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Poor Quality Sleep and its Associated Factors Among Iranian Patients Under Treatment for Cancer

Maryam Garousi[1], Mojtaba Vand Rajabpour[2], Kambiz Novin[2], Mahtab Motamed[3], Pedram Fadavi[2], Sanaz Bahremand[2], Mastaneh Sanei[2] and Saba Faraji[3]*

1. Department of Radiation Oncology, Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran

2. Department of Radiation Oncology, Faculty of Medicine, Imam Khomeini Hospital Complex , Tehran University of Medical Sciences, Tehran, Iran

3. Department of Psychiatry, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran

*** Corresponding author**

Saba Faraji, MD

Department of Psychiatry, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran
Tel: +98 21 2282 9356
Email: Saba_faraji@yahoo.com

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Abstract

Background: Sleep disorder is one of the main complaints of patients with cancer that could affect their quality of life and clinical outcomes. We aimed to investigate major contributors of poor quality sleep in patients with cancer that underwent treatment.

Methods: We performed a cross-sectional study on 250 patients with cancer referred to the oncology department of Shohaday-e-Haftome-Tir Hospital, Tehran, Iran. Sleep quality as the main outcome of the study was evaluated using the Persian version of the self-report PSQI questionnaire. Global PSQI score >5 was categorized as the poor quality sleep. We also collected demographic and clinical data and physical performance status based on ECOG scale which grading is from 0:Fully active to 12:Death. Collecting the data regarding each patient was performed through medical records and face-to-face interviews.

Results: Mean age (±SD) of the study participants was 52.8 (±11.9) and 177 (70.8%) patients were female. The overall proportion of poor quality sleep was 66.8%. Sleep disorders were observed more frequent in patients with partial (OR=2.0, 95% CI=1.0, 3.8) and complete (OR=7.4, 95% CI=1.5, 36.4) physical dysfunction (p-value<0.05). There was also a strong association between a history of sleep disorder and cancer-related insomnia (OR=4.4, 95% CI=1.9, 10.1). No association was found between age, marital status, metastasis status, and cancer location with poor quality sleep.

Conclusion: Poor sleep quality had a high prevalence among our patients. Patients with physical functional impairment and those with psychiatric disorders (mood disorder) and pre-existing insomnia were the main groups of patients with a higher likelihood of cancer-related insomnia.

Keywords: Neoplasms, Pittsburg sleep quality index, Sleep disorders, Sleep quality

Introduction

Cancer is a global public health challenge with a growing trend across the world (1). This upward trend is more intense in low and middle income countries and cancer also has more lethal outcomes (2,3). According to GLOBOCAN, two thirds of cancer death occur in such countries (3). Cancer affects various aspects of patients' life. It comprises several mental and physical complications in cancer patients like pain, cancer treatment related fatigue, reduction of quality of life, immune system suppression and mental disorders (4). There are several evidences illustrating that quality of sleep in patients with cancer is also affected and it could be deteriorated due to cancer treatment and in one study conducted in Iran, it was shown that interventions focused on pain and fatigue management improve the patients sleep quality (5,6). Sleep disorder is known as a serious complaint in patients with cancer and is experienced by more than half of patients with cancer (4). Good quality sleep as a major need has strong relationship with quality of life and survival of patients with cancer (7). According to the previous studies, sleep deprivation is related to killer cell suppression that are essential part of immune system in combat against cancer cells and tumors (8). Therefore, in such circumstances, patients with cancer are more fragile against cancer and its consequences. It also makes them more vulnerable to infections and as a result, it can affect patients with cancer's clinical outcomes through another pathway (9).

Several studies with different approaches have been already performed and many different factors have been addressed in relation to sleep disturbance in patients with cancer. Pain, treatment side effects, sex, age, psychological causes, depression, cancer stage and cancer primary location have been already investigated as the predisposing factors for cancer-related insomnia in patients with cancer (9-11). Cancer-related insomnia is considered as a modifiable outcome, and determining the main factors of this phenomenon will be helpful to get a better comprehension considering its mechanism to prevent it (11). However, there is no consensus regarding risk factors of poor sleep quality in patients with cancer who underwent cancer treatment. In the current study we applied the PSQI self-report approach to evaluate the quality of sleep in patients with cancer. We also aimed to investigate risk factors of cancer-related poor quality sleep and performance status relation with sleep disorder in a sample of Iranian patients with cancer who underwent cancer treatment. There are few studies in this field in Iran addressing different types of cancer. Quality of sleep has a significant impact on a patient's quality of life. Therefore, early diagnosis and referral to a psychiatrist and interventions are extremely important.

Materials and Methods

The study was carried out on 250 cancer patients referred to the oncology department of Shohaday-e-Haftom-e-Tir Hospital, Tehran, Iran between April 2020 to December 2020.

The inclusion criteria were patients with solid tumors who are undergoing chemotherapy or radiotherapy or hormone therapy and are aged 20-80 years. The exclusion criteria included individuals over 80 years and under 20 years and a history of substance use disorder.

Sleep quality was the main interesting outcome that was assessed using the validated Persian version of Pittsburgh Sleep Quality Index (PSQI) questionnaire. PSQI includes 19 items that evaluates sleep quality in 7 distinctive subdomains as following: subjective sleep quality (1 question), sleep latency (2 questions), sleep duration (1 question), habitual sleep efficiency (3 questions), sleep disturbances (9 questions), use of sleep medication (1 question) and daytime dysfunction (2 questions). Score for each question ranged from 0 to 3. In this scoring scale, 0 represents "very good", 1 "fairly good", 2 "fairly bad" and 3 "very bad". Overall subjective sleep quality score was calculated through sum of all questions score and it ranged from 0 to 21. Higher score was associated with lower sleep quality and patients with score higher than 5 were categorized in bad sleep quality group. We also collected study participants demographic characteristics and their clinical history including age, sex, marital status, and physical performance status based on ECOG scale (The Eastern Cooperative Oncology Group scale). The ECOG Scale of Performance Status is one such measurement. It describes a patient's level of functioning in terms of their ability to care for themself, daily activity, and physical ability (walking, working, *etc*.). The grading is from 0: Fully active, able to carry

on all pre-disease performances without restriction to 5: Dead (12), cancer site, metastasis status, metastasis location, type of the received treatment, history of psychiatric disorder, history of sleep disorder, and history of taking sleeping peels using both face-to-face interview and their medical records.

We used descriptive statistics to report our data. To evaluate the association between dichotomous variable, we applied Chi-Square test. Comparison of numerical variables was performed using Mann–Whitney U-test. Multiple logistic regression was also utilized to adjust the effect of confounding variables. We used Stata 14.1 to perform statistical analysis. Statistical significance level was $p<0.05$.

Ethics approval

The current study was approved by the Iran University of Medical Sciences. The ethical code is: IR.IUMS.FMD.REC.1400.042. Informed consent was also taken from each participant before the interview.

Results

The study was performed on 250 cancer patients who underwent either radiotherapy or chemotherapy at an educational hospital in Tehran. Mean age (±SD) of study participants was 52.8 (±11.9) and 177 (70.8%) patients were female. More than half of the patients (56.0%) were totally active (ECOG score=0) on ECOG scale, whereas only 2.0% were totally inactive (ECOG score=3). Breast cancer (45.2%) was the most prevalent cancer in the current study, followed by GI cancer (24.0%) and head and neck cancer (13.6%). Other clinical and demographic characteristics of the study participants were provided in table 1.

According to the data, 167 patients (66.8%) were categorized in poor sleep. The prevalence of poor sleep was drastically higher in female (71.7%) than male (54.7%) (Table 2). However, after adjustment in multiple regression model, no statistically significant association was observed (p-value=0.100) (Table 3). An upward trend was observed when we compared proportion of poor sleep based on ECOG score where 59.2% patients with ECOG 0 score had low quality sleep, while it reached 100% at the 3 score of ECOG. Odds of poor sleep in patients with higher score of ECOG (score 2 and 3) was 7.4 times higher than the reference group (p-value=0.008). History of insomnia

Table 1. The participants' demographic and clinical characteristics

Gender	N	%
Male	73	29.2%
Female	177	70.8%
Marital status		
Single	30	12.0%
Married	220	88.0%
ECOG performance status		
0	140	56.0%
1	89	35.6%
2	16	6.4%
3	5	2.0%
Cancer type		
Breast	113	45.2%
Gastrointestinal	60	24.0%
Urinary system cancer	12	4.8%
Head and Neck	34	13.6%
Brain	6	2.4%
Female cancer	23	9.2%
Skin	2	0.8%
Metastasis status		
Present	87	34.8%
Absent	163	65.2%
Metastasis location		
Bone	16	18.6%
Brain	11	12.7%
Visceral	59	68.6%
Mood disorder		
No	188	75.2%
Yes	62	24.8%
History of Sleep disorder		
No	177	70.8%
Yes	73	29.2%
History of taking sleep pills		
No	201	80.4%
Yes	49	19.6%
Total	250	100%

Table 2. Distribution of sleep quality based on the participants' demographic and clinical characteristics

Variable	poor sleep	
Gender	n (%)	p-value
Male	40 (54.7%)	
Female	127 (71.7%)	**0.010**
Age group		
20-40	20 (55.5%)	
41-60	106 (70.2%)	
Over 60	41 (65.0%)	0.232
ECOG		
0	83 (59.2%)	
1	65 (73.0%)	
2	14 (87.5%)	
3	5 (100%)	**0.013**
Disease stage		
Local cancer	105 (64.4%)	
Metastatic cancer	62 (71.2%)	0.273
Cancer site		
Breast	81 (71.6%)	
GI	39 (65.0%)	
Other	47 (61.0%)	0.293
Mood Disorder		
No	115 (61.1%)	
Yes	52 (83.8%)	
Sleeping pill		
No	124 (61.6%)	
Yes	43 (87.7%)	**0.011**
Sleep disorder		
No	104 (58.7%)	
Yes	63 (86.3%)	**<0.001**
Total	167 (66.8%)	-----

Table 3. Determining contributing factors in bad quality sleep in the cancer patients

Variable	Adjusted OR	95% CI	p-value
Gender			
Male	Reference		
Female	1.9	0.8, 4.1	0.100
Age group			
20-40	Reference		
41-60	1.9	0.8, 4.5	0.114
Over 60	1.1	0.4, 3.2	0.741
ECOG			
0	Reference		
1	2.0	1.0, 3.8	0.031
2	7.4	1.5, 36.4	0.013
Disease stage			
Local cancer	Reference		
Metastatic cancer	1.5	0.7, 2.8	0.232
Cancer site			
Breast	Reference		
GI	1.0	0.4, 2.5	0.916
Other	0.7	0.3, 1.8	0.573
Mood Disorder			
No	Reference		
Yes	2.2	0.9, 4.9	0.054
Sleep disorder			
No	Reference		
Yes	4.4	1.9, 10.1	<0.001

was addressed as the other contributing factor in the quality of sleep in cancer patients. Proportion of poor sleep in patients with history of sleep disorder was 86.3, which was considerably higher than patients without such history and the observed association was shown statistically significant (OR=4.7, 95% CI=1.9, 10.1) (p-value<0.001). No association between cancer stage, cancer location, age and sleep quality score was found.

Table 4. Distribution of sleep quality score in study participants based on Pittsburgh Sleep Quality index in general and by its domains by gender

	Male, (n: 73)	Female (n: 177)	Total (n: 250)	
Domain score	Median (IQR)	Median (IQR)	Median (IQR)	p-value
Subjective sleep quality	1 (1)	1 (1)	1 (1)	0.372
Sleep latency	1 (1)	2 (2)	2 (2)	<0.001
Duration of sleep	1 (2)	1 (2)	1 (2)	0.898
Habitual sleep efficiency	1 (2)	1 (2)	1 (2)	0.180
Sleep disturbances	1 (0)	1 (1)	1 (1)	0.011
Daytime dysfunction	0 (0)	0 (0)	0 (0)	0.610
Sleep medical use	0 (1)	0 (2)	0 (2)	0.232
Overall score	6 (5)	8 (6)	8 (6)	0.025

Besides, in table 4, we compared PSQI sleep quality score in overall and by its subdomains between male and female. Sleep disturbance, sleep latency and overall score of sleep quality on PSQI scale was highlighted significantly higher in female than male (p-value<0.05) (Table 4).

Discussion

Poor quality sleep could affect several aspects of life and leads to a decrease in quality of life (7). It is estimated that prevalence of sleep disorders are virtually two times higher in patients with cancer and it is known as one of the main complaints of patients who suffer from cancer (13). The current study was aimed at evaluating prevalence of poor quality sleep in a sample of Iranian patients with cancer and determining the main drivers of this phenomenon.

Overall prevalence of poor quality sleep in our sample was pretty high, and around 66.0% of the patients have reported bad sleep. This high prevalence of bad sleep was supported by previous studies (5,11). The reported values for poor quality sleep in patients with cancer treated with chemotherapy ranges from 50% to 75% in previously published reports and these values were in line with our findings (14). High prevalence of poor quality sleep in patients with cancer might be referred to physical and mental complications arisen by life threatening nature of cancer. Cancer is known as a serious health condition that might finish the patient life; therefore, fear of death in cancer patients is linked to high level of stress and anxiety (15,16). Moreover, invasive treatment of cancer may lead to a couple of physical complications and adverse effects such as pain and physical performance status. Consequently, in presence of mental and physical problems in cancer patients' poor sleep quality sounds logical (6).

Median score of overall sleep quality score was significantly higher in female than male. We also spotted a significant difference in sleep latency and sleep disturbances sub-domains when we compared men with women. However, after adjustment for confounding variables the association between gender and sleep quality disappeared. We also found no association between age and marital status as it has been already demonstrated in previous studies (6,10). Although we found no indication that poor quality sleep was related to age interpretation of such association is complicated. Age might be considered as an intermediate factor in the causal pathway since it is a predisposing factor for a couple of mental and physical health conditions such as mood disorder, insomnia, pain threshold, *etc*. that might increase risk of poor sleep quality (17).

The results of the present study showed that patients with severe physical performance status were more likely to have poor sleep and quality of their night sleep was outstandingly lower than more active patients. The mentioned results were similar to previous published reports. However, generalizability of these findings is still controversial since many studies have shown that investigation of physical performance status is partially biased (17). However, it is argued that impaired physical performance status can result in prolonged absence from work and ultimately losing job in patients with cancer who underwent cancer treatment. It can also lead to psychological dysfunction due to unemployment and the further financial problems related to cost of cancer treatment particularly in communities with poor and unequal health system (17,18).

We also found that mood disorders and history of insomnia were the other main contributors of poor

quality sleep in cancer patients. Romito *et al* have already shown a strong correlation between mental health and quality of night sleep in cancer patients. They demonstrated that quality of sleep in patients with depression, distress and anxiety was strongly lower (19). The same finding was also reported by George *et al* that show an association between overall disturbed mood and poor sleep quality (11).

We used a self-report approach to investigate the quality of sleep and it was our main limitation in the current study. Additionally, we had limitations in sample size and study power. Another limitation is lack of data regarding pain assessment, cancer treatment, related fatigue, and tobacco and opium use in the current study. However, we performed the study on a sample of cancer patients including both early and advanced cancer cases. A robust statistical method was also utilized in order to address the main contributing factor of cancer-related insomnia in cancer patients who underwent cancer treatment.

Conclusion

Poor sleep quality is shown a common and high prevalence problem affecting most of cancer patients. Patients with physically impaired function and those with mood disorders were the main groups of patients with higher likelihood of cancer-related insomnia. Thus, it is logical that we emphasized the role of mental and physical health of cancer patients and attempted to keep patients optimally healthy and functional during their course of cancer treatment.

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Conflict of Interest

The authors declare no conflict of interest.

Informed consent

Informed consent was obtained from all the participants included in the study.

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