



Survey of Sleep Status and its Related Factors among Hospitalized Patients with Heart Failure

Nazila Javadi, PhD^{1, 2}, Azar Darvishpour, PhD^{2, 3*}, Neda Mehrdad, PhD⁴,
Nasrin Mokhtari Lakeh, RN, MSN⁵

¹Faculty of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran.

²Social Determinants of Health Research Center, Guilan University of Medical Sciences, Rasht, Iran.

³Faculty of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran.

⁴Elderly Health Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran.

⁵Faculty of Nursing and Midwifery, Guilan University of Medical Sciences, Rasht, Iran.

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Abstract

Background: Sleep disorders among heart failure (HF) patients negatively influence the quality of life. Awareness of sleep disturbances, as one of the disturbing factors of the quality of life among HF patients, and its related factors would help health care staff to provide more comprehensive care. Hence, this study was conducted to determine the quality of sleep and its related factors in hospitalized patients with HF.

Methods: This cross-sectional survey study was conducted on 240 patients with HF hospitalized in one of the health centers of Guilan University of Medical Sciences between July and December 2013. Samples were selected by convenience sampling. The Pittsburgh Sleep Quality Index and a researcher-designed questionnaire on sleep disturbing factors were the instruments of this study. The correlation and relationship between sleep quality and variables related to personal, environmental, and disease factors were assessed.

Results: The majority of the samples (91.2%) had a poor sleep quality. A significant positive correlation was found between sleep quality and age ($r = 0.322$; p value < 0.001), body mass index ($r = 0.212$; p value < 0.001), number of comorbidities ($r = 0.205$; p value $= 0.001$), number of hospitalizations ($r = 0.202$; p value < 0.001), number of drugs consumed ($r = 0.178$; p value $= 0.003$), and length of stay in hospital ($r = 0.149$; p value $= 0.011$). Also, significant differences were seen between sleep quality and sex (p value $= 0.014$), smoking (p value $= 0.038$), educational level (p value $= 0.047$), and hospital noise (p value $= 0.004$).

Conclusion: Age, sex, educational level, smoking, and obesity were the most significant factors affecting the sleep quality in our HF patients.

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*Corresponding Author: Azar Darvishpour, Faculty of Nursing and Midwifery, Shahid Beheshti Highway, Daneshjo Street, Faculty of Nursing and Midwifery, Rasht, Iran. 41469-39841. Tel: +98 13 33555056. Fax: +98 13 33550097. E-mail: darvishpour@gums.ac.ir

Introduction

Almost a third of life is passed in sleep. Sleep is a basic physiological need of humans and is required for energy conservation, appearance, and physical well-being; and if it is not provided, the human life is threatened.¹ A healthy heart beats 70-80 times per minute while awake, but it decreases to 60 during sleep. Accordingly, sleep may be helpful to maintain the heart function.²

Human health is associated with the quantity and quality of sleep.³ A review of literature suggests that demographic, environmental, and illness-related factors may contribute to sleep disturbances.⁴ The quality and quantity of sleep are always influenced by physical, psychological, social, and individual factors such as age, sex, medication, body mass index (BMI), socioeconomic status, marital status, educational level, race, smoking, diseases, and physical disorders.⁵ However, the results of some studies on factors associated with sleep quality are inconsistent. For example, one study reported that the common sleep complaints in the older adults were often secondary to their comorbidities and not to aging per se.⁶ Disease and hospitalization have a close relationship with sleep disturbances.⁷ Hospitalization especially leads to disturbances in the sleep pattern and insomnia.⁸

Heart failure (HF) is the common final course of most heart diseases and represents one of the most important clinical challenges in health today.⁹ HF is a common, fatal, and life-threatening condition.¹⁰ There is no exact information on heart disease prevalence in Iran, while reports show that more than 5.8 million Americans suffer from this disease.¹¹ Heart disease reduces the quality of life,¹² and more patients who suffer from heart failure experience a poor quality of life.¹³ Sleep disorders among HF patients negatively influence their quality of life.¹⁴ The results of the Wang et al.¹⁵ study (2010) showed that 81% of the patients with HF reported a poor sleep quality. Poor sleep quality and insomnia symptoms have been associated with worse health, increased health care costs and utilization, absenteeism from work, and increased risk for psychiatric disorders including depression. Daytime sleepiness has been correlated with increased risk of motor vehicle accidents, worse physical health, and increased mortality risk.¹⁶ Chronically disturbed sleep is allied to a number of deleterious effects, including reduced memory and learning ability, compromised immune function, and an increased risk of cardiovascular disease.¹⁷ Also, the quality and quantity of poor sleep, as a stressful situation, will cause the secretion of epinephrine and norepinephrine, which by itself can not only increase palpitation, breathing rate, blood pressure, myocardial need to oxygen, and cardiac dysrhythmia but also reduce renal perfusion. These factors can exacerbate ischemia and infarction and finally cause myocardial infarction.¹⁸ Daytime fatigue, insomnia complaints, increased workload

of the heart, imbalance in the delivery and consumption of myocardial oxygen, and increased activity of sympathetic and neurohormonal systems are the consequences of sleep disturbances in patients with HF. Sleep disturbances among HF patients can lead to death and disability.¹⁹

Awareness of sleep disturbances, as one of the disturbing factors of the quality of life among patients with HF, and its associated factors would enable health care providers to offer more comprehensive care. It is essential to evaluate sleep disturbance factors and to modify many of these factors to maintain an environment for optimal sleep quality which would promote the recovery process.²⁰ Thus, considering the importance of sleep and its negative effects on the quality of life in patients with HF, this study was conducted to determine the quality of sleep and its related factors in hospitalized patients with HF.

Methods

This is a cross-sectional survey study. The study population consisted of all patients with HF hospitalized in one of the health centers of Guilan University of Medical Sciences between July and December 2013. The sample size was calculated based on the Wang et al.¹⁵ study (2010), in which 81% of the patients had HF with poor sleep quality and the rates of precision and acceptable error were 0.05 and 0.09, respectively. The sample size was calculated to be 236; however, for more accuracy, 240 subjects were selected. Samples were selected via the convenience sampling if they met the inclusion criteria, comprising age above 18 years, HF of at least one year's duration, ejection fraction below 40%, being alert, and no history of depression and other mental disorders. The exclusion criteria consisted of HF of less than one year's duration, ejection fraction \geq 40%, absence of alertness, and a history of depression. Initially, 256 patients were approached. Five patients refused to participate in the study. Eleven patients failed to meet the inclusion criteria: 6 patients with HF of less than one year's duration and 5 patients with a history of depression.

The instruments of this study were the Pittsburgh Sleep Quality Index (PSQI) and a researcher-designed questionnaire on sleep-disturbing factors.

The PSQI is a self-rated questionnaire assessing sleep quality and disturbances. It measures the following seven dimensions of sleep characteristics: subjective sleep quality; sleep latency; sleep duration; habitual sleep efficiency; sleep disturbance; use of sleep medication; and daytime functioning. The English version of the questionnaire was used and translated into Persian. There are eighteen items in the scale, with a possible total score between 0 and 21. A higher score denotes a worse sleep quality, with a score higher than 5 indicating a poor sleep quality. The original scale showed good internal consistency (Cronbach's $\alpha =$



0.83) and test-retest reliability ($r = 0.85$; p value < 0.001).²¹ In the Izadi²² study, the reliability of the questionnaire using test-retest was reported as $r = 0.8$.

The researcher-designed questionnaire was comprised of the following categories: 1) personal characteristics such as age, sex, educational level, marital status, employment status, economic status, smoking, job status, and BMI; 2) disease-related factors such as duration of HF, ejection fraction, comorbidities, hospitalization, length of stay in hospital, and drugs; and 3) environmental factors affecting nocturnal awakening such as noise, light, diagnostic testing, control of vital signs, drug prescription, room temperature, and quality of bed. The scientific validity of the questionnaire was confirmed by 10 experts, and its content validity was approved. The reliability of the questionnaire was calculated to be 0.81 using Cronbach's alpha coefficient.

The data on different diseases were extracted from the patients' records. In this study, an ejection fraction $\leq 40\%$ according to the echocardiographic results of the patients' records was considered as systolic HF. The BMI was obtained via the formula: weight (kg) / [height (m) \times height (m)].

The institutional Ethics Committee approved the study protocol, and the study population provided informed consent with the proviso that they could withdraw from the study at any point.

For the statistical analyses, the statistical software SPSS version 16.0 for Windows (SPSS Inc., Chicago, IL) was used, and a p value < 0.05 was considered statistically significant.

Results

The results on 240 hospitalized patients with HF showed that 55% of the samples ($n = 132$) were female and 45% male. The mean age of the samples was 60.17 ± 9.14 years (for women 60.75 ± 8.86 years and for men 59.48 ± 9.48 years). The majority of the study population (47.5%) had an educational level below high school diploma. Also, 85.8% of the patients were married, 82.9% were non-smokers, 63.3% were unemployed, and 49.6% were of the average level of economic status. The frequency, mean, and standard deviation of the variables related to the personal characteristics and disease factors are presented in Tables 1 and 2, and the factors effective on nocturnal awakening are shown in Table 3.

The mean score of sleep quality was 11.61 ± 4.20 in the men, 12.85 ± 3.75 in the women, and 12.29 ± 3.91 in general. The majority (91.2%) had a poor sleep quality (score of 5 or higher). The mean scores in all the dimensions were as follows: sleep latency component = 1.95 ± 0.84 ; sleep duration component = 1.66 ± 0.92 ; habitual sleep efficiency component = 2.06 ± 0.94 ; sleep disturbances component = 1.49 ± 0.73 ; daytime dysfunction component = 1.69 ± 0.80 ; sleep medication component = 1.57 ± 1.20 ; and sleep quality

component = 1.85 ± 0.85 .

Table 1. Patients' characteristics*

Sex	
Male	108 (45)
Female	132 (55)
Educational level	
Illiterate	102 (42.5)
Under diploma	114 (47.5)
Diploma and above	24 (10)
Economic status	
Good	28 (11.6)
Medium	138 (57.5)
Weak	74 (30.8)
Marital status	
Married	206 (85.8)
Single	34 (14.2)
Job status	
Employed	88 (36.6)
Unemployed	152 (63.3)
Smoking	
Yes	41 (17.08)
No	199 (82.9)
Age (y)	60.17 \pm 9.14
Body mass index (kg/m ²)	29.21 \pm 4.16

*Data are presented as n (%)

Table 2. Frequency distribution, mean, and standard deviation of the disease variables*

Comorbid conditions	
Coronary artery disease	96 (40.0)
Hypertension	144 (60.0)
Diabetes mellitus	89 (37.1)
Peripheral vascular disease	28 (11.6)
Chronic obstructive pulmonary disease	31 (12.9)
Asthma	2 (0.8)
Renal dysfunction	71 (29.5)
Gastrointestinal disturbances	32 (13.3)
Arthritis	28 (11.7)
Ejection fraction (%)	30.08 \pm 2.92
Duration of heart failure (mo)	55.37 \pm 30.36
Length of stay in hospital (d)	3.83 \pm 2.25
Number of hospitalizations due to heart failure	5.17 \pm 2.68
Number of medications currently consumed	5.17 \pm 2.68

*Data are presented as mean \pm SD or n (%)

Table 3. Environmental variables*

Variable	Frequency			
	Never	Sometimes	Often	Always
Physical factors				
Noise	121 (50.41)	75 (31.3)	30 (12.5)	14 (5.8)
Light	174 (72.5)	36 (15.0)	17 (7.1)	13 (5.4)
Room temperature	159 (66.3)	46 (19.2)	18 (7.5)	17 (7.1)
Quality of bed	154 (64.2)	43 (17.9)	19 (7.91)	218.8)
Caring factors				
Diagnostic tests	165 (68.8)	46 (19.2)	17 (7.1)	12 (5)
Control of vital signs	170 (70.8)	42 (17.5)	11 (4.6)	17 (7.1)
Drugs prescription	156 (65.0)	52 (21.7)	17 (7.1)	15 (6.3)

*Data are presented as n (%)

Table 4. Sleep quality dimensions*

Subjective sleep quality		Daytime dysfunction	
Very good	20 (8.3)	Daytime drowsiness	
Good	47 (19.6)	Never	63 (26.3)
Bad	121 (50.4)	< Once/week	35 (14.6)
Very bad	52 (21.7)	1–2 times/week	78 (32.5)
		> 3 times/week	64 (26.7)
Sleep latency		Problems with lack of energy	
Time needed to fall asleep		No	24 (10.0)
< 15 minutes	20 (8.3)	Few	60 (25.0)
16–30 minutes	36 (15.0)	Some	99 (41.3)
31–60 minutes	96 (40.0)	Major	57 (23.8)
> 61 minutes	88 (36.7)		
Falling asleep within 30 minutes		Use of sleeping medication	
Never	39 (16.3)	Never	64 (26.7)
< Once/week	41 (17.1)	< Once/week	53 (22.1)
1–2 times/week	82 (34.2)	1–2 times/week	44 (18.3)
> 3 times/week	78 (32.5)	> 3 times/week	79 (32.9)
Sleep duration		Habitual sleep efficiency	
> 7 hours	18 (7.5)	> 85%	17 (7.1)
6–6.9 hours	102 (42.5)	75–84%	49 (20.4)
5–5.9 hours	62 (25.8)	65–74%	76 (31.7)
< 4.9 hours	58 (24.2)	< 64%	98 (40.8)

*Data are presented as n (%)

The results in the different aspects of the sleep quality questionnaire showed that the majority of the samples (50.4%) described their quality of sleep subjectively as “bad” and 21.7% as “very bad”. The results regarding the dimensions of sleep quality are shown in Table 4.

In the sleep disturbance dimension, the majority of the subjects (37.1%) had trouble sleeping after awaking during the night: 67.1% due to urination; 21.3% due to respiratory problems; 21.3% due to cough or snoring; 23.8% because of feeling cold; 15.4% because of feeling hot; 8.3% because of

pain; and 6.3% due to nightmares (Table 4).

In regard to environmental factors, the most frequent physical factor for awakening was ambient noise (49.58%), followed by bed quality (34.57%), room temperature (33.74%), and light (27.49%), respectively. Among the caring factors, the most frequent awakening factor was drug administration (34.99%) and then diagnostic tests (31.24%) and control of vital signs (29.16%).

According to the Pearson correlation coefficient, significant positive correlations were found between sleep



quality and age ($r = 0.322$; p value < 0.001), BMI ($r = 0.212$; p value < 0.001), number of comorbidities ($r = 0.205$; p value < 0.001), number of hospitalization ($r = 0.202$; p value < 0.001), number of medications currently being taken ($r = 0.178$; p value < 0.01), and length of stay in hospital ($r = 0.149$; p value < 0.05). Also, a poor and significantly negative correlation was found between the quality of sleep and the ejection fraction ($r = -0.139$; p value < 0.05), but the relationship between sleep quality and the duration of HF was not significant.

According to the Student *t*-test, there was a significant difference in the mean score of sleep quality between the two sexes ($t = 2.464$; p value = 0.014). Also, there were significant differences in the sleep quality scores based on smoking ($t = 2.088$; p value = 0.038). Nevertheless, no statistically significant differences were observed in the sleep quality scores based on marital status, employment status, comorbidities (e.g. chronic obstructive pulmonary disease, hypertension, and renal dysfunction), and medications (e.g. Digoxin, angiotensin blockers, diuretics, Aldactone, beta blockers, angiotensin-converting enzyme inhibitors, calcium blockers, and nitrates) (p value > 0.05).

Significant differences in the sleep quality scores were observed in relation to hospital ambient noise ($t = 2.920$; p value = 0.004), while no statistically significant differences were indicated between the mean scores of sleep quality and the other physical and caring factors (p value > 0.05).

According to the ANOVA test, significant difference was observed in the sleep quality scores in terms of the educational level ($f = 3.107$; p value = 0.047), whereas there was no statistically significant difference (p value > 0.05) between the mean scores of sleep quality based on the economic status.

Discussion

In the present study, the mean score of sleep quality was high and 91% of the patients had a poor sleep quality: the prevalence and severity of poor sleep quality were higher than those in previous studies. The highest mean score of sleep quality having been reported so far was 11.72 ± 4.41 by the Mystakidou²³ study. In the Wang et al.¹⁵ study (2010) 81%, Redeker⁴ (2006) 68%, Raymond et al.⁸ (2001) 75%, and Santos et al.⁹ (2012) 68.5% patients with HF had a poor sleep quality. The previous studies were conducted on stable patients and outpatients; consequently, the higher prevalence of the poor sleep quality in the patients of the present study may be attributed to the environmental and clinical factors related to hospitalization. Hospitalization has a close relationship with sleep disturbances, such that the majority of patients complain of lack of sleep and sleep disorders in the first 3 nights.⁷

In the sleep disturbance dimension, the majority of our

patients woke up to urinate for more than two or three times at night per week. This finding is consistent with the Wang et al.¹⁵ (2010) study. Awakening may result from a host of environmental, social, psychological, and health-related reasons e.g. sleep-disordered breathing) which are closely associated with poor sleep architecture and decrements in sleep continuity. The resulting decreases in slow-wave sleep may lead to a reduced secretion of rennin and aldosterone, and decreased rapid eye movement (REM) sleep may increase the urine flow and decrease osmolality. These factors may result in nocturia.²⁴ The inappropriate use of diuretics may be involved in urination and urinary frequency at night.¹⁵

In the present study, the majority of the samples had drowsiness. There are similar results in the Redeker⁴ (2006) study. Sleep problems cause fatigue, lack of concentration, and daily sleepiness.¹⁵

The majority of our samples reported sleep duration of less than 4.9 hours. Also, the majority had a delay of half an hour to fall asleep. The results of the Erickson et al.²⁵ study (2003) showed that 56% of the patients with HF had difficulty in falling asleep and 39% had sleep deprivation. The sleep duration mean in this study was 5.13 ± 1.41 hours, which is 6 hours below the sleep duration mean in the Santos et al.⁹ study (2012). The reason for sleep duration reduction is perhaps hospitalization and being away from home and other environmental and clinical factors. Almost one-third of our patients had used sleeping pills; this finding is consistent with the results of the Erickson et al.²⁵ study (2003).

The majority of our patients had difficulty in falling asleep after waking up during the night and most had sleep efficiency less than 64%. Respiratory problems can be noted as factors that reduce sleep efficiency, which increases the waking up frequency during the night. Thus, the use of sleep promoting interventions can be effective in improving sleep efficiency.

In this study, the sleep disorders were more frequent in the individuals with a higher BMI. Park et al.²⁶ (2009) showed that a lack of sleep and a decrease in sleep duration could lead to abdominal obesity. Gangwisch et al.²⁷ (2005) found that individuals who slept less than 7 hours were exposed to overweight and obesity. Vgontzas et al.²⁸ (2008) showed that 47% of the obese people and 25.5% of the non-obese people in their study complained of insomnia. Vitiello et al.²⁹ (2004) and Tworoger¹⁷ (2005) concluded that an increase in the body mass index (BMI) was correlated with a reduction in sleep quality. In obese people, fat deposition in the tissues of the pharynx and the compression of the pharynx by the cervical superficial fat mass cause air-duct stricture, contributing to sleep disorders.³⁰ Obesity is associated with sleep apnea and other sleep disorders.¹⁷ Weight loss in HF patients who are overweight or obese may help reduce sleep disorders and improve sleep quality.

In the present study, the relationship between the quality of sleep and the number of medications taken was significant

and positive. In the Wang et al.¹⁵ study (2010), a significant positive relationship between sleep quality and drugs was obtained ($r = 0.208$; p value = 0.037). Cicolin et al.³¹ (2006) showed that the use of angiotensin-converting enzyme inhibitors might accelerate sleep-disordered breathing. In the Tanabe et al.³² study (2011), the use of the angiotensin-converting enzyme inhibitor was one of the sleep disturbance predictors in patients with hypertension. Also, the relationships between the use of diuretics causing frequent urination at night and beta blockers and sleep problems have been documented in several studies.^{32,33} The poor sleep quality of our samples may be related to sleep apnea and side effects of drugs. Therefore, a good knowledge of drug side effects and their effects on sleep disturbances could be effective in the prevention and treatment of sleep problems and quality of life.

There was an inverse relationship between sleep quality and number of comorbidities among our study population. In the Wolkove³⁴ study, the patients with more diseases had a lower sleep quality. In the Wang et al.¹⁵ study (2010), sleep quality had a significant and positive correlation with the number of associated disabilities ($r = 0.256$; p value = 0.010). An increase in the number of diseases will lead to a rise in the number of drugs taken, which in turn will be followed by more side effects. As was mentioned earlier, side effects of drugs can lead to sleep problems.

Our results demonstrated a positive correlation between the number of hospitalizations and the quality of sleep. In the Wang et al.¹⁵ study (2010), the correlation between the quality of sleep and the number of hospitalizations was significant and positive ($r = 0.207$; p value = 0.038). One study showed that the mean number of admissions per month in the patients with insomnia was nearly twice that of the individuals without a history of sleep disorders.³⁵ Self-care deficits and the severity of the disease may be among the causes of increased hospitalizations.

Sleep disorders among HF patients can negatively influence their quality of life. Such disorders are also known to interfere with self-care practices and increase unplanned hospitalization risks.⁹

There was a positive and significant relationship between sleep quality and sleep duration in this study. Redeker and Hilkert³⁶ (2005) and Tranmer et al.⁷ (2003) also showed that sleep quality was poorer in the patients with longer durations of hospitalization. In contrast, the Dogan et al.³⁷ (2005) study demonstrated no significant correlation between the quality of sleep and the duration of hospitalization. However, patients with more difficulties are liable to have longer hospital stays, and lengthier stays in the hospital separate them from their natural environment of home and cause greater stress by disrupting their normal life. These problems, may, therefore, affect the sleep quality of these patients.

There was a relationship between the ejection fraction and the quality of sleep among our study population: a

reduction in the ejection fraction was tied to an increase in sleep disturbances. In the Skobel et al.³⁸ (2005) study, the mean of the ejection fraction in a group of patients with HF, who had sleep-related breathing problems, was lower than that of those without sleep-related respiratory disorders. This suggests that patients with a lower ejection fraction could experience sleep-related breathing difficulties and the concomitant reduction in sleep quality. In a study in Iran, there was a significant and positive correlation between the quality of sleep and the ejection fraction ($r = 0.017$; p value < 0.05) and between sleep disorders and the ejection fraction ($r = 0.011$; p value < 0.05).⁵

Among our patient population, there was no difference in the mean score of sleep quality based on the economic status; nonetheless, the sleep quality score was higher in the group with a lower economic status. Low income and difficulty in providing healthcare costs will increase personal stress and inability to control disease signs.³⁹ The majority of the patients in the present study were of an average economic status, and most residents of this area of the country prefer to go to private centers if they can afford it. The reasons for this absence of difference may be the relatively cheaper health care costs in state hospitals and the average or poor economic status of the majority of the patients.

The sleep quality scores were higher in the group with less education in our study. Previous studies have reported that people with higher educational levels have a better sleep quality.^{40,37} However, there are studies that have found no relationship between sleep quality and education.¹⁵ Lower levels of education reduce access to self-care educational resources, which can affect the neglect of sleep problems and sleep sanitation.

The sleep quality score was higher in the employed than in the non-employed patients in the current study; however, there was no difference in the scores in terms of the job itself. In the Tworoger et al.¹⁷ study, sleep quality was better among the employed women than among the unemployed ones. Perhaps the poor quality of sleep in the patients of the present study is related to the concerns over absence from work because of hospitalization.

In this study, the older patients had a lower sleep quality. Research has shown that with increasing age, sleep disturbances increase.^{41,42} The results of the studies by Erickson et al.²⁵ (2003), Tranmer et al.⁷ (2003), and Reid et al.⁴³ (2006) showed that the incidence of sleep disorders in the HF patients increased with age. In contrast, Wang et al.¹⁵ (2010), Dogan et al.³⁷ (2005), and Mystakido²³ (2007) found no relationship between sleep and age. The relation between sleep and age is a complex issue and depends on many factors, including disease. An increase in age is in tandem with an increase in the risk of chronic diseases. Conversely, Foley et al.⁶ (2004) focused on sleep complaints in elderly patients with chronic diseases and found no relationship between age and sleep disorders. Be that as it may, the relationship



between age and sleep quality in this study indicates that in elderly patients with HF, there is a greater need for strategies and interventions to enhance sleep quality.

There was an association between the quality of sleep and sex among our patients. The women had a lower sleep quality. Previous studies have shown that women have more sleep disorders and less sleep duration than men.^{44, 45} There are, however, studies that have found no difference in sleep quality based on gender.³⁶ Kalleinen et al.⁴⁶ (2006) suggested that menopause played an important role in the structural changes of elderly women and that their sleep was disrupted in postmenopause as compared to youth years.

In our study, there was no relationship between marital status and sleep quality, which is consistent with the Wang et al.¹⁵ study (2010). There was a relationship between the quality of sleep and marital status in the Dogan et al.³⁷ study (2005). The sleep quality of married individuals is better owing to having a family supportive source. The stress of illness and hospitalization on the one hand and a lack of family support source, on the other, may worsen sleep problems.

In the present study, the smokers had a lower sleep quality than the non-smokers. Sabanayagam and Shankar⁴⁷ (2011) showed that most of the smokers in their study tended to smoke at night and before sleep. Nicotine in cigarettes can cause insomnia and sleep problems and thus reduce sleep quality. The relationship between sleep disorders and cigarette smoking has been documented in other studies.^{22, 47, 48} Smoking cessation may reduce sleep disorders and improve sleep quality in these patients.

Among the environmental factors, noise was the most important factor in nocturnal awakenings. In the Pimental-Souza et al.⁴⁹ (1996) study in Brazil, 45.7% of the patients with sleep disorders complained about ambient noise, 22.9% about the environmental temperature, 20% about the presence of other patients, and 11% about not being accustomed to the hospital environment. Based on the results of the Lei et al.⁵⁰ study (2009), the noise of other patients, nurses, and nurses' shoes was the most important factors in sleep disturbances.

Raymond et al.⁸ reported that their patients often complained of sleep disorders; the complaint might be related to environmental factors such as noise and frequent personnel intervention or internal factors such as delirium, depression, stress, inability in lying down, and pain. The authors concluded that hospitalization significantly caused sleep disorders and nightmares. These disorders may be created by different external factors such as the ambient noise, light, frequent staff intervention, or internal factors such as pain, delirium, depression, stress, and improper positioning of the bed.³⁷ These findings underscore the need for a proper environment to enhance the sleep quality of patients in hospitals.

The use of non-random sampling and self-report questionnaires was the major limitation of the current

study. Therefore, we would recommend that longitudinal studies via random sampling be used to determine the causal relationship between sleep quality and its related factors, using objective measurement tools.

Conclusion

Sleep disorders in patients with HF constitute a side issue which requires due clinical attention. Age, sex, educational level, smoking, and obesity are the most significant factors affecting the sleep quality in HF patients. Moreover, the quality of sleep correlates with clinical factors and associated diseases such as the number of drugs, number of comorbidities, number of hospitalizations, ejection fraction, and length of hospital stay. Some of the sleep-related factors identified in this study such as age and gender cannot be modified, which requires more attention to older female patients by health professionals and clinical staff. Debilitating diseases and the severity of HF can be partly prevented by self-care education and adopting a healthy lifestyle.

The paucity of data on sleep quality and its associated factors in hospitalized patients with HF together with an absence of treatment for sleep disorders can have unpleasant individual and social outcomes. As the poor quality of sleep can have a negative impact on psychological health, physical functioning, quality of life, and longevity, there is a need for the development of interventions to promote sleep quality in patients.

Due to the interaction between sleep and general health and the role which sleep plays in the quality of life, an awareness of the factors associated with the sleep quality in patients with HF would help health care providers to offer more comprehensive care. Health care teams can reduce the number of hospitalizations and improve the quality of sleep in patients by teaching self care and encouraging treatment follow-up.

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References

1. Zakeri Moghadam M, Shaban M, Kazeminejad A, Ghadiani L. Comparison of effective factors on sleeping the nurses and

- hospitalized patient's viewpoints. *Hayat* 2006;12:5-12.
- Zolfaghari M, Farokhnezhad Afshar P, Asadi Noghabi AA, Ajri Khameslou M. Modification of environmental factors on quality of sleep among patients admitted to CCU. *Hayat* 2012;18:61-68.
 - Farhadinasab AA, Azimi H. Study of patterns and subjective quality of sleep and their correlation with personality traits among medical students of Hamadan university of medical sciences. *Sci J Hamadan Univ Med Sci* 2008;15:11-15.
 - Redeker NS, Stein S. Characteristics of sleep in patients with stable heart failure versus a comparison group. *Heart Lung* 2006;35:252-261.
 - Zeighami Mohamadi S, Shahparian M. Evaluation of sleep problems and its associated factors in male patients with systolic heart failure. *Qom Univ Med Sci J* 2013;6:64-73.
 - Foley D, Ancoli-Israel S, Britz P, Walsh J. Sleep disturbances and chronic disease in older adults results of the 2003 national sleep foundation sleep in America survey. *J Psychosom Res* 2004;56:497-502.
 - Tranmer JE, Minard J, Fox LA, Rebelo L. The sleep experience of medical and surgical patients. *Clin Nurs Res* 2003;12:159-173.
 - Raymond I, Nielsen TA, Lavigne G, Manzini C, Choiniere M. Quality of sleep and its daily relationship to pain intensity in hospitalized adult burn patients. *Pain* 2001;92:381-388.
 - dos Santos MA, Guedes Ede S, Barbosa RL, da Cruz Dde A. Sleeping difficulties reported by patients with heart failure. *Rev Lat Am Enfermagem* 2012;20:644-650.
 - Asgharzadeh Haghighi S, Zeighami Mohammadi SH. Mortality and length of hospital stay in elderly with systolic heart failure at Alborz Hospital in Karaj (2003-2008). *J Qazvin Univ Med Sci* 2012;15:86-94.
 - Lloyd-Jones D, Adams R, Carnethon M, De Simone G, Ferguson TB, Flegal K, Ford E, Furie K, Go A, Greenlund K, Haase N, Hailpern S, Ho M, Howard V, Kissela B, Kittner S, Lackland D, Lisabeth L, Marelli A, McDermott M, Meigs J, Mozaffarian D, Nichol G, O'Donnell C, Roger V, Rosamond W, Sacco R, Sorlie P, Stafford R, Steinberger J, Thom T, Wasserthiel-Smoller S, Wong N, Wylie-Rosett J, Hong Y, for the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics-2009 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation* 2009;119:21-181.
 - Shih ML, Chen HM, Chou FH, Huang YF, Lu CH, Chien HC. Quality of life and associated factors in patients with heart failure. *Hu Li Za Zhi* 2010;57:61-71.
 - Shojaei F. Quality of life in patients with heart failure. *Hayat* 2008;14:5-13.
 - Redeker NS, Jeon S, Muench U, Campbell D, Walsleben J, Rapoport DM. Insomnia symptoms and daytime function in stable heart failure. *Sleep* 2010;33:1210-1216.
 - Wang TJ, Lee SC, Tsay SL, Tung HH. Factors influencing heart failure patients' sleep quality. *J Adv Nurs* 2010;66:1730-1740.
 - Buyse DJ, Hall ML, Strollo PJ, Kamarck TW, Owens J, Lee L, Reis E, Matthews KA. Relationships between the Pittsburgh Sleep Quality Index (psqi), Epworth Sleepiness Scale (ess), and clinical/polysomnographic measures in a community sample. *J Clin Sleep Med* 2008;4:563-571.
 - TwoRoger S, Davis S, Vitiello M, Lentz M, McTiernan A. Factors associated with objective (actigraphic) and subjective sleep quality in young adult women. *J Psychosom Res* 2005;59:11-19.
 - Daneshmandi M, Neisheh F, Sadeghi Shermeh M, Ebadi A. Effect of eye mask on sleep quality in patients with acute coronary syndrome. *JCS* 2012;1:135-143.
 - Javaheri Sh. Sleep disorders in systolic heart failure: A prospective study of 100 male patients. The final report. *Int J Cardiol* 2006;106:21-28.
 - Monsén MG, Edélt-Gustafsson UM. Noise and sleep disturbance factors before and after implementation of a behavioral modification program. *Intensive Crit Care Nurs* 2005;21:208-219.
 - Buyse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh sleep quality index: a new instrument for psychiatric practice and research. *Psychiat Res* 1989;28:193-213.
 - Izadi Avani F, Adib Hajbagheri M, Afazel MR. Quality of sleep and its related factors in the hospitalized elderly patients of kashan hospital in 2007. *Feyz* 2009;12:52-59.
 - Mystakidou K, Parpa E, Tsilika E, Pathiaki M, Gennatas K, Smyrmiotis V, Vassiliou I. The relationship of subjective sleep quality pain and quality of life in advanced cancer patients. *Sleep* 2007;30:737-742.
 - Redeker NS, Adams L, Berkowitz R, Blank L, Freudenberger R, Gilbert M, Walsleben J, Zucker MJ, Rapoport D. Nocturia, sleep and daytime function in stable heart failure. *J Card Fail* 2012;18:569-575.
 - Erickson VS, Westlake CA, Dracup KA, Woo MA, Hage A. Sleep disturbance symptoms in patients with heart failure. *AACN Clin Issues* 2003;14:477-487.
 - Park SE, Kim HM, Kim DH, Kim J, Cha BS, Kim DJ. The association between sleep duration and general and abdominal obesity in Koreans: data from the Korean National Health and Nutrition Examination Survey, 2001 and 2005. *Obesity (Silver Spring)* 2009;17:767-771.
 - Gangwisch JE, Malaspina D, Boden-Albala B. Inadequate sleep as a risk factor for obesity: analyses of the Nhanes I. *Sleep* 2005;28:1289-1296.
 - Vgontzas AN, Lin HM, Papaliaga M, Calhoun S, Vela-Bueno A, Chrousos GP, Bixler EO. Short sleep duration and obesity: the role of emotional stress and sleep disturbances. *Int J Obes (Lond)* 2008;32:801-809.
 - Vitiello MV, Larsen LH, Moe KE. Age-related sleep change: gender and estrogen effects on the subjective-objective sleep quality relationships of healthy, noncomplaining older men and women. *J Psychosom Res* 2004;56:503-510.
 - Kiani Asiabar M, Samimi Ardestani H, Mahdi Zadeh J. Radiorequency palatoplasty: soft tissue reduction for snoring. *Teh Univ Med J* 2008;66:118-122.
 - Cicolin A, Mangiardi L, Mutani R, Bucca C. Angiotensin-converting enzyme inhibitors and obstructive sleep apnea. *Mayo Clin Proc* 2006;81:53-55.
 - Tanabe N, Fujita T, Fujii Y, Orii T. Investigation of the factors that contribute to the onset of insomnia in hypertensive patients by using a post-marketing surveillance database. *Yakugaku Zasshi* 2011;131:669-677.
 - Yilmaz MB, Erdem A, Yalta K, Turgut OO, Yilmaz A, Tandogan I. Impact of beta-blockers on sleep in patients with mild hypertension: a randomized trial between nebivolol and metoprolol. *Adv Ther* 2008;25:871-883.
 - Wolkove N, Elkholy O, Baltzan M, Palayew M. Sleep and aging: 2. Management of sleep disorders in older people. *CMAJ* 2007;176:1449-1454.
 - Thase ME. Correlates and consequences of chronic insomnia. *Gen Hosp Psychiatry* 2005;27:100-112.
 - Redeker NS, Hilkert R. Sleep and quality of life in stable heart failure. *J Card Fail* 2005;11:700-704.
 - Dogan O, Ertekin S, Dogan S. Sleep quality in hospitalized patients. *J Clin Nurs* 2005;14:107-113.
 - Skobel E, Norra C, Sinha A, Breuer C, Hanrath P, Stellbrink C. Impact of sleep-related breathing disorders on health-related quality of life in patients with chronic heart failure. *Eur J Heart Fail* 2005;7:505-511.
 - Jean-Louis G, Kripke DF, Ancoli-Israel S, Klauber MR, Sepulveda RS. Sleep duration, illumination, and activity patterns in a population sample: effect of gender and ethnicity. *Biol Psychiatry* 2000;47:921-927.
 - Friedman EM, Love GD, Rosenkranz MA, Urry HL, Davidson RJ, Singer BH, Ryff CD. Socioeconomic status predicts objective and subjective sleep quality in aging women. *Psychosom Med* 2007;69:682-691.
 - Njawe P. Sleep and rest in patients undergoing cardiac surgery. *Nurs Stand* 2003;12:33-37.



42. Tribl GG, Schmeiser-Rieder A, Rosenberger A, Saletu B, Bolitschek J, Kapfhammer G, Katschnig H, Holzinger B, Popovic R, Kunze M, Zeitlhofer J. Sleeping habits in the Austrian population. *Sleep Med* 2002;3:21-28.
43. Reid KJ, Martinovich Z, Finkel S, Statsinger J, Golden R, Harter K, Zee PC. Sleep: a marker of physical and mental health in the elderly. *Am J Geriatr Psychiatry* 2006;14:860-866.
44. Spoomaker VI. Depression and anxiety complaints, relations with sleep disturbances. *Eur Psychiat* 2005;20:205-207.
45. Asai T, Kaneita Y, Uchiyama M, Takemura S, Asai S, Yokoyama E, Miyake T, Harano S, Suzuki K, Ibuka E, Kaneko A, Tsutsui T, Ohida T. Epidemiological study of the relationship between sleep disturbances and somatic and psychological complaints among the Japanese general population. *Sleep Biol Rhythms* 2006;4:55-62.
46. Kalleinen N, Polo O, Himanen SL, Joutsen A, Urrila AS, Polo-Kantola P. Sleep deprivation and hormone therapy in post menopausal women. *Sleep Med* 2006;7:436-437.
47. Sabanayagam C, Shankar A. The association between active smoking, smokeless tobacco, second-hand smoke exposure and insufficient sleep. *Sleep Med* 2011;12:7-11.
48. Jahne A, Cohrs S, Rodenbeck A, Andreas S, Loessl B, Feige B, Kloepfer C, Hornyak M, Riemann D. Nicotine. Influence on sleep and its relevance for psychiatry and psychotherapy. *Nervenarzt* 2010;81:844-859.
49. Pimental- Souza F, Carvalho JC, Siqueria AL. Noise and sleep quality in two hospitals in the city of Belo Horizonte, Brazil. *Braz J Med Biol Res* 1996;29:515-520.
50. Lei Z, Qiongjing Y, Qiuli W, Sabrina K, Xiaojing L, Changli W. Sleep quality and sleep disturbing factors of inpatients in a chimes general hospital. *J Clin Nurs* 2009;18:2521-2529.