

# Sleep Disorder After Coronary Artery Bypass Operation



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## ABSTRACT

**Introduction:** In general, after coronary artery bypass operation, 39% to 69% of patients experience insomnia, poor sleep quality, and lack of sleep continuity (frequent awakening, difficult sleep, restless sleep, and early morning awakening). The aim of this study was to investigate the sleep quality of patients on the preoperative 1<sup>st</sup> day, postoperative 3<sup>rd</sup> day, postoperative 7<sup>th</sup> day, and postoperative 30<sup>th</sup> day of a coronary artery bypass operation.

**Patients and Methods:** Ninety-nine patients who underwent elective coronary bypass operation in our clinic between January 2017 and January 2018 were included in this study. The patients were assessed using the Pittsburgh Sleep Quality Index (PSQI) questionnaire on the preoperative 1<sup>st</sup> day, postoperative 3<sup>rd</sup> day, postoperative 7<sup>th</sup> day, and postoperative 30<sup>th</sup> day.

**Results:** The mean age of total patients was 61.5 ± 11.4 years (range: 35-80); 67 were male and 22 were female. According to the results of the PSQI survey conducted on patients, there is a statistically significant increase in sleep quality on the postoperative 3<sup>rd</sup> day in comparison with the results of the preoperative 1<sup>st</sup> day evaluation. According to the postoperative 3<sup>rd</sup> day evaluation, there is a statistically significant decrease in sleep quality compared with the postoperative 7<sup>th</sup> and 30<sup>th</sup> days. Also, the PSQI scores of the postoperative period have a statistically significant correlation with age (p= 0.002, p= 0.004, p= 0.009).

**Conclusion:** Although sleep disturbance has a significant impact on the physical and emotional adaptation and recovery after coronary artery bypass operation, the number of studies conducted on this subject is quite low.

**Key Words:** Pittsburgh Sleep Quality Index survey; sleep disorder; coronary artery bypass

## Koroner Arter Baypas Operasyonu Sonrası Uyku Bozukluğu

### ÖZET

**Giriş:** Koroner arter baypas operasyonu sonrasında görülen uyku bozukluğu hastaların yaşam kalitesini önemli ölçüde olumsuz etkilemektedir. Bu çalışmanın amacı, preoperatif birinci gün, postoperatif üçüncü, yedinci ve 30. gün koroner arter baypas operasyonu yapılan hastaların uyku kalitesini araştırmaktır.

**Hastalar ve Yöntem:** Ocak 2017-Ocak 2018 tarihleri arasında kliniğimizde elektif şartlarda koroner arter baypas operasyonu yapılan 99 hasta bu çalışmaya dahil edildi. Hastalar, preoperatif birinci gün, postoperatif üçüncü, yedinci ve 30. gün Pittsburgh Uyku Kalitesi Endeksi anketini yaptılar.

**Bulgular:** Hastaların yaş ortalaması 61.5 ± 11.4 yıl (35-80), 67'si erkek, 22'si kadındı. Hastalara yapılan Pittsburgh Uyku Kalitesi Endeksi anketi sonucuna göre postoperatif üçüncü gün, preoperatif birinci güne göre istatistiksel olarak artış saptanmıştır. Postoperatif yedinci gün ve postoperatif 30. gün postoperatif üçüncü güne göre istatistiksel olarak anlamlı düşüş saptanmıştır. Postoperatif dönem yapılan Pittsburgh Uyku Kalitesi Endeksi anketi puanları yaş ile istatistiksel olarak anlamlı ilişkili saptanmıştır (p= 0.002, p= 0.004, p= 0.009).

**Sonuç:** Uyku bozukluğu koroner arter baypas operasyonu sonrasında fiziksel ve duygusal adaptasyon ve iyileşme üzerindeki etkisinin sık görülmesine rağmen bu konuda yapılan araştırma sayısı oldukça azdır.

**Anahtar Kelimeler:** Pittsburgh Uyku Kalitesi Endeksi anketi; uyku bozukluğu; koroner arter baypas

## INTRODUCTION

After coronary artery bypass graft (CABG) operation, 39% to 69% of patients experience insomnia, poor sleep quality, and lack of sleep continuity (frequent awakening, difficult sleep, restless sleep, and early morning awakening)<sup>(1,2)</sup>. Sleep disturbance significantly affects the patient's quality of life and causes morbidity and mortality<sup>(3)</sup>.

The aim of this study was to investigate the sleep quality of patients on the preoperative 1<sup>st</sup> day, postoperative 3<sup>rd</sup> day, postoperative 7<sup>th</sup> day, and postoperative 30<sup>th</sup> day of a CABG operation.

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## PATIENTS and METHODS

Ninety-nine patients who underwent elective CABG operation in our clinic between January 2017 and January 2018 were included in this study. Patients younger than 35 years and older than 80 years were not included in this study. Also, patients with body mass index above 35 kg/m<sup>2</sup>, having regular alcohol consumption history, having a history of chronic use of hypnotics, previously diagnosed with sleep disorder, who have undergone a surgical operation other than the CABG operation in the last 12 months, and who are illiterate were also excluded from this study. The patients were assessed using the Pittsburgh Sleep Quality Index (PSQI) questionnaire on the preoperative 1<sup>st</sup> day, postoperative 3<sup>rd</sup> day, postoperative 7<sup>th</sup> day, and postoperative 30<sup>th</sup> day.

The PSQI evaluates the sleep quality of the patients. It consists of seven sections: Subjective sleep quality, The time to fall asleep, Sleep time, Sleep effectiveness, Conditions affecting sleep, The use of sleeping agents, and sleepiness during the day<sup>(4)</sup>.

All the sections of the PSQI are calculated with separate scores ranging from 0 to 3. Each section is evaluated both with its own points system and with its general points system in this test. The total score of the test is between 0 and 21. Scores of the test can be interpreted as: 0-5 points, healthy sleep; 6-10 points, bad sleep; and above 10 points, long-term sleep quality impairment<sup>(4)</sup>.

The study protocol was approved by the Healty Sciences University Istanbul Training and Research Hospital Ethics Committee (No: 1579; Date: 07/12/2018). The study was conducted in accordance with the principles of the Declaration of Helsinki.

### Statistical Analysis

Data obtained in the study were analyzed using the SPSS version 15.0 software (SPSS Inc., Chicago, IL, USA). The descriptive statistical analysis results were shown as mean  $\pm$  standard deviation values for numerical data, and as number (n) and percentage (%) for categorical data. Two independent group comparisons of the numerical variables were done using Mann-Whitney U test. Analysis of quantitative variables in dependent groups was performed using Friedman test. Subgroup analysis was done with Wilcoxon test. Correlation between quantitative variables was analyzed with Spearman correlation analysis test. Statistical significance (alpha) value was accepted as  $p < 0.05$ .

## RESULTS

Among the total patients, 67 (67.67%) were male and 32 (32.22%) female. The age of these patients varied between 35 and 80 years (mean, 61.5  $\pm$  11.4 years). We found that diabetes

mellitus in 33.7% patients, hypertension in 39.8% patients, and cigarette use in 59.59% patients. Demographical data of the patients are shown in Table 1.

In this study, we found a statistically significant difference between the preoperative and postoperative sleep scores in the PSQI questionnaire ( $p < 0.001$ ) (Figure 1). We also found a statistically significant increase in the sleep scores of the postoperative 3<sup>rd</sup> day compared to the preoperative 1<sup>st</sup> day. Moreover, a statistically significant decrease has been observed in the sleep scores of postoperative 7<sup>th</sup> and 30<sup>th</sup> day compared to the postoperative 3<sup>rd</sup> day. A statistically significant higher scale point average in the postoperative 7<sup>th</sup> and 30<sup>th</sup> day has also been noted in comparison to the preoperative 1<sup>st</sup> day evaluation ( $p < 0.001$ ) (Table 2).

We did not find any statistically different relationship between the scores obtained as a result of the preoperative PSQI questionnaire and the age variable ( $p = 0.137$ ). However, we found a statistically significant relationship between the scores obtained as a result of the postoperative PSQI questionnaire and age variable ( $p = 0.002$ ,  $p = 0.004$ ; and  $p = 0.009$ ) (Table 3).

Statistical correlation of PSQI questionnaire in terms of gender, profession, chronic kidney failure, diabetes mellitus, hypertension, cerebral hemorrhage, and peripheral artery disease were also evaluated; however, we did not find a correlation between them ( $p > 0.06$ ).

When the operation and postoperative data of the patients were examined, mean number of grafts was found to be 2.8  $\pm$  0.8; extubation time, 5  $\pm$  1.1 hours; drainage, 432  $\pm$  182.5 mL; blood transfusion, 2  $\pm$  0.9 U; intensive care stay, 1.2  $\pm$  0.5 days; discharge time, 4.7  $\pm$  0.7 days (Table 4).

## DISCUSSION

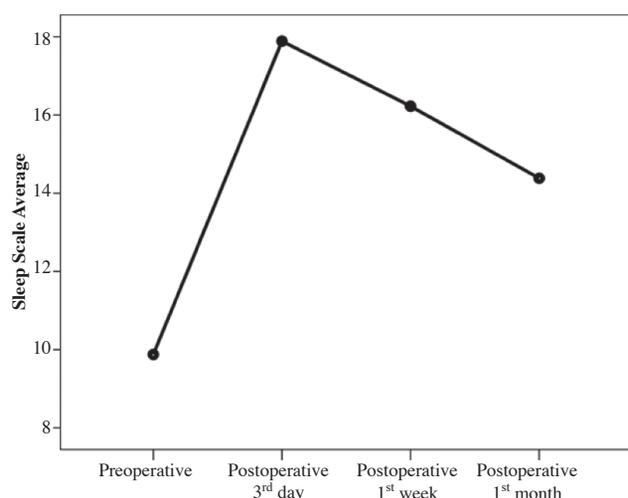
In our study, we aimed to investigate the sleep quality of patients who underwent CABG operation. We observed a statistically significant increase in the sleep scores of postoperative 3<sup>rd</sup> day compared to the preoperative 1<sup>st</sup> day. We also found a statistically significant decrease in sleep scores of postoperative 7<sup>th</sup> and 30<sup>th</sup> day compared to the postoperative 3<sup>rd</sup> day.

Sleep disturbance can be seen in 39% to 69% patients after a CABG operation<sup>(1,2)</sup>. Internal (age, gender, disease, and current sleep disturbance) and external (environmental and medical treatment) factors are considered to be effective in the development of sleep problems observed after CABG operation<sup>(5)</sup>.

Sleep disorders, such as decreased total sleep time, inability to sleep, falling asleep due to rapid eye movements, and daytime sleepiness are common after CABG operation. According to many studies, it was reported that patients who underwent CABG operation had change in their sleep levels after operation<sup>(5-7)</sup>.

**Table 1. Demographical data of patients**

	Mean ± SD	Min-Max
Age	61.5 ± 11.4	35-84
	N	%
Sex		
Male	67	75.3
Female	32	24.7
Profession		
Housewife	21	23.6
Retired	23	25.8
Free	28	31.5
Other	17	19.1
Resume		
Diabetes mellitus	30	33.7
Smoking	58	59.5
Hypertension	35	39.8
Ischemic heart disease	51	57.3
Peripheral arterial disease	4	4.5
Chronic renal failure	4	4.5
Other systemic diseases	15	16.9

**Figure 1.** A statistically significant change was found between the sleep scale of the patients and postoperative.

Changes in sleep patterns seen after CABG operation depends on various factors, for example, individual (age, gender, etc.), physiological (primary sleep disorders, pain, shortness of breath, fatigue, nocturia, etc.), psychological (emotional), and environmental (hospital environment, patient care activities, etc.)<sup>(5,8,9)</sup>. These factors affect sleep patterns before operation, during hospitalization, and during recovery. According to a study, patients with primary sleep disorders have been reported

to have more sleep disorders after CABG operation<sup>(10)</sup>. In our study, patients with primary sleep disorders were not included because we aimed to determine the sleep problems that occurred after CABG operation.

In a study conducted by Redeker et al., they reported that an increase in night sleep time, decrease in daytime sleep time, decrease in the number of night awakenings, and an improvement in sleep quality were observed 6 months after the CABG operation<sup>(11)</sup>. In our study, we found that sleep disorder, frequent awakening, and daytime sleep were seen in the early period after CABG operation.

In a study conducted by Jean-Louis et al., patients who underwent CABG operation were divided into groups according to age and gender. In this study, they found that elderly patients had more sleep disorder than younger patients<sup>(12,13)</sup>. In our study, we also found that sleep disturbance was higher in elderly patients compared to younger patients.

In a prospective meta-analysis study, Cappuccio et al. found that patients who underwent CABG operation had a relationship between stroke or mortality and sleep time in the postoperative period. According to this study, they showed that as the sleep duration decreases, patients have an increase in stroke or mortality rates<sup>(14)</sup>. In our study, there was no stroke or mortality due to sleep problems in patients.

**Table 2.** A statistically significant change in the sleep scale of the patients was detected ( $p < 0.001$ ). There is a statistic increase on the postoperative 3<sup>rd</sup> day according to the preoperative 1<sup>st</sup> day evaluation. According to the postoperative 3<sup>rd</sup> day evaluation, there is a statistic decrease in the postoperative 7<sup>th</sup> and 30<sup>th</sup> days

	Mean $\pm$ SD	Min-Max	Median
Sleep Scale (PSQI)			
Preoperative	9.9 $\pm$ 6.2	0-25	9
Postoperative 3 <sup>rd</sup> day	17.9 $\pm$ 7.5	4-37	18
Postoperative 1 <sup>st</sup> week	16.2 $\pm$ 6.5	4-31	15
Postoperative 1 <sup>st</sup> month	14.4 $\pm$ 6.8	3-31	13
p value	< 0.001		

PSQI: Pittsburgh Sleep Quality.

**Table 3.** Preoperative and postoperative PSQI questionnaire in terms of age. Preoperative sleep scale is not statistically significant in terms of age ( $p = 0.137$ ), and postoperative sleep scale is statistically negative in terms of age ( $p = 0.002$ ,  $p = 0.004$ ,  $p = 0.009$ )

	Age	
	Rho	p
Sleep Scale (PSQI)		
Preoperative	-0.159	0.137
Postoperative 3 <sup>rd</sup> day	-0.323	0.002
Postoperative 1 <sup>st</sup> week	-0.301	0.004
Postoperative 1 <sup>st</sup> month	-0.274	0.009

PSQI: Pittsburgh Sleep Quality.

**Table 4.** Operation and postoperative data

	Mean $\pm$ SD	Min-Max
Number of grafts	2.8 $\pm$ 0.8	1-4
Cross clamp time (min)	42 $\pm$ 15.1	12-120
Cardiopulmonary bypass time (min)	71.8 $\pm$ 23.9	25-152
Postoperative extubation time (hours)	5 $\pm$ 1.1	3-8
Drainage (mL)	432 $\pm$ 182.5	150-950
Blood transfusion (Unit)	2 $\pm$ 0.9	0-9
Intensive care unit duration (days)	1.2 $\pm$ 0.5	1-3
Discharged time (days)	4.7 $\pm$ 0.7	4-5

Many studies have been conducted to find the time when the sleep patterns of patients with sleep problems return to normal after CABG operation. According to a study, they found that in patients who underwent CABG operation, the sleep problem reached the maximum level on the postoperative 1<sup>st</sup> day, began to decline on the postoperative 3<sup>rd</sup> day, and decreased to preoperative levels on the postoperative 6<sup>th</sup> day<sup>(15)</sup>. In our study, we found a statistically significant increase in the postoperative 3<sup>rd</sup> day compared to the preoperative 1<sup>st</sup> day. We found a sta-

tistically significant decrease in postoperative 7<sup>th</sup> and 30<sup>th</sup> day compared to the postoperative 3<sup>rd</sup> day. We also found a statistically significant higher scale point average in the postoperative 7<sup>th</sup> and 30<sup>th</sup> day compared to the preoperative 1<sup>st</sup> day evaluation ( $p < 0.001$ ).

In a study by Magni et al., they found that sleep disturbance persists for months after CABG operation. They also reported that sleep disturbance persisted for about a year in 68% of patients although sleep disturbance improved over time<sup>(16)</sup>.

As a result of a systematic review, it has been shown that after CABG operation, more than 50% of patients with sleep disturbances have different reasons during for the disorder in the 1<sup>st</sup> and 6<sup>th</sup> month<sup>(9)</sup>. According to this study, they found that sleep disturbance after CABG operation persists due to physical and environmental factors (pain, quality of life, and noise)<sup>(17)</sup>. In our study, we found that sleep problems were higher in our patients with low socioeconomic status. In addition, we determined that sleep problems last longer in these patients in the postoperative period.

It is known that patients who have undergone CABG operation have poor sleep quality and problems with irregular sleep cycle and sleep transition<sup>(18)</sup>. Sleep disturbance in the postoperative period may be due to surgical incision site pain, thorax drain, bed rest for a long time, and high anxiety level. In addition, muscle pain, especially in the shoulder, back, and neck; patients' breathing; coughing; and moving may cause difficulty in sleeping<sup>(5)</sup>.

There is a positive relationship between sleep quality and emotional well-being after CABG operation<sup>(10)</sup>. In some studies, various methods, such as cognitive therapy and exercise have been investigated to improve sleep quality in patients<sup>(19-21)</sup>. They also showed in these studies that these methods significantly reduced sleep problems, especially in elderly patients. However, few studies have been conducted on these sleep management strategies in patients undergoing CABG operation<sup>(8)</sup>.

The limitations of this study are retrospective design and use of a single center for the research.

In conclusion, sleep is an important factor in the recovery of patients after CABG operation. The effect of sleep disturbance on physical and emotional aspects and recovery should be further investigated more comprehensively in patients undergoing CABG operation.

**Ethics Committee Approval:** The study protocol was approved by the Healty Sciences University Istanbul Training and Research Hospital Ethics Committee (No: 1579; Date: 07/12/2018).

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

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**Conflict of Interest:** The authors declared that there was no conflict of interest during the preparation and publication of this article.

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