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ORIGINAL ARTICLE

Subjective sleep quality of cancer patients

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Summary

Purpose: *To determine the quality of sleep, to locate the reasons for sleep disturbances and to define strategies overcoming sleep disturbances of cancer patients.*

Methods: *175 cancer patients were included in this study. Data were collected using the Pittsburgh Sleep Quality Index (PSQI); a demographic data form and two open-ended questions on the reasons and coping strategies for sleep disturbances were filled in.*

Results: *The mean sleep quality score was 9.46±4.669. The reasons given by patients for sleep disturbances were mostly cancer diagnosis (61.71%), adverse effects of therapy (58.85%), and financial problems (36.00%). Most patients (83.82%) used no pharmacologic strategies like lifestyle practices (64.25%), behavioral practices (21.25%), and biologic treatments (4.34%). Total PSQI scores of female patients were significantly higher compared to male patients, indicating poor sleep quality (Z=3.189; p=0.001). There was no statistically significant difference between age, education, illness duration, types of cancer and total PSQI scores (p>0.05).*

Conclusion: *This research implied that cancer patients had poor sleep quality. Healthcare professionals should assess the sleep quality of cancer patients and solve this problem in a holistic perspective in order to provide a supportive environment during the caregiving process.*

Key words: cancer, nursing, pharmacologic and non-pharmacologic strategy, sleep disturbance

Introduction

High-quality sleep is essential for a healthy lifestyle. Quality of sleep in the individual can be disturbed by illness [1]. Cancer is a chronic illness that can cause insomnia due to its nature and the adverse effects of therapy, and also dramatic changes in the homeostasis of cancer patients [2].

Sleep disturbances are highly prevalent among cancer patients. According to several authors, the rates of insomnia in cancer patients range between 30-75% [3-10]. Despite being noticeably widespread, this problem has not got adequate attention. Engstrom et al. studied sleep disturbances of cancer patients and found that patients didn't seek any help and didn't share the problem with others [5]. Similarly, healthcare professionals didn't inquire about their sleep. O'Donnel had emphasized that cancer patients perceived sleep disturbances as a minor problem compared to cancer itself [2]. It was stated that oncology nurses didn't focus on this issue adequately although they were aware of their patients' sleep problems [11,12]. One study reported that sleep disorders were not included in the typical patients' assessments [13]. From this perspective, it was clearly shown that clinicians were faced with the responsibility of assessing the sleep/wake disturbances in cancer patients and preparing a care plan containing appropriate strategies [14].

Cancer patients are affected negatively by sleep disturbances [15]. Insomnia leads to an increase in the levels of norepinephrine and a decrease in the activity of natural killer cells which can weaken the immune system's anticancer capabilities [16]. Also, insomnia can surely reduce the quality of life of cancer patients, delay the effectiveness of treatment by diminishing patients' tolerance to therapy and can lead cancer patients to quit their therapy [17].

In coping with poor sleep quality patients use lifestyle changes, behavioral changes, and biologic treatments [18]. A combination of effective sleep routines

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(e.g. avoiding drinking coffee, avoiding physical activity in the late evening hours) and cognitive behavioral therapy with hypnotic medicine can help improve the symptoms of poor sleep quality and ameliorate quality of life [2]. Studies have found that cancer patients listened to music, stayed awake, used medications, read, exercised meditation, and restricted fluids before sleeping [5,10].

There is a need to characterize the nature of sleep, the role of sleep during cancer process [19], and to identify the reasons of sleep disorders [7]. Research into the sleep/wake disturbances of cancer patients should be given a high priority [12].

It was the purpose of this research to shed light on sleep disturbances in cancer patients by determining the sleep quality, to identify the reasons for sleep disturbances, and to define the patients' coping strategies. Important data would be provided to healthcare professionals this way.

Methods

A descriptive design was used in this study. The sample included 175 outpatients undergoing cancer chemotherapy at Dr. Abdurrahman Yurtaslan Oncology Education and Research hospital in Ankara, Turkey, in July-August 2006. All patients gave informed consent for participation in the study. Data were collected using the PSQI, and a demographic data form and two open-ended questions on the reasons and coping strategies for sleep disturbances were filled in. PSQI is a survey and assessment test which provides data about sleep quality and the type and severity of sleep disturbances within a one month period developed by Buysee et al. [20]. PSQI contains 24 questions and 7 subscales. Each question is scored between 0 and 3 points. The sum scores of the 7 subscales indicate the total PSQI score. Total PSQI scores range between 0-21. When the total score is above 5, the quality of sleep of patients is considered "poor". The Turkish validation and reliability analyses of this PSQI were performed in 1966 by Agargun et al. in Turkey [21] and it was determined that the Cronbach's alpha coefficient was 0.80. In the reliability analysis, Cronbach's alpha coefficient was 0.74 in the present study, indicating that the PSQI was a reliable tool for this study.

Upon obtaining the approval of institutional review board, the researcher explained the purpose of the study to the cancer patients, got informed consent from them and completed the study by interviews conducted face to face. Each interview lasted approximately 15 minutes. The responses of patients to open-ended questions were listed and responses having the same meaning were classified under certain titles. Descriptive statistics were calculated. The reasons of sleep disturbances were classified under the two main titles by the researcher as follows: cancer-related problems (cancer diagnosis, adverse effects of chemotherapy, financial problems, lack of support system, cancer-related unemployment) and non-cancer-related problems (family issues, daily events, others). Cancer-related problems were evaluated for each patient and were scored according to the number of problems given by patients. These scores were coded as "0-1" (none or few problems), "2" (moderate problems), "3 or more" (many problems). Non-cancer-related problems were classified as either yes or no, depending on the availability of the problem. The scores of patients were coded as "0" (no problem) or "1-2" (problem is real).

Statistical analysis

Data analysis was performed by using SPSS 15.00 for Windows (SPSS Inc., Chicago, Illinois). Frequencies and percentages were used to define the characteristics of cancer patients. In the reliability statistics of PSQI, Cronbach's alpha coefficient was calculated. To determine the difference of 3 or more groups (e.g. between age groups, types of cancer and PSQI scores) the Kruskal-Wallis non-parametric variance analysis was employed. If significant difference was found the Bonferroni-corrected Mann-Whitney U test was used. To reveal if the total score of PSQI differed by sex, education and illness duration (between two groups) Mann-Whitney U test was used. The statistically significance level was set at $p \leq 0.05$.

Results

As indicated in Table 1, the mean age of the sample was 49.33±14.086 years (range 15-76); the median illness duration was 5 months. Most were women (54.86%), with a primary school education level (57.14%), and married (94.86%). Breast cancer patients predominated (33.71%). The ratio of comorbidity was 34.29%. They had mostly (46.67%) cardiovascular diseases besides cancer. Most (77.71%) of cancer patients in the sample received PSQI scores above 5.

As presented in Table 2, the mean sleep quality score was 9.46±4.669 (range 1-19) which indicated poor sleep quality. As demonstrated in Table 3, the total PSQI scores of female patients were significantly higher than male patients, indicating poorer sleep quality ($Z=3.189$; $p=0.001$). There was no statistically significant difference between age, education, illness duration, types of cancer and total PSQI scores (for age

Table 1. Sociodemographic and clinical characteristics of cancer patients (n=175)

Characteristics	*n*	*%*
Age (years), mean ±SD (range)	49.33±14.08 (15-70)	
Illness period (days), mean ±SD (range)	386.07±769.34 (10-5110)	
Sex		
Female	96	54.86
Male	79	45.14
Education		
Illiterate	37	21.14
Primary school	100	57.14
High school	35	20.00
University	3	1.71
Marital status		
Married	166	94.86
Single	9	5.14
Illness		
Breast	59	33.71
Colorectal	22	12.57
Lung	19	10.85
Stomach	11	6.28
Sarcoma	11	6.28
Non Hodgkin's lymphoma	10	5.71
Hodgkin's lymphoma	9	5.14
Gynecologic	7	4.00
Other	27	15.42
Comorbidity		
Yes	60	34.29
No	115	65.71
Illness besides cancer		
Cardiovascular disease	28	46.67
Diabetes mellitus	18	30.00
Other	14	23.33
Poor sleep quality		
Yes	136	77.71
No	39	22.29

SD: standard deviation

Table 2. PSQI scores of cancer patients (n=175)

PSQI subscales	*Range*	*Mean ±SD*
Subjective sleep quality	0.00-3.00	1. 69±0.90
Sleep latency	0.00-3.00	1.90±1.11
Sleep duration	0.00-3.00	1.58±1.16
Habitual sleep efficiency	0.00-3.00	1.10±1.31
Sleep disturbances	0.00-3.00	1.55±0.65
Use of sleeping medication	0.00-3.00	0.00±0.27
Daytime dysfunction	0.00-3.00	1.62±1.13
Total score	1-19	9.46±4.66

PSQI: Pittsburgh sleep quality index, SD: standard deviation

x^2=2.329; p=0.312; for education Z=1.016; p=0.310; for illness period Z=1.067; p=0.286, for types of cancer x^2=10.467; p=0.234).

As shown in Table 4, the main reasons for sleep disturbances expressed by cancer patients were cancer diagnosis (25.59%), adverse effects of therapy (24.41%) and financial problems (14.93%), while some cancer-unspecific ones (e.g. family issues, daily events) were recorded.

As demonstrated in Table 5, the PSQI scores of patients having moderate number of problems related to cancer were significantly higher than those of the patients having none or few problems, indicating poorer sleep quality (Z=4.377; p<0.001). The PSQI scores of patients having many problems related to cancer were significantly higher than those of the patients having none or few problems (Z=7.572; p<0.001). The PSQI scores of patients having many problems related to cancer were significantly higher than those of the patients having moderate number of problems (Z=3.027; p=0.002). The PSQI scores of patients having any problems related to non-cancer reasons were significantly higher than those of the patients having no problem related to non-cancer reasons which indicated poorer sleep quality (Z=2.891; p=0.004).

As indicated in Table 6, most of the cancer patients had used at least one coping strategy (83.82%). Table 7 shows coping strategies used in this study. They were related to lifestyle practices (64.25%), behavioral practices (21.25%), biologic treatments (4.34%) and others (10.14%).

Discussion

As expected, when patients were asked about their quality of sleep based on the PSQI scale, 77.71% revealed that they had poor quality of sleep. O'Donnel reported that insomnia influenced approximately 50% of cancer patients [2]. McMillan et al. determined that 63% of cancer patients reported a problem with sleep disturbance [22]. Our results are consistent with these reports. In an increasing number of studies it was determined that cancer patients had poor sleep quality [23-28]. As expected, female patients had poorer sleep quality than male patients. This result is consistent with the literature that female gender has been associated with increased reports of sleep problems [11]. Other risk factors were having cancer-related and non-cancer-related reasons. As the number of cancer-related problems increases, the quality of sleep of cancer patients worsens. The quality of sleep of cancer patients deteriorates when non-cancer-related problems are added to cancer-related problems.

While researching sleep disturbances in cancer patients in this study, a multitude of reasons for sleep disturbance were made evident. Patients described

Table 3. PSQI scores according to patient characteristics (n=175)

Group	*n*	*Min*	*Max*	*Mean±SD*	*Test statistics*	*p-value*
Total	175	1.00	19.00	9.46±4.66		
Sex						
Female	96	2.00	19.00	10.56±4.63	Z=3.189	0.001
Male	79	1.00	17.00	8.25±4.27		
Age group (years)						
≤44	65	1.00	18.00	8.88±4.61	x^2=2.329	0.312
45-59	62	1.00	18.00	10.08±4.98		
≥60	48	3.00	19.00	9.67±4.06		
Educational level						
Primary school and less	137	1.00	19.00	9.69±4.43	Z=1.016	0.310
Secondary school and above	38	1.00	18.00	8.92±5.19		
Marital status						
Married	166	1.00	19.00	9.52±4.59	Not calculated	
Single	9	3.00	18.00	9.56±5.25		
Illness duration (months)						
≤6	94	2.00	19.00	9.15±4.26	Z=1.067	0.286
>6	81	1.00	18.00	9.95±4.97		
Cancer						
Breast	58	2.00	18.00	10.62±4.58	x^2=10.46	0.234
Colorectal	23	2.00	18.00	9.30±4.58		
Lung	20	1.00	16.00	7.65±3.48		
Gastric	11	3.00	19.00	9.27±4.98		
Sarcoma	9	2.00	18.00	7.78±5.24		
Non Hodgkin's lymphoma	10	4.00	17.00	8.70±5.06		
Hodgkin's lymphoma	9	1.00	18.00	10.44±5.53		
Gynecologic	7	5.00	17.00	11.86±5.43		
Other	28	3.00	16.00	8.82±4.08		

PSQI: Pittsburgh sleep quality index, SD: standard deviation

Table 4. Reasons for sleep disturbances given by cancer patients (n=175)

Reasons for sleep disturbances	*n*	*%*
Cancer-related problems		
Cancer diagnosis	108	61.71
Adverse effects of therapy	113	58.85
Financial problems	63	36.00
Lack of support system	42	24.00
Unemployment	13	7.42
Fatigue	10	5.71
Pain	6	3.42
Non-cancer-related problems		
Family issues	37	21.14
Daily events	17	9.71
Other (sleep routines, being elderly, heart surgery, etc.)	23	13.14

"Cancer Diagnosis" as being the number one cause of sleep disturbance. Engstrom et al. studied the changes on the sleep patterns of cancer patients and found that sleep problems were related to the perception of cancer, its treatment, and experiences of other symptoms [5]. Kishore et al. found that most of the cancer patients believe that cancer was an illness resulting in death [29]. O'Donnel emphasized that cancer is a uniquely stressful experience and this stress continues during the disease process [2]. In addition to these findings and O'Donnel's statements, it can be said that even if having personal and cultural differences, cancer interrupts human life.

In this study, among the reasons for sleep disturbances, "Adverse Effects of Therapy" were found to be the second most dominant reason for sleep disturbance. Consistent with this result, one study determined that breast cancer patients had poor quality of sleep and experienced daytime sleepiness during the active phase of chemotherapy [30]. It was emphasized that menopausal symptoms (especially hot flashes and sweating), resulting from chemotherapy and hormone therapy like tamoxifen are related to sleep disturbances [11]. In addition to this study it was found that cancer patients undergoing chemotherapy had poor sleep quality [26]. Another research reported that among the reasons of psychological or mental suffering in cancer patients

Table 5. PSQI Scores of cancer patients according to problem categories (n=175)

Group	*n*	*Min*	*Max*	*Mean*	*Test statistics*	*p-value*
Total	175	1.00	19.00	9.46±4.66		
Cancer-related problem						
None or few problems	68	1.00	15.00	6.38±3.16	x^2=60.977	<0.001
Moderate problems	43	3.00	18.00	9.98±4.29		
Many problems	64	5.00	19.00	12.55±3.95		
Non-cancer-related problem						
No	100	1.00	18.00	8.61±4.25	Z=2.891	0.004
Yes	75	2.00	19.00	10.73±4.80		

PSQI: Pittsburgh sleep quality index

Table 6. Use of non-pharmacologic strategies vs. sleep disturbances by cancer patients

Use of non-pharmacologic strategies	*n*	*%*
Yes	114	83.82
No	22	16.18
Total	136	100.00

Table 7. Strategies used by cancer patients with sleep disturbances

Strategies against sleep disturbances	*n*	*%*
Lifestyle practices	133	64.25
Consuming milk products		
Drinking water		
Watching TV		
Reading a book		
Eating a bed-time snack		
Stepping onto balcony for fresh air		
Behavioral practices	44	21.25
Taking a warm bath		
Listening to music		
Praying/reading Kor'an		
Biologic treatments	9	4.34
Use of medications		
Alternative therapies (drinking herbal teas)		
Others	21	10.14
Using internet		
Playing card games		
Doing housework		
Knitting		
Staying awake		
Immersed in thought in bed		
Talking with others		
Total	207	100.00

were treatment complications [31]. Although psychological or mental suffering of cancer patients was not assessed in the present study, this factor may have contributed to poor sleep quality.

Among other reasons, family issues and financial problems (related to high cost of anticancer medicines) were factors for sleep disturbances. As individuals who are part of a family, it can be concluded that cancer patients may often continue to contribute to solving family issues such as loss of spouse, absence of children and future concerns for children while needing positive support during treatment. In a longitudinal study on insomnia in cancer patients it was reported that reasons for insomnia were related to overall health, family, friends, cancer diagnosis and financial problems rather than actual physical symptoms of cancer [32]. Hanratty et al. reviewed 21 studies and found that financial stress was reported in 13 studies on cancer patients [33]. Our results are consistent with these findings.

In the present study, an additional reason for sleep disturbances was the lack of support system. This finding can result from the perception of duties at home and at work as being distressful while being treated for cancer. In a qualitative study it was found that one theme of the experiences of cancer patients was about support of the family [34]. Unemployment as a result of cancer treatment was also another reason given for sleep disturbance. The frequency of therapy and severe symptom distress experiences can result in extreme lifestyle changes. Carlsen et al. found that cancer patients were at a significant risk for unemployment [35]. In another study it was reported that the diagnosis of cancer had an effect on cancer patients' employment status according to some factors such as sex, age, type of job, income and cancer site [36]. Stressful daily events such as hospital visits, interactions with neighbors, and adherence to daily routines were another reason contributing to sleep disturbances and might be a threat to a supportive environment during the period of illness.

This research reveals that fatigue and pain cause sleep disturbances. It is known that these two symptoms are engaged with sleep disruption, anxiety and depression as a symptom cluster [37]. Based on this finding, one study revealed that the rate of insomnia was 72% in cancer patients that applied for a pain and

symptom control clinic, and significant correlations were found between difficulty in falling asleep and fatigue, and early awakening and fatigue [38]. It was also reported that 30-60% of cancer patients with pain complained about sleep disturbances, emphasizing that pain caused a state of continued awakeness that interrupted sleep homeostasis [11]. One study found that fatigue and insomnia caused the greatest distress in cancer patients during the first cycle of chemotherapy [39].

The third purpose of this study included the examination of coping strategies used by cancer patients; a number of coping strategies were employed. This study indicated that the high ratio of coping strategies as help-seeking behavior by Turkish cancer patients should be looked at more closely. Some of the cancer patients listened to music as a non-pharmacologic strategy. Music is an ancient therapy method that has been used since antiquity. Music therapy is also a well-known approach in Turkish populations because of the complementary therapeutic effect on psychological, neurological and cardiac diseases. The first prominent usage of music therapy by Turks was practiced during the Ottoman Empire period. However, some musical therapy practices were available by shaman musicians called "baksi" before Islam was introduced in Middle Asia [40]. Some patients in the sample utilized "Praying" as a coping strategy. Spiritual needs are crucial for patients with life-threatening illness. In one study spiritual needs of cancer patients were reported and it was also determined that their thoughts were focused on loss of roles, self-identity, and fear of death, and that most of these needs were related to anxiety and sleeplessness [41]. It could be emphasized that in the present study spirituality was found as a positive factor for improving sleep disturbances in cancer patients. Nursing interventions in this context can facilitate self-awareness, interpersonal connections and living a meaningful life [42]. This study showed that coping strategies used by cancer patients to combat sleep problems were more extensive than those described by Engstrom et al. who reported the use of medications, reading, meditation, restricting fluids before bed, sleeping in a different room and extended bed time [5]. Williams et al. determined that self-care strategies of cancer patients included listening to music, staying awake, and use of medications [10]. Different from the results of Sela et al. [38], this study found that cancer patients did not use sleep medications extensively; only 4 patients had taken sleep medications. It is probable that most of the patients in this study had not spoken to a healthcare professional about their sleep disturbances or had decided to handle their sleep disturbances by themselves.

Conclusion

This research revealed that cancer patients had poor sleep quality subjectively. During the disease process, oncology nurses have a key role to assess data on sleep quality of cancer patients. This data should be included in the routine health history of cancer patients.

Most of the reasons of sleep disturbances of cancer patients were related to the illness and the therapeutic procedures (cancer diagnosis, adverse effects of chemotherapy, etc.), while some of them were nonspecific to this process (family issues, daily events, etc.). This implies that the care plan should be prepared from a holistic perspective. The views of patients about cancer diagnosis and treatment can be changed by relevant educational activities. For the lack of support result, this situation implies a need for a well-educated family caregiver.

Although patients utilized lifestyle practices, behavioral practices, biologic treatments against their sleep disturbances, their sleep quality levels were poor. This result emphasizes that cancer patients need the support of healthcare professionals in order to solve their sleep disturbances. If poor sleep quality is not dealt with, this problem may worsen the quality of life of cancer patients and may interrupt the therapeutic efforts. Non-pharmacologic and pharmacologic interventions under the supervision of healthcare professionals may be suggested and consequences of these interventions may be tested.

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