effects, depending on the treatment regimen used. Fatigue is one of the most common symptoms that cause many cognitive and physiological conditions in cancer patients. Therefore, aim of this study is to examine how fatigue affects anxiety, depression, and sleep quality of patients undergoing chemotherapy.

Method: The data of this descriptive-cross-sectional study were obtained from 72 cancer patients over the age of 18 who agreed to participate in the study in a research hospital in Izmir between May 2020 and October 2020. 'Patient Information Form', 'Hospital Anxiety and Depression Scale (HADS)', 'FACIT Fatigue Scale', and 'Pittsburgh Sleep Quality Index (PSQI)' were used to collect data.

Results: As a result of the analysis, a statistically significant and positive correlation was found with a correlation coefficient of 0.468 for PSQI and FACIT and Depression subscale. A statistically significant, positive and moderate correlation was found with a correlation coefficient of 0.342 calculated between PSQI and Depression subscale. A statistically significant difference was found with a correlation coefficient of 0.616 calculated between the FACIT scale and the HADS. In the scales applied to the patients, it was determined that there were statistically significant differences only between the chemotherapy type, disease stage, and age from the descriptive characteristics of the patients.

Conclusion and Recommendations: A high level of fatigue affects adversely patients' anxiety, depression and sleep quality. Planning interventions to control the factors that cause fatigue in patients undergoing chemotherapy will prevent them from experiencing other negative symptoms.

Keywords: chemotherapy, fatigue, sleep quality, anxiety, depression

Introduction

Cancer is a life-threatening health problem that ranks second among the causes of death in the world, has a high rate of mortality and morbidity, and causes negative effects on the quality of life of the individual. According to the World Health Organization -

International Agency for Research on Cancer (IARC)'s 2020 world cancer statistics, an estimated 19.3 million new cancer cases and approximately 10.0 million cancer deaths occurred worldwide (WHO 2020). In cancer treatment, single or several treatment methods such as chemotherapy, radiotherapy, surgical treatment and stem

cell transplantation are used individually or together according to the stage, type, and location of the cancer (Hosseinzadeh E 2017). Chemotherapy is the most preferred systemic treatment method. Chemotherapy has many side effects, depending on the treatment regimen used. The most common side effects are fatigue, nausea and vomiting, neutropenia, anaemia, peripheral neuropathy, sleep disturbances, constipation, and diarrhoea. Treatment and its side effects significantly affect the quality of life of patients, as well (Yesilbalkan, 2014, Genc A. 2018). Cancer-related fatigue is defined as a feeling of physical, emotional and/or cognitive fatigue/burnout related to cancer or cancer treatments that are not related to recent activity, disrupt normal functioning and does not heal with adequate rest (Berger AM. 2015). The aetiology of cancer-related fatigue has not yet been fully clarified, but may include various physiological and biochemical systems that may vary according to the type of tumour, stage of the disease, and treatment (Fabi, 2020). Fatigue is a multidimensional condition that negatively affects the general health status, physical activity level and quality of life of the patients and impairs the energy, mental capacity and psychological state of the patients over time (Luctkar-Flude 2007). Long-term symptoms cause patients to experience anxiety and depression in the long term. The studies have reported that the rate of depression in cancer patients is three times higher than that of the general population (Smith, 2015). The studies conducted on cancer patients have reported that the type of cancer, its treatment, and the duration of treatment adversely affect the coping strategies of patients with the disease and cause them to suffer from anxiety and depression disorders (Bag, 2014). Furthermore, depression in patients causes individuals to feel more tired and experience sleep disorders (Ho, 2015). Studies have indicated that nearly half of cancer patients experience sleep disturbances due to factors related to their current diseases, pain, treatment side effects, stress, anxiety, depression, and fatigue (Pazarcikci, 2017). The most important symptoms related to cancer affecting the quality of life are pain, depression, sleep disorders and fatigue. Therefore, nurses should individually assess

the patients and they should apply nursing interventions appropriate for the patient. The aim of this study is to examine the effect of fatigue on anxiety, depression, and sleep quality in patients undergoing chemotherapy.

Method

Design of the Study: This is a descriptive-correlational and cross-sectional study.

Population and Sample: The population of the study consisted of patients who were treated in a medical oncology unit in a research hospital in Izmir between May 2020 and October 2020. The sample consisted of 72 voluntary patients who applied to the medical oncology unit of the same hospital between May 2020 and October 2020, underwent outpatient chemotherapy and agreed to participate in the study. The inclusion criteria were having undergone at least one cycle of chemotherapy with the diagnosis of cancer, being voluntary to participate in the research, being 18 years of age or older, being able to speak and understand Turkish, not having a health problem that prevents communication, and being suitable for interviewing the general situation.

Data Collection Tools and Data

Collection: The data were collected by using face-to-face interview method in a period of about six months. 'Patient Information Form', which was prepared upon the literature review, 'FACIT Fatigue Scale', 'Hospital Anxiety and Depression Scale (HADS)', and 'Pittsburgh Sleep Quality Index' were used to collect data.

Patient Information Form: The patient's information about age, gender, educational background, marital status, social security, educational background, marital status, type of chemotherapy, and disease stage was recorded in the patient information form.

The Functional Assessment of Chronic

Illness Therapy (FACIT): It is a part of the measurement system and was developed to evaluate the quality of life of cancer patients, spirituality and / or belief aspects. If the score from the scale is 30 or less in score calculation of FACIT, it is reported that the perceived fatigue is clinically severe.

Hospital Anxiety and Depression Scale (HADS): The Hospital Anxiety and Depression Scale (HADS) was developed by Zigmond (1983), and its validity and

reliability study was conducted by Aydemir et al., (1997). It contains a total of 14 questions, seven of which measure anxiety and the other seven measure depression

Pittsburgh Sleep Quality Index (PSQI): PSQI was developed by Buysse et al., in 1989 and the validity and reliability study of the scale in Turkey was conducted by Agargun et al.,.

Cronbach's internal consistency coefficient of the scale was determined to be 80. The scale that determines sleep quality consists of 18 self-report questions and evaluates sleep quality in the last 4 weeks.

Data Analysis: The data were analysed in the Statistical Package for Social Science (SPSS) 21.0 program. Number and percentage distributions and appropriate parametric and nonparametric tests were used in the data assessment. The assumption of normality was checked using the Shapiro Wilk test. While the Independent Samples T test was used to compare the means of two independent groups with normal distribution, the Mann Whitney U test was used to compare the means of two independent groups that did not have normal distribution. Post Hoc Bonferroni test was applied to reveal the group or groups that caused the difference. Pearson's correlation was used to measure the correlation between continuous variables that were normally distributed. Spearman's correlation was used to measure the correlation between continuous variables that were not normally distributed.

Ethical Considerations: Ethics committee approval was obtained from the S.B.U Bozyaka Training and Research Hospital for the study (Ethics Committee No: 15345988-799)

Results

Socio-Demographic and Disease-Related Characteristics of the Patients Undergoing Chemotherapy: A 52% of the participants were in the age range of 46-64 years, and more than half of them (63.4%) were female. A great majority of the sample (73.2%) were married. Although the number of primary/secondary school and high school graduates was equal, their rate was 26.8% of the participants. 32% of them described their income status as moderate. 46.5% of the participants had breast cancer, followed by gastrointestinal system cancers and lung

cancer, respectively. A great majority of the patients were at disease stage 2 and duration of the diagnosis was longer than 6 months (Table 1). Statistically significant differences were not found between the anxiety subscale mean scores according to the demographic characteristics of the participants ($p>0.05$). The depression subscale mean score of the group with disease stage 3 from the demographic characteristics was higher than the mean score of the group with disease stage 1. No statistically significant differences were found between the depression subscale mean scores in terms of the other demographic characteristics ($p>0.05$) (Table 2). No statistically significant differences were found between the mean HADS mean scores in terms of the demographic characteristics of the individuals ($p>0.05$). (Table 2) When the FACIT mean scores were compared in terms of the demographic characteristics of the participants, it was found that the mean score of the group of 65 years and over was higher than the mean score of the age group of 46-64 years. When the FACIT mean scores were compared according to the disease stage, it was found that the mean score of the 3rd stage group was higher than the mean score of the 1st stage group. Concerning duration of the diagnosis, the FACIT mean scores of the groups of 6 months-1 year and 1 year and above were higher than the mean score of the group of 1-6 months ($p=.024$ and $p=.014$). No statistically significant differences were found between the FACIT mean scores in terms of the variables of gender, educational background, marital status, social security, income status, type of cancer and type of chemotherapy ($p>0.05$). (Table 3). As a result of examining the differences between the PSQI mean scores according to the demographic characteristics of the participants, it was determined that the mean score of the group of 65 years and over was higher than the mean score of the age group of 46-64 years ($p=0.03$). According to the type of chemotherapy, the mean score of the "Cisplatin + Gemcitabine" group was higher than the mean score of the "Platinum group agents/Paclitaxel-Carboplatin" group ($p=.023$). A statistically significant difference was found between the disease stages in the PSQI mean scores. The mean score of the 3rd stage group was higher than

the mean scores of the 1st stage, 2nd stage, and 4th stage groups ($p=.012$, $p=.044$ and $p=.042$). No statistically significant differences could be found between the mean of PSQI according to gender, educational status, marital status, social security, income status, type of cancer, and duration of the diagnosis ($p>0.05$). (Table 3). When the scores the participants obtained from all three scales were examined, it was determined that the FACIT score ranged between 20-33 points, PSQI scores ranged between 7-16 points, and the HADS scores

ranged between 14-23 points (Table 4). Upon examination of the correlations between the FACIT and the other scales, it was determined that FACIT had a statistically significant, positive and moderate correlation with PSQI and HADS. FACIT had a statistically significant, positive and moderate correlation with anxiety and depression subscales. A statistically significant, positive and moderate correlation was found with a correlation coefficient of 0.307 calculated between PSQI and HADS. (Table 5)

Table 1. Distribution of Patients Undergoing Chemotherapy in Terms of Demographic Characteristics

		n	%
Age	30-45	18	25.4
	46-64	37	52.1
	65 years and over	16	22.5
Gender	Female	45	63.4
	Male	26	36.6
Educational Background	Illiterate	8	11.3
	Literate	7	9.9
	Primary/Secondary School	19	26.8
	High School	19	26.8
Marital status	University	18	25.4
	Married	52	73.2
Social security	Single	19	26.8
	Available	67	94.4
Income status	Non-available	4	5.6
	High	22	31.0
	Low	17	23.9
Type of cancer	Moderate	32	45.1
	Breast cancer	33	46.5
	Gastrointestinal system cancers	15	21.1
	Lung cancer	13	18.3
Type of chemotherapy	Other cancer types	10	14.1
	Oxaliplatin, Calcium folinate, 5- Fluorouracil	4	5.6
	Taxane group agents	3	4.2
	Platinum group agents/Paclitaxel-Carboplatin	11	15.5

Stage of the Disease	Cisplatin or Oxaliplatin	16	22.5
	Cisplatin + gemcitabine	6	8.5
	Doxorubicin, Cyclophosphamide, Paclitaxel	5	7.0
	Other (6-Thiopurines, Vincristine,..)	26	36.6
	Stage 1	15	21.1
Duration of the Diagnosis	Stage 2	33	46.5
	Stage 3	18	25.4
	Stage 4	5	7.0
	1-6 months	20	28.2
	6 months-1 year	27	38.0
	1-2 years	22	31.0
	3 years and longer	2	2.8

Table 2. Total Mean Scores of Anxiety and Depression Subscales and HADS Total Mean Scores of Descriptive Characteristics of Patients Undergoing Chemotherapy

Descriptive Characteristics	n	Mean	Anxiety Subscale			Depression Subscale			Total Score of HADS			
			Standard Deviation	Test Statistics	p	Standard deviation	Test Statistics	p	Standard deviation	Test Statistics	p	
Age	30-45 years	18	9.8333	4.40884	0.078	0.925	3.69419	0.824	0.443	6.7262	0.112	0.894
	46-64 years	37	9.1081	3.49109			3.78316			6.55515		
	65 years and over	16	13.625	3.98278			3.16228			6.80655		
Gender	Female	45	10.7556	4.08595	0.22	0.827	3.94508	0.16	0.874	7.10705	0.215	0.83
	Male	26	9.5385	3.31152			3.05841			5.64433		
Educational background	Illiterate	8	10.25	3.29231	0.16	0.958	3.58569	0.474	0.755	6.26641	0.294	0.881
	Literate	7	10.8571	3.81725			3.78594			7.2045		
	Primary/Secondary School	19	10.2105	5.3421			3.75024			8.23592		
	High school	19	9.6316	3.24172			3.2633			5.79726		
Marital status	University	18	10.9444	2.80348			4.00367			5.71776		
	Married	52	10.8654	3.69338	0.646	0.521	3.44856	0.314	0.755	6.20086	0.546	0.587
Social security	Single	19	8.7895	4.13444			4.15771			7.62652		
	Available	67	10.2836	3.86837	0.267	0.79	3.69452	0.29	0.773	6.70352	0.315	0.754
Income status	Non-available	4	10.75	2.62996			2.38048			4.11299		
	High	22	8.9091	3.61933	0.576	0.565	3.8266	0.35	0.706	6.621	0.27	0.764
	Low	17	9.7647	4.16127			2.80886			5.93222		
Type of cancer	Moderate	32	11.5625	3.76944			3.91801			6.98724		
	Breast cancer	33	11.4545	4.06225	0.692	0.56	4.14921	1.771	0.161	7.33583	1.402	0.25

	Gastrointestinal system cancers	15	8.8667	2.91466			2.74816			4.98378		
	Lung cancer	13	10.6154	3.105			2.78733			5.09147		
	Other cancer types	10	8.3	4.90351			3.35989			7.16163		
Type of chemotherapy	Oxaliplatin, Calcium folinate, 5-Fluorouracil	4	7.75	3.0957	0.758	0.606	1.41421	1.245	0.296	4.11299	1.111	0.366
	Taxane group agents	3	14.6667	7.2111			7.23418			14.36431		
	Platinum group agents/Paclitaxel-Carboplatin	11	8.1818	4.28952			4.20606			7.52934		
	Cisplatin or Oxaliplatin	16	9.875	3.41565			2.72565			5.42179		
	Cisplatin + Gemcitabine	6	16.8333	2.75681			2.31661			4.53505		
	Doxorubicin, Cyclophosphamide, Paclitaxel	5	8.6	3.43511			4.72229			5.71839		
	Other(6-Thiopurines, Vincristine,..)	26	10.1923	3.82381			3.50933			6.42172		
Stage of the disease	Stage 1	15	9	3.48876			4.95407	2.977	.038	7.66439	2.649	0.056
	Stage 2	33	9.8788	3.58342			2.7244			5.57864		
	Stage 3	18	12.9444	4.06202	1.757	0.164	3.34117			6.84397		
	Stage 4	5	7.6	4.30116			3.16228			4.63681		
Duration of the diagnosis	1-6 months	20	9	3.46562	2.25	0.113	4.16091	2.449	0.094	6.47485	2.885	0.063
	6 months -1 year	27	11.0741	4.22885			3.32049			6.82775		
	1 year and longer	24	10.5417	3.32072			3.24121			5.80854		

Table.3. Comparison of PSQI and FACIT Total Mean Scores in Terms of Descriptive Characteristics of Patients Undergoing Chemotherapy

Descriptive Characteristics	PSQI Mean Scores			FACIT Mean Scores					
	n	Mean	Standard Deviation	Test Statistics	p	Mean ± SD	Test Statistics	p	
Age	30-45 years	18	9.8333	4.99706	11.068	.004*	8.85486	3.296	.043*
	46-64 years	37	9.1081	4.43336			8.46358		
	65 years and over i	16	13.625	3.81007			9.67385		
Gender	Female	45	10.7556	5.45292	581	0.962	9.09834	-0.164	0.87
	Male	26	9.5385	3.1652			9.35126		
Educational Background	Illiterate	8	10.25	4.0267	0.369	0.985	7.57816	0.441	0.778
	Literate	7	10.8571	6.17599			6.09449		
	Primary/Secondary School	19	10.2105	4.60168			11.05198		
	High School	19	9.6316	4.27149			10.84527		
Marital status	University	18	10.9444	5.49301			6.59		
	Married	52	10.8654	5.10297	399.5	0.217	7.99856	1.035	0.304
Social Security	Single	19	8.7895	3.29274			11.73489		
	Available	67	10.2836	4.83925	162	0.507	9.32151	-0.195	0.846
Income status	Non- available	4	10.75	3.5			5.56028		
	High	22	8.9091	4.34148	4.165	0.125	10.57482	0.178	0.837
	Low	17	9.7647	3.81657			9.36436		
Type of cancer	Moderate	32	11.5625	5.25441			8.12974		
	Breast cancer	33	11.4545	5.34492	2.701	0.44	9.67316	0.38	0.768
	Gastrointestinal system cancers	15	8.8667	3.90726			8.78147		
	Lung cancer	13	10.6154	4.97558			8.6395		
Type of chemotherapy	Other cancer types	10	8.3	2.16282			9.2111		
	Oxaliplatin, Calcium folinate, 5-Fluorouracil	4	7.75	1.89297			6.733	1.049	0.402
	Taxane group agents	3	14.6667	5.68624			14.57166		
	Platinum group	11	8.1818	3.31114			12.60375		

	<i>agents/Paclitaxel- Carboplatin</i>								
	<i>Cisplatin or Oxaliplatin</i>	16	9.875	4.47027			9.15765		
	<i>Cisplatin + Gemcitabine</i>	6	16.8333	4.11906	15.28	.018*	5.36656		
	<i>Doxorubicin, Cyclophosphamide, Paclitaxel</i>	5	8.6	4.03733			7.04982		
	<i>Other(6-Thiopurines, Vincristine,..)</i>	26	10.1923	4.65634			7.89596		
Stage of the disease	<i>Stage 1</i>	15	9	5.07093			7.86009	3.751	.015*
	<i>Stage 2</i>	33	9.8788	4.07552			9.15585		
	<i>Stage 3</i>	18	12.9444	5.35199	8.282	0.41*	8.83712		
	<i>Stage 4</i>	5	7.6	1.67332			5.41295		
Duration of the diagnosis	<i>1-6 months</i>	20	9	4.72396	2.99	0.224	7.47117	5.154	.008*
	<i>6 months -1 year</i>	27	11.0741	5.21039			10.27818		
	<i>1 year and longer</i>	24	10.5417	4.18048			7.38965		

Table 4. Distribution of the Scale Scores in terms of Descriptive Characteristics

		n	Mean score	Mean score	Mean score
Age	30-45 years	18	24.9444	19.2222	9.8333
	46-64 years	37	24.9189	18.4054	9.1081
	65 years and over	16	31.3750	19.0625	13.6250
Gender	Female	45	26.2444	18.8889	10.7556
	Male	26	26.6154	18.5385	9.5385
Educational background	Illiterate	8	29.5000	19.1250	10.2500
	Literate	7	23.1429	18.7143	10.8571
	Primary/Secondary school	19	26.4211	18.0526	10.2105
	High School	19	26.2105	18.0526	9.6316
	University	18	26.3889	20.1111	10.9444
Marital status	Married	52	27.0577	19.0192	10.8654
	Single	19	24.5263	18.0526	8.7895
Social security	Available	67	26.3284	18.8209	10.2836
	Non- available	4	27.2500	17.7500	10.7500
Income status	High	22	26.7273	18.8636	8.9091
	Low	17	27.2353	17.7647	9.7647
	Moderate	32	25.6875	19.2188	11.5625
Type of cancer	Breast cancer	33	27.4848	18.7576	11.4545
	Gastrointestinal system cancers	15	25.6000	18.4667	8.8667
	Lung cancer	13	26.1538	21.3846	10.6154
	Other cancer types	10	24.2000	15.8000	8.3000
Type of Chemotherapy	Oxaliplatin, Calcium folinate, 5-Fluorouracil	4	21.0000	17.7500	7.7500
	Taxane group agents	3	28.6667	20.6667	14.6667
	Platinum group agents/Paclitaxel-Carboplatin	11	28.6364	20.9091	8.1818
	Cisplatin or Oxaliplatin	16	24.5625	17.9375	9.8750
	Cisplatin + Gemcitabine	6	33.0000	23.1667	16.8333

Table 5. The Correlation Between FACIT and the other Scales

		FACIT	Anxiety	Depression	HADS
PSQI	Rho	.468**	.232**	.342**	.307**
	p	.000*	.051	.004*	.009*
FACIT	Rho		.535	.556	.616
	p		.000*	.000*	.000*
Anxiety	Rho			.567	.891
	p			.000*	.000*
Depression	Rho				.879
	p				.000*

Discussion

In the literature, it is reported that the majority of patients undergoing chemotherapy experience many symptoms that cause fatigue such as pain and stress due to their existing diseases and ongoing treatments. In the present study, it was found that fatigue had a very serious effect on anxiety, depression, and sleep quality in patients undergoing chemotherapy.

In the literature, it is stated that the level of fatigue of cancer patients may vary depending on variables such as gender, age, cancer type, cancer stage, comorbid diseases and treatment options. Likewise, when the symptoms of fatigue were evaluated in the present study, it was found that the fatigue scores of the groups with a diagnosis duration of 6 months-1 year and 1 year and longer were higher than the mean score of the group with a diagnosis period of 1-6 months ($p=.024$ and $p=.014$). It was thought that the reason behind the fatigue increasing with prolonged duration of diagnosis was the intensity of the treatment regimen and the increasing number of medical procedures. Likewise, İzgu et al., evaluated fatigue in patients undergoing chemotherapy and radiotherapy in their study and determined that individuals with advanced stage of cancer and comorbid diseases experienced more severe fatigue (İzgu et al., 2020). In the same study, it was found that the male gender reported more severe fatigue. In the

present study, no statistically significant differences were found between the FACIT mean scores according to the variables of gender, cancer type and chemotherapy type. Lewis et al. In their study evaluating fatigue in individuals receiving cancer treatment, Lewis et al., reported that the type of cancer and the type of treatment they received did not cause a significant difference on the severity of fatigue, which is parallel with the present study (Lewis 2014).

In the literature, unlike this study, the studies evaluating fatigue among all cancer types have reported that lung cancer patients were the most tired group, while patients with malignancies in the head and neck region were the least tired group (Smets et al., 98; Weis 2011). In the present study, however, no statistically significant differences were found between the FACIT mean scores according to the cancer type and chemotherapy type variables ($p>0.05$). (Table 3).

When the fatigue levels of the patients were examined, it was observed that they had a positive correlation with parameters such as anxiety, depression, and sleep. Especially recent studies have demonstrated that fatigue and sleep disorder are positively correlated, and sleep disorders seen in individuals who suffer from fatigue are more severe than those who do not (Redeker 2000; Morrow et al., 2002). Studies in the field of depression have reported that the fatigue seen in cancer

has a strong correlation with depression (Lobefaro et al., 2022; Storey et al., 2012).

It is thought that the reason why fatigue affects many symptoms may be physiological stressor mechanisms (chemo/radiotherapy or accumulation of tumour wastes, active tumour growth, and deterioration of aerobic metabolism due to anaemia) in its pathophysiological mechanism (Argon 2012).

Likewise, Anderson et al., reported that fatigue in cancer patients was positively correlated with anxiety and depression. They explained that their conclusion may be due to the increase in cytokine levels, especially in serum interleukin 1 level, which is physiologically involved in cancer treatment (Anderson et al., 2003). When examining from a physiological point of view, it was thought that the increase in fatigue determined in the present study led to negative symptoms such as sleep, anxiety, and depression, which was caused by disease-related variables (anaemia, presence of infection, comorbid conditions).

Anxiety develops in varying degrees in patients with cancer. The estimated current prevalence of anxiety disorders in oncology is reported to be 15-28%. In a study, Stark et al., evaluated anxiety disorders in cancer patients and found that 44% of cancer patients had some anxiety, while 23% suffered from a high level of anxiety (Stark 2002).

While anxiety is often associated with depression in cancer patients, no difference was found between anxiety and depression in the current study.

Similar to the study by Dies, depression was found to be independent of anxiety (Dies 2013). This difference may be associated with the characteristics of the patient group in which the study was conducted, the severity of the disease, and different prognosis of the disease. In addition, in the present study, it was determined that there was a significant and high value in terms of depression in patients with a history of stage 3 cancer. Considering the stages, the fact that stage 3 stays between the chance of cycle and the period of near death is thought to affect the patients' coping process with the

disease, forces them spiritually, and makes them more prone to depression because they feel exhausted after long-term treatments.

In the present study, when we evaluated sleep quality alone in patients undergoing chemotherapy, we found that sleep quality got impaired in these patients. Similarly, Pazarcık et al., evaluated sleep quality in their study and found the rate of poor sleep quality of the patients was 96.7% before the treatment and very high (100%) after the sixth cycle of chemotherapy (Pazarcık 2017). In the literature, it is stated that this negative change in chemotherapy and sleep quality is due to the fact that the patients are stressed and nervous before chemotherapy or due to the side effects of the drugs used (Davidson 2002). In the same study, it was determined that there was no significant difference between sleep quality scores and socio-demographic and clinical characteristics. We also did not detect a significant difference between socio-demographic characteristics and sleep quality in the present study (Table 2).

When findings of the present study and previous studies are evaluated holistically, we see that fatigue affects sleep quality, anxiety and depression levels negatively

Limitations: The major limitation of the study is that the ethical approvals were issued during the pandemic; therefore, most patient groups undergoing chemotherapy (CT) changed their CT regimen to oral CT, and the number of cancer patients who could reach the hospital was low. In addition, patients were evaluated once, regardless of the number of chemotherapy cycles, and no prospective follow-up was performed.

Conclusion and Recommendations: A high level of fatigue affects patients' anxiety, depression and sleep quality negatively. Planning interventions to control the factors that cause fatigue in patients undergoing chemotherapy will prevent them from experiencing other negative symptoms.

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