ORIGINAL ARTICLE

Sleep Quality in the Admitted Elderly: A Prospective Observational Study in Eastern India

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Received on: 03 July 2022; *Accepted on:* 26 July 2022; *Published on:* 31 August 2022

Abstract

Background: With declining age, elderly admissions are encountered with sleep disturbances during the hospital stay. Poor sleep health can adversely affect many organ functions causing a weakened immune system, increased adverse cardiovascular events, impaired cognitive function, and increased fall risk and frailty in the elderly. The present study tried to address the issue of sleep quality in admitted elderly patients in a hospital setup.

Materials and methods: A prospective observational study was conducted among the elderly inpatients of a few tertiary care setups in Eastern India. Patients were personally interviewed to evaluate the history of sleep quality at home, sleep quality after the first and the third days of admission, and potential associated factors. The Pittsburgh Sleep Quality Index (PSQI) was used to assess the sleep quality in the subjects. Patient-reported factors contributing to poor sleep health were noted. Data were statistically analyzed.

Results: Sleep efficiency is significantly affected by hospital stay. The global PSQI score conferred poor sleep quality in 51.05% elderly in baseline, 58.64% after the first night of hospitalization, and 62.86% after the third night of hospitalization. Sleep quality was assessed using PSQI questionnaire. Prolonged sleep latency and decreased total sleep duration were noted among study participants at the third time point in comparison with the first. Factors like doctor–nurse interruption, pain, light, and noise as some of the most frequently reported factors contributed to poorer sleep. Higher age, infrequent physical activity, previous history of hospitalization, anxiety, and depressive state were significantly associated with higher odds of poor sleep quality.

Conclusion: The study demonstrated that overall sleep quality was significantly affected during hospital stay in older adults. Patient-reported factors contributing toward poorer sleep health must be intervened in order to achieve better treatment outcomes in the elderly.

Keywords: Elderly, Hospitalization, Pittsburgh Sleep Quality Index, Sleep quality.

Bengal Physician Journal (2022): 10.5005/jp-journals-10070-7085

Introduction

Sleep has a crucial role in health and is a universal need for all higher life forms including humans, the absence of which leads to serious physiological and psychological consequences. Sleep plays an active role in memory functions, regulation of emotions, and metabolic actions. Sleep architecture, however, faces a considerable change with age. From infancy to adulthood, sleep architecture undergoes marked changes in terms of initiation, maintenance, and percentage of time spent in each sleep stage.[1,2] Sleep efficiency is known to decline with age; however, the underlying reasons are much more complex and poorly understood.[3]

Sleep efficiency is also compromised during stress, illness, or change in the environment of sleep such as hospitalization. Physical factors (acute illness, disease severity, and pain), psychological factors (e.g., stress, anxiety), environmental factors (e.g., light, noise), and other allied factors (medication effects, medical interventions, doctor and nurse interruptions, etc.) all contribute to compromised sleep quality and quantity in hospitalized patients.[4,5] With declining age, elderly admissions are encountered with sleep disturbances during the hospital stay which in turn adversely affects the cognitive and holistic well-being. Poor sleep health can further adversely affect many organ functions causing weakened immune system, increased adverse cardiovascular events, impaired cognitive function, and increased fall risk and frailty in the elderly.[6] The present study tried to address the issue of sleep quality in admitted elderly patients in a hospital setup and their adaptation of sleep qualities overtime after 3 days of admission.

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How to cite this article: Mukherjee S, Era N, Singh R, *et al*. Sleep Quality in the Admitted Elderly: A Prospective Observational Study in Eastern India. Bengal Physician Journal 2022;9(2):30–34.

Source of support: Nil

Conflict of interest: None

Materials and Methods

A prospective observational study was conducted in inpatient wards of few tertiary care teaching hospitals in Eastern India. The study commenced only after obtaining due permission for conduct from the institutional ethics committee. Patients aged 60 years or above, admitted to the facility, were included in the study. Those having psychiatric ailments or underlying conditions that may affect

the sleep quality (sleep apnea, allergic rhinitis, etc.) were excluded from the study. Eligible patients willing to participate in the study were included and baseline clinical characteristics, including age, gender, physical activity, alcohol, and smoking habits, were noted. Each patient was interviewed using PSQI[7] questionnaires to evaluate sleep quality at home, sleep quality at the first and the third nights of admission, and patients were also asked to identify factors that disturb their sleep during admission, including light exposure, sound exposure, disturbance by doctors, disturbance by nurses, stress, pain, and other factors if any.

Principal diagnosis was also obtained from a medical record. Pittsburgh Sleep Quality Index was used to measure the quality and patterns of sleep among adults. It includes seven components: subjective sleep quality (C1), sleep latency (C2), sleep duration (C3), habitual sleep efficiency (C4), sleep disturbances (C5), use of sleeping medications (C6), and daytime dysfunction (C7). Each component has a range of 0–3 points. A score of 0 indicates no difficulty, while a score of 3 indicates severe difficulty. The seven components are added to yield one global score, with a range of 0–21 points, 0 indicating no difficulty and 21 indicating severe difficulty. A total score of 5 or greater is indicative of poor sleep quality. A 5-item Geriatric Depression Scale (GDS)[8] and Generalized Anxiety Disorder 7-item[9] (GAD-7) scale were used for subjective assessment of anxiety and depression status in included subjects.

Baseline characteristics and all factors that affect sleep quality were analyzed by a *t*-test or Mann–Whitney *U*-test for continuous data and a Chi-square or Fisher's exact test for categorical data. The statistically significant difference was determined at $p < 0.05$. All statistical analyses for various measures were performed using various statistical software packages like Statistical Package for the Social Sciences [Windows version 21.0; SPSS Inc., Chicago (IL), USA] and Microsoft Excel.

Results

The study included a total of 250 elderly inpatients admitted in a tertiary care teaching setup in Eastern India. The sleep questionnaire was completed by 237 elderly subjects, who were included in the final analysis. The mean recorded age was 69.25 ± 10.12 years, with 51.48% females representing the total study population. Other basic demographics like marital status, education, physical activity, smoking, and alcohol habits were noted (Table 1).

Sleep quality was assessed using the PSQI questionnaire. Components like subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, and daytime sleepiness were adjudged at various time points. Mean latency of sleep was significantly increased to 34.66 ± 17.83 minutes after the first night ($p < 0.001$) and 33.56 ± 20.52 minutes after the third night of hospitalization ($p < 0.001$), compared with 22.35 ± 12.66 minutes recorded at baseline. While more than 20.67% of elderly reported having more than 7 hours of total sleep duration prior to hospitalization, the percentage dropped to 8.44% by the third night of hospital stay. Mean sleep duration was recorded 5.4 ± 2.51 hours at baseline, which decreased to 5.11 ± 1.73 hours by the first night ($p = 0.1437$) and 4.32 ± 1.75 hours by the third night ($p < 0.001$). Daytime sleepiness was reported in higher number of elderly during hospitalization than otherwise (Table 2).

Use of subjective scales of anxiety and depression revealed anxiety to be present in around 15% elderly and 27.42% were found to have symptoms suggestive of depression (Table 3).

Table 1: Patient characteristics

Variable	*Frequency (%)*
Age (years)	
60–69	104 (43.88)
70–79	83 (35.02)
>80	50 (21.09)
Gender	
Male	115 (48.52)
Female	122 (51.48)
Marital status	
Married	169 (71.31)
Widowed/widower	68 (28.69)
Education	
No formal schooling	59 (24.89)
Primary school	30 (12.65)
Secondary school	73 (30.80)
Graduate or higher	75 (31.64)
Physical activity	
Regular	165 (69.62)
Irregular	72 (30.38)
Smoking status	
Smokers	108 (45.57)
Nonsmokers	129 (54.43)
Alcohol consumption	
Alcoholic	92 (38.81)
Nonalcoholic	145 (61.18)

Patient-reported factors contributing to poor sleep profile in the hospital are listed in Table 4. Doctor–nurse interruption, pain, light, and noise were among the most frequently reported factors after the first night of hospital stay. However, the results show the patient acclimatizing to the hospital environment gradually, with the patient-reported figures for light, noise, and care interruptions dropping by the third night of stay.

Factors like age, gender, marital status, physical activity, education, smoking, alcoholism, previous hospitalization episode, daytime naps, hypnotic use, anxiety, and depression status were assessed for any possible association with poor sleep quality. Higher age (above 70 years), infrequent physical activity, previous history of hospitalization, anxiety, and depressive state were significantly associated with higher odds of poor sleep quality (Table 5).

Discussion

Poor sleep quality during hospitalization is a cause of concern across a range of inpatient settings worldwide. Impaired sleep quality during hospitalization, specifically in the elderly, has been associated with worse health outcomes. Sleep in the elderly is usually characterized by decreased deep sleep, increased lighter sleep, frequent awakenings, less REM sleep, and eventually lesser total sleep time. Complaints of insomnia are more frequent in older adults, in whom sleep arousal is much more frequent due to environmental stimuli of noise or light.[10,11] Such stimuli being much more prevalent in the hospital setup, elder admitted patients are more frequently noted with poorer sleep profiles. Apart from the environmental cues, other factors like anxiety, depression, family support, and prevailing illness contribute toward aggravation of this

Table 2: Assessment of sleep quality in admitted elderly subjects

	At home (baseline)	*First night of admission*	*Third night of admission*
		Frequency (%)	
Subjective sleep quality (C1)			
Very good	85 (35.86)	59 (24.89)	34 (14.34)
Fairly good	64 (27)	51 (21.52)	34 (14.34)
Fairly bad	55 (23.20)	84 (35.44)	105 (44.30)
Very bad	33 (13.92)	43 (18.14)	64 (27)
Sleep latency (C2)			
<15 min	49 (20.67)	29 (12.23)	35 (14.76)
16–30 min	132 (55.69)	84 (35.44)	91 (38.39)
31–60 min	45 (18.99)	98 (41.35)	80 (33.75)
>60 min	11 (4.64)	26 (10.97)	31 (13.08)
Sleep duration (C3)			
>7 hours	49 (20.67)	12 (5.06)	20 (8.44)
6–7 hours	43 (18.14)	29 (12.22)	35 (14.76)
5–6 hours	76 (32.06)	122 (51.47)	92 (38.82)
<5 hours	69 (29.11)	74 (31.22)	90 (37.97)
Habitual sleep efficiency (C4)			
>85%	43 (18.14)	30 (12.65)	28 (11.81)
75–84%	79 (33.33)	51 (21.52)	67 (28.27)
65–74%	76 (32.06)	122 (51.48)	82 (34.59)
<65%	39 (16.45)	74 (31.22)	60 (25.31)
Sleep disturbances (C5)			
Not in last month	102 (43.04)	102 (43.04)	54 (22.78)
Once in a week	84 (35.44)	84 (35.44)	99 (41.77)
1–2 times a week	39 (16.45)	39 (16.45)	76 (32.06)
More than thrice a week	12 (5.06)	12 (5.06)	8 (3.37)
Use of sleeping medications (C6)			
Not in last month	173 (72.99)	173 (72.99)	144 (60.75)
One tablet in a week	23 (9.70)	23 (9.70)	10 (4.21)
1–2 tablets in a week	17 (7.17)	17 (7.17)	5 (2.11)
More than 3 tablets in a week	24 (10.12)	24 (10.12)	78 (32.91)
Daytime dysfunction (C7)			
Not difficult	132 (55.69)	128 (54)	102 (43.04)
Little difficult	69 (29.11)	82 (34.59)	100 (42.19)
Difficult	24 (10.12)	25 (10.54)	27 (11.39)
Very difficult	12 (5.06)	2 (0.84)	8 (3.37)
Global PSQI score			
Less than 5	116 (48.94)	98 (41.35)	88 (37.13)
5 or more	121 (51.05)	139 (58.64)	149 (62.86)

Values expressed as frequency (%)

Table 3: Subjective assessment of anxiety and depressive state

Subjective scale	*Grade*	*Frequency (%)*
GAD-7	No anxiety	151 (63.71)
	Mild	51 (21.51)
	Moderate	25 (10.54)
	Severe	10 (4.21)
GDS-5	No depression	172 (72.57)
	Symptoms suggestive of depression	65 (27.42)

issue during hospital stay. The present study thus tried to oversee the burden of poor sleep quality in elderly admitted patients in our hospital setups.

The study included a total of 237 elderly patients whose response regarding sleep quality was recorded at three time points–baseline, after the first, and the third night of hospitalization. As a part of our results, sleep-quality index was seen to deteriorate at the third time point in comparison with the first, thus suggesting that sleep efficiency is significantly affected by hospital stay. The global PSQI score conferred poor sleep quality in 51.05% elderly in

Table 4: Patient reported factors for poor sleep quality

	First night of admission	*Third night of admission*
Light	80 (33.75)	45 (18.98)
Noise	66 (27.84)	52 (21.94)
Hot/cold	11 (4.64)	10 (4.21)
Stress	28 (11.81)	37 (15.61)
Physical symptoms (dyspnea/ cough, etc.)	5 (2.11)	6 (2.53)
Frequent urination	17 (7.17)	14 (5.9)
Pain	79 (33.33)	97 (40.93)
Doctor–nurse interruption	93 (39.24)	61 (25.73)
Others	13 (5.48)	8 (3.37)

Values expressed as frequency (%)

baseline, 58.64% after the first night of hospitalization, and 62.86% after the third night of hospitalization. Sleep quality was assessed using PSQI questionnaire. Prolonged sleep latency and decreased total sleep duration were noted among study participants at the third time point in comparison with the first. Our study noted doctor–nurse interruption, pain, light, and noise as some of the most frequently reported factors contributing to poorer sleep. It was however noted that most patients slowly acclimatize with the hospital milieu. Higher age, infrequent physical activity, previous history of hospitalization, anxiety, and depressive state were significantly associated with higher odds of poor sleep quality. The same has been noted in other studies by Chaudary et al.,[12] Das et al.,[13] and Adib-Hajbaghery et al.[14]

Sleep deprivation can deleteriously affect with decreased pain tolerability, delayed healing, confusion, delusions, disorientation,

Table 5: Association between various parameters and poor sleep quality

Variable	*N*	*Good sleep quality (n = 88)*	*Poor sleep quality (n = 149)*	*OR (95% CI)*	*p-value*
Age-group					
<70	104	59 (56.73)	45 (43.26)	4.7 (2.67–8.28)	0.000
>70	133	29 (21.80)	104 (78.20)		
Gender					
Male	115	39 (33.91)	76 (66.09)	0.76 (0.45–1.3)	0.319
Female	122	49 (40.16)	73 (59.83)		
Marital status					
Married	169	71 (42.01)	98 (57.99)	2.17 (1.16–4.07)	0.014
Others	68	17 (25)	51 (75)		
Physical activity					
Regular	165	70 (42.42)	95 (56.97)	2.21 (1.19–4.09)	0.010
Irregular	72	18 (25)	54 (75)		
Education					
Literate	178	63 (35.39)	115 (64.60)	0.74 (0.41–1.35)	0.336
Illiterate	59	25 (42.37)	34 (57.63)		
Smoking status					
Yes	108	38 (35.18)	70 (64.81)	0.86 (0.50–1.46)	0.57
No	129	50 (38.76)	79 (61.24)		
Alcohol consumption					
Yes	92	25 (27.17)	67 (72.83)	0.48 (0.27–0.85)	0.011
No	145	63 (43.44)	82 (56.55)		
Previous history of hospitalization					
No	82	45 (54.87)	37 (45.12)	4.16 (2.34–7.41)	0.00001
Yes	155	35 (22.58)	120 (77.41)		
Day time napping					
Yes	132	53 (40.15)	79 (59.84)	1.34 (0.78–2.29)	0.34
No	105	35 (33.33)	70 (66.66)		
On hypnotics					
Yes	88	33 (37.5)	55 (62.5)	1.02 (0.59–1.76)	0.93
No	149	55 (36.91)	94 (63.09)		
GAD-7					
No/mild anxiety	202	83 (41.08)	119 (58.91)	4.18 (1.55–11.23)	0.002
Moderate to severe anxiety	35	5 (14.28)	30 (85.72)		
GDS-5					
No depression	172	72 (41.86)	100 (58.13)	2.20 (1.16–4.18)	0.014
Symptoms suggestive of depression	65	16 (24.61)	49 (75.38)		

Values expressed as frequency (%); $p < 0.05$ considered significant

altered blood pressure, and higher heart rate, which can in turn lead to a prescribing cascade in order to alleviate the compounded issues. Thus, improving the sleep efficiency can holistically help the patient with better treatment outcomes. Interventions to optimize sleep should be focused on. Measures like dim-lighted patient area at night, use of silent footwears, distribution of earplugs, or eye masks if needed can help to take a step forward in improving sleep experience in the admitted elderly population. Future studies can aim to study the effect of these interventions in curbing this concern.

Conclusion

Impaired sleep profile can deleteriously affect the overall health outcome in hospitalized elderly population. The present study focussed on poor sleep quality in the admitted elderly in the hospital setup. Various factors reportedly contribute to deprived sleep during hospitalization. Measures to improve the sleep efficiency should be stressed upon to help achieve better treatment outcomes in older adults.

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