

# Evaluation of quality of sleep and effecting factors in hospitalized neurosurgical patients

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## ABSTRACT

**Objective:** To evaluate the quality of sleep and effecting factors in hospitalized patients in a neurosurgery clinic.

**Methods:** This research was conducted as a descriptive study in a neurosurgery clinic of a University Hospital, in Turkey, between November 2005 and June 2006. The study sample consisted of 102 patients who met the inclusion criteria and agreed to participate in the study. Data were collected using the "Questionnaire Form," which included socio-demographic, illness, sleep, and hospital characteristics, and the "Pittsburgh Sleep Quality Index" (PSQI). The data obtained were assessed by SPSS 10.00 Program, using number, percentage, arithmetic mean, t-test, variance, and correlation analysis.

**Results:** The mean age of the patients was 43.22±16.72 years, 54.9% were females, and 72.5% were married. Hospitalization duration of the patients was 14.31±8.97 days on average, 84.3% had previous hospital experience, and 72.5% had knowledge about their illnesses. Of them, 51% expressed a sleep problem. Pain (41.2%) and noise (31.4%) was found to affect the sleep quality of hospitalized patients. Of the patients hospitalized in the neurosurgery ward, 64.7% were found to have poor quality of sleep prior to admission, while poor quality of sleep was determined for 49% before being discharged from the hospital. However, a better sleep quality was noted prior to discharge, compared to that at their admission to the hospital.

**Conclusions:** Varied degrees of quality of sleep have been reported by the patients and influences of personal and environmental factors on sleep quality have been noted. Strategies to enhance physical and mental comfort, and to minimize disruptions should positively enhance sleep quality.

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Sleep is a physical and psychological need for all humans. It is also one of the inevitable daily living activities to maintain optimum health. Sleep provides time for the repair and recovery of body systems for the next period of wakefulness. Sleep is a complex, regular, recurrent, easily reversible state, and is not merely a period of physiological quiescence.<sup>1</sup> Sleep has the following features: sleep latency, the length of sleep period, the total time of sleep, regularity of sleep, and quality. Sleep quality is an important concept for clinical applications and research concerned with sleep. Sleep quality is a measure of the feeling that a person would have of being energetic, active, and ready for a new day, and includes numerous quantitative and qualitative aspects. This concept includes sleep latency, time of sleep, number of waking-up times per night, depth of sleep, and resting.<sup>2,3</sup> Because of its direct effects on cardiopulmonary, gastrointestinal, and neuromuscular functions, an individual with inadequate sleep may present various physical and psychological problems.<sup>4-8</sup> Sleep quality defects can cause disorder of a person's feelings, thoughts, and motivation. Physical and cognitive symptoms for people who have bad sleep quality are tiredness, loss of concentration, weariness, a low threshold for pain, anxiety, nervousness, irrational thoughts, hallucinations, loss of appetite, constipation, and being more accident prone.<sup>3,5</sup> It is well known that sleeping problems of patients cause tension, delays in healing of wounds, increased pain, and contributes to many difficulties in the daily activities of patients.<sup>1,5,9</sup> Although the functions and mechanisms of sleep are not clearly understood, it is generally accepted that it is necessary for the maintenance of good health and well-being. According to the literature, hospitalized patients often complain of sleep disturbance.<sup>1,7</sup> The studies in Turkey by Doğan et al<sup>5</sup> and Kara<sup>6</sup> also showed that hospitalized patients had sleep problems. Sleep disturbances may be caused by a variety of exogenous factors such as ward environmental noise, bright lighting, and repetitive staff interventions,

or endogenous factors such as delirium, depression, stress, inability to lie comfortably, and pain.<sup>5</sup> Although patients may appear to sleep in hospital, it may not be refreshing or restorative. Therefore, poor sleep can have serious detrimental effects on health and recovery from illness.<sup>1,5,6</sup> The factors listed above all indicate a necessity on the part of healthcare providers to detect sleep problems by identifying accurately the sleep activity, and thus the sleep patterns and habits of individual patients and to initiate effective individualized interventions in order to resolve such problems.<sup>5,6,10</sup> The aim of this cross-sectional, descriptive, and analytic research was to determine the quality of sleep and effecting factors in hospitalized neurosurgical patients. The research questions are the following: What is the sleep quality of patients at admission to the neurosurgery clinic? What is the sleep quality of patients hospitalized at the neurosurgery clinic prior to discharge? What are the sleep problems experienced by patients hospitalized at the neurosurgery clinic? What are the factors that have negative influences on the sleep quality of patients hospitalized at the neurosurgery clinic?

**Methods.** This research was carried out with patients who were hospitalized at the neurosurgery unit of a University Hospital from November 2005 to June 2006. The inclusion criteria for these patients are to be conscious and willing to participate in the research. Of the 131 patients included in the sample, 29 were excluded due to several reasons including medical conditions such as confusion, aphasia/dysphasia, and death, as well as transfer of the patients to another hospital or early discharge. Finally, research was completed with 102 patients. Permission to undertake this study was received from the Hospital Inquiry Review Board. Prior to this study, the patients were informed of the purpose of the research. Participants were assured of their right of refusal to participate or to withdraw from the study at any stage. The anonymity and confidentiality of participants were guaranteed. Data were collected by a Questionnaire Form and the Pittsburgh Sleep Quality Index (PSQI). Developed by the researchers, the Questionnaire Form includes questions on socio-demographic variables such as age, sex, education level, employment status, marital status, and questions related to illness and hospital. The PSQI is a self-rated questionnaire developed by Buysse et al,<sup>2</sup> which measures sleep quality in a clinical population. The validity and reliability studies of the index in Turkey had been conducted by Ağargün et al.<sup>3</sup> In the original study, Cronbach's alpha internal consistency coefficient was 0.80, while it was 0.78 in our study. The PSQI contains 24 questions, 19 of which are self-rated. Of these, 5 questions are answered by the roommate or

partner of the inpatient. Question 19 is not taken into consideration at scoring. The first 18 questions include 7 subcomponents: quality of sleep, sleep latency, length of sleep, sleeping habits, sleep disorders, use of sleeping pills, and daytime activity disorder. Each component scores between 0 and 3 points. The total index score is between 0 and 21. The PSQI total score of 5 and above indicates poor sleep quality.<sup>2,3</sup> The time needed to answer the PSQI was approximately 10 minutes and evaluation took approximately 5 minutes. Data collection has been completed in 2 phases, one at admission, and the other prior to discharge. Obtained data were analyzed by SPSS (Statistical Package for Social Science for Windows). Frequency and percentage values of the grouped variables, and arithmetic means, and standard deviations of numeric variables were calculated. Student's *t*, Paired *t*, and Mann Whitney-U tests were used to determine the difference between 2 groups, while differences among multiple groups were compared by using Kruskal-Wallis and One-Way ANOVA test. Relations between mean scores were determined by Pearson's correlation technique.

**Results.** The mean age of the 102 patients studied was 43.22±16.72 years. They had received 8.75±4.72 years of education on average. Of them, 54.9% were women, 72.5% were married, and 66.7% shared a room or bed with a partner. The patients, most of whom were operated due to brain tumors or neurovascular disorders (52.9%), remained in the hospital for 14.31±8.97 days on average. Previous hospital experience was reported in 84.3%, and 72.5% had information on their illness. All patients were staying in single rooms, of which 64.7% could sleep whenever they wanted to, and 49% during daytime, with 51% experiencing sleep problems (Table 1). As Table 2 demonstrates, major factors that have negative influences on sleep qualities of the inpatients were pain (41.2%) and noise (31.4%). Poor quality of sleep (PSQI score>5) of the neurosurgery inpatients at admission was 64.7%, and prior to discharge was 49%, showing an improvement in these patients' sleep quality prior to discharge compared to that at admission ( $p<0.05$ ). Significant decreases in mean scores of PSQI subjective sleep quality and daytime function disorders, in particular, have been observed prior to discharge ( $p<0.05$ ) (Table 3). When the effects of socio-demographical characteristics on sleep quality at admission and prior to discharge were examined, no significant effect of age or educational status was observed ( $p>0.05$ ). Similarly, marital status or sharing a bed or room was found not to have any influence on patients' sleep quality ( $p>0.05$ ) (Table 4). Gender, however, was influential on the sleep quality at admission and prior to discharge; male subjects had

**Table 1** - Figures regarding patients' socio-demographic, illness, sleep, and hospital characteristics.

Variables	n	(%)
<i>Previous hospitalization</i>		
Yes	86	(84.3)
No	16	(15.7)
<i>Information on the illness</i>		
Yes	42	(41.2)
Limited	32	(31.3)
No	28	(27.5)
<i>Able to sleep whenever helshe wants</i>		
Yes	66	(64.7)
Sometimes	12	(11.8)
No	24	(23.5)
<i>Able to sleep during daytime</i>		
Yes	50	(49.0)
Sometimes	22	(21.6)
No	30	(29.4)
<i>Sleep problems in hospital</i>		
Yes	20	(19.6)
Sometimes	32	(31.4)
No	50	(49.0)

**Table 2** - Factors that disrupt patients' sleep.\*

Factors that disrupt sleep	n	(%)
Pain	42	(41.2)
Uncomfortable bed and pillow	4	(3.9)
Worries regarding the illness	10	(9.8)
Noise	32	(31.4)
Hospital staff, patients, visitors that enter and leave the room	10	(9.8)
Very low or high room temperatures	12	(11.8)
Very bright or dim room lighting	2	(2.0)
Nursing and medical interventions during sleep time	6	(5.9)
Breakfast delivered very early in the morning	6	(5.9)
Being very hungry or full	2	(2.0)

\*Multiple choices have been selected

**Table 3** - Mean sleep quality scores of patients at admission and prior to discharge.

Sleep quality	Admission x ± SD	Discharge x ± SD	t	P-value
Subjective sleep quality	1.29±1.12	0.90±0.83	2.51	0.01*
Sleep latency	1.39±1.17	1.41±1.19	0.10	0.91
Sleep period	1.02±1.29	1.18±1.16	0.86	0.39
Sleep habits	1.31±1.26	1.00±1.11	1.69	0.09
Sleep disorders	1.45±0.58	1.43±0.57	0.20	0.83
Taking sleep pills	0.37±0.98	0.12±0.52	1.58	1.11
Daytime function disorders	1.37±1.02	0.57±0.90	4.92	0.00**
Total sleep quality	8.29±5.03	6.61±4.35	2.72	0.009**

\* $p < 0.05$ , \*\* $p < 0.01$

higher scores (poorer sleep quality) than females, with a significant difference between gender ( $p < 0.05$ ) (Table 4). The effects of patients' illnesses, sleep characteristics, and previous hospital experience on the sleep quality at admission and prior to discharge were also evaluated (Table 4), and hospitalization duration was found not influential on sleep quality ( $p > 0.05$ ). However, patients who were hospitalized for the first time and those who did not have information on their illnesses had poorer sleep quality ( $p > 0.05$ ). Patients experiencing sleep problems in the hospitals had poorer sleep quality compared to those with no or fewer incidences of sleep problems, and the difference among the groups was significant ( $p < 0.01$ ) (Table 4). Prior to discharge, those who could sleep whenever they wanted to ( $p < 0.01$ ), and those who could sleep during daytime ( $p < 0.05$ ) had better quality of sleep scores, with a significant difference among groups.

**Discussion.** This study was performed with the purpose of evaluating the quality of sleep and effecting factors in hospitalized patients in a neurosurgery clinic. Our results, in conjunction with those reported in the literature, begin to provide a normative base on which to measure the quality of sleep for hospitalized patients.

Physiological, psychological, and environmental changes that occur with disease and hospitalization impact on patients, leading to negative consequences on sleep pattern and quality. Patients, while trying to cope with physical effects of the disease, also need to adapt to several changes with hospitalization such as an unfamiliar environment, unknown procedures, and new routines, which all require marked modifications in lifestyle. Providing and maintaining the best sleep quality possible is particularly important when deviation from health is the case. Hospitalized patients who are recovering from surgery or illness need restorative sleep. Unfortunately, few studies have systematically explored sleep experience, and therefore, we have a poor understanding of the sleep experience and the effectiveness of planned or current strategies designed to enhance restorative sleep.<sup>1</sup>

Much of our understanding about patients' sleep patterns in the hospital setting is based on research conducted in intensive care unit (ICU) environments.<sup>11</sup> This research generally shows that ICU environments, characterized by high levels of noise and light and multiple interruptions, influence the quality and effectiveness of sleep.<sup>1,12-14</sup> Descriptive studies report that hospitalized patients experience altered sleep patterns.<sup>15-18</sup> Patients reported frequent interruptions of sleep from disruptive environmental factors such as noises from the nursing station or the unit, uncomfortable room temperatures, or uncomfortable beds.<sup>1</sup> Findings from these studies

**Table 4** - Effects of patients' socio-demographic, illness, sleep, and hospital characteristics on sleep quality.

Variables	Admission total sleep quality x ± SD	Discharge total sleep quality x ± SD
<i>Gender</i>	6.71±4.81	5.68±3.60
Female	10.22±4.69	7.74±4.97
Male	t=2.61, p=0.01*	t=1.71, p=0.09
<i>Marital status</i>		
Married	8.76±4.90	6.84±4.39
Single	4.78±3.23	4.78±3.38
Widowed	8.33±6.66	7.33±5.03
Divorced	15.50±2.12	9.50±7.78
	f=7.8, p=0.05	f=2.07, p=0.61
<i>Sharing a bedroom at home</i>		
Not sharing	8.22±6.00	6.00±5.24
A partner in the next room	8.63±4.44	8.38±4.24
Spouse in the same room/bed	8.24±5.03	4.16±0.71
	f=0.92, p=0.95	f=2.07, p=0.35
<i>Previous hospitalization</i>		
Yes	8.12±5.02	6.51±4.24
No	9.25±5.31	7.13±5.22
	z=0.51, p=0.60	z=0.22, p=0.82
<i>Information on illness</i>		
Yes	8.14±4.46	6.48±4.75
Limited	7.69±5.53	6.44±4.02
No	9.21±5.45	7.00±4.40
	f=0.67, p=0.71	f=0.26, p=0.87
<i>Ability to sleep whenever he/she wanted to in hospital</i>		
Yes	7.76±5.05	5.45±4.11
Sometimes	7.50±4.46	9.67±3.72
No	10.17±5.15	8.25±4.33
	f=1.10, p=0.34	f=3.89, p=0.02*
<i>Ability to sleep during daytime in hospital</i>		
Yes	6.96±4.70	4.64±0.70
Sometimes	9.00±5.31	9.45±3.72
No	10.00±5.04	7.80±4.71
	f=1.92, p=0.15	f=6.71, p=0.003**
<i>Sleep problems in hospital</i>		
Yes	11.90±5.61	11.40±3.75
Sometimes	6.69±3.75	7.25±4.34
No	7.88±4.97	4.28±2.64
	f=3.87, p=0.02*	f=15.47, p=0.000**

\*p&lt;0.05, \*\*p&lt;0.01

provide important initial information on the nature of sleep in the hospital setting. To comprehensively understand sleep patterns, there is a need to measure sleep quality in other patient populations along the continuum of a hospitalization.

Despite that most of the patients hospitalized at the neurosurgery clinic in our study were able to sleep whenever they wanted to or during daytime, more than half of them reported sleep problems, indicating a negative influence of hospital environment and hospitalization on sleep, and demonstrating that environmental as well as physical and psychological factors were effectual on sleep quality in hospitals. Our findings are similar to those reported by Doğan et al<sup>5</sup> and Kara<sup>6</sup> in their studies with hospitalized patients in

Turkey. Pain and noise were often reported as factors with negative effects on the quality of sleep. The primary source of noise with negative effects on patients' sleep quality was "noise made by patients and visitors in other rooms/wards" followed by "noises made by hospital staff in the corridors of the unit, loud footsteps, telephone rings, and noises from equipment such as doors, windows, medical carts, and so forth." This finding was in accordance with the literature and research results, that pain and noise were among the major factors that impair sleep quality.<sup>2,5-7,10,19,20</sup>

The total PSQI scores of <5 indicate "good sleep quality," while scores of 5 or greater indicate "poor sleep quality,"<sup>2-4</sup> and according to this definition patients hospitalized at the neurosurgery unit had poor

sleep quality both at patient admission and prior to discharge. Sleep quality prior to discharge, however, was better compared to that at admission. The mean PSQI subjective sleep quality and daytime function disorders scores were significantly lower prior to discharge. In various studies it was found that preoperative worries and fears, and postoperative period pains affect sleep quality in a negative way.<sup>1,5,7,21</sup> That most of the patients had a better sleep quality at discharge might be explained by a positive reflection of decreased physical and psychological problems concerning the operative procedures on the sleep quality. Poor sleep quality prior to discharge, however, can be attributed to physical and psychological problems, such as inability to maintain daily activities at home resulting from the surgery as well as problems related to the hospital environment. Because the patients could not achieve full independence in their daily lives and activities, improvement observed in the Daytime Function Disorders was considered not to reflect the reality. These findings were similar to those reported by Doğan et al.<sup>5</sup>

Age and educational status were not significantly correlated with sleep quality at admission and prior to discharge, and neither was the marital status, and sharing a bed/room with a partner, with no statistically significant difference among the groups. These findings were in accordance with the findings of similar studies.<sup>5,6,8</sup> Gender, however, was an effecting factor on sleep quality at admission: male patients' sleep quality was poorer than that of female patients, with a significant difference between the 2 groups. It is stated in the literature that men could spare time for rest during daytime and may therefore experience more difficulties in sleeping than women who often cannot spare time to rest during daytime, thus, experiencing fewer problems in falling asleep due to physical tiredness.<sup>8,19</sup> Significant differences in sleep observed particularly at admission is in accordance with the literature,<sup>8,19</sup> Doğan et al,<sup>5</sup> and Kara.<sup>6</sup> Hospitalization duration was found not to significantly affect sleep quality ( $p>0.05$ ). In Turkey, however, there are contradictory studies showing that a long hospital stay has a positive effect,<sup>22</sup> while others show no effect of the length of hospital stay on sleep quality.<sup>5,6</sup> Patients who had been hospitalized for the first time, and those who did not have information on their illnesses displayed poorer quality of sleep scores. There were, however, no significant differences between groups. This finding was similar to those reported by studies in our country on sleep quality in hospitals.<sup>5,6</sup> Previous experience of a similar condition may help an individual in adapting to such situations, which has been considered true for patients with previous hospitalization experiences, having fewer problems in falling asleep in our study. Patients experiencing sleep

problems had poorer sleep quality compared to those experiencing seldom or no problems in our study. This finding was also supported by the studies of Kara<sup>6</sup> and Ocağcı<sup>22</sup> in which a significant impact of problems experienced in hospitals on sleep quality had been demonstrated. Patients who were able to sleep whenever they wanted to or during the daytime had better sleep quality prior to discharge. That all patients in our study had been staying in single rooms is considered to be a factor that offered them the opportunity to sleep whenever they wanted to and during the daytime. The finding was supported by Kara,<sup>6</sup> defining that increased number of patients in wards leads to increased sleep problems.

In conclusion, our study demonstrated that patients hospitalized in neurosurgery units had better sleep quality prior to discharge compared to that at admission, that sleep quality of those experiencing sleep problems in hospitals was significantly worse, and that pain and noise were among the major factors with negative effects on patients' quality of sleep. In light of the obtained results the following are suggested: Factors that negatively influence sleep and rest may be identified for each inpatient and relevant interventions may be planned. Procedures that interrupt sleep may be carried out at appropriate times, for example, when patients are not asleep. Patient's sleep pattern and sleep quality may be identified and evaluated using suitable methods. Insufficient hospitalization duration was the weakest part of our study: if it had been one month longer, our results would have been much more reliable. We believe that the findings of our study will provide evidence for healthcare providers when planning interventions to improve quality of sleep.

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