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Research Article

A QUESTIONNAIRE BASED PILOT STUDY OF SLEEP PATTERNS AND PROBLEMS AMONG THE ELDERLY IN DELHI

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A B S T R A C T

Objectives: Sleep is an integral part of the health and well-being of an individual. India has acquired the label of "an ageing nation". With an increase in ageing population, incidence and prevalence of sleep difficulties are also on the rise. It causes a change in physiological parameters which leads to serious consequences. The objective of the study was to evaluate the sleep patterns and problems associated with the elderly and its relationship with other demographic parameters in an urban population of Delhi, India.
Methods: Geriatric urban population of Delhi, North India was considered for the Community-based study. Pittsburgh Sleep Quality Index (**PSQI**) was used to access the state of sleeping quality. Data were evaluated using the SPSS software through Chi-square and t-test.
Results: PSQI based results showed that 71.4% of the participants were having insomnia. It was observed that the insomnia was not related to gender, increasing age and sleeping with a partner. The mean GPSQI of the study was 8.43 ± 4.08.
Discussions: The results suggest the high prevalence of insomnia in elderly living in Delhi which is not correlated with age, gender and sleeping with a partner. Pittsburgh Sleep Quality Index score was found to high in Delhi elderly due to variation in their social framework, family structure and economic status.
Clinical implications: The result can be utilized for designing more appropriate treatments and awareness programs about sleep-related problems in the elderly.

INTRODUCTION

Sleep is an essential physiological activity for restoration and repair of body processes. Sufficient amount of sleep is needed for normal metabolic, hormonal and autonomic functioning. Sleep quality of an individual includes sleep duration, depth of sleep, sleep latency, and restfulness. Approximately 7 hours of sleep is required for normal cognitive and behavioral function (Eugene and Masiak, 2015). The undisturbed and sound sleep hours help to maintain mood, memory and cognitive performance, whereas lack of sleep has been linked with emotional distress, irritation, hypertension, cognitive impairment, obesity, improper functioning of endocrine, healing and immune systems (Rashid *et al*., 2012). Sleep disorders lead to mental diseases, cardiac diseases, and accidents which causes poor quality of life.

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The normal duration of sleep is also essential for older adults for the proper regulation of metabolic, hormonal and autonomic functions. But due to the change in the circadian rhythm, they have a habit of early awakening. Older people face many difficulties in sleep such as longer time to get sleep, more frequently awakening during the night and greater difficulty in getting back to sleep, shorter sleep hours and periods of rapid eye movement (Rashid *et al*., 2012). Insomnia is defined as a difficulty in initiating and maintaining sleep or waking up too early or chronically non-restorative sleep according to the International Classification of Sleep Disorders, Second Edition (ICSD-2; 2005). Sleep is essential in maintaining the body's circadian rhythm and is considered as an indicator of the quality of life (Tel, 2013). The adequate sleep can be achieved by including certain habits in our lifestyle such as a safe place to sleep, decreased screen-time and noise before bed, sleep hygiene recommendations, prioritizing sleep and lifestyle modifications. Normal age-related changes in sleep alone do not contribute to the

pathological sleep problem. In elderly, the causative factors for disturbed sleep includes predisposing factors (a set of individual characteristics such as, sex, age, wakefulness, personality traits and neurotransmitter systems associated with sleep); precipitating factors (stressful events such as the death of a relative, emotional imbalance, disrespect or unemployment); and perpetuating factors (behaviours that leads to continuation of sleep problems and cause for poor sleep, even after the precipitating factors have been solved). Other than these factors, loneliness, inadequate sleep habits, anxiety, adverse effects of medications, physiologic changes associated with ageing such as circadian rhythm disorders and psychosomatic disorders contribute for maintenance of insomnia. It has been estimated that >50% of community-dwelling individuals and 2/3rd of institutionalized elderly persons aged >65 years were affected by sleep disturbances. The institutionalized elderly showed more disturbed and fragmented sleep habits as compared to community-dwelling older adults (Harrington *et al*., 2007). Previous studies demonstrate the positive correlation of insomnia with age and gender (Bixler *et al*., 1979; Lack *et al*., 1988; Weyerer *et al*., 1991). Sleep patterns were found to be changing subjectively and objectively with ageing (Iyer *et al*., 2008). Various researchers have shown that elderly usually complaint about frequent night waking, trouble in getting to sleep and trouble in staying asleep but only limited data on this important aspect of ageing have been reported from an elderly population of India. The existence of a close and interesting relationship between sleep, obesity, and metabolic syndrome was also observed (Iyer & Iyer., 2006). The prevalence of insomnia in the hospital-based study of Indian elderly population was found to be 32%. It drew a positive relationship between the prevalence of insomnia with a place of living (rural or urban), depression, and addiction [Gambhir *et al*., 2014]. India is at the verge of population ageing due to improved medical facilities. In India, geriatric age group constitutes 8.6% of the total population as per 2011 census (Ministry of Home Affairs., 2012) and it was estimated to be around 20–25% of the population by 2050, with a large burden of sleep-related health problems. Surprisingly, sleep disorders are not included in the world report on ageing and health released by the World Health Organization in 2015.

Majority of the elderly are not aware of the complications of sleep disturbances, probably due to lack of knowledge about insomnia. The under recognition and under diagnosis by health care personnel have also added to this problem. Early detection and intervention of sleep disturbances in the elderly can help to reduce insomnia related mortality rate. The dramatic and continuous change in the demographic pattern of ageing population has profound medical consequences which will require a comprehensive, global public-health response. More than 50% of elderly people have sleep problems due to underuse or overuse of pharmacological interventions. In developed countries, the elderly are more aware of sleep-related problem and facilities. However, sleep medicine is considered as a new and emerging discipline in developing country like India with limited sleep research. Therefore, this study was conducted to estimate the prevalence of sleep patterns and problems in an elderly population in Delhi, India. Effect of partner on sleeping pattern was also explored along with relationship between gender, age and sleeping habit with the rate of insomnia (with PSQI > 5). Through this study, we aim to promote public and clinician awareness regarding the effects of insomnia and the potential benefits of adequate sleep on the health of the elderly for their better quality of life.

METHODS

Population Survey

The study was conducted in urban areas of New Delhi region. Older adults above 60 years of age were studied. Questionnaire method was used in this study. Inclusion criteria were a willingness to participate and older adults above 60 years of age whereas exclusion criteria were person below 60 years of age and those who were not oriented /conscious. Verbal informed consent was taken from the participants before answering the questionnaire. The participants were asked about the sleeping pattern, medications used, and current disease. The questionnaire was pre-tested on a sub-population and necessary modifications were made.

Sleep questionnaire

A questionnaire based on the Pittsburgh Sleep Quality Index (**PSQI**) was used to collect data. It is a self-report questionnaire that assesses sleep quality over a 1-month time interval. The PSQI consists of 19 individual items, creating 7 components that produce one global score, and takes 5–10 minutes to complete. The seven components which are included in PSQI are subjective sleep quality (C1), Sleep latency (C2), Sleep duration (C3), Habitual sleep efficiency score (C4), sleep disturbances (C5), use of sleeping medications (C6), daytime dysfunction (C7). Most of the components are categorically evaluated on a score of 0-3. Zero score show low and 3 indicate high impact. Besides PSQI, Socio-demographic information (age, gender, sleep status with a partner) was also noted.

This Socio-demographic information was taken as variable to analyze the PSQI components separately. Although all participants are above the age of 60, they were divided into two groups above 70 and below 70 for better analysis of sleep components. Sleeping habit with a partner was also taken as a variable as a partner may have a positive or negative effect on sleep quality. The PSQI is a simple, less time taking, validated, and self-administered questionnaire used to measures sleep parameters. The total score value from these seven components ranged from 0 to 21. This score value indicates about the sleep quality and disturbance, higher scores indicate a lower quality of sleep. A PSQI global score equal and greater than 5 indicate towards poor quality of sleep with a sensitivity of 89.6–98.7% and this value was used to define symptoms of insomnia in the present study (Buysse *et al*., 1989).

Statistical Analysis

Data analysis was done using statistical software SPSS (version 21; SPSS Inc., Chicago, IL, USA). Independent t-test analysis was done to find the relationship of insomnia with various variables. Demographic characteristics are examined with descriptive statistics including mean (M), standard deviations (SD) for continuous variable and percentage (%) for categorical variables. Insomnia was analyzed based on the global PSQI score; participants were considered having insomnia i.e. bad sleeper if they have score > 5 and a good sleeper if score value was ≤ 5. Box plot analysis was done to find the even distribution of global score of variables (gender, age, and sleep partner status).

RESULTS

Participant demographic characteristics study: The demographic characters which were used in the study are gender, age and sleep habit with partner/without a partner. Out of 60 respondents, 29 were men and 31 were women. Therefore out of a total of 60 participants, 48% were male and 51% were female. 31.7% of participants were above the age 70 and 68.3% were below the 70 age. 65% of participants were sleeping with a partner and 35% were sleeping without a partner (Table1). The t-test analysis found that the socio-demographic parameters were not linked to each other (Table 2).

Table 1 Evaluation of Socio-demographic characteristic in the study population

	Frequency	Percentage (%)
Gender		
Male	29	48.33%
Female	31	51.66
Age (Years)		
> 75	19	31.67
< 75	41	68.33
Living condition/Marital status		
With partner	39	65
Without partner	21	35

Table 2 Evaluation of the relationship between Socio-demographic characteristic in the study population

Variables	Pooled Data (N=60)	Male (n= 29)	Female (n=31)	p Value
Age (yrs), M±SD	71. 53 ± 8.82	69. 68 ± 8.70	73. 25 ± 8.73	0.119
Sleeping with a partner / room-mate	65.5 %	64.5 %	65 %	0.575

Through administering the PSQI questionnaire, various sleep parameters were observed. It was noted that subjective sleep quality (C1) was mildly difficult for 55% while very good for 12%. Sleep latency (C2) was >60 minutes for 21%. Sleep duration (C3) was <5 hours for 28%. Habitual sleep efficiency score (C4) was >85% for 35% of respondents. 40% reported sleep disturbances (C5) once in a week. 65% did not report the use of sleeping medications (C6) in the previous month. 61.7% of respondents had some form of daytime dysfunction (C7). The global PSQI was less than 5 (good sleep quality) for 28.3% while it was 5 or more (poor sleep quality) for the remaining 71.7% of the respondents. The mean GPSQI of the study was 8.43 ± 4.08 (Table 3).

Sleep quality and prevalence of insomnia by gender, age, and sleeping partner status.

Sleep quality and prevalence of insomnia by gender: The PSQI components such as subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, and sleep disturbance, need for sleep medications and daytime dysfunction showed no significant gender difference. While when the global score was compared, female participants were found to have higher scores than males. A significant difference ($p = 0.03$) was observed in the PSQI global score value between men and women ($p < 0.05$). However, there was no significant gender difference ($p = 0.29$) when the prevalence of insomnia was evaluated. Male and female participant showed 58.6% and 83.9% prevalence of insomnia respectively, based on GPSQI value of equal and greater than five (Table 3).

Sleep quality and prevalence of insomnia by age: No statistically significant relationship was observed in sleep quality components (subjective sleep quality, sleep duration, habitual sleep efficiency, and sleep disturbance, need for sleep medications and daytime dysfunction) among two age groups. Even, the global score value and prevalence of insomnia was found to be statistically not significant among two age groups. The participant having age ≤ 70 showed 70.7 insomniac conditions whereas participant having age group greater than > 70 were having 73.7% insomnia. However, sleep latency showed a significant relationship among two age groups. The 16.7, 35.0, 26.7 and 21.7% participants reported having a sleep latency of ≤ 15 min, 30 min, 60 min, > 60 min respectively (Table 4).

Sleep quality and prevalence of insomnia by sleeping partner status: A statistically significant relationship was observed in sleep duration ($p=0.02$), habitual sleep efficiency ($p=0.008$) and GPSQI score ($p=0.01$) when these sleep components are evaluated among variable i.e. with or without partner sleep. However other sleep quality components were found to be insignificant. Out of total participants 11.7, 45.0, 15 and 28.3 % reported to have sleep duration of > 7, 6–7, 5–6, < 5 hours respectively. The distribution of participants among various categories of habitual sleep efficiency (≥ 85%, 75–84%, 65–74 %,< 65%) was 35%, 20 % 18.3% and 26.7% respectively. There was no significant relationship observed when the prevalence of insomnia was evaluated based on the GPSQI scores among participant which were sleeping lonely or with a partner (Table 5).

Table 3 Analysis of various sleep parameters in Delhi adult population according to gender

	Variables	Total n (%)	Male n (%)	Female n (%)	p
1.	**Subjective sleep quality**		22.10+1.3	22+1.1	0. 661 NS
	No difficulty	12 (20.0)	6 (20.7)	6 (19.4)	0.546 NS
	Mild difficulty	33 (55.0)	18 (62.1)	15 (48.4)	-
	Moderate difficulty	13 (21.7)	4 (13.8)	9 (29.0)	-
	Severe difficulty	2 (3.3)	1 (3.4)	1 (3.2)	-
2.	**Sleep latency**				
	≤ 15 min %	10 (16.7)	6 (20.7)	4 (12.9)	0.438 NS
	30 min %	21 (35.0)	11 (37.9)	10 (32.3)	-
	60 min %	16 (26.7)	5 (17.2)	11 (35.5)	-
	> 60 min	13 (21.7)	7 (24.1)	6 (19.4)	-
3.	**Sleep duration, M ± SD**		329.7+104.1	342.9+75.1	0.047NS
	> 7 h %	7 (11.7)	5 (17.2)	2 (6.5)	0.259 NS
	6–7 h, %	27 (45.0)	15 (51.7)	12 (38.7)	-
	5–6 h, %	9 (15.0)	3 (10.3)	6 (19.4)	-
	< 5 h %	17 (28.3)	6 (20.7)	11 (35.5)	-
4.	**Sleep time(minute)**		2193.96+1	2218.9+116.7	0.534NS
5.	**Habitual sleep efficiency, M ± SD**		76.3+19.9	80.6+16	0.169NS
	≥ 85%, %	21 (35.0)	14 (48.3)	7 (22.6)	0.176NS
	75–84%, %	12 (20.0)	5 (17.2)	7 (22.6)	-
	65–74%, %	11 (18.3)	5 (17.2)	6 (19.4)	-
	< 65%, %	16 (26.7)	5 (17.2)	11 (35.5)	-
6.	**Sleep disturbance**				
	No disturbance	3 (5.0)	2 (6.9)	1 (3.2)	0.176NS
	Mild disturbance	24 (40.0)	15 (51.7)	9 (29.0)	-
	Moderate disturbance	29 (48.3)	10 (34.5)	19 (61.3)	-
	Severe disturbance	4 (6.7)	2 (6.9)	2 (6.5)	-
7.	**Need for sleep medications**				
	Not during the past month, %	39 (65.0)	22 (75.9)	17 (54.8)	0.109NS
	Less than once a week, %	14 (23.3)	6 (20.7)	8 (25.8)	-
	Once or twice a week, %	7 (11.7)	1 (3.4)	6 (19.4)	-
	≥ 3 times a week, %	0 (0)	0 (0)	0 (0)	-
8.	**Daytime dysfunction**				
	No difficult	23 (38.3)	11 (37.9)	12 (38.7)	0.189 NS
	Little difficult	28 (46.7)	16 (55.2)	12 (38.7)	-
	Difficult	9 (15)	2 (6.9)	7 (22.6)	-
	Very difficult	0 (0)	0(0)	0(0)	-
9.	**PSQI total score, M ± SD**	8.43 ± 4.08	7.27 ± 3.84	9.51 ± 4.07	0.03*
10.	**Insomnia (PSQI > 5)**	43 (71.7)	17 (58.6)	26 (83.9)	0.29 NS

Notes: *p value- significant at ≤ 0.05. NS indicates a non-significant association. Habitual sleep efficiency# = total hours of sleep/(get-up time−bedtime) × 100%, PSQI: Pittsburgh Sleep Quality Index. The score ranges from 0 to 3, the lowest score indicates good functioning. Participants having #PSQI < 5 were defined as Good sleepers.

Table 4 Analysis of various sleep parameters in Delhi adult population according to age groups.

	Variables	Total n (%)	Less than and equal to 75 years, n (%)	More than 75 years, n (%)	p*
1.	**Subjective sleep quality**		21.9+1.1	22.2+1.4	0.258 NS
	No difficulty	12 (20.0)	8 (19.5)	4 (21.1)	0.476 NS
	Mild difficulty	33 (55.0)	24 (58.5)	9 (47.4)	-
	Moderate difficulty	13 (21.7)	7 (17.1)	6 (31.6)	-
	Severe difficulty	2 (3.3)	2 (4.9)	0 (0)	-
2.	**Sleep latency**				-
	≤ 15 min %	10 (16.7)	9 (22.0)	1 (5.3)	**0.05***
	30 min %	21 (35.0)	17 (41.5)	4 (21.1)	-
	60 min %	16 (26.7)	9 (22.0)	7 (36.8)	-
	> 60 min	13 (21.7)	6 (14.6)	7 (36.8)	-
3.	**Sleep duration, M ± SD**		335.4+92.8	338.8+85.1	0.744 NS
	> 7 h %	7 (11.7)	6 (14.6)	1 (5.3)	0.353 NS
	6–7 h, %	27 (45.0)	20 (48.8)	7 (36.8)	-
	5–6 h, %	9 (15.0)	6 (14.6)	3 (15.8)	-
	< 5 h %	17 (28.3)	9 (22.0)	8 (42.1)	-
4.	**Sleep time(minute)**		2211.6+28..2	2196.6+102.6	0.142 NS
5.	**Habitual sleep efficiency, M ± SD**		78.2+19.6	79.2+14	0.082 NS
	≥ 85%, %	21 (35.0)	16 (39.0)	5 (26.3)	0.617NS
	75–84%, %	12 (20.0)	8 (19.5)	4 (21.1)	-
	65–74%, %	11 (18.3)	8 (19.5)	3 (15.8)	-
	< 65%, %	16 (26.7)	9 (22.0)	17 (36.8)	-
6.	**Sleep disturbance**				
	No disturbance	3 (5.0)	3 (7.3)	0 (0.0)	0.423NS
	Mild disturbance	24 (40.0)	14 (34.1)	10 (52.6)	-
	Moderate disturbance	29 (48.3)	21 (51.1)	8 (42.1)	-
	Severe disturbance	4 (6.7)	1 (7.3)	1 (5.3)	-
7.	**Need for sleep medications**				
	Not during the past month, %	39 (65.0)	26 (63.4)	13 (68.4)	0.128NS
	Less than once a week, %	14 (23.3)	12 (29.3)	2 (10.5)	-
	Once or twice a week, %	7 (11.7)	3 (7.3)	4 (21.1)	-
	≥ 3 times a week, %	0 (0)	0 (0)	0 (0)	-
8.	**Daytime dysfunction**				
	No difficult	23 (38.3)	16 (39.0)	7 (36.8)	0.741NS
	Little difficult	28 (46.7)	18 (43.9)	10 (52.6)	-
	Difficult	9 (15)	7 (17.1)	2 (10.5)	-
	Very difficult	0(0)	0(0)	0(0)	-
9.	**PSQI total score, M ± SD**	8.43 ± 4.08	7.92 ± 3.90	9.52 ± 4.37	0.161 NS
10.	**Insomnia(PSQI > 5)**	43 (71.7)	41 (70.7)	19 (73.7)	0.535 NS

Notes: *p value- significant at ≤ 0.05. NS indicates a non-significant association. Habitual sleep efficiency# = total hours of sleep/(get-up time− bedtime) × 100%, PSQI: Pittsburgh Sleep Quality Index. The score ranges from 0 to 3, the lowest score indicates good functioning. Participants having #PSQI < 5 were defined as Good sleepers.

Table 5 Analysis of various sleep parameters in Delhi adult population according to the absence/ presence of a partner

	Variables	Total n (%)	With Partner n (%)	Without Partner n (%)	p
1.	**Subjective sleep quality**		22.3+1.1	21.5+1.3	0.234 NS
	No difficulty	12 (20.0)	7 (17.9)	5 (23.8)	0.247 NS
	Mild difficulty	33 (55.0)	25 (64.1)	8 (38.1)	-
	Moderate difficulty	13 (21.7)	6 (15.4)	7 (33.3)	-
	Severe difficulty	2 (3.3)	1 (2.6)	1 (4.8)	-
2.	**Sleep latency**				
	≤ 15 min %	10 (16.7)	9 (23.1)	1 (4.8)	0.127 NS
	30 min %	21 (35.0)	15 (38.5)	6 (28.6)	-
	60 min %	16 (26.7)	9 (23.1)	7 (33.3)	-
	> 60 min	13 (21.7)	6 (15.4)	7 (33.3)	-
3.	**Sleep duration, M ± SD**		344.7+89.8	321.3+89.9	0.604 NS
	> 7 h %	7 (11.7)	5 (12.8)	2 (9.5)	**0.02***
	6–7 h, %	27 (45.0)	21 (53.8)	6 (28.6)	-
	5–6 h, %	9 (15.0)	7 (17.9)	2 (9.5)	-
	< 5 h %	17 (28.3)	6 (15.4)	11 (52.4)	-
4.	**Sleep time(minute)**		2209.1+105.6	2202.6+145.8	0.114 NS
5.	**Habitual sleep efficiency, M ± SD**		79.6+18.8	76.3+16.7	0.472 NS
	≥ 85%, %	21 (35.0)	17 (43.6)	4 (19.0)	**0.008***
	75–84%, %	12 (20.0)	8 (20.5)	4 (19.0)	-
	65–74%, %	11 (18.3)	9 (23.1)	2 (9.5)	-
	< 65%, %	16 (26.7)	5 (12.8)	11 (52.4)	-
6.	**Sleep disturbance**				
	No disturbance	3 (5.0)	2 (5.1)	1 (4.8)	0.063NS
	Mild disturbance	24 (40.0)	20 (51.3)	4 (19.0)	-
	Moderate disturbance	29 (48.3)	14 (35.9)	15 (71.4)	-
	Severe disturbance	4 (6.7)	3 (7.7)	1 (3.8)	-
7.	**Need for sleep medications**				
	Not during the past month, %	39 (65.0)	27 (69.2)	12 (57.1)	0.645NS
	Less than once a week, %	14 (23.3)	8 (20.5)	6 (28.6)	-
	Once or twice a week, %	7 (11.7)	4 (10.3)	3 (14.3)	-
	≥ 3 times a week, %	0 (0)	0 (0)	0 (0)	-
8.	**Daytime dysfunction**				
	No difficult	23 (38.3)	16 (41.0)	7 (33.3)	0.189 NS
	Little difficult	28 (46.7)	16 (41.0)	12 (51.7)	-
	Difficult	9 (15)	7 (17.9)	2 (9.5)	-
	Very difficult	0(0)	0(0)	0(0)	-
9.	**PSQI total score, M ± SD**	8.43 ± 4.08	7.46 ± 3.42	10.23 ± 4.66	**0.01***
10.	**Insomnia(PSQI > 5),**	43 (71.7)	27 (69.2)	16 (76.2)	0.399 NS

Notes: *P value- significant at ≤ 0.05. NS indicates a non-significant association. Habitual sleep efficiency# = total hours of sleep/(get-up time− bedtime) × 100%, PSQI: Pittsburgh Sleep Quality Index. The score ranges from 0 to 3, the lowest score indicates good functioning. Participants having #PSQI < 5 were defined as Good sleepers.

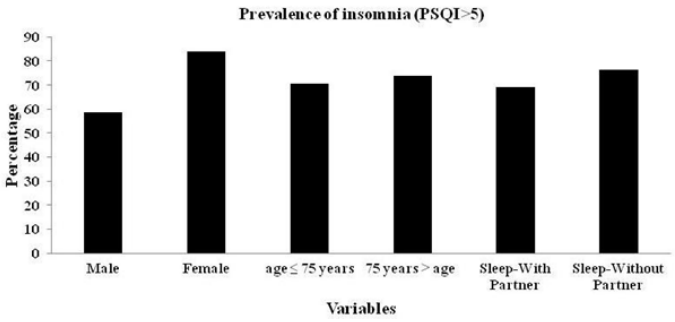

Figure 1 Prevalence of Insomnia among elderly in Delhi

Insomnia was higher in participants who were in the age group of above 70 and sleeping without a partner. Female participants showed more disturbed sleep as compared to male. All these variables were found to statistically insignificant with respect to their contract character (Figure-1).

Analysis of the distribution of global score values: The box plot of the global score with gender showed that female participants were having more even distribution of global score as compared to the male participants. This plot also depicts that male participants were having more global score than the median value. The female participants have different and high median global score value as compare to male participants (Figure-2).

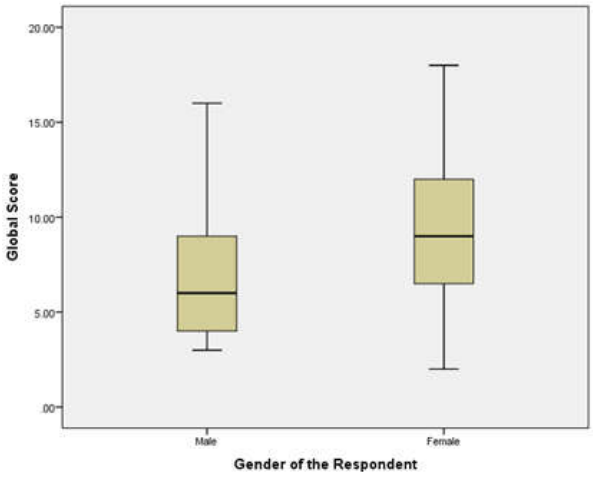

Figure 2 Global score value distribution according to gender among elderly in Delhi

To analyze the distribution of participants according to age groups box plot analysis was done. The box plot result showed that the participants in two age groups have approximately similar global score median value and these values are distributed evenly (Figure-3).

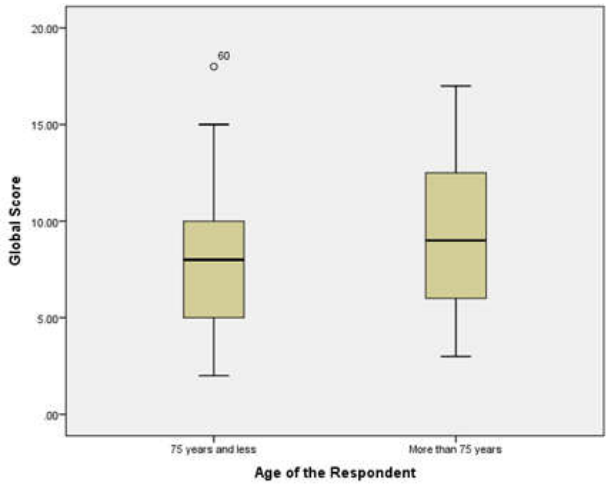

Figure 3 Global score value distribution according to age among elderly in Delhi

In the box plot analysis of the third variable, it was observed that the global score values were unevenly distributed in two groups of participants. The participants which were having a habit of sleeping without a partner have more global score value than the median and more spread global score value as compare to the participants sleeping with partner There are few out outlier in participants which have a habit of sleeping with a partner (Figure-4).

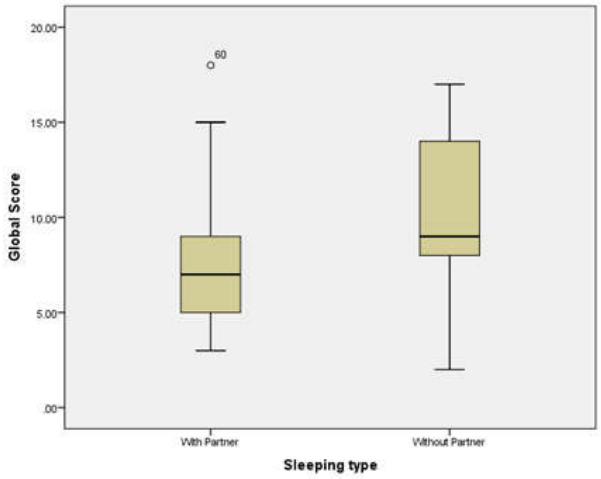

Figure 4 Global score value distribution according to Sleep with /without a partner among elderly in Delhi

DISCUSSION

Our study analyzes the factors affecting sleep quality in the elderly population of Delhi, India. 71.7% of the population was found to be sleep deprived in the present study. Previous researchers have also observed poor sleep quality in 78% (Lo Catherine & Lee, 2012) of Chinese, 77% and 60.9% in a Turkish population (Fadıloğlu *et al*., 2006; Eser *et al*., 2007). Even the high prevalence of insomnia (78%) was found in the elderly population of Penang, Malaysia (Rashid *et al*., 2012). The mean GPSQI of our study was also high (8.43 ± 4.08). A study was done on the south Indian population also showed similar GPSQI means value, 8.04±4.59 (George *et al*., 2018). Results from other studies support this finding. A study done by Gulseren Daglar, in Turkey reported a PSQI of 7.28±3.97 whereas study done by Chia-Yi-Wu, in Taipei reported a PSQI of 6.3±4.40.8 (Dağlar *et al*., 2014; Wu *et al*., 2012). The difference in the GPSQI might be due to the different cultures and lifestyles of people in different countries.

According to our study, on looking at the association between different socio-demographic variables, no significant relationship was noted.

The significant sex-related difference in sleep disorders was not observed in our study (p=0.3). The sleep quality was found to be poor in the woman as compared to men. Similarly, a study was done in Turkey also showed that personal variables such as age, gender, education, income and having children did not affect sleep quality (Dağlar *et al*., 2014). However, women were found to be more susceptible to sleep problems as compared to men due to the difference in social and economic status (Arber *et al*., 2012). In the Japanese population, the prevalence of sleep problems was 26.4% and 31.1% in men and women respectively (Vandeputte & Weerd, 2003). The gender difference could be due to population structure, ethnicity, geographical location, social and economic status.
In our study, the sleep quality was found to be not significantly associated with increasing age. This finding was consistent with the Northern Taiwan study where advanced age was not associated with insomnia prevalence in elderly patients. However, a statistically significant association was observed between insomnia and increasing age in elderly patients belonging to north Indian population (Gambhir *et al*., 2014). Similar results were also reported in a study done in Malaysia, 50% of the patients experienced a significant decrease in sleep quality (47.2%) with age (Razali *et al*., 2016). but no linear association was observed between age and sleep quality.

The positive and negative behavior of sleeping partner will impact the sleep quality of an individual. It was observed that the partner's sleep problems negatively affect other partners' health and wellbeing (Strawbridge *et al*., 2004). A similar study conducted on the US population also demonstrated that daily negative and positive interactions with a partner affected sleep quality among older adults with chronic pain in a positive and negative way. There are fewer chances of sleep disorders if individuals receive supportive and empathic responses from their partner, whereas, if the partner was not supportive, it leads to punishing responses in the individual which affects the sleep quality (Chen *et al*., 2015). However, we did not observe any significant difference in the sleep quality of participants who were having the habit of sleeping with a partner or without a partner. This variation might be due to the social framework, family structure, relationship between the patterns and economic status of the sample population.

Limitations

In this study, the sleep pattern was evaluated by subjective methods, and there was no validation by objective methods. In addition, due to the cross-sectional nature of the analysis, a causal relationship between the sleep quality parameters was not identified. However, the present study reveals the high prevalence of sleep-related disorders than expected in an apparently normal Indian geriatric population. The inadequate knowledge and awareness about sleep disorders may play a major role in the high prevalence of sleep-related disorders in the elderly. In addition, critical evaluation of diagnostic methods of sleep disturbances and sleep-related disorders is needed in the Indian context.

CONCLUSION

According to the study's findings, the elderly have poor sleep quality (71.4%) which was not affected by gender, age and sleep habit with a partner. Thus, in our study effect of partner was not observed on sleeping pattern. In India, the elderly population is gradually increasing which results in a sharp rise in sleep problems of elderly people. Therefore, health assessment of an elderly should include questions on sleep quality.

It is the need of the hour that public health system should pay attention to sleep quality and insomnia in term of its psychosocial, physiological and pathological aspects. Knowledge gained from this sleep research should lead to the effective management of sleep disorders in the elderly and the promotion of sleep research as an emerging discipline in India.

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