Sleep Quality and Quality of Life in Breast Cancer Patients: Comparative Study with a Healthy Control Group

Meme Kanserli Hastaların Uyku ve Yaşam Kalitesi: Sağlıklı Kontrol Grubu ile Karşılaştırmalı Çalışma

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Abstract

Objective: Breast cancer (BC) is the most frequent cancer among women. Many BC patients suffer from sleep problems, which have a negative impact on their quality of life (QoL). Our study aims to investigate sleep problems in BC patients treated with active chemotherapy or in remission in comparison with a healthy control group (HCG), given the importance of sleep disorders and QoL.

Materials and Methods: A multicenter, cross-sectional study was conducted. Four different surveys including sociodemographic characteristics questionnaire, Pittsburgh sleep quality index (PSQI), hospital anxiety and depression scale and The European Organisation for Research and Treatment of Cancer core quality of life questionnaire (QLQ-C30) were used to collect study parameters.

Results: Of 164 participants, the mean age was 42.0±11.7 years. Overall PSQI median score for all participants was 6 points (range, 3-9 points). PSQI median value was higher in cancer patients compared to the control group, which were 6 points (range, 4-9 points), and 4 points (range, 3-7 points), respectively (p=0.004). The mean depression score was 5 points (range, 3-8 points) in BC patients, and 4 points (range, 2-6 points) in HCGs, respectively (p=0.025). Having BC diagnosis was an independent factor increasing the risk of bad sleep quality in compared to healthy controls (odds ratio: 2.568, 95% confidence interval: 1.169-5.645; p=0.019).

Conclusion: There was a close association between poor sleep quality, depression and QoL scores in patients with BC. In patients with breast cancer, appropriate management of associated comorbidities will aid a better quality of life in these patients.

Keywords: Breast cancer, depression, quality of life, subjective sleep quality

Öz

Amaç: Meme kanseri kadınlar arasında en sık görülen kanser olup, birçok hasta hayat kalitesini de olumsuz yönde etkileyen uyku bozukluklarından yakınmaktadır. Bu çalışmada aktif kemoterapi alan ve remisyon da olan meme kanserli hastaların uyku problemlerini ve bunun yaşam kalitesi üzerine olan etkilerini sağlıklı popülasyon ile karşılaştırarak değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışma çok merkezli, kesitsel bir anket çalışması olarak planlanmıştır. Hastalara 4 farklı anket formu uygulanmıştır: sosyodemografik özellikler anketi, Pittsburgh uyku kalitesi indeksi (PSQI), hastane anksiyete ve depresyon ölçeği ve Kanserin Tedavisi ve Araştırması için Avrupa Örgütü temel yaşam kalitesi anketi (QLQ-C30).

Bulgular: Çalışmaya 164 katılımcı dahil edildi. Ortalama yaş 42,0±11,7 idi ve ortanca PSQI skoru tüm katılımcılar için 6 (3-9) idi. Ortanca PSQI skoru, kanser hastalarında kontrol grubu ile karşılaştırıldığında daha yüksek olarak bulundu ve sırasıyla 6 (4-9) ve 4 (3-7) idi (p=0,004). Tüm katılımcılar için ortanca depresyon skoru 5 (2-7) puan olarak bulundu. Ortanca depresyon skoru, kanser hastalarında ve sağlıklı kontrol grubunda sırasıyla 5 (3-8) ve 4 (2-6) olarak bulundu (p=0,025). Kanser tanısına sahip olmak, sağlıklı kişiler ile karşılaştırıldığında; kötü uyku kalitesi için bağımsız bir risk faktörü bulundu (odds oranı: 2,568, güven aralığı %95: 1,169-5,645, p=0,019).

Sonuç: Meme kanserli hastalarda kötü uyku kalitesi, depresyon ve hayat kalitesi arasında yakın bir ilişki mevcuttur. Daha iyi bir yaşam kalitesi sağlamak, depresyondan korunmak için meme kanserleri hastaların kemoterapi süresinde ya da remisyonda olmalarına bakılmaksızın uyku kalitelerinin çok iyi değerlendirilmesi ve yakın takip edilmesi oldukça önemlidir.

Anahtar Kelimeler: Meme kanseri, depresyon, yaşam kalitesi, subjektif uyku kalitesi

Introduction

The most frequent cancer among women, breast cancer (BC) is still one of the most challenging cancers globally.[1] The prognosis is good in the early stages if modern treatment approaches are used effectively, however, it can be fatal, especially in advanced stages. The 5-year recurrence-free survival for BC patients ranges between 65 and 80%, and the 10-year overall survival ranges between 55 and 96%.[2] The quality of life (QoL) should be considered when treating all BC patients given their high survival rates.

Whether under treatment or in remission, the diagnosis of cancer can cause a high level of psychological and mental problems.[3] These include sleep disorders, which have a negative correlation with well-being and general health.[4] Overall, the frequency of sleep disturbance in cancer patients is very difficult to determine, however, it is predicted to be between 24% and 95%.[5] Compared to other cancer patients, a higher rate of sleep disturbance (67% to 90%) has been reported specifically in BC.[6] BC causes many different mental and psychological problems such as depression and anxiety as well as sleep disorders.[6-8] Sleep disorders are known to be a risk factor for many psychological problems. For example, a significant relationship between depression and sleep disorders in the patient population with BC was described previously.[9] In addition, sleep problems can lead to many negative consequences such as low QoL, fatigue, cognitive disorders, and dysfunctional relationships.[6] In patients with BC, sleep disorders and depression are frequently observed together and both affect the QoL of patients negatively.[10]

In daily oncological practice, in appropriate cases, neo-adjuvant or/and adjuvant chemotherapy are used frequently for all biological subgroups of early-stage or local advanced BCs. Some evidence suggests that sleep problems worsen after the start of chemotherapy. It has been shown that a notable percentage of BC patients undergoing chemotherapy treatment complain of sleep problems, especially on the first nights after chemotherapy treatment.[11,12] Moreover, these issues may persist up to 10 years after treatment, even if the patient is in remission.[6] Hence, it is crucial to draw attention to this issue because of the intimate relationship between sleep disorders and QoL, which is one of the primary goals of cancer treatment, especially for patients with BC who have a high cure rate.

Our study aims to investigate the sleep quality of BC patients treated with active chemotherapy or in remission in comparison with a healthy control group (HCG). We believe that this is the first study to evaluate the relationship between sleep disturbances, depression, anxiety, and QoL in BC compared with an HCG.

Materials and Methods

Study Population

A multicenter, cross-sectional study was designed in three different hospitals in Turkey between February and September 2022. This study population consisted of stage 1-3 BC patients who received active neo-adjuvant or adjuvant chemotherapy or BC patients over 18 years of age in remission who were referred to these centers. Women diagnosed with histopathologically confirmed stage 1-3 BC are considered eligible. Patients were included if received at least one cycle of chemotherapy and this group was defined as the active chemotherapy group. The study also included patients with BC in remission who had completed surgery, radiotherapy, and/or chemotherapy and this group was defined as the BC in remission group. The patients in remission followed by hormonal therapies were considered eligible. Exclusion criteria included patients with stage 4 BC, brain metastases, a history of mental disorders, a medical history of taking sleeping pills regularly, and male BC patients. The control group consisted of people without a diagnosis of cancer and any known psychiatric or chronic disease.

The Study Instruments

Data were collected through four different surveys. The first questionnaire form was designed to learn about baseline demographic characteristics and disease-related information about the patients and HCGs. This form was applied as a face-to-face interview, and patients' medical files were also used.

The second questionnaire was the Pittsburgh sleep quality index (PSQI). The PSQI was developed in 1989 and is a dependable and valid form for the evaluation of overall sleep quality. Turkish version of PSQI is also validated and reliable for the Turkish population.[13,14] It has been used to evaluate sleep disturbances in the last one-month period. There are 19 self-assessment questions assessing 7 sleep parameters, including relative sleep quality, sleep latency, sleep duration, usual sleep efficiency, sleep disruption, sleep medication use, and diurnal dysfunction. Each component is scored on a 0-3 scale, with a total score ranging from 0 to 21. Lower scores denote a healthier sleep quality. A total score of 5 or greater is indicative of bad sleep quality, and they were defined as "bad sleepers". Others were defined as "good sleepers".[13]

The third form was the hospital anxiety and depression scale (HADS) which was designed 30 years ago.[15] A validated and reliable Turkish version of the HADS form was used.[16] It is an easy, practical, self-reported questionnaire, that assesses both anxiety and depression. The questionnaire consists of seven questions for anxiety and seven questions for depression. For both scales, each question is scored from 0 to 3 and a total score of 0-7 is considered normal, 8-10 borderline, and 11-21 abnormal.

The fourth form, The European Organisation for Research and Treatment of Cancer (EORTC) core QoL questionnaire (QLQ-C30) scale was performed to evaluate the cancer patients' psychological, physical, and social functions.[17] It has been extensively used to determine cancer patients' QoL. This test included a total of 30 questions and included a global health status scale, a functional scale, and a symptom scale. For most items, subjects respond on a four-point scale from "not at all" to "very much". Most components use a "past week" recall period. A total score consists of a value between 0-100, for all scales. Thus, for a functional scale, a high score indicates a healthy/high level of functioning, for global health status/QoL a high score indicates a high QoL, but for a symptom scale/item, a high score indicates a high level of problems. Guzelant et al.[18] validated this form for the Turkish population.

Statistical Analysis

When appropriate, descriptive analyses are demonstrated using mean ± standard deviation, median (minimum-maximum interquartile range), or number (%). Kolmogorov-Smirnov test was used to define the normal distribution of variables. For analyzing non-normal and normal data, the Mann-Whitney U test and independent t-test were used respectively. To compare the independent categorical variables chi-square or Fisher's Exact test was used. A binary logistic regression model was created to detect independent factors for predicting poor sleep quality. Statistical Package for the Social Sciences (SPSS), Version 25.0 was used for all statistical tests. A two-sided p-value less than 0.05 was considered statistically significant.

Ethical Consideration

This research was planned and conducted following Good Clinical Practice and the Declaration of Helsinki and was approved by the University of Health Sciences, Van Training and Research Hospital Ethics Committee (decision number: 2022/03-05, date: 09.02.2022). Written consent was obtained from all the participants in the study.

Results

The study sample consisted of 164 participants including 55 patients who were treated with active chemotherapy, 54 patients who were in remission, and 55 participants who were in HCG. The mean age was 42.0±11.7 years for all participants. The mean age of the cancer group was higher than that of the HCGs and was 47.0±9.4 and 32.0±9.3 years, retrospectively (p<0.001). The marriage rate and the median number of children were also higher in the cancer-diagnosed patient group (p<0.001). The proportion of participants who graduated from university was higher in the control group when compared with the cancer group and was 60.0% and 17.4%, respectively (p<0.001). About half of all participants were housewives and their monthly income was worse. The distribution of stage 1,2 and 3 patients among patients diagnosed with cancer was 18.7%, 47.7%, and 33.6%, respectively. The baseline demographic characteristics are given in detail in Table 1.

The median score of total PSQI was 6 (3-9) points for all participants. The median value of PSQI was statistically significantly higher in cancer patients when compared with HCG, and it was 6 (4-9) points and 4 (3-7) points, retrospectively (p=0.004). Subgroups of sleep quality were also evaluated. The median sleep latency, habitual sleep efficiency, and sleep disturbance scores were also obtained to be significantly higher in cancer patients. The median anxiety score as assessed by the HADS was 6 (3-9) points for all participants. When evaluated according to anxiety scores, they were similar for both groups (p=0.135). The median depression score was 5 (2-7) points. It was found that 5 (3-8) points and 4 (2-6) points for the cancer patients and HCGs, retrospectively (p=0.025). QLQ-C30 scale was used to evaluate cancer patients' QoL. For all participants, the median functional scale, global health status, and symptom scale scores were 74 (60-84), 58 (50-75), and 25 (15-41) points, retrospectively. Whereas the median functional score and global health status score were numerically lower

in the cancer patients' group, the median symptom scale score was higher in cancer patients. However, there was no statistically significant difference between the groups when assessed according to the QoL subscales. In addition, within the symptom scale, pain scores that could affect the daily life of the cancer patients were also evaluated. No statistically significant difference was observed between the groups in terms of pain. A comparison of sleep, anxiety, and QoL scales was presented in detail in Table 2.

As mentioned above, a total PSQI score of 5 or greater is indicative of bad sleep quality. The participants were divided into 2 groups bad sleepers and good sleepers. All baseline sociodemographic characteristics were similar in both groups except smoking. While in the bad sleepers' group, the rates of currently smoking and former-smoking participants were 18.4% and 16.1%; in the good sleepers' groups, it was 10.4% and 5.2%, respectively (p=0.017). The majority of participants with bad sleep quality were diagnosed with cancer. In the bad sleepers' group, the rates of cancer diagnosed and control patients were 74.7% and 25.3%, respectively (p=0.017).

We also compared HDAS anxiety scores and status, HDAS depression scores and status, and QLQ-C30 scores for poor sleepers and good sleepers. The median HDAS anxiety score was 6 (3-8) points and 7 (3-9) points for the good and bad sleepers' groups, retrospectively (p=0.135). The median HDAS depression score was 4 (2-6) points and 6 (4-8) points for the good and bad sleepers' groups, retrospectively (p=0.001). In addition, median functional scale and global health status scale points were statistically significantly lower in the poor sleepers' group, whereas the symptom scale score was higher in the bad sleepers' group (p=<0.001 for functional and symptom scales, p=0.003 for global health status score). A comparison of anxiety, depression, and QoL scales for the bad sleepers' and good sleepers' groups is demonstrated in detail in Table 3.

In order to identify independent factors predicting bad sleep quality, a binary logistic regression model was constructed; being diagnosed with cancer was an independent factor that increased the risk of poor sleep quality compared to the HCG [odds ratio (OR): 2.568, 95% confidence interval (CI): 1.169-5.645, p=0.019]. Moreover, smoking also was found to be an independent factor (OR: 5.109, 95% CI: 1.747-14.938, p=0.003). Thus, it was observed that cancer diagnosis and active smoking are important predictive factors for bad sleep quality.

The patients with cancer included in the study were divided into 2 groups patients receiving active chemotherapy and patients in remission. There were 55 and 54 patients in the active chemotherapy group and in the remission group, respectively. In the active chemotherapy group, 35 patients (63.6%) were considered poor sleepers, while 30 patients (55.6%) were poor sleepers in the remission group (p=0.390). Patients who are both in remission and receiving active chemotherapy; when compared in terms of sleep quality according to disease stage, there was no statistically significant difference between the groups (p=0.70). Additionally, there was no significant difference in the group receiving active chemotherapy compared to the

Table 1. Demographic characteristics of cancer patients and control group				
	Total (n=164)	Cancer (n=109)	Control (n=55)	p
Age (mean ± SD)	42±11.7	47±9.4	32±9.3	<0.001
Marital status				
Married	118 (72.0)	91 (83.5)	27 (49.1)	<0.001
Single	38 (23.2)	11 (10.1)	27 (49.1)	
Other	8 (4.9)	7 (6.4)	1 (1.8)	
Having children				
No	50 (30.5)	18 (16.5)	32 (58.2)	<0.001
Yes	114 (69.5)	91 (83.5)	23 (41.8)	
Number of children, median, IQR	2 (2-3)	3 (2-3)	2 (1-2)	<0.001
Educational level				
Illiterate	16 (9.8)	15 (13.8)	1 (1.8)	<0.001
Primary school	45 (27.4)	43 (39.4)	2 (3.6)	
Middle school	15 (9.1)	11 (10.1)	4 (7.3)	
High school	30 (18.3)	18 (16.5)	12 (21.8)	
University	52 (31.7)	19 (17.4)	33 (60.0)	
Academic degree	6 (3.7)	3 (2.8)	3 (5.5)	
Employment				
Housewife	82 (50.0)	76 (69.7)	6 (10.9)	<0.001
Official	38 (23.2)	7 (6.4)	31 (56.4)	
Employee	21 (12.8)	9 (8.3)	12 (21.8)	
Retired	5 (3.0)	5 (4.6)	0 (0)	
Other	18 (11.0)	12 (11.0)	6 (10.9)	
Monthly income				
0-3.000 ₺	68 (41.5)	66 (60.6)	2 (3.6)	<0.001
3.000-5.000 ₺	28 (17.1)	22 (20.2)	6 (10.9)	
5.000-10.000 ₺	26 (15.9)	13 (11.9)	13 (23.6)	
>10.000 ₺	42 (25.6)	8 (7.3)	34 (61.8)	
Smoking status				
Currently smoking	24 (14.6)	9 (8.3)	15 (27.3)	0.001
Never	122 (74.4)	84 (77.1)	38 (69.1)	
Former smoking	18 (11.0)	16 (14.7)	2 (3.6)	
Alcohol status				
Yes	20 (12.2)	15 (13.8)	5 (9.1)	0.263
No	143 (87.2)	94 (86.2)	49 (89.1)	
Former alcohol	1 (0.6)	0 (0)	1 (1.8)	
SD: Standard deviation, IQR: Interquartile range				

patients in remission in terms of smoking history, depression status, and EORTC scores. Table 4 shows the poor sleep quality and factors affecting it by comparing active chemotherapy and remission groups.

Discussion

This study was designed to assess the sleep quality of BC patients compared to the HCG. The median value of PSQI was statistically significantly higher in cancer patients compared to the control group. A close relationship has been shown between poor sleep quality, depression, and QoL in patients with BC compared to healthy controls. To have a better life quality and stay away from depression; the sleep quality of the BC patient should be closely evaluated even if they receive active chemotherapy or are in remission.

The mean age of the cancer group was 47.0±9.4 years. Some sociodemographic findings, including mean age, marriage rate, and median number of children, were statistically higher in the BC group than in the HCG. It is known that the diagnosis of BC in women increases after the age of 40 years and the average age of the patients in our study is compatible with the literature.[19,20] We think that these differences in demographic

Table 2. Comparison of sleep, anxiety and quality of life scales of cancer patients and control group				
	Total (n=164)	Cancer patients group (n=109)	Control group (n=55)	p
Total PSQI score, median (IQR)	6 (3-9)	6 (4-9)	4 (3-7)	0.004
Subjective sleep quality	1 (1-2)	1 (0-2)	1 (1-1)	0.933
Sleep latency	1 (1-2)	2 (1-2)	1 (0-2)	0.001
Sleep duration	0 (0-1)	0 (0-1)	0 (0-1)	0.139
Habitual sleep efficiency	0 (0-1)	0 (0-1)	0 (0-1)	0.025
Sleep disturbances	1 (1-2)	2 (1-2)	1 (1-1)	0.002
Use of sleeping medication	0 (0-0)	0 (0-0)	0 (0-0)	0.512
Daytime dysfunction	1 (0-1)	1 (0-1)	1 (0-1)	0.907
HDAS anxiety score, median (IQR)	6 (3-9)	7 (3-9)	5 (2-8)	0.135
HDAS anxiety status				
Normal	101 (61.6)	62 (56.9)	39 (70.9)	
Borderline	32 (19.5)	23 (21.1)	9 (16.4)	0.196
Abnormal (anxiety)	31 (18.9)	24 (22.0)	7 (12.7)	
HDAS depression score, median (IQR)	5 (2-7)	5 (3-8)	4 (2-6)	0.025
HDAS depression status				
Normal	124 (75.6)	79 (72.5)	45 (81.8)	
Borderline	29 (17.7)	20 (18.3)	9 (16.4)	0.178
Abnormal (depression)	11 (6.7)	10 (9.2)	1 (1.8)	
QLQ-C30 functional scale score	74 (60-84)	74 (56-84)	77 (67-85)	0.126
QLQ-C30 global health status score	58 (50-75)	57 (50-68)	66 (33-78)	0.317
QLQ-C30 symptom scale score	25 (15-41)	28 (15-46)	23 (12-38)	0.257
PSQI: Pittsburgh sleep quality index, IQR: Interquartile range, HDAS: Hospital anxiety and depression scale, QLQ-C30: Quality of life questionnaire				

characteristics are due to some potential biases in the selection of the HCG in the different centers included in the study. However, we think that it did not affect the results of our study, since no relationship could be shown between poor sleep quality and these demographic situations without smoking.

In our current trial, the median value of PSQI was 6 (4-9) points and 4 (3-7) points, retrospectively, and it was statistically significantly higher in cancer patients compared to the HCG (p=0.004). Moreover, this significance was also shown in some sleep quality subgroups such as sleep latency, habitual sleep efficiency, and sleep disturbance. In a study, conducted by Fortner et al.,[5] the mean PSQI was 6.8 (±4.0) points for BC patients. Shorofi et al.,[6] was also planned a study about sleep quality and depression among BC patients undergoing chemotherapy. In this study mean PSQI was found 6.48 (±2.62). Moreover, a single-arm cross-sectional study was also planned to evaluate sleep disorders in non-metastatic BC patients with ninety-two participants. Despite the fact that the mean PSQI score was not presented in this study, bad sleep quality was detected in 53 (60%) BC patients.[21] In our current study, PSQI scores in patients diagnosed with BC were found to be similar to the literature data. As far as our knowledge, this is the first comparative study with an HCG in which the median sleep quality score of BC patients was statistically significantly higher than the HCG. So, it is very important to be aware of sleep problems during the treatment and follow-up of BC patients.

Table 3. Comparison of anxiety, depression and QoL scales for the bad sleepers' and good sleepers' groups			
	Good sleepers (n=77)	Bad sleepers (n=87)	p
HDAS anxiety score, median (IQR)	6 (3-8)	7 (3-9)	0.135
HDAS anxiety status			
Normal	51 (66.2)	50 (57.5)	
Borderline	15 (19.5)	17 (19.5)	0.342
Abnormal (anxiety)	11 (14.3)	20 (23.0)	
HDAS depression score, median (IQR)	4 (2-6)	6 (4-8)	0.001
HDAS depression status			
Normal	65 (84.4)	59 (67.8)	
Borderline	8 (10.4)	21 (24.1)	0.042
Abnormal (depression)	4 (5.2)	7 (8.0)	
QLQ-C30 functional scale score	78 (68-87)	67 (52-81)	<0.001
QLQ-C30 global health status score	66 (50-83)	53 (41-66)	0.003
QLQ-C30 symptom scale score	17 (11-33)	33 (22-47)	<0.001
Qol: Quality of life, HDAS: Hospital anxiety and depression scale, IQR: Interquartile range, QLQ-C30: Quality of life questionnaire			

Table 4. Comparison of active chemotherapy and remission groups in terms of poor sleep quality and the factors affecting it

	Active chemotherapy group (n=55)	Remission group (n=54)	p
Smoking status			
Never	43 (78.2)	41 (75.9)	
Former smoking	8 (14.5)	8 (14.8)	0.928
Currently smoking	4 (7.3)	5 (9.3)	
HDAS depression status			
Normal	37 (67.3)	42 (77.8)	
Borderline	11 (20.0)	9 (16.7)	0.349
Abnormal (depression)	7 (12.7)	3 (5.6)	
QLQ-C30 functional scale score	76 (60-84)	67 (52-83)	0.183
QLQ-C30 global health status score	58 (50-71)	52 (50-66)	0.286
QLQ-C30 symptom scale score	28 (17-38)	29 (12-46)	0.964
Sleep quality status			
Good sleepers	20 (36.4)	24 (44.4)	
Bad sleepers	35 (63.6)	30 (55.6)	0.390

HDAS: Hospital anxiety and depression scale, QLQ-C30: Quality of life questionnaire

Similar to the literature, participants were divided into 2 groups poor sleepers and good sleepers according to PSQI scores. The majority of participants with poor sleep quality were diagnosed with cancer. In the bad sleepers' group, the rates of cancer diagnosed and control patients were 74.7% and 25.3%, respectively (p=0.017). From a different perspective, there were 109 BC patients in the study, and 65 of them (59.6%) had bad sleep quality. In various studies conducted on patients with BC, 50.8%, 61%, and 65% of BC women were classified as bad sleepers.[5,6,11] In our study, it was shown that more than half of the patients with BC had sleep disorders and the rates were quite similar to the literature. In addition, sleep problems were statistically significantly higher than in the HCG. Furthermore, in our current study, in the bad sleepers' group, the rates of currently smoking and former-smoking participants were 18.4% and 16.1%; in the good sleepers' groups, it was 10.4% and 5.2%, respectively (p=0.017). Sleep disturbances are seen more frequently among cigarette smokers than non-smokers. Similar to what is well known in the literature, in our study of our patient population with BC, it was shown that sleep disorders were observed at a higher rate in smokers.[22]

We think that bad sleep quality both impairs the QoL and may cause psychological problems such as depression. In our current trial, in addition to sleep quality, we also evaluated the depression, anxiety, and QoL status of BC patients. The median HDAS anxiety scores are similar in both groups but the median HDAS depression score was 4 (2-6) points and 6 (4-8) points for the good and bad sleepers' groups, retrospectively (p=0.001). Hence, there was a statistically significant higher median depression score in the bad sleepers' group compared to the good sleepers' group. Shorofi et al.,[6] was shown a positive correlation between depression scores and sleep quality scores among BC patients. A significant association between poor sleep quality and depression has been shown in previous studies in many cancer types and non-cancer conditions.[23-26] The general QoL status, which consists of 3 different components functional status, global health status, and symptom status was also evaluated. The median functional scale and global health status scale points were statistically significantly lower in the bad sleeper group, while the symptom scale score was statistically significantly higher in the bad sleeper group (p=<0.001 for functional and symptom scales, p=0.003 for global health status score). In fact, as can be easily guessed, bad sleep quality is related to impaired QoL in different conditions and populations.[27-30] Thus, after the current study, it can be concluded that the presence of poor sleep quality, impairs the QoL with all its components and is closely related to depression in women with BC.

A binary logistic regression model was performed to evaluate the factors associated with bad sleep quality. Having a cancer diagnosis and smoking were independent factors in increasing the risk of bad sleep quality compared to the HCG. In our study, both cancer diagnosis and smoking were shown to be independent predictive factors for bad sleep quality and thus depression and impaired QoL.

It was shown in different studies, that sleep disorders are common and an important problem in cancer patients undergoing chemotherapy.[31-33] Furthermore, some studies have recommended to screen cancer patients for the potential sleep disorders.[34] The cancer patients included in the study were divided into 2 groups receiving active chemotherapy and remission patients' groups and we evaluated the sleep qualities, depression status and QoL status separately. While 35 patients (63.6%) were evaluated as bad sleepers in the active chemotherapy group; in the remission group, 30 patients (55.6%) were bad sleepers (p=0.390). Furthermore, there was no significant difference in depression status and EORTC scores in the group receiving active chemotherapy compared to patients in remission. Thus, although it was demonstrated that cancer diagnosis increases the risk for poor sleep quality and QoL; it has been shown that there is no difference in the sleep quality and QoL between BC patients receiving active chemotherapy or being in remission.

Study Limitations

This study has some limitations. One of them is the proportion of patients with low sociocultural status is high, especially in the BC patient group, and the findings are based on self-report measures that may not reflect the actual sleep quality depression and QoL status of the participant. Second, participants were surveyed only once due to the cross-sectional design. Third, certain sociodemographic findings such as median age, marriage rate, and median number of children were statistically higher in the women with BC group than in the HCG. We think that these differences in demographic characteristics are due to some potential biases in the selection of the HCG in the different centers included in the study. This potential

bias may have influenced the results, particularly as smoking is thought to be an independent predictive factor for poor sleep quality. Conversely, our study consisted of 165 participants. The relatively high number of patients, the multicenter design, and the fact that it is the first known study with a control group in BC could be counted as strengths of our study.

Conclusion

In conclusion, our current study was designed to assess sleep quality, depression, anxiety, and QoL in BC patients in comparison with an HCG, taking into account the importance of sleep disorders and QoL. Having BC has been shown to be an independent factor in increasing the risk of bad sleep quality. Moreover, there was a close relationship between bad sleep quality, depression, and QoL in patients with BC compared to the HCG. In order to have a better QoL and avoid depression, a BC patient's sleep quality should be closely assessed, even if they are on active chemotherapy or in remission.

Ethics

Ethics Committee Approval: This research was planned and conducted following Good Clinical Practice and the Declaration of Helsinki and was approved by the University of Health Sciences, Van Training and Research Hospital Ethics Committee (decision number: 2022/03-05, date: 09.02.2022).

Informed Consent: Written consent was obtained from all the participants in the study.

Authorship Contributions

Concept: Y.İ., İ.K., E.A., Design: Y.İ., Data Collection or Processing: Y.İ., O.Y.B., İ.K., E.A., Analysis or Interpretation: Y.İ., O.Y.B., Literature Search: Y.İ., Writing: Y.İ.

Conflict of Interest: No conflict of interest was declared by the authors.

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