



## Effect of self-care interventions on sleep quality in post-coronary artery bypass grafting patients: A single-center, randomized-controlled study

*Koroner arter baypas greftleme yapılan hastalarda öz bakım girişimlerinin uyku kalitesi üzerine etkisi: Tek merkezli, randomize kontrollü çalışma*

Haleh Ghavami<sup>1</sup>, Fahimeh Safarzadeh<sup>1</sup>, Rasoul Ghare Aghaji Asl<sup>1</sup>

Department of Medical Surgical Nursing, Urmia Medical Sciences University, Urmia, Iran

### ABSTRACT

**Background:** This study aims to evaluate the effect of self-care interventions based on sleep hygiene practices, nutrition, and physical activity on sleep quality in post-coronary artery bypass grafting patients.

**Methods:** This randomized-controlled study included a total of 146 patients (109 males, 37 females; mean age 55.31 years; range, 41 to 65 years) who underwent isolated coronary artery bypass grafting at Seyyed Al- Shohada Hospital of Urmia Medical Sciences University, between September 2017 and May 2018. The patients were divided into two groups as the self-care intervention group (n=73) and as the control group (n=73). The self-care intervention group received six educational courses on sleep hygiene, nutrition, and physical activity. Then they received individualized consulting weekly for three months. The control group was instructed to continue their normal life and routine care and received no education. The Demographic Information Form and the Pittsburgh Sleep Quality Index were used for data collection.

**Results:** The mean Pittsburgh Sleep Quality Index scores in the self-care intervention group decreased to 7.1±2.3 after the intervention, while it increased to 9.5±2.1 in the control group. There was no significant difference between the two groups in terms of the mean global Pittsburgh Sleep Quality Index scores before the study (p=0.91); however, the scores were statistically significantly higher after the self-care intervention (p=0.001).

**Conclusion:** Patients undergoing coronary artery bypass grafting may benefit from self-care interventions based on sleep hygiene, nutrition, and physical activity to improve the quality of sleep.

**Keywords:** Coronary artery bypass grafting; nutrition; physical activity; self-care interventions; sleep hygiene; sleep quality.

### ÖZ

**Amaç:** Bu çalışmada koroner arter baypas greftleme sonrasında hastalarda uyku hijyeni uygulamaları, beslenme ve fiziksel aktivite temelli öz bakım girişimlerinin uyku kalitesi üzerine etkisi incelendi.

**Çalışma planı:** Bu randomize kontrollü çalışmaya Eylül 2017 ve Mayıs 2018 tarihleri arasında Seyyed Al- Shohada Hastanesi'nde izole koroner arter baypas greftleme yapılan toplam 146 hasta (109 erkek, 37 kadın; ort. yaş 55.31 yıl; dağılım, 41-65 yıl) alındı. Hastalar öz bakım girişim grubu (n=73) ve kontrol grubu (n=73) olmak üzere iki gruba ayrıldı. Öz bakım girişim grubuna uyku hijyeni, beslenme ve fiziksel aktiviteye ilişkin altı eğitim kursu verildi. Ardından üç ay boyunca haftada bir kere olmak üzere bireysel danışmanlık verildi. Kontrol grubuna normal yaşamlarına ve rutin bakımlarına devam etmeleri söylendi ve herhangi bir eğitim verilmedi. Verilerin toplanmasında Demografik Bilgi Formu ve Pittsburgh Uyku Kalitesi İndeksi kullanıldı.

**Bulgular:** Girişim sonrasında ortalama Pittsburgh Uyku Kalitesi İndeksi skoru, öz bakım girişim grubunda 7.1±2.3'e geriler iken, kontrol grubunda 9.5±2.1'e yükseldi. İki grup arasında, çalışma öncesi ortalama Pittsburgh Uyku Kalitesi İndeksi skoru açısından anlamlı bir fark bulunamadı (p=0.91); ancak, skorlar öz bakım girişimi sonrasında istatistiksel olarak anlamlı düzeyde daha yüksekti (p=0.001).

**Sonuç:** Koroner arter baypas greftleme yapılan hastalar, uyku kalitelerini artırmak için uyku hijyeni, beslenme ve fiziksel aktivite temelli öz bakım girişimlerinden yarar elde edebilir.

**Anahtar sözcükler:** Koroner arter baypas greftleme; beslenme; fiziksel aktivite; öz bakım girişimleri; uyku hijyeni; uyku kalitesi.

Received: June 22, 2018 Accepted: July 25, 2018

**Correspondence:** Haleh Ghavami, PhD. Department of Medical Surgical Nursing, Urmia Medical Sciences University, 5756115111 Urmia, Iran.  
Tel: 0098 443 275 4963 e-mail: haleh\_ghavami@yahoo.co.uk

### Cite this article as:

Ghavami H, Safarzadeh F, Ghare Aghaji Asl R. Effect of self-care interventions on sleep quality in post-coronary artery bypass grafting patients: A single-center, randomized-controlled study. Turk Gogus Kalp Dama 2018;26(4):550-556.

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Adequate amount and good quality of sleep are basic human needs.<sup>[1]</sup> Sleep quality is defined as the subject's satisfaction with sleep experience, integrating domains of sleep initiation, sleep maintenance, sleep quantity, and refreshment upon awakening.<sup>[2]</sup> Emerging evidence has assigned an important role to sleep as a modulator of metabolic homeostasis. The impact of variations in sleep duration, sleep-disordered breathing, and chronotype to cardiometabolic function encompasses a wide array of perturbations spanning from obesity, insulin resistance, type 2 diabetes, the metabolic syndrome, cardiovascular disease risk, and mortality in both adults and children.<sup>[3]</sup> Defects in sleep quality can disturb emotions, thoughts, and motivation. Individuals with poor quality of sleep show many physical and cognitive symptoms, such as tiredness, exhaustion, difficulty concentrating, decreased pain threshold, loss of appetite, nervousness, anxiety, and depression.<sup>[4]</sup>

Coronary artery bypass grafting (CABG) is common in developed countries. In Iran, 60% of open heart surgeries are CABG.<sup>[5]</sup> Undergoing CABG is a significant life event with an important psycho-emotional impact on patients and their families. Most patients report fear and anxiety, and many of them report that uncertainty about the future is more disturbing than their chest pain.<sup>[6]</sup> Coronary artery bypass grafting contributes to issues such as survival, quality of life, and increase in expectations.<sup>[7]</sup> Sleep disturbances are common after cardiac surgery. They are reported to occur in 60 to 80% of patients in the immediate post-operative period, and alterations in sleep pattern seem to continue to occur in 39 to 69% of cardiac surgery patients during the first month after hospital discharge.<sup>[8]</sup> The sleep pattern of these patients is characterized by shorter periods, frequent awakenings, and a perception of poor quality. As a consequence of fragmented sleep, patients usually experience increased daytime sleepiness, fatigue and irritability, which may reduce their motivation to attend rehabilitation therapy, prolong the recovery period, and increase the length of hospitalizations.<sup>[9]</sup>

Self-care is considered as individuals' performance or practice of activities for their own benefit to maintain health, life, and well-being.<sup>[10]</sup> Concerning undesirable effects of sleep disorders, nurses should ascertain that their patients have enough sleep and rest as a care duty.<sup>[11]</sup>

To the best of our knowledge, there is no study examining the effects of self-care interventions including sleep hygiene, physical activity, and healthy nutrition on quality of sleep in post-CABG patients. Therefore, in the present study, we aimed to evaluate

the effectiveness of self-care interventions as a safe and well-tolerated method, irrespective of any equipment or device used, on sleep quality in post-CABG patients. Our hypothesis was that self-care interventions would improve the quality of sleep in the intervention group.

## PATIENTS AND METHODS

This single-center, randomized-controlled study (RCT No. IRCT20180515039677N1) with a pre-post-test design included a total of 146 patients (109 males, 37 females; mean age 55.31 years; range, 41 to 65 years) between September 2017 and May 2018. Inclusion criteria were as follows: undergoing isolated CABG (not combined with valve replacement surgery), willingness to participate in the study, giving a written informed consent, having sleeping problems on the basis of the Pittsburgh Sleep Quality Index (PSQI), and being older than 18 and younger than 65 years. Exclusion criteria were as follows: previous diagnosis of sleep disorders, chronic use of hypnotics, previous additional surgery within the last six months, participation in another interventional sleep study within the last six months, having major depression, a physical/psychiatric disorder which could seriously impair their physical mobility, and giving consent for withdrawal from the study. The flow diagram is shown in Figure 1. A written informed consent was obtained from each participant. The study protocol was approved by the Ethics Committee of Urmia University of Medical Sciences, Urmia, Iran (IR.UMSU.REC.1396.234). The study was conducted in accordance with the principles of the Declaration of Helsinki.

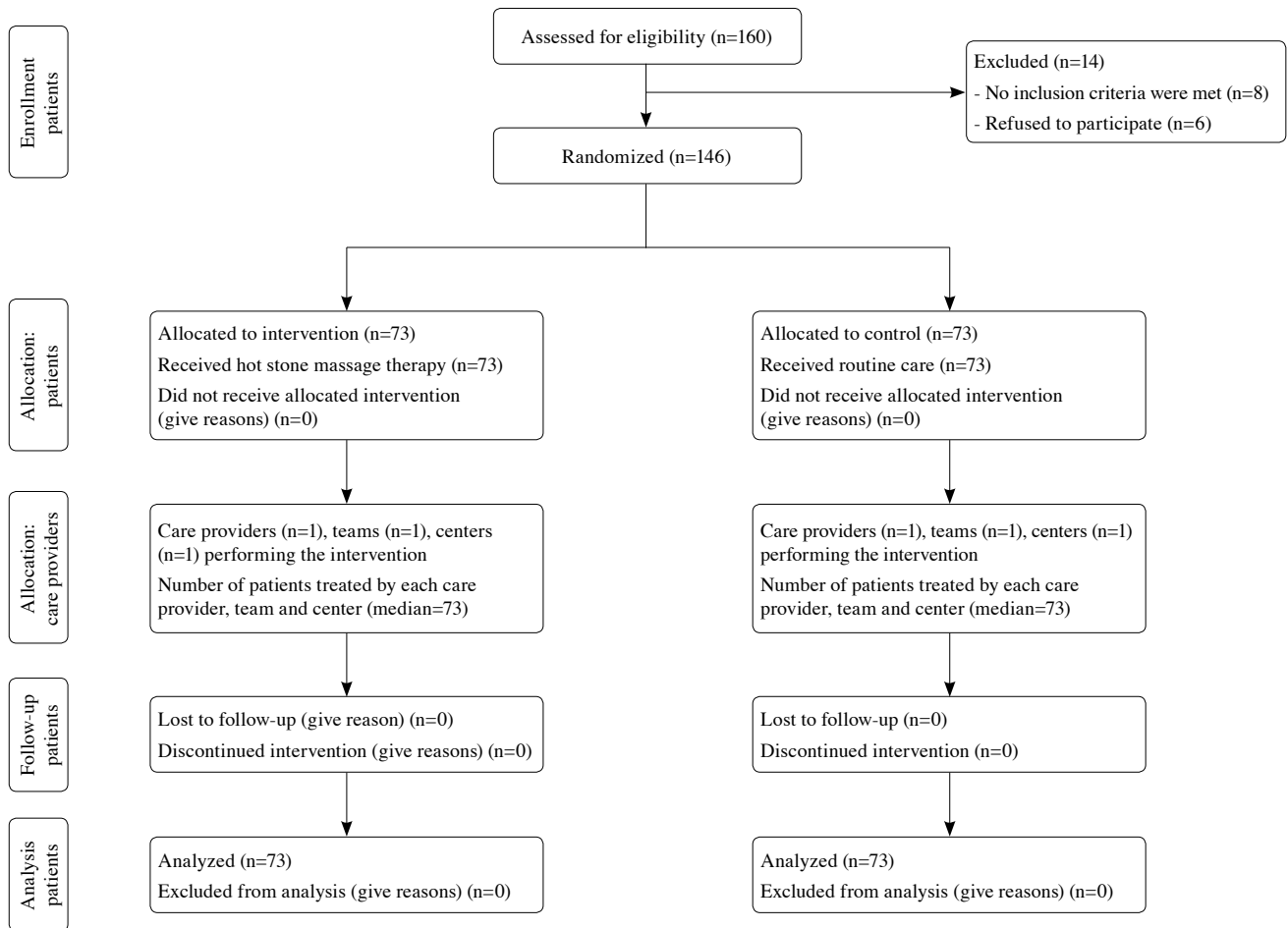
For randomization in this study, an independent investigator made random allocation cards using computer-generated random numbers. The allocator kept the original random allocation sequences in an inaccessible third place and worked with a copy. Instead of the letters A and B, she used the codes I and C (I for the intervention group and C for the control group) to avoid further confusion. Then, she continued randomization until 40 samples were allocated to the intervention group and 40 to the control group.

### Intervention method

#### Interventions for experimental group

##### *First part of intervention (Self-care education)*

A master nursing student at the Division of Critical Care Nursing instructed self-care courses for the intervention group. She also took self-care educational course during her master program before this research.



**Figure 1.** CONSORT flow diagram.

The self-care educational courses were held for each 10 to 11 patients twice a week. Each session lasted 1.5 h, and in total six sessions (including two sessions on sleep hygiene, two sessions on healthy nutrition emphasized on necessary diet changes to get a good night's sleep, and two sessions on physical activity were hold for each of these courses.

In total, seven courses, each of them including six educational sessions, were held. The patients participated in these courses according to the schedule. Fortunately, in the present study, the participants did not have more than one absence session, and the content of the missed session was instructed to them individually at the end of next session.

#### *Second part of intervention (weekly consulting)*

All participants in the intervention group were asked to attend at the counseling sessions (for solving their self-care problems) weekly for three months.

In these counseling sessions, self-care checklist including dietary plan, physical activity, and sleep hygiene during the last month was reviewed by the investigator and its feedback was given to them. Furthermore, they were encouraged to have healthy lifestyle including sleep hygiene, healthy nutrition emphasized on necessary diet changes to get a good night's sleep, and physical activity.

#### **Interventions for control group**

The control group had their routine/traditional care and treatment. They did not receive any self-care intervention or counseling.

#### **Data collection and measurements**

A Demographic Information Form (DIF), and the Persian Version of PSQI were used to collect data. The PSQI is a self-rated questionnaire to evaluate subjective sleep quality in general and clinical populations over the previous month. It consists of 19 self-related

questions and five questions that should be answered by bedmates or roommates. These last five questions are used only for clinical information and, therefore, they are not tabulated in the scoring. The 19 self-related questions are categorized into seven components and graded on a score ranging from 0 to 3. The PSQI components are as follows: (i) subjective sleep quality, (ii) sleep latency, (iii) sleep duration, (iv) habitual sleep efficiency, (v) sleep disturbances, (vi) use of sleeping medication, and (vii) daytime dysfunction. The sum of these components yields one global score, which ranges from 0 to 21, where the highest score indicates the worst sleep quality. A global PSQI score greater than 5 indicates major difficulties in, at least, two components or moderate difficulties in more than three components.<sup>[12]</sup> The validity and reliability of the PSQI were carried out in several studies. In the study of Ghavami and Akyolcu, Cronbach's alpha reliability coefficient of the Persian version of the PSQI scale ( $\alpha$ ) in the first measurement was calculated as 0.746 and it was 0.783 in the last measurement.<sup>[13]</sup> Furthermore, Farrahi Moghaddam *et al.*<sup>[14]</sup> reported a sensitivity of 100%, specificity of 93%, and a Cronbach's alpha coefficient of 0.89% for the Persian version of the questionnaire. The PSQI and DIF were filled for all the participants before the intervention. The PSQI was filled again for all the participants one month after the end of the intervention.

### Statistical analysis

Statistical analysis was performed using the SPSS version 15.0 software (SPSS Inc., Chicago, IL, USA). Descriptive data were expressed in mean  $\pm$  standard deviation (SD) and number (n) and frequency (%). To examine the quantitative variables, paired sample t-test was used, while the chi-square test was used to examine the qualitative variables. The Smirnov-Kolmogorov test was used to analyze the normal distribution of sleep quality scores in both groups before or after the self-care intervention. To compare the global PSQI scores before and after self-care intervention in each of the study groups, the paired t-test and independent t-test were used. The sample size was calculated as 73 participants for each group, based on the findings of a similar study<sup>[2]</sup> with a confidence interval (CI) of 95% and a test power of 80%. A *p* value of 0.05 was considered statistically significant.

### RESULTS

In the present study, 23.3% participants in the control group and 27.4% participants in the intervention group were female. A total of 60.3% participants in the control group and 39.7% in the intervention group were illiterate. In the control group, the mean age was 55.7 $\pm$ 5.1 years, while it was 56.9 $\pm$ 6.5 years in the

**Table 1. Sleep quality scores before and after self-care intervention\***

Groups		Statistic	p value
Control	Before the intervention	1.37	0.051
	After the intervention	1.15	0.140
Intervention	Before the intervention	0.910	0.38
	After the intervention	1.9	0.05

\* The Kolmogorov-Smirnov test was used to test the normal distribution of data. The results show that the distribution of sleep quality scores is normal and parametric tests can be used to test the study hypothesis (*p*>0.05).

**Table 2. Global Pittsburgh Sleep Quality Index scores before and after self-care intervention\***

Groups		Mean $\pm$ SD	p value
Control	Before intervention	9.78 $\pm$ 2.30	0.362
	After intervention	9.54 $\pm$ 2.14	
Intervention	Before intervention	9.83 $\pm$ 3.65	0.001
	After intervention	7.13 $\pm$ 2.26	

SD: Standard deviation; \* Based on the paired t-test, there was a significant difference between the mean global Pittsburgh Sleep Quality Index scores before and after the intervention in the intervention group (*p*=0.001), while there was no significant difference between the mean global Pittsburgh Sleep Quality Index scores before and after the intervention in the control group (*p*=0.36). PSQI, Pittsburgh Sleep Quality Index.

**Table 3. Global Pittsburgh Sleep Quality Index scores before and after self-care intervention\***

Groups		Mean±SD	p value
Control	Before intervention	9.78±2.30	0.914
Intervention		9.83±3.65	
Control	After intervention	9.54±2.14	0.001
Intervention		7.13±2.26	

SD: Standard deviation; \* Based on the independent t-test, there was no significant difference in the mean global Pittsburgh Sleep Quality Index scores before intervention between the control and intervention group (p=0.914); however, the difference between the two groups was significant after the intervention (p=0.001).

intervention group. In addition, 100% participants in both groups were married.

The distribution of sleep quality scores was normal ( $p>0.05$ ) (Table 1).

Based on the paired t-test, in the intervention group a significant difference was found between the mean global PSQI scores before and after the intervention ( $p=0.001$ ). However, in the control group, there was no significant difference between the mean global PSQI scores before and after the intervention ( $p=0.36$ ) (Table 2).

Based on the results of the independent t-test, there was no significant difference in the mean global PSQI scores before the intervention between the control and intervention group ( $p=0.914$ ), although the difference between the two groups was significant after the intervention ( $p=0.001$ ) (Table 3).

## DISCUSSION

This randomized-controlled study was designed to evaluate the effectiveness of a self-care intervention based on sleep hygiene practices, healthy nutrition emphasized on necessary diet changes to get a good night's sleep, and physical activity on quality of sleep in post-CABG patients. Our study findings support our hypothesis that self-care intervention would improve the quality of sleep in post-CABG patients. The results of this study showed a statistically significant difference between the sleep quality before and after the intervention ( $p=0.001$ ), suggesting that applying self-care intervention in post-CABG patients improved their sleep quality.

The improvements in the quality of sleep in post-CABG patients observed in this study were also consistent with changes obtained with other non-pharmacological interventions which had a positive effect on improved quality of sleep in patients with cardiovascular disease, including nurse-led

intervention,<sup>[5]</sup> aromatherapy with lavender oil,<sup>[15]</sup> massage therapy,<sup>[16,17]</sup> jaw relaxation,<sup>[18]</sup> acupressure,<sup>[19]</sup> supervised exercise training program,<sup>[20]</sup> and CD-based relaxation program.<sup>[21]</sup> All of the aforementioned non-pharmacological interventions led to improved quality of sleep in patients with cardiovascular disease. However, negative aspects of most of these methods included the requirement of equipment, increased physiotherapist work force, and an increased cost of treatment. The self-care interventions, as described in our study, were safe and well-tolerated, irrespective of any equipment or device used.

Furthermore, our study is consistent with a previous study carried out by Ranjbaran et al.<sup>[2]</sup> on sleep quality in patients after CABG, which was an interventional study using PRECEDE-PROCEED model. The authors reported that addition of an intervention based on the PRECEDE-PROCEED model to the cardiac rehabilitation program might further improve the sleep quality of patients.

Similar to our study, as a non-pharmacological treatment for symptom management in post-cardiac surgery patients, Akinçi et al.<sup>[22]</sup> showed that posture and relaxation training had beneficial effects on sleep quality, reducing sleep medication use, alleviating dyspnea and pain, and increasing quality of life. On the other hand, the study of Atalan et al.<sup>[23]</sup> showed that the prevalence of sleep disturbances, particularly excessive daytime sleep or poor sleep, were significantly more common in patients with delirium 12 months after surgery. Hence, applying interventions for improving quality of sleep such as self-care interventions, as in our study, may contribute to reduced delirium rates in post-CABG patients.<sup>[23]</sup>

Furthermore, in the study of Akinçi et al.<sup>[22]</sup> investigating the effects of posture and relaxation training on sleep in patients with cardiac surgery demonstrated that, in the postoperative period, sleep

medication use might cause side effects such as respiratory depression, anxiety, cognitive impairments, and weakness. This may also affect the compliance of the patient to the rehabilitation program.

The results of our study provided new insights into how self-care interventions based on; sleep hygiene practices, healthy nutrition emphasized on necessary diet changes to get a good night's sleep, and physical activity, can contribute to improve the quality of sleep and, consequently, to decrease sleep medications-related side effects such as respiratory depression, anxiety, cognitive impairments, and weakness in post-CABG patients.

Nonetheless, there are some limitations to this study. First, the participants in our study were recruited only from one hospital. Second, the duration of intervention in our study was relatively short. Therefore, we recommend further multi-center studies with longer intervention duration to confirm our findings.

In conclusion, despite the high rate of sleep disorders among post-coronary artery bypass grafting patients, using practical and safe methods such as self-care interventions based on sleep hygiene practices, healthy nutrition emphasized on necessary diet changes to get a good night's sleep, and physical activity can contribute to improved quality of sleep, comfort level, and quality of life among these patients. Traditionally, poor sleep quality prompts physicians to prescribe drugs for patients which may be associated with certain adverse effects, such as memory impairment, drug resistance, dependence, and addiction. Our study results suggest that self-care interventions based on sleep hygiene practices, healthy nutrition emphasized on necessary diet changes to get a good night's sleep, and physical activity can be useful to decrease sleep disturbances in this patient population.

#### Acknowledgments

This article was extracted from a master's thesis. The authors would like to express their thanks to the patients who participated in this research.

#### Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

#### Funding

The authors received no financial support for the research and/or authorship of this article.

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