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Original Article

Relationships between sleep, quality of life and anxiety in patients undergoing cardiac surgeries

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Highlights: **(1)** Sleep quality was improved in patients who underwent CABG. **(2)** The quality of life of patients who underwent CABG was improved. **(3)** There was no relationship between anxiety levels and sleep quality. **(4)** It is important to control pain and environmental factors to enhance sleep quality.

Objective: the objective of this study is to examine the relationships between sleep, quality of life and anxiety in patients undergoing cardiac surgeries during the preoperative period, at discharge, two weeks after discharge and three months after discharge. **Method:** this study had a prospective, descriptive and correlational design and was conducted in a single center. The sample consisted of 68 patients who had undergone cardiac surgeries. The data were collected using an Information Form, the State-Trait Anxiety Inventory, the Richard-Campbell Sleep Questionnaire and the Nottingham Health Profile. **Results:** the patients' sleep quality increased from moderate to good at each measurement moment after the surgeries, when compared to sleep quality measured at their first hospitalization. While the state anxiety scores decreased at discharge and 2 weeks after the initial hospitalization, they increased to a moderate level 3 months after discharge. There was no significant relationship between anxiety levels and sleep quality at any measurement moment. Additionally, the patients' quality of life was significantly improved 2 weeks and 3 months after discharge. **Conclusion:** the results of this study showed that the sleep quality of patients who had undergone cardiac surgeries was improved during the postoperative period, and that this improvement exerted a positive effect on their quality of life.

Descriptors: Sleep Quality; Quality of Life; Anxiety; Cardiac Surgical Procedure; Postoperative Period; Health Personnel.

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Introduction

Over the last decade, heart diseases have been the leading cause of death worldwide[1]. According to the World Health Organization, an estimated 17.9 million people died due to cardiovascular diseases in 2019, which accounted for 32% of all deaths worldwide. Additionally, over three-quarters of these deaths were in low- and middle-income countries[2]. The Coronary Artery Bypass Graft (CABG) surgeries are routinely performed in the treatment of coronary artery occlusions[3].

In a systematic review of 41 articles, modifiable determinants that affect the quality of life of patients undergoing CABG were identified. These factors included alcohol consumption, BMI, depression and smoking during the preoperative period, as well as pain, postoperative complications, need for intensive care and hospitalization time during the postoperative period[4]. The surgical interventions, diagnoses, treatments and care practices used can cause sleep-related problems during the postoperative period.

It was reported that the prevalence of sleep disruption was high in patients within 3 months after Coronary Artery Bypass Graft (CABG), and that it was a common health problem[5].

There are studies in the literature reporting that patients' sleep quality after open heart surgeries is poor[6-7]. Due to various complications after surgical interventions, the patients' intensive care hospitalizations can be prolonged. Although not an absolute predictor, state anxiety is an important determinant of poor sleep quality. These factors may affect the patients' ability to adapt to their conditions after the surgery. As a result, anxiety can be seen in individuals who have undergone cardiac surgeries[8]. In the relevant literature, it has been found that patients have sleep problems before and after cardiac surgeries, and that the anxiety they experience affects their sleep quality. Additionally, evidence suggests that individuals experience varying sleep quality levels from one week to ten years after CABG[9-10].

These elements pose a potential danger for the recovery process in patients hospitalized in intensive care units after surgical interventions, mainly due to sleep deprivation[11]. These factors that lead to changes in lifestyles cause a decrease in quality of life and, concurrently, deterioration in terms of health[8].

Although the outcomes related to morbidity and mortality rates after open heart surgeries are favorable, the patients' general well-being should be assessed by means of functional, emotional and mental parameters. Recovery after a cardiac surgery is not determined by physical indicators alone because medical treatment, social factors and psychological factors may also affect the process[12]. It was reported that the physical and mental components of quality of life and the physical limitation of patients after CABG are associated with 5-year mortality[13]. A systematic review revealed that CABG benefit patients and improve their quality of life. Anxiety and/or depression, diabetes *mellitus*, chronic obstructive pulmonary disease, history of stroke and decreased left ventricular function, and renal dysfunction were determined to exert adverse effects on quality of life after CABG[9,13].

Patients with a history of cardiac surgery are oftentimes susceptible to significant psychological disturbances and negative thought patterns that adversely affect their quality of life and need support to normalize their life after the CABG[14]. Additionally, there is not enough evidence to describe the relationship between sleep, quality of life and anxiety characteristics during the postoperative period[12,15]. Therefore, exploring this relationship might help manage the patients' symptoms and contribute to improving the recovery process. Thus, this study aimed at examining the relationships between sleep, quality of life and anxiety in patients undergoing cardiac surgeries during the preoperative period, at discharge, two weeks after discharge and three months after discharge.

Methods

Study design

This research was designed as a prospective, descriptive and correlational study. The Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines was also used[16]. It was conducted between April and November 2022 at a single center, a university hospital in Ankara, Turkey.

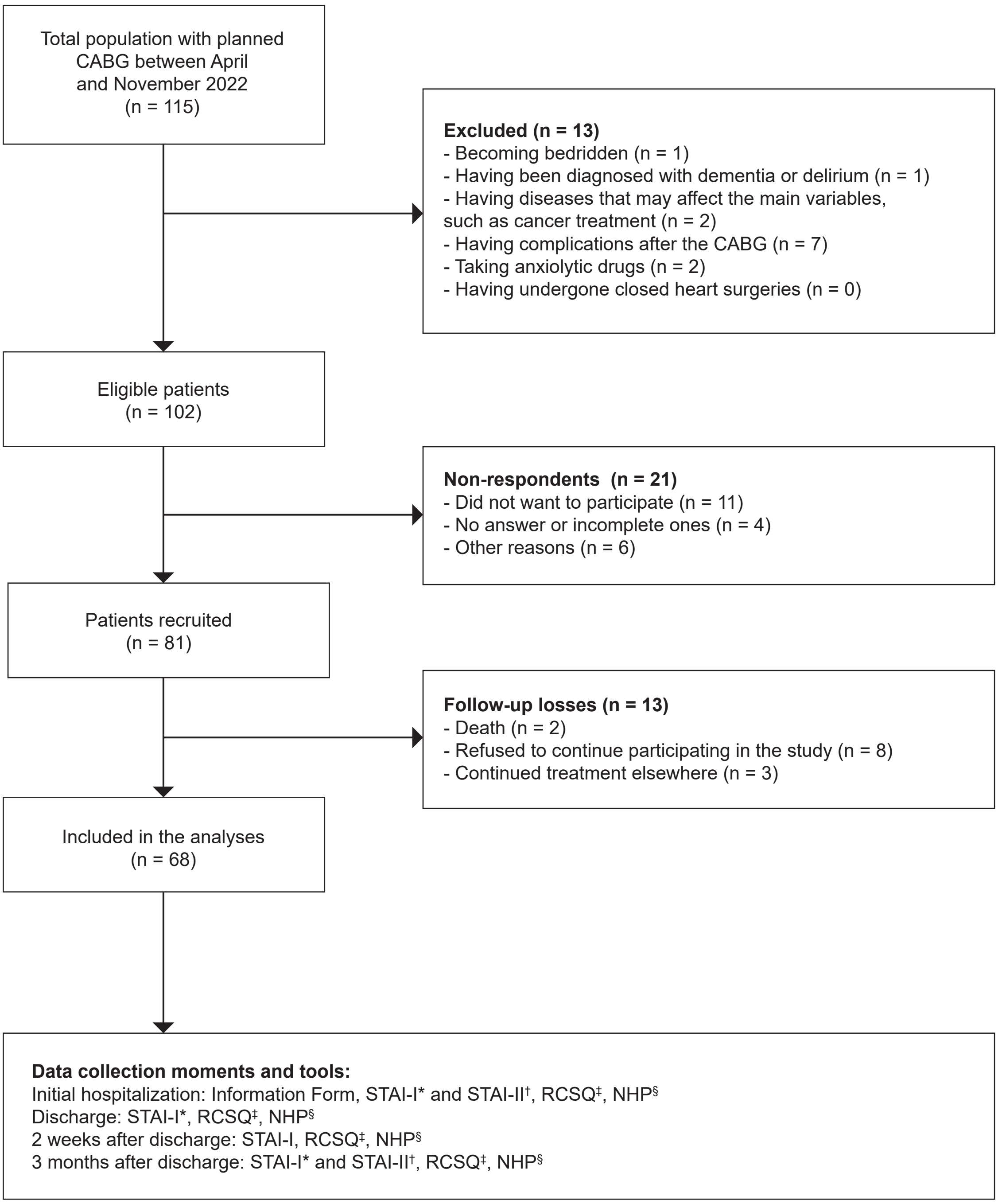
Study participants

The sample size required to conduct the study was calculated by power analysis in the G*Power 3.1.9.7 package program. With reference to a previous study[15], the required sample size was calculated as at least 58 with an effect size of 0.48, α err prob=0.05, and 1-β err prob=0.95. The study was completed with 68 patients (Figure 1). According to the *post-hoc* power analysis, the effect size of the study was 0.3, and the power of the sample to represent the population was 0.80.

The inclusion criteria consisted of patients who willingly agreed to participate in the study in writing, were at least 18 years old, and had undergone open heart CABG. Thirteen patients who met the exclusion criteria were not included in the sample (Figure 1).

Data collection

The data were collected four times from patients who were confirmed to have open heart surgeries (1) when they were initially admitted to the clinic, (2) when they were discharged from the hospital, (3) 2 weeks after their discharge from the hospital, and (4) 3 months after hospital discharge (Figure 1). The second author collected the data by filling the questionnaires out for each patient. Each patient was normally invited to the hospital for follow-up appointments in the outpatient clinic at two moments: two weeks and three months after CABG[3]. Twenty-one patients who did not answer the questionnaires during the data collection process and 13 that could not be reached during follow-up were excluded from the study (Figure 1).



*STAI-I = State Anxiety Inventory; †STAI-II = Trait Anxiety Inventory; ‡RCSQ = Richard-Campbell Sleep Questionnaire; §NHP = Nottingham Health Profile

Figure 1 – Follow-up chart. Ankara, Turkey, 2022

An Information Form created by the researchers, the State-Trait Anxiety Inventory, the Richard-Campbell Sleep Questionnaire and the Nottingham Health Profile were used to collect the data.

Information form

Created by the researchers, this form includes questions about demographic and clinical characteristics that may impact heart health. The patients' medical data were obtained from their records. Their heart disease classification was made by the second author according to the New York Heart Association Classification[17].

State-Trait Anxiety Inventory (STAI-I and STAI-II)

The scale was developed in 1970, and its validity and reliability in Turkish were studied[18]. Each scale consists of 20 items. The scores on each scale range from 20 to 80. High scores indicate high anxiety levels. In this study, the Cronbach's α internal consistency coefficients of STAI were calculated as 0.87 for STAI-I and 0.89 for STAI-II.

Richard-Campbell Sleep Questionnaire (RCSQ)

RCSQ was developed in 1987, and the Turkish validity and reliability study of the scale was performed in 2015[19]. It is a 6-item scale. Each item is scored from 0 to 100 using the Visual Analog Scale technique. A score of "0-25" indicates 'very poor sleep quality', whereas a score of "76-100" means 'very good sleep quality'. The 6th item, which evaluates the noise level in the environment, is not considered in the total score calculation. As the questionnaire score increases, the patient's sleep quality increases. The Cronbach's α coefficient of the questionnaire was calculated as 0.91 in a previously conducted study[19] and as 0.85 in the current one.

Nottingham Health Profile (NHP)

NHP is a general quality of life questionnaire that measures the perceived health problems of a person and the effects of these problems on their activities of daily living. The questionnaire was developed in 1981, and the psychometric properties of the Turkish adaptation of NHP were studied in 1997[20]. The questionnaire consists of 38 items. Each item is answered as "Yes" or "No". The questionnaire assesses six dimensions. Each dimension is scored between 0 and 100. A score of "0" indicates the best health condition, whereas "100" represents the worst. The Cronbach's α coefficient of the questionnaire was calculated as 0.87 in a previously conducted study[20] and as 0.84 in the current one.

Data analysis

Data analysis was performed in the SPSS 22.0 program. In the data analyses, descriptive statistical methods such as frequencies, percentages and mean values were used, as well as the Shapiro-Wilk test. The changes in the variables examined within the study scope over time were evaluated using repeated-measures ANOVA (Bonferroni test for whole group comparisons) and t-test for paired-samples. Pearson's correlation test was used to examine the relationships between variables. The statistical significance level was accepted as $p<0.05$.

Ethical aspects

Approval for the study was obtained from the Social Sciences and Humanities Ethics Committee of Bartın University (Number: 2022-SBB 0191). Institutional permission was obtained and all patients signed the Informed Consent Form. During the study process, the principles set forth in the Declaration of Helsinki were complied with. Permissions to use the Richard-Campbell Sleep Questionnaire and the Nottingham Health Profile were obtained by e-mail from the authors who validated them in the Turkish context. The State-Trait Anxiety Inventory is an open access set of scales.

Results

The patients' demographic and clinical characteristics are shown in Table 1. Their mean age was 62.50±9.771. While 75% of them were male, 88.2% were married and 44.1% had Secondary School degrees. It was discovered that 91.2% of the patients had BMI values in the normal range, 95.6% were at Level 1 according to the New York Heart Association classification, 32.4% were smokers, and 13.2% consumed alcohol. It was determined that 89.7% of the patients had hypertension, 61.8% diabetes, 48.5% hyperlipidemia, and 7.4% chronic obstructive pulmonary disease (COPD). It was found that 91.2% of the patients received antihypertensive treatment, 72.1% underwent anticoagulant treatment, and 39.7% followed oral antidiabetic treatment. The patients' mean surgery time was 7.044±1.098 hours, their mean preoperative hospitalization time was 4.191±1.632 days, their mean postoperative hospitalization time in the intensive care unit was 3.882±1.252 days, and their mean postoperative hospitalization time was 5.029±1.795 days.

Table 1 - Descriptive and clinical characteristics of the patients. Ankara, Turkey, 2022

Variable		X*	SD†
Age		62.50 (min=32, max=87)	9.771
Surgery time, hours		7.044 (min=5, max=10)	1.098
Preoperative hospitalization time, days		4,191 (min=1, max=10)	1.632
Postoperative hospitalization time, days		5.029 (min=2, max=13)	1.795
Intensive care hospitalization time, days		3.882 (min=2, max=7)	1.252
		n	**%**
Gender	Female	17	25.0
	Male	51	75.0
Marital status	Married	60	88.2
	Single	8	11.8
Schooling	Elementary School	6	8.8
	Secondary School	30	44.1
	High School	21	30.9
	University	11	16.2
Body Mass Index	Normal	62	91.2
	Overweight	6	8.8
New York Heart Association Classification	Level 1	65	95.6
	Level 2	3	4.4
Unhealthy habits	Smoking	22	32.4
	Alcohol Use	9	13.2
Existing chronic diseases*	Hypertension	61	89.7
	Diabetes	42	61.8
	Hyperlipidemia	33	48.5
	COPD‡	5	7.4
Regular medication use	Antihypertensive	62	91.2
	Anticoagulant	49	72.1
	Oral antidiabetic	27	39.7

*X = Mean; †SD = Standard Deviation; the percentages are calculated over the total number of participants; ‡COPD = Chronic Obstructive Pulmonary Disease

The results of the comparisons between the RCSQ, STAI-I, STAI-II and NHP scores obtained by the patients based on the time variable are presented in Table 2. It was observed that the patients' mean RCSQ score, which was 39.808±8.471 at the time of their initial hospitalization, was significantly increased at the following measurement moments (F=717.224, p<0.001). It was determined that the RCSQ scores of the patients which were at a moderate level at the time of their initial hospitalization, at discharge and 2 weeks after discharge improved to a good level 3 months after discharge.

While the patients' STAI-I scores decreased significantly from the values at the time of their initial hospitalization (X=41.911; SD=3.254) to those at discharge (X=39.838, SD=2.360) and 2 weeks after discharge (X=37.794; SD=2.965) (F=55.283, p<0.001), their scores 3 months after discharge (X=42.691; SD=1.964) reached similar levels to those in the first assessment. While the patients' mean STAI-II score was 46.088±2.863 at the time of their initial admission, it significantly decreased to 44.573±2.402 3 months after discharge (t=3.402, p=0.001).

The patients' scores regarding pain (F=396.910, p<0.001), physical activity (F=61.359, p<0.001), sleep (F=234.209, p<0.001) and emotional reactions (F=461.155, p<0.001), which are NHP dimensions, significantly decreased 2 weeks and 3 months after discharge. Moreover, a significant (F=622.898, p<0.001) decrease was found in the patients' energy scores 3 months after discharge. It was determined that the patients did not experience any social isolation 3 months after discharge, and that there was a significant decrease (F=27.366, p<0.001) in their social isolation scores from the values at the time of their initial hospitalization to those 2 weeks and 3 months after discharge.

Table 2 - Comparison of RCSQ*, STAI-I†, STAI-II‡ and NHP§ scores obtained by the patients according to the time variable. Ankara, Turkey, 2022

Scale scores	Initial hospitalization (1)		Discharge (2)		2 weeks after discharge (3)		3 months after discharge (4)		F**/t p	Difference
	X‖	SD¶	X‖	SD¶	X‖	SD¶	X‖	SD¶		
RCSQ*	39.80	8.47	53.32	6.29	65.94	5.83	79.15	4.14	717.22 <0.001††	1-2, 1-3, 1-4, 2-3, 2-4, 3-4
STAI-I†	41.91	3.25	39.83	2.36	37.79	2.96	42.69	1.96	55.28 <0.001††	1-2, 1-3, 2-3, 2-4, 3-4
STAI-II‡	46.08	2.86	-	-	-	-	44.57	2.40	3.40 0.001‡‡	
NHP§ Pain	58.63	16.90	-	-	21.87	13.72	3.12	6.25	396.91 <0.001††	1-2, 1-3, 2-3
NHP§ Physical mobility	45.40	18.56	-	-	64.88	13.35	38.41	12.46	61.35 <0.001††	1-2, 1-3, 2-3
NHP§ Energy	98.03	12.72	-	-	92.64	25.00	3.92	12.25	622.89 <0.001††	1-3, 2-3
NHP§ Sleep	78.52	15.18	-	-	51.17	22.75	13.82	18.36	234.20 <0.001††	1-2, 1-3, 2-3
NHP§ Social isolation	20.58	30.11	-	-	1.47	7.17	0.00	0.00	27.36 <0.001††	1-2, 1-3
NHP§ Emotional reactions	76.14	21.82	-	-	24.01	13.10	2.77	5.21	461.15 <0.001††	1-2, 1-3, 2-3

*RCSQ = Richard-Campbell Sleep Questionnaire; †STAI-I = State Anxiety Inventory; ‡STAI-II = Trait Anxiety Inventory; §NHP = Nottingham Health Profile; ‖X = Mean; ¶SD = Standard Deviation; **F = Repeated-measures ANOVA; ††Bonferroni; ‡‡Paired-samples t-test

The relationships between the RCSQ, STAI-I, STAI-II and NHP scores before and three months after the surgeries are shown in Table 3. It was determined that the RCSQ scores were not significantly correlated with the STAI-I or STAI-II values (p>0.05). A significant correlation was found between the overall RCSQ scores obtained by the patients and their scores in the NHP dimensions including Pain, Physical Activity and Energy 3 months after their discharge (p<0.05). It was determined that the patients' RCSQ scores at the time of their initial hospitalization and 2 weeks after their discharge were correlated with their NHP Sleep dimension scores (p<0.05). Additionally, there was a significant correlation between the NHP Emotional reactions dimension scores obtained by the patients and their and RCSQ scores 2 weeks after discharge (p<0.05).

Table 3 - Relationships between the patients' RCSQ* scores and their STAI-I†, STAI-II‡ and NHP§ total and dimension scores. Ankara, Turkey, 2022

Scales and Dimensions	Initial hospitalization RCSQ*		Discharge RCSQ*		2 weeks after discharge RCSQ*		3 months after discharge RCSQ*	
	r‖	p	r‖	p	r‖	p	r‖	p
STAI-I†	-0.162	0.188	-0.088	0.476	0.220	0.071	-0.095	0.439
STAI-II‡	-0.096	0.434	-	-	-	-	-0.171	0.164

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Scales and Dimensions	Initial hospitalization RCSQ*		Discharge RCSQ*		2 weeks after discharge RCSQ*		3 months after discharge RCSQ*	
	r[||]	p	r[||]	p	r[||]	p	r[||]	p
NHP[§] Pain	0.095	0.441	-	-	-0.156	0.204	-0.431	**<0.001**
NHP[§] Physical mobility	0.038	0.757	-	-	0.031	0.805	-0.276	**0.023**
NHP[§] Energy	0.061	0.621	-	-	0.215	0.078	-0.296	**0.014**
NHP[§] Sleep	-0.290	**0.016**	-	-	-0.382	**0.001**	-0.057	0.642
NHP[§] Social isolation	-0.005	0.965	-	-	0.073	0.552	-	-
NHP[§] Emotional reactions	0.020	0.873	-	-	-0.268	**0.027**	-0.205	0.094

*RCSQ = Richard-Campbell Sleep Questionnaire; †STAI-I = State Anxiety Inventory; ‡STAI-II = Trait Anxiety Inventory; §NHP = Nottingham Health Profile; ||r = Pearson's correlation coefficient

The scores obtained by the patients in the RCSQ dimensions are presented in Table 4. It was determined that sleep depth, sleep latency, awakenings, returning to sleep and sleep quality dimension scores of the patients were poor at the time of their initial hospitalization, at discharge, and 2 weeks after discharge. Later on, all scores increased to a good level 3 months after their discharge ($p<0.05$). The patients' scores in the RCSQ dimensions significantly increased at each subsequent measurement. It was also considered that the patients had unfavorable scores due to the noise levels in the hospital environment, but these scores increased to favorable levels after their discharge.

The self-reported reasons for sleep insufficiency defined by the patients are presented in Table 4. The leading reasons for sleep insufficiency reported by the patients at the time of their initial hospitalization were ambient noise (75.0%), anxiety (66.2%), light (64.7%), fear (50%), uncomfortable bed (48.5%), fatigue (48.5%), chest pain (29.4%) and hunger (20.6%). The reasons reported by the patients at the time of their discharge were pain in the incision site (98.5%), difficulty sleeping in the supine position (97.1%), ambient noise (64.7%), uncomfortable bed (63.2%) and fatigue (52.9%). According to their reports 2 weeks after discharge, they mentioned difficulty sleeping in the supine position (98.5%), pain in the incision site (79.4%) and fatigue (48.5%). Based on their testimonies 3 months after discharge, the reasons were strain in the supine position (98.5%) and fatigue (10.3%).

Table 4 - Comparisons of the RCSQ* dimension scores and self-reported reasons for sleep insufficiency. Ankara, Turkey, 2022

Sleep Domain (0-100)	Initial hospitalization (1)		Discharge (2)		2 weeks after discharge (3)		3 months after discharge (4)		F[§]/p[||]	Difference
	X[†]	SD[‡]	X[†]	SD[‡]	X[†]	SD[‡]	X[†]	SD[‡]		
Sleep depth	39.48	9.14	51.17	7.02	64.77	7.40	80.22	4.27	511.53 <0.001	1-2, 1-3,1-4, 2-3, 2-4, 3-4
Sleep latency	40.36	9.63	52.86	7.39	66.98	7.13	78.45	5.27	463.12 <0.001	1-2, 1-3,1-4, 2-3, 2-4, 3-4
Awakenings	39.26	10.69	53.16	7.27	65.80	7.15	79.26	5.74	452.60 <0.001	1-2, 1-3,1-4, 2-3, 2-4, 3-4
Returning to sleep	40.22	9.48	54.33	8.97	65.88	7.62	79.55	5.84	399.34 <0.001	1-2, 1-3,1-4, 2-3, 2-4, 3-4
Sleep quality	39.70	8.71	55.07	7.60	66.25	6.98	78.29	10.01	285.55 <0.001	1-2, 1-3,1-4, 2-3, 2-4, 3-4
Noise level in the environment	33.16	13.68	46.54	12.22	80.00	13.92	88.30	7.65	317.03 <0.001	1-2, 1-3,1-4, 2-3, 2-4, 3-4

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Sleep Domain (0-100)	Initial hospitalization (1)		Discharge (2)		2 weeks after discharge (3)		3 months after discharge (4)		F§/p||	Difference
	X†	SD‡	X†	SD‡	X†	SD‡	X†	SD‡		
Reasons for sleep insufficiency										
	n	%	n	%	n	%	n	%		
Pain at the incision site	-	-	67	98.5	54	79.4	4	5.9		
Difficulty in the supine position	1	1.5	66	97.1	67	98.5	67	98.5		
Ambient noise	51	75.0	44	64.7	4	5.9	-	-		
Light	44	64.7	35	51.5	2	2.9	-	-		
Uncomfortable bed	33	48.5	43	63.2	3	4.4	-	-		
Hunger	14	20.6	6	8.8	3	4.4	-	-		
Fatigue	33	48.5	36	52.9	33	48.5	7	10.3		
Anxiety	45	66.2	3	4.41	-	-	-	-		
Fear	34	50.0	2	2.9	-	-	-	-		
Chest pain	20	29.4	-	-	-	-	-	-		
Respiratory distress	6	8.8	2	2.9	-	-	1	1.5		

*RCSQ = Richard-Campbell Sleep Questionnaire; †X = Mean; ‡SD = Standard Deviation; §F = Repeated-measures ANOVA; ||Bonferroni

Discussion

The mean age of the sample of this study was around early 60s, and the patients had hypertension, diabetes and hyperlipidemia, which have the potential to contribute to the development of coronary heart disease. Additionally, smoking, which can impair vascular health in patients, was common in our sample. It is already known that these problems can affect sleep quality. The age and gender distributions of different samples may vary; however, adopting lifestyle habits that protect heart health and the effective treatment of chronic diseases may be beneficial to pursue normal sleep patterns(21). It is noteworthy that in this study, when the patients were admitted to the hospital, their sleep quality was moderate, their self-reported reasons for sleep insufficiency were fatigue, anxiety, fear and chest pain, and that these factors are also associated with heart failure(21). Furthermore, in this study it was noticed that sleep was affected by ambient noise, lighting and bed comfort. As a consequence, minimizing adverse environmental factors might increase the patients' sleep quality after CABG.

In this study, it was determined that the patients' surgery and hospitalization time in the intensive care unit and the cardiology ward were long, and this situation led them to stay in an environment other than their home. A previous study reported that the main factors disrupting sleep in patients undergoing cardiac surgeries admitted to intensive care units were discomfort and pain caused by medical devices(7). In another study, conducted with 424 surgical patients, it was stated that the prevalence of poor sleep quality was 64.9%, and the variables associated with poor sleep were anxiety, depression, exposure to light, poor social support, having an emergency surgery and moderate to severe pain(22). CABG and the hospital environment are two main components that can negatively affect the patients' anxiety, sleep quality and quality of life. Based on the findings of a study(15), over half of the patients experienced sleep difficulties after hospital discharge following CABG. In our study, it was observed that the patients' sleep quality was moderate after their surgery and 2 weeks after discharge, but it increased to a good level 3 months following discharge. Additionally, the relationships between the quality of life dimension scores obtained by the patients and their overall RCSQ scores were found to be significant at the time of their initial hospitalization and 2 weeks after their discharge. It was determined that the sleep problems experienced by the patients in the early postoperative period were similar to those reported in other studies in the relevant literature, and the reasons for sleep insufficiency included pain in the incision site, difficulty sleeping in the supine position, fatigue and environmental factors. In the long-term evaluation, it was determined that the limitations of staying in the supine position for recovery of the sternum caused sleep insufficiency. It was also found that sleep problems affected the patients' quality of life.

In this study, it was revealed that the patients' state anxiety scores decreased during the postoperative period; however, their anxiety score at 3 months increased to a moderate level similar to their score at the beginning of their treatment. Furthermore, the patients' trait anxiety scores decreased at a high rate. The literature reports that patients oftentimes experience high anxiety levels both before and six months after cardiac surgeries(12). In this study, no significant relationship was found between the patients' anxiety levels and their sleep quality at any of the measurement moments. In the literature, it was stated that preoperative state anxiety exerted a negative effect on sleep quality in patients undergoing CABG(5). A previously conducted study(5) revealed that 4.6% of the patients experienced moderate to severe anxiety, and that 35.6% suffered from moderate to severe depression in the first month after their CABG. In the same study, it was observed that the dynamic changes in the participants' sleep quality continued after discharge due to the resulting physical and psychological stress(5). In this study, there was a significant relationship between the NHP Emotional reactions dimension scores obtained by the patients and their RCSQ scores 2 weeks after their discharge. Poor sleep quality is a symptom that might be associated with several health problems. Maintaining sleep management at home is the patients' responsibility, but reducing their anxiety levels and conducting psychoeducational interventions should be a part of the continuous health care process to improve their sleep quality(6). Enhancing sleep quality may lead to an improvement in the patients' mental well-being and overall outcomes with an increase in their quality of life.

A systematic review of 26 studies on CABG showed that surgical interventions improved the patients' quality of life(9). Another systematic review demonstrated that the quality of life Physical and Mental dimensions (n=7,537) were improved after CABG(10). One study(23) reported that 22% of the patients had a decrease in their score related to the quality of life Physical dimension one year after their cardiac surgery. In this study, it was found that the scores obtained by the patients in the quality of life dimensions were poor before the surgeries, except for the Social isolation dimension. However, there was a significant increase 2 weeks and 3 months after their discharge from the hospital. In a study(15), a significant improvement was reported in physical and social functions during the 6-month follow-up of patients after cardiac surgeries, but the anxiety levels remained high, which was similar to those in preoperative measurements. In this study, it was determined that sleep and quality of life were associated with the pain, physical activity and energy variables 3 months after discharge. The results of this study suggested that improving sleep quality after a CABG might increase quality of life by assisting in management of the patients' pain, physical activity and energy levels.

This study had some limitations. In the first place, anxiety and quality of life were evaluated based on the patients' self-reports, but validated measuring tools were used to reduce bias. Secondly, sleep quality was assessed using a subjective measuring tool and we suggest resorting an objective one such as actigraphy for further studies. Thirdly, the participants were surveyed before and in the short-term after their CABG.

This study has the following strengths: it provides updated data to the literature in which sleep, anxiety and quality of life are evaluated together in CABG patients; in this research, the patients were evaluated during the preoperative period, at discharge, and 2 weeks and 3 months after discharge; another strength is having determined adequacy of the sample through power analysis.

Conclusion

In this study, it was observed that the patients' sleep quality was moderate in the preoperative and early postoperative periods, and that it increased to a good level 3 months after discharge. It is recommended to conduct studies using objective sleep assessments and evaluating sleep, anxiety and quality of life in long-term follow-ups after CABG. It was determined that the patients' state and trait anxiety levels were moderate 3 months after discharge, and these levels did not affect their sleep quality. It was also observed that sleep quality was associated with quality of life, pain, physical activity, energy, sleep and emotional state. It is also evidenced that environmental arrangements in clinical settings are required to help patients enjoy sufficient and healthy sleep. This research suggests conducting qualitative studies to deeply understand the relationship between sleep quality and quality of life components in post-CABG patients.

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