

Original Research Article

Sleep quality index among the elderly population in selected areas of Delhi: a community-based cross-sectional study

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Received: 13 February 2023

Revised: 16 March 2023

Accepted: 17 March 2023

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ABSTRACT

Background: Studies have shown that effects of low sleep quality can include cognitive decline, sleepiness during the day, and decreased quality of life. Problems with sleep have also been associated with an increased risk of hospitalization and increased mortality. Therefore, the present study was envisaged to assess the sleep quality index and the factors associated with it among the elderly.

Methods: This cross-sectional study was conducted in rural and urban setting of Delhi. We selected 115 participants in each area using systematic random sampling. We used a semi structured questionnaire and validated sleep quality index to collect the data.

Results: In the present study, only 41 (17.8%) out of 230 individuals were having normal sleep quality and 189 out of 230 individuals were having poor sleep quality. 105 (55.5%) in the rural area (Fatehpur Beri), and 84 (44.5%) in the urban area (Aliganj) were having poor sleep quality respectively. In the rural area, taking sleeping pills and depression were significantly associated with higher scores of sleep quality index.

Conclusions: Poor sleep quality was found in 82.2% of elderly participants which was associated with a rural locality, depression, and not taking sleep pills. There is a need to start a sleep hygiene program for the elderly population, particularly in rural area.

Keywords: Depression, Elderly population, Sleep quality index

INTRODUCTION

The elderly population is characterized by people aged above sixty years.¹ The increased life expectancy and the decline in the mortality rates have both contributed to a rise in the number of elderly people in all over the world including India. As a result of this population aging, the number of people aged 60 and above will almost triple between 2013 and 2050, increasing from 12% to 21% of the total population (from 23% to 32% in developed countries).

Elderly people suffer from dual medical problems, i.e., communicable as well as non-communicable diseases due

to a decline in immunity as well as age-related physiological and degenerative changes leading to an increased burden of morbidity. Factors such as aging of the brain, problems associated with physical health, cerebral pathology, and socio-economic factors such as breakdown of the family support systems, social isolation, and a decrease in economic independence are associated with this.² As the sleep patterns change with age, the elderly experience advanced sleep timings, difficulty falling asleep, and increased sleep latency. The duration of light sleep [stage 1 and 2 NREM (non-rapid eye movement) sleep] increases; slow wave sleep (stage 3 NREM sleep) and REM (rapid eye movement) sleep decreases. Sleep is more vulnerable to external stimuli

and more interrupted with frequent arousals, brief awakenings, and transitions to lighter sleep.

The effects of low sleep quality results in cognitive decline, sleepiness during the day, and poor quality of life. Problems with sleep have also been associated with an increased risk of hospitalization and increased mortality.³ Therefore, the present study was envisaged to assess the sleep quality among the elderly and the factors associated with it.

METHODS

The study was a community-based cross-sectional comparative study conducted in selected areas of Delhi for a duration of 18 months from January 2021 to June 2022. The villages under primary health centre (PHC), Fatehpur Beri, and the urban health training center Aliganj were included which are the field practice area of the Department of Community Medicine of VMMC and Safdarjung Hospital, New Delhi.

Taking the prevalence of insomnia in north India (urban and rural) as 32% as per the study conducted at Sir Sunderlal Hospital of the Institute of Medical Sciences, Banaras Hindu University on 504 elderly Indian patients (304 males and 200 females) with 95% confidence interval, 20% relative error & non-response rate of 10% the sample size was calculated using the formula:²

$$(Z_{1-\alpha/2})^2 pq / \epsilon^2$$

N = sample size;

$Z_{1-\alpha/2}$ (constant) = 1.96 for 95% confidence limits;

p=anticipated population proportion

q = (1-p), ϵ (relative error) = 20%

After adding 10% as a loss to follow up, the sample size came out to be 224. However, a slightly higher number of 230 study subjects were selected for the study (115 in Aliganj and 115 in Fatehpur Beri area).

A complete list of households with the elderly population was obtained. Systematic random sampling was done of the houses where the elderly were found to be studied. The first house to be included in the study was determined by simple random sampling and then every Nth house was included. 115 elderlies were selected from each area to make it a total of 230 participants.

All the study participants were the elderly (above 60 years) residing in selected areas of health centers for more than 6 months. All those who fulfilled the inclusion criteria and gave consent for the study were included as participants till the sample size was achieved.

The persons of >60 years who could not be contacted even after 3 attempts, till the time of completion of data

collection, and persons with severe physical/mental illness and/ or admitted were excluded from the study.

Information about sleep quality was assessed using a valid and reliable Pittsburgh sleep quality index after obtaining permission from Pittsburgh University, Ireland. The scale is used for the assessment of the quality of sleep. The scores range from 0 to 21 and the authors suggest that a score >5 i.e., the scores from 6-21 denotes poor sleep quality and is considered a significant sleep disturbance whereas <5 or =5 denotes good sleep quality. Individual components of the PSQI were also calculated: component 1-subjective sleep quality, component 2- sleep latency, component 3- sleep duration, component 4- habitual sleep efficiency, component 5- sleep disturbances, component 6- sleeping medication, and component 7- daytime dysfunction.

Scores were compared between rural and urban elderly populations.

Ethical clearance was obtained from the Institute Ethics Committee of Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi. At the end of the study, findings have been used to suggest corrective measures to those suffering from poor sleep quality in the community with the help of IEC activities conducted among study participants.

The data collected was both qualitative and quantitative in nature. Qualitative data included comorbid illness, risk factor history, other risk factor history, housing conditions, etc. Quantitative data included socio-demographic profile, and sleep quality index. All the data were coded and entered into a master spreadsheet on MS Office Excel and later transferred to SPSS (IBM SPSS Statistics 21.0) for analysis. Appropriate tests of significance between proportions (i.e., Chi-square and Fisher's exact test as applicable) at p values of less than 0.05 were taken.

RESULTS

The locality of the residence of elderly participants was categorized into urban and rural (Table 1). The participants at Aliganj center were identified as urban (n=115) whereas the participants from Fatehpur Beri center belonged to the rural category (n=115).

Table 1: Distribution of study participants according to Pittsburgh sleep quality index scores (N=230).

	Rural area (Fatehpur Beri)		Urban area (Aliganj)	
	n=115	%	n=115	%
Score (0-5) normal sleep quality (n=41)	10	24.4	31	75.6
Score (6-21) poor sleep quality (n=189)	105	55.5	84	44.5

Table 2: Study of factors associated with quality of sleep among the study participants.

Parameters		Quality of sleep Scores				Chi square	P value
		0-5		>5			
		n=41	%	n=189	%		
Age in years	60-70	34	82.92	145	76.72	0.752	0.386
	71-80	7	17.07	37	19.59		
	>81	0	0	7	3.70		
Sex	Male	24	58.53	85	44.97	2.486	0.115
	Female	17	41.46	104	55.02		
Type of family	Nuclear	29	70.73	148	78.30	1.225	0.268
	Joint	6	14.63	23	12.16	0.111	0.739
	Extended	2	4.87	5	2.64	0.569	0.451
	Single	4	9.75	12	6.35	0.604	0.437
Socio-economic status	Upper	8	19.51	55	29.10	4.647	0.325
	Upper middle	14	34.15	68	35.98		
	Lower middle	10	24.39	35	18.52		
	Upper lower	7	17.07	29	15.34		
	Lower	2	4.88	2	1.06		
Environment in bed room of sleep	Hot	4	9.75	15	7.93	0.147	0.701
	Cold	10	24.39	33	17.46	1.064	0.302
	Optimal	17	41.46	74	39.15	0.075	0.784
	As per weather	10	24.39	67	35.44	1.85	0.174
Condition in bed room of sleep	Low light, noisy	12	29.26	55	29.10	0.001	0.983
	High light, noisy	7	17.07	42	22.22	0.533	0.465
	High light, no noise	16	39.02	74	39.15	0.0002	0.987
	Low light, no noise	6	14.63	18	9.52	0.941	0.332
Taking sleeping pills	Yes	37	90.25	7	25.66	163.1	0.0001
	No	4	9.75	182	96.30		
Locality	Urban	31	75.60	84	44.45	13.08	0.0003
	Rural	10	24.40	105	55.55		
Associated risk factor	Smoker	7	17	53	28	2.102	0.147
	Non smoker	34	83	136	80		
	Alcohol	8	19.51	24	12.69	1.306	0.253
	Non alcoholic	33	75.60	165	44.44		
Depression	No depression	33	80.48	109	52.38	7.425	0.006
	Mild depression	8	19.51	54	28.57		
	Severe depression	0	0	26	13.75		
Comorbid disease	DM Yes	6	14.63	53	28.04	3.176	0.075
	No	35	85.36	136	71.96		
	HTN Yes	8	19.51	59	31.21	3.352	0.067
	No	33	80.48	130	68.78		
	CVD Yes	8	19.51	18	9.52	2.862	0.091
	No	33	80.48	171	90.47		

In the present study, 41 (17.8%) out of 230 elderlies were having normal and 189 (82.2%) out of 230 elderlies were having poor sleep quality. 105 (55.5%) individuals in the rural area (Fatehpur Beri) and 84 (44.5%) in the urban area (Aliganj) were having poor sleep quality respectively.

Table 2 presents the factors associated with quality of sleep among the study participants. Sleep quality was not associated with age, sex, type of family, socio-economic

status, environment of the bed room of sleep and condition of the bed room of sleep.

Among those having good sleep quality, maximum elderly (82.92%) were in the age group of 60-70 years as compared to 71-80 years and those in the age group of 80 years and above. Good sleep quality was higher among males 24 (58.53%), those belonging to nuclear families (70.73%), and those belonging to upper middle socio-economic status (34.1%). Good sleep quality was also

higher among those having an optimal environment of bedroom (41.46%) and those with high light, no noise condition of the bedroom (39.02%). But none of the factors were statistically significant with sleep quality.

Sleep quality was significantly associated with the consumption of sleeping pills (90.25%) as compared to

those who did not consume sleeping pills (9.75%) (p value <0.05). Good sleep quality was more prevalent in urban population of Delhi i.e. 31(45.6 %) as compared to 10 (24.39%) rural population (p value <0.05). Among those who had good sleep quality, most of the participants (80.48%) had no depression as compared to those who had depression (19.51%) (p value <0.05).

Table 3: Pittsburgh sleep quality index.

	Urban (115) Urban area (Aliganj)		Rural (115) Rural area (Fatehpur Beri)		(Wilcoxon rank sums test)	P value
	Mean	SD	Mean	SD		
Component 1- Subjective sleep quality	1.20	1.03	2.16	0.74	0.0001	0.001
Component 2 -Sleep latency	2.01	1.08	2.12	1.07	0.4505	0.903
Component 3 -Sleep duration	1.90	0.88	1.01	0.68	0.0001	0.001
Component 4- Habitual sleep efficiency	0.86	1.04	1.58	0.53	0.0001	0.001
Component 5- Step disturbances	1.53	0.55	1.58	0.53	0.4843	0.945
Component 6- Use of sleeping medications	0.48	1.04	0.68	1.20	0.1958	0.608
Component-7 Daytime dysfunction	1.11	0.94	2.37	2.04	0.0001	0.001
Global PSQI	9.01	4.43	11.52	4.52	0.0001	0.055

It was observed that sleep quality was good amongst the non-smokers (83%) and the non-alcoholics 33 (75.6%) as compared to smokers and alcoholics. However, these differences were not statistically significant.

Amongst those who had good sleep quality, the majority had no history of diabetes mellitus (85.36%), hypertension (80.48%), and cardiovascular diseases (80.48%). However, there was no statistically significant association with sleep quality (DM, p=0.07, HT, p=0.06, CVD, p=0.09).

The mean scores and standard deviation for all 7 components of the Pittsburgh sleep quality index were calculated according to the residence. The mean scores of all 7 components were added to compute the global PSQI which was 9.01 with an SD of 4.43 for urban participants (Aliganj) and 11.52 with an SD of 4.52 observed in rural participants (Fatehpur Beri) which means rural elderly had scored poor in all the components of sleep quality.

DISCUSSION

In the present study, 17.8% of the elderly were having normal sleep quality and 82.2% of the elderly were having poor sleep quality. The findings of the present study are higher as compared to those reported by Kaushal et al in which 63.9% of the elderly participants aged 60 years had poor sleep quality.⁴ Similarly, the findings in the current study are also higher than those found in a cross-sectional study conducted by Chaudhary et al among 96 elderly patients residing in rural area of Dehradun, India who reported 35.4% of participants to have poor sleep quality.⁵ Das et al in their community-based study among 180 elderly population in West

Bengal reported the prevalence of poor sleep quality to be 68.89% among their study participants which is a little lower than that found in the current study.⁶ In another cross-sectional study conducted by Gouthaman et al revealed 65.2% of the elderly had poor sleep quality.⁷ Similarly Thichumpa et al reported the prevalence of poor sleep quality as 44% among 266 community-dwelling elderly individuals in northern Thailand.⁸ Similarly lower prevalence was also reported by Sagayadevan et al among the Singaporean elderly, Razali et al, Park et al in 157 Korean elderly, Wu et al in elderly of Taipei district, China and Tel in Turkey.⁹⁻¹³

As far as rural area is concerned, our findings were similar to the study conducted by Suguna et al amongst 230 elderly participants in a rural Area of Southern Karnataka, India.¹⁴ Their findings revealed that 52.6% of the study participants had poor sleep quality which is comparable to the 55.5% found in the current study. However, the prevalence of poor sleep quality was much higher in a study conducted by George et al in 170 elderly people in a rural population in Kerala, India, where 72.4% of the elderly were involved.¹⁵

In the study conducted by Chaudhary et al mean GPSQI score for the elderly participants came out to be 5.6±1.9, which is much lower to the 10.27±4.48 reported in the current study.⁵ Similarly, Das et al also reported a median Global PSQI of 7.00 amongst their elderly participants which is also lower than the present study.⁷ Lower global PSQI as compared to the present study was also reported in studies conducted by George et al, Suguna et al, Reddy et al, Thichumpa et al.^{8,15-17} Similarly, lower mean PSQI score were also reported in studies conducted by Park et al and Wu et al.^{11,12} The mean PSQI scores reported in

their study were 6.42 and 6.3±4.4 respectively which is much lower to the 10.27±4.48 reported in the current study.

This variation in the prevalence across studies can be explained by the different study settings, populations under consideration, sample size and timing of studies; participants from rural areas versus those in urban areas.

As the study was conducted among a small group of population and the sample size of the study was less, the external generalizability results of the study is limited. Moreover, the maximum number of study participants fall in the age group of 60-70 years (82.92%), the results cannot be generalized for the higher age groups (>70 years). The association between the sleep quality of the study participants and factors like age, sex, type of family, socio-economic status, substance abuse, comorbidities (viz. diabetes, hypertension, cardiovascular disease, cancer) was not statistically significant as compared to some of the studies conducted previously.

CONCLUSION

In the present study, poor sleep quality was found in 82.2% participants overall. Sleep quality was not significantly associated with age, sex, type of family, socio-economic status, environment of the bed room of sleep and condition of the bed room of sleep whereas it was significantly associated with consumption of sleeping pills. In the present study, sleep quality had no significant association with smoking and alcohol consumption. Data also suggests that sleep quality was significantly associated with depression. The findings of the present study suggest that screening the aged person for insomnia and prompt referral of insomniacs at regular basis can address this issue of insomnia among aged population. Health education regarding importance of sleep hygiene practices and adverse effects of insomnia should be imparted at the community level to increase the awareness of this problem among the general population.

ACKNOWLEDGEMENTS

The authors would like to thank the participants of the study for their full co-operation and for their support.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of VMMC and Safdarjung Hospital, New Delhi

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Cite this article as: Sandooja C, Panda M, Kumar V, Kishore J. Sleep quality index among the elderly population in selected areas of Delhi- a community-based cross-sectional study. *Int J Community Med Public Health* 2023;10:1537-42.