



SLEEP QUALITY AND ITS CONTRIBUTING FACTORS AMONG HOSPITALIZED HEART FAILURE PATIENTS

Cardiology

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KEYWORDS

INTRODUCTION:

Sleep is defined as a periodic, reversible state of cognitive and sensory disengagement from the external environment. The body undergoes various physiological changes during sleep that is important for growth and hemostasis. Poor sleep quality and insomnia have been associated with day time somnolence and worsening of health, thereby causing increased health care costs and utilization. Chronically disturbed sleep causes deleterious effects, including reduced memory and learning ability, compromised immune function, and an increased risk of cardiovascular disease.

Sleep deprivation can affect many organ functions and health consequences including weakening immune system, increasing cardiovascular events, cognitive function impairment, and increased risk of falling and bone fracture in elderly.

Heart failure (HF) is the common final course of most heart diseases and represents one of the most important clinical challenges in health today. 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.

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.

Our study aimed to assess Sleep Quality and contributing factors among hospitalized HF patients.

METHODOLOGY:

This study is prospective observational study conducted at Department of Cardiology of Mahatma Gandhi Hospital, Jaipur. 50 patients (18 years or above) with HF of at least one year duration, admitted in CCU during period of July 2021 to December 2021 were included in the study after obtaining their written informed consent. The study was approved by the institutional ethical committee via letter MGMC &H/IEC/JPR/202/492 (dated June 21, 2021).

Samples were collected if they met inclusion criteria which was 18 years or above with HF of at least one year duration and EF $\leq$ 40%.

The exclusion criteria were HF < 1year duration, LVEF >40%, conditions that can disturb sleep-wake cycle including hepatic encephalopathy, uremic encephalopathy, toxic or substance intoxication or withdrawal and CNS infection and patients not giving consent.

These patients were personally interviewed using Pittsburgh Sleep Quality Index (PSQI) questionnaire to evaluate sleep quality at home and Richards-Campbell Sleep Questionnaire (RCSQ) to evaluate sleep quality in hospital, and baseline clinical characteristics including age, sex, underlying disease and current medication use were recorded.

The questionnaires of this study were PSQI and RCSQ. PSQI is a self-rated questionnaire which assesses sleep quality and disturbances over a 1-month time interval. It contains 19 individual items generating seven "component" scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The sum of scores for these seven components yields one global score with a range of 0-21 points, a score of 0 indicating no difficulty and a score of 21 indicating severe difficulty in all areas. A global PSQI score greater than 5 yielded a diagnostic sensitivity of 89.6% and specificity of 86.5% in distinguishing good and poor sleepers (1). RCSQ is a five-item visual analog scale and the scores for each item are marked on a 100-mm rule, with 0 mm corresponding to poor sleep and 100 mm corresponding to optimal sleep. The total score was calculated by dividing the resulting sum of the score of five items by five. Sleep is rated as bad if score between 0-33 mm, poor if score ranged from 34-66 mm and good if score between 67-100 mm (2).

RESULTS:

In our study, among 50 patients, 30 (60%) were males and 20 (40%) were females. Mean age of patients were 50.8 years and average BMI was 21.9kg/m². Among all cases 36 patients were smokers and 17 patients had h/o alcohol intake. The three most common underlying diseases were hypertension (68%), CAD (66%), and type 2 diabetes mellitus (44%).

Table 1 demonstrates frequency and mean of personal characteristics and disease conditions in patients.

Table 1: Baseline clinical characteristics

1.	Sex	
	Male	30 (60%)
	Female	20 (40%)
2.	Age (years, mean)	50.8
3.	BMI (kg/m ² , mean)	21.9
4.	Smoking	36 (72%)
5.	Alcohol	17 (34%)
	Underlying disease	
	Hypertension	34 (68%)
	Type 2 diabetes mellitus	22 (44%)
	Hypothyroidism	2 (4%)
	Asthma	1 (2%)
	Anemia	7 (14%)
	Coronary artery disease	33 (66%)
	Stroke / CVA	3 (6%)
	Chronic obstructive pulmonary disease	19 (38%)
	Kidney disease (AKI/CKD)	14 (28%)

Majority of cases (82%) had a poor sleep quality (PSQI score of 5 or higher).

Table 2 show prevalence of poor sleep quality (PSQI score)

Table 2 Prevalence of poor sleep quality (PSQI Score)

Components	At Home %
Subjective sleep quality $\geq$ 2	19 (38%)
Sleep latency > 30 mins	15 (30%)
Sleep Duration < 6 hours	18 (36%)
Sleep efficiency < 85%	26 (52%)
Sleep Disturbances	14 (28%)
Use of sleep medications	8 (16%)
Day time dysfunction	11 (22%)
Global PSQI score (score of 5 or higher)	41 (82%)

Mean PSQI Score in males was 11.50 and in females was 12.10. Significant improvement shown in sleep quality (RCSQ scale) from the day of admission to the third day during hospital stay.

Table 3a and 3b demonstrates the same.

Table 3a: Sleep quality Score (PSQI Score)

Group (n = 50)	Mean PSQI Score
Male (30)	11.50
Female (20)	12.10
General (50)	11.70

Table 3b: Sleep quality at Hospital (RCSQ Scale)

Parameters	At first night of admission sleep quality (Scale < 66 mm), n=50	At third night of admission (Scale < 66 mm), n=50
Last Night Sleep (Light to deep)	38 (76%)	15 (30%)
Lat Night Sleep latency (Unable to sleep to sleep immediately)	43 (86%)	19 (38%)
Spent most of the Last Night (awake to barely woke up)	28 (56%)	8 (16%)
Last Night Sleep When you woke up (unable to fall back to sleep right away)	31 (62%)	3 (6%)
Last Night Sleep Quality (badly to well)	44 (88%)	14 (28%)

26 patients had sleep duration less than 6hours, their subjective sleep quality score was more than 2.

Table 4 demonstrates relation between duration of sleep and sleep quality score

Table 4: Relation between duration of sleep and sleep quality

Duration of sleep	n=50	Subjective Sleep Quality score (≥ 2)
>7 hours	5 (10%)	0.6
6-7 hours	19 (38%)	1.7
5-6 hours	14 (28%)	2.2
< 5 hours	12 (24%)	2.6

Mean subjective sleep quality score >2 at home was mostly found in age group more than 50 years and cases aged >70years had score 2.66. Sleep score was bad in age group >70 years and was poor in age group 50-70 years according to RCSQ score at hospital.

Table 5 demonstrates relation between age group and sleep quality at home and at hospital

Tables 5 Relation between Age group and sleep quality at home and at hospital

Age Group (n=50)	Mean subjective Sleep Quality score (0 to 3) (at home)	Mean RCSQ score (Total score 100) (at hospital)
< 40 (4)	0.75	77.2
41 – 50 (10)	1.6	65.8
51 – 60 (15)	2.13	56.4
61 – 70 (12)	2.41	43.6
>70 (9)	2.66	27.4

Mean subjective Sleep Quality score was poor in smokers as compared to non smokers.

Table 6 demonstrates the same.

Tables 6 Relation between Smokers vs Non- Smokers and Sleep quality

N=50	Mean subjective Sleep Quality score (0 to 3)
Smokers (36 %)	2.18
Non – smokers (14 %)	1.64

Factors affecting sleep quality at hospital are shown in Table 7 and Table 8 shows relation between number of comorbidities and sleep quality at home and hospital

Tables 7 Factors affecting sleep quality at Hospital

Physical/Environmental Factors	At first night of admission, n = 50 (%)	At third night of admission, n= 50 (%)
Sound / Noise	39 (78%)	27 (54%)
Light	43 (86%)	33 (66%)
Breathing Difficulty	28 (56%)	18 (36%)
Pain	27 (54%)	31 (62%)
Stress	14 (28%)	10 (20%)

Tables 8 Relation between number of comorbidities and sleep quality at Home and hospital

Table 8: Relation between number of comorbidities and sleep quality at home and hospital

Number of Comorbidities	N=50 (%)	Subjective Sleep Quality score (≥ 2) (at home)	RCSQ scale (Scale < 66 mm) (at hospital)
0	1 (2%)	0 (0%)	0 (0%)
1	14 (28%)	2 (4%)	4 (8%)
2	19 (38%)	12 (24%)	14 (28%)
>2	16 (32%)	12 (24%)	13 (26%)

DISCUSSION:

Our study demonstrated that the mean score of sleep quality was high and 82% of the patients had a poor sleep quality, the prevalence and severity of poor sleep quality were higher than those in previous studies. These findings were comparable with study done by Wang et al. study (2010) 81%, Redeker (2006) 67%, and Santos et al. (2012) 68.5% patients with HF had a poor sleep quality. The mean score of sleep quality of our study was 11.50 in the male, 12.10 in the female, and 11.70 in general. Similarly, Mystakidou in their study reported the mean score of sleep quality to be 12.0 (3). 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.

There was significant improvement shown in sleep quality (RCSQ scale) from the day of admission to the third day during hospital stay. The sleep quality during admission worsened in all components including sleep latency, wake after sleep onset, early morning awakening, sleep efficiency, and subjective sleep quality. This may be due to familiarity of patients with hospital environment and improvement of medical illness.

Majority of patients >50% (26) had sleep duration less than 6hours, their subjective sleep quality score was more than 2. The reason for sleep duration reduction may be due to hospitalization and other environmental and clinical factors. These findings were similar to study done by nazila et al. In which majority of their samples reported sleep duration of less than 4.9 hours.

In our study, mean subjective sleep quality score >2 at home was mostly found in age group more than 50 years and cases aged >70years had score 2.66. Sleep score was bad in age group >70 years and was poor in age group 50-70 years according to RCSQ score at hospital. However, in the admitted patients sleep quality remained poorer compared to home which supports the fact that a hospital environment likely affects the sleep quality in the hospital. Sleep disorders increases with aging. Various studies done by Erickson et al. (2003), Tranmer et al. (2003), and Reid et al. (2006) showed that the incidence of sleep disorders in the HF patients increased with age. This can be due to multifactorial causes including medical comorbidities, chronic diseases. This finding shows that there is greater need for intervention to enhance sleep quality in elderly patients.

In the present study, the smokers had a lower sleep quality than the non-smokers. Sabanayagam and Shankar (2011) in their study found that most of the smokers tends to smoke at night and before sleep. Nicotine in cigarettes can cause insomnia and thereby, reducing sleep quality. Smoking cessation may reduce sleep disorders and improve sleep quality in these patients.

In our study, light disturbance, noise and breathing difficulty were the factors that contributed to the poor sleep quality, this finding corresponded to a previous study which demonstrated that light and noise exposures were the most disruptive factors contributing to poor sleep quality. Light exposure is known to suppress the release of melatonin, a sleep-promoting substance produced from the pineal gland controlled by the suprachiasmatic nuclei (SCN), the central circadian clock located in the hypothalamus thus, affecting circadian rhythm.

In our study, there was inverse relation between sleep quality and number of comorbidities. Similarly, Wang et al.15 study (2010), in their study reported sleep quality had a significant and positive correlation with the number of associated disabilities and study done by Wolkove, found that the patients with more diseases had a lower sleep quality. This may be due to disease itself and increase in number of drug intake. Many studies have shown that sleep deprivation was associated with unfavorable medical condition, such as impaired host immune function, stimulating an inflammatory process of the body,

impaired cognitive function, or even increased risk of coronary events.

This study conducted on the sleep quality of hospitalized patients demonstrated a high prevalence of poor sleep quality in hospitalized patients, and interestingly, the sleep quality was partly improved during hospitalization. There are various measures that can be taken to improve sleep quality in hospitalized patients – cessation of smoking, minimizing light exposure by using eye mask / dim lights, preventive measures for development of chronic disease.

The use of non-random sampling and self-report questionnaires was the major limitation of the current study. Our study was only conducted on the 1st day and the 3rd day of hospital admission so the study with longer follow-up may give more insight on the true sleep quality affected by hospitalization.

CONCLUSION:

Sleep disorders in patients with HF constitute a side issue which requires due clinical attention. There are various modifiable and non-modifiable factors affecting sleep quality. Age and smoking 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 comorbidities and physical/environmental factors. Age and sex being non modifiable factors, older female patients requires more attention by health professionals and clinical staff. Sleep quality can be improved by cessation of smoking, preventive use of eye masks in hospital environment. Early preventive measures to be taken for development of debilitating diseases and severity of heart failure by adopting healthy life style and self-care education.

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.

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