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Sleep quality and associated factors among patients with chronic heart failure in Iran

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Abstract

Background: Sleep disorders are common among patients with chronic heart failure (HF), and it can have a significant effect on patients' daily activities as well as their health. The purpose of this study was to assess sleep quality and its predictors in Iranian patients with chronic HF.

Methods: This cross-sectional study was conducted on a sample of 200 patients with HF in two hospitals of Tehran University of Medical Sciences from June to November 2009. These patients completed a demographic questionnaire, and their sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI). One-way analysis of variance (ANOVA), Kruskal-Wallis test, t-test and Linear regression were used for data analysis.

Results: Seventy-nine percent of patients (n = 158) reported poor sleep quality (PSQI > 5). The range of global PSQI scores was 3–20. Also, a significant relationship was found between PSQI scores and patients' age ($p<0.004$), gender ($p< 0.042$), educational level ($p< 0.001$), occupational status ($p< 0.038$), number of hospitalizations ($p< 0.005$), type of referral ($p< 0.001$), non-cardiac diseases ($p< 0.001$), diuretic use ($p< 0.021$) and left ventricular ejection fraction ($p< 0.015$). Three predictors were identified using regression analyses with stepwise methods, and included age, type of referral and educational level.

Conclusion: The high prevalence of poor sleep quality highlighted the importance of sleep disorders in HF patients. There are many factors associated with sleep quality and sleep disorders that health providers should recognize for improved and effective management.

Keywords: Sleep Quality, Heart Failure, Sleep Disorder. .

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Introduction

Heart failure (HF) is a progressive chronic disease (1). Over 15 million people in Europe suffer from HF (2). It is estimated that HF prevalence will be nearly 5.7 million cases by 2030(3).According to Lloyd-Jones, et al. (2010), more than 2.4 million hospitalized patients have HF, and nearly 300000 annual deaths are directly related to HF (4). Although mortality has decreased among patients with HF, it still results in high 5-year mortality similar to many cancers (5).

In September 1999, in Iran, about 25% of hospitalized patients in cardiac wards suffered from HF (6). Moreover, the preva-

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lence of HF will increase to 3500 per 100000 among normal people in the near future (5).

Sleep disorders such as sleep-related breathing disorders (SRBD) including central sleep apnoea syndrome (CSA) and obstructive sleep apnoea (OSA) have been reported in patients with HF (7). One-third of human life is occupied by sleep, and sleep disorders may affect a person's quality of life (8). The prevalence of sleep disorders and SRBD in patients with HF have been reported to be 10–70 % and 10–60%, respectively (1,9). Sleep disorders affect different aspects of life, such as general health, physical and cognitive performance, daily activities and mental health. Psychological manifestations such as reduced cognition and reduced accommodation skills occur because of poor sleep. In addition, increased risks of depression and anxiety disorders are seen in these patients (10). Sleep disorders in these patients are oftentimes mistakenly considered symptoms of HF. Therefore reliable, validated and effective sleep assessment instruments should be used to identify sleep disorders. Few studies have assessed sleep disorders from the view of HF patients (1).The Pittsburg Sleep Quality Index (PSQI) is a standardized instrument used to screen sleep disorders (11). There are around 160 types of sleep-related diseases (12). Epidemiological studies are required to expand our knowledge about different aspects of the common health problems of HF patients. Unfortunately, to date, very few studies have been conducted on the sleep quality of Iranian HF patients. In this study, we determined sleep quality and its predictors in Iranian patients with chronic HF.

Methods

Data

This was a cross-sectional study. The patients were recruited from two large educational hospitals of Tehran University of medical sciences from June to November 2009. HF patients (n = 200) were selected based on the following inclusion criteria: diagnosis of HF as determined by physicians based on signs and symptoms of HF for 6 months or longer, LVEF≤40, age of 18 years or older and willingness to take part in the study. Exclusion criteria included unstable HF, serious psychiatric diseases, other life threatening diseases and hearing impairment.

Data were collected by questionnaires. Questionnaires were divided into two sections. Section 1 required information on the demographic characteristics of the respondents and their clinical status, while section 2 included the PSQI.

Demographic data included age, gender, marital status, level of education, economic status, employment status and body mass index (calculated by using the patients' height and weight). The patients' clinical status consisted of time duration since the diagnosis of HF, number of hospitalizations, type of referral, non-cardiac diseases, diuretic usage and LVEF (obtained from the patients' medical records) and mean blood pressure.

PSQI was used to measure sleep quality over a one month period. This questionnaire includes 18 items comprising seven equally weighted components: subjective sleep quality (1 item), sleep latency (2 items), sleep duration (1 item), sleep efficiency (3 items), sleep disturbances (9 items), day-time dysfunction (2 items) and sedative usage (1 item). The seven components were summed to a single global PSQI score with a possible scale range of 0 to 21. A global score greater than 5 indicates a poor sleep quality.

PSQI has been tested for reliability as well as face and content validity in Iran by Malakouti et al. (2009) (13). The face and content validity of this questionnaire were approved, with an internal consistency as indexed by a Cronbach alpha coefficient of $\alpha = 0.86$ (13), so this questionnaire has good psychometric properties. In the current study, the Cronbach alpha value indicated that our data had adequate reliability ($\alpha = 0.78\%$); content validity was assessed by experts in this field.

After obtaining approval from the Research Council of Tehran University of Medical Sciences, permission for data collection was obtained from the directors of the hospital. The patients who met the inclusion criteria were verbally informed about the purpose of the study. They were informed that all responses would remain anonymous. The questionnaires were administered during the waiting time of the outpatients visiting the hospital and during the time between medical treatment and nursing care of the hospitalized patients.

Statistical Methods

The Statistical Package for Social Science (version 16, SPSS; Chicago, IL) was used to analyze the data. Data analysis approaches included: Descriptive statistics consisting of frequency, percentage, mean, standard deviation (SD) and the range of the data. One-way analysis of variance (ANOVA), Kruskal-Wallis test and t-test were used to compare means between groups, Linear regression analyses with the stepwise method was used to identify predictors of sleep quality. Significance was accepted at a P value less than 0.05 for all statistical analyses.

Results

A total of 200 patients (128 (64%) male, 72 (36%) female), with the mean age of 73.17 years (SD= 10.35) participated in this

Table 1. Frequency distribution of Clinical and demographic characteristics

Variables	n	%
Age		
60<	23	11.5
69-60	41	20.5
70-79	70	35
80-89	66	33
Gender		
Male	128	64
Marital status		
Single	1	0.5
Married	168	84
Divorced or Widowed	31	15.5
Educational level		
College	6	3
Diploma	44	22
Elementary	101	50.5
Illiterate	49	24.5
Occupation		
Employed(active)	17	8.5
Retires	93	46.5
Homemaker	58	29
On sickness leave	32	16
Body-mass index(kg/m^2)		
<20	22	11
20-24.99	94	47
25-29.99	54	27
≥30	30	15
Length of the disease (months)		
<12	132	66
12-23	21	10.5
≥24	47	23.5
LVEF (%)		
10-19	20	10
20-29	35	17.5
30-40	145	72.5
Diuretic consumption		
Yes	167	83.5
Mean blood pressure		
70-89	52	26
90-109	129	64.5
≥110	19	9.5

study. Most patients were married (84%, n=168), educated at an elementary level (50.5%, n= 101), homemakers (29%, n=58) and retired (46.5%, n= 93). The mean BMI of the patients was 24.9kg/m^2 (SD= 4.6kg/m^2). Eighty-four percent of the patients (n= 168) were hospitalized and the rest were outpatients. The mean time since the diagnosis of HF was 37.08 months (SD= 16.88). Underlying non-cardiac diseases included hypertension (25%, n= 50), diabetes mellitus and hypertension both (26.5%, n= 53), diabetes mellitus only (15%, n= 30), hyperlipidemia (12%, n=24), asthma (7.5%, n= 15), arthritis (3%, n= 6) and others (7.5%, n= 15); of the patients, 3.5% (n= 7) did not have any non-cardiac diseases. A majority of the patients (83.5%) were taking diuretics during the study. The mean ejection fraction and mean blood pressure were 34.7% (SD= 7.2) and 96.7 mmHg (SD= 1.05), respectively. Other demographic and clinical characteristics of the participants are shown in Table 1. The global PSQI scores of the patients (N= 200) ranged from 3 to 20 with a mean score of 8.59. The dimensions of sleep quality are shown in Table 2.

With a threshold of 5, (11) about 79% (n= 158) of the patients had a PSQI score greater than 5 and were identified as having poor sleep quality. Fifty-seven percent of the

Table 2. Frequency distribution of dimentions of sleep quality

Dimension		n %
Subjective sleep quality	Very good	5(2.5)
	Good	109(54.5)
	Bad	78(39)
	Very	8(4)
Sleep latency	Never	5(2.5)
	<once/week	137(68.5)
	1-2times/week	42(21)
	≥3times/week	16(8)
Sleep duration	>7hours	16(8)
	6-7hours	109(54.5)
	5-6hours	45(22.5)
	<5hours	30(15)
Habitual sleep efficiency	>85%	53(26.5)
	75-84%	90(45)
	65-74%	39(19.5)
	<64%	18(9)
Use of sleeping medication	Never	123(61.5)
	<once/week	36(18)
	1-2times/week	20(10)
	≥3times/week	21(10.5)
	0.66±1	
Daytime dysfunction	Never	6(3)
Daytime drowsiness	<once/week	121(60.5)
	1-2times/week	68(34)
	≥3times/week	5(2.5)
Problems with lack of energy	Never	4(2)
	<once/week	111(55.5)
	1-2times/week	78(39)
	≥3times/week	7(3.5)

Table 3. Self-reported conditions causing Sleep disorders (n=200)

Condition	Mean (SD)	0-1, n (%)	2-3, n (%)
Have to get up to use the bathroom	2.12(0.57)	22(11)	178(89)
Cannot get to sleep with 30minutes	1.26(0.75)	154(77)	46(23)
Wake up at midnight or early morning	1.96(0.60)	34(17)	166(83)
Have a bad dream	0.57(0.66)	180(90)	20(10)
Have pain	0.94(0.88)	152(76)	48(24)
Cough or snore loudly	0.95(0.74)	165(82.5)	35(17.5)
Cannot breath comfortably	1.58(0.76)	97(48.5)	103(51.5)
Feet too hot	0.30(0.52)	196(98)	4(2)
Feet too cold	0.26(0.54)	196(98)	4(2)

0=not during the past month, 1=less than once a week, 2=once or twice aweek,3-three or more times a week

Table4. Relation between sleep quality and demographic and clinical variables.

Variables	PSQI (Mean±SD)	p
Age		0.004
60<	6.39±3.05	
69-60	8.48±3.75	
70-79	8.40±3.77	
80-89	9.62±3.66	
Gender		0.042
Male	7.90±3.34	
Female	8.97±3.92	
Educational level		<0.001
Diploma and higher	10.64±3.67	
Elementary	7.88±3.32	
Illiterate	6.95±3.96	
Occupation		0.038
Employed(active)	10.88±4.01	
Retires	8.44±3.90	
Homemaker	7.67±3.15	
On sickness leave	9.46±3.55	
Hospitalization frequency		0.005
1-2	7.57±3.56	
3-4	8.40±3.45	
5-6	10.64±3.98	
>7	8.70±4.05	
LVEF (%)		0.015
10-19	9.85±2.66	
20-29	9.82±3.76	
30-40	8.11±3.81	
Diuretic consumption		0.021
Yes	8.89±3.76	
NO	7.06±3.38	
Non cardiac diseases		<0.001
Yes	8.70±3.76	
No	5.28±1.25	

Table 5. Linear regression of predictor variables on sleep quality(N=200)

Variable	B	SE	B(standardized coefficients)	p
Age	0.054	0.025	0.153	0.036
Type of referral	2.240	0.649	0.229	0.001
Noncardiac Comorbidity	-3.941	1.317	-0.200	0.003
Educational level	0.765	0.350	0.160	0.030

Note: analyzed by the stepwise method.p<0.05

patients (n = 114) rated their sleep as fairly good or very good and just 43% (n= 86) rated their sleep as fairly bad or very bad. The mean night-time sleep duration was 5.6 hours (SD= 1.14).

Sixty-one percent of the patients (n= 122) did not use any sleeping medication, and 60% of the patients (n=120) suffered from day-time dysfunction that occurred less than once a week. Self-reported conditions causing sleep disorders are shown in Table 3.

There was a significant relationship between PSQI scores and the four demographic variables of age (p< 0.004), gender (p< 0.04), educational level (p< 0.001) and employment status (p< 0.03), and between PSQI scores and the five clinical variables of the number of hospitalizations (p<0.001), types of referral (p<0.001), non-cardiac diseases (p< 0.001), diuretic usage (p< 0.02) and LVEF (p< 0.015) (Table 4). To identify the predictors of sleep quality, the nine variables were entered into the regression model. The age of the patients, type of referral and educational level were the significant predictors (Table 5).

Discussion

In this study, it was revealed that more than 3/4th of the patients did not have a good sleep. Malakouti et al. found that

most retired elderly Iranians had poor sleep and 29.2% suffered from day-time sleepiness (13). Sleep disorders were reported in 74% of patients with HF in Taiwan (1). In this sample, type of referral played an important role in sleep quality. In our study, most patients were hospitalized; and changes in the patient's environment, physical activity and social limitations, and light exposure at night may have affected melatonin secretion and worsened insomnia (14). In this study, most patients had age>60 years and 85% of them were hospitalized. Several studies reported poor sleep quality in hospitalized older patients (15, 16). Most patients did not use sleep medications and only 39% used sleep medications previously. In a study by Erickson et al. about 32% of the patients used sleep medications (10); most of these patients were elderly and this may explain the findings because sleep disorders increase with age (13). We found that PSQI global scores were different across the age groups. Patients 80 years or older had high global scores for PSQI. Similar results were found in other studies (17,18). Recent studies have also reported that sleep disorders increase with age (19). The results also showed a significant relationship between sleep quality in chronic HF patients and gender. Tamanna et al. reported higher prevalence and intensive sleep disorder in women (20). Educational level has been reported to affect the quality of sleep in patients (21). In 2006 in England, Adam and colleagues reported that women with lower educational levels have better sleep habits compared to those with higher education (22).

The results of this study revealed that sleep quality is significantly associated with employment status. Friedman reported that the social and economic status of elderly patients is related to sleep quality (23). This study also found a significant relationship between type of referral and sleep quality ($p< 0.00$), indicating that hospitalized patients had worse sleep quality compared to outpatients. Therefore, a change in a patient's environment may worsen insomnia (14).

In this study, most patients using diuretics had poor sleep quality. Medications such as diuretics cause urination and nocturnal enuresis. Previous studies have shown that nocturia is correlated with a worsened sleep quality (16). Nocturia negatively influences the quality of sleep (24). In this study, most patients over 50 years of age and patients with EF between 10 and 20% were poor sleepers compared to patients with EF between 30 and 40%. HF patients with EF less than 40% usually suffer from SRBD (25). Usually, the male gender and >60 years of age are risk factors for disordered breathing during sleep (such as Cheyne-Stokes) in HF patients (25). In this study, many patients were male and in the age range of 60 years or older. Our reports may not reflect self-reported sleep disorders in the whole country because this research was conducted in Tehran hospitals only. The lack of objective data from polysomnography to identify SRBD including CSA and OSAis another limitation of this study. There was a strong correlation between the OSA severity and risk of hypertension. Moderate to severe OSA is associated with prevalent hypertension. Sleep deprivation and insomnia were related to the increase in the incidence and prevalence of hypertention (26). No significant correlation was found between BP and sleep quality in this study. Moreover, the means of blood pressure was not high in this study.

Conclusion

Several factors were related to sleep quality. Sleep is a complex concept and nurses and other health providers should understand the multifactorial nature of sleep disorders to achieve effective management (1). A higher rate of poor sleep quality in Iranian patients with HF suggests the necessity to attend more to the sleep of patients; for example, diuretics should be used in a suitable time during the day to avoid interference with sleep. The findings of this study may be of importance to healthcare provid-

ers, particularly cardiovascular nurses and physicians to consider sleep quality as a vital element of their treatment plans.

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