

Descriptive analysis of sleep quality and its determinants among rural population of coastal Karnataka

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Abstract

Background: A good quality of sleep helps to maintain mood, memory and cognitive performance. **Aim & Objective:** To assess quality of sleep and its determinants among rural adults. **Settings and Design:** A community based cross sectional study was carried out in rural field practice area of a medical college **Methods and Material:** Pittsburg sleep quality index scale was used to assess quality of sleep. Semi-structured questionnaire was used to collect information from participants. Anthropometric and blood pressure measurements were taken. **Statistical analysis used:** Chi-square test was used to find out association between poor sleep and specific morbidities. Univariate and multivariate logistic regression was done to assess predictors of poor sleep. **Results:** Among the 614 study subjects, 60.3% had good sleep. Presence of morbidity was significantly associated with poor sleep [AOR=1.48; 95%CI=1.05-2.08]. Presence of a dark room, taking a bath or having milk before bed time were top reasons cited to be facilitating good sleep. Presence of mosquitoes, having young children or adolescent at home and vital events in last one year were reported to hinder good sleep. **Conclusions:** A sizeable proportion of rural adults have poor sleep. Presence of morbidity was a significant predictor of poor sleep.

Keywords

Sleep Quality; Social Determinants; Adult; Morbidity; Environmental.

Introduction

Sleep is an essential part of life. Sleep quality of an individual encompasses sleep duration, sleep latency, depth of sleep and restfulness. A good quality of sleep which is associated with fewer sleep disturbances helps to maintain mood, memory and cognitive performance. Lack of sleep has been linked with irritability and emotional distress, compromised endocrine and immune function, cognitive impairment, hypertension, impaired healing and obesity. (1-3) Hence, sleep-related disorders (SRDs) not only impair quality of life but also pose several health-related problems and have been considered as an important public health problem. Prevalence of sleep

related disorders ranges from 20-32% among healthy adults in India. (4)

Quality of sleep can be associated with both internal and external/environmental factors. Factors such as listening to calm music, physical activity, yoga and sleep hygiene are known to promote sleep. (5) External factors such as use of caffeine, alcohol, nicotine and drugs like antihistamines, beta blockers, alpha blockers and antidepressants can also have an impact on sleep. Sleep environment such as light, noise and temperature can also have significant effect on the quality of sleep. (6) Evidence has also shown that internal factors like presence of chronic morbidity is associated with sleep problems. (7) Addressing these internal and external factors affecting

sleep can improve its quality and hence, improve the overall quality of life of an individual.

Aims & Objectives

1. To assess the quality of sleep among adults residing in rural area
2. To identify the sociodemographic, behavioral and environmental factors associated with quality of sleep among adults residing in rural area.

Material & Methods

Study type: A community based cross-sectional study

Study area: Field practice area of Department of Community Medicine of a teaching hospital in coastal Karnataka

Study population

Inclusion criteria: Adults who were aged more than or equal to 18 years

Exclusion criteria: Severely ill patients and those with speech and hearing impairment

Sample size calculation: Results of a study conducted in South Indian population about sleep related disorders using Pittsburg Sleep Quality Index (PSQI), (6) where the prevalence of poor quality sleep was reported to be 6.2% was used to estimate sample size for this study. Using the formula $4pq/d^2$, absolute precision of 2% for 95% confidence interval, the sample size was calculated to be 559. Accounting for 5% non-response rate, the sample size was estimated to be 589.

Strategy for collection: Convenience sampling was employed to identify the study subjects from the field practice area. House to house surveys were carried out by a team of trained interviewers consisting of faculty, postgraduates and medico social workers. The semi structured questionnaire used for the interview included information pertaining to demographic variables (age, gender, marital status, education and occupation), and sleep quality and determinants. In addition, anthropometric measurements and blood pressure (BP) measurements were taken. PSQI was used to evaluate sleep quality in the past one month. PSQI differentiates "poor" from "good" sleep by measuring seven domains: subjective rating of participant's sleep quality (from "very good" to "very bad"), sleep latency (the time taken to fall asleep), sleep duration (hours of actual sleep at night), habitual sleep efficiency (total hours asleepx100/ total hours in bed) and sleep disturbances (unable to sleep within 30 minutes, waking up in middle of night/early morning, getting up to use bathroom, not able to breathe comfortably, cough or snore loudly, feel to cool or hot, having bad dreams and having pain), use of sleep medication (medication prescribed or taken over the counter), and daytime dysfunction over the last month (trouble staying awake during the day). Scoring of the answers was based on a 0 to 3 scale, whereby 3 reflects the negative extreme on the likert scale. A global sum of "5" or greater indicates "poor" sleep.(6) The person with

impaired quality of sleep was referred to peripheral health center managed by the department of Community Medicine where Psychiatrist / Psychologist come for consultation on a fortnightly basis. These centers provide primary health care facilities to people residing in the field practice area including screening and management of non-communicable diseases, under-five immunization and antenatal care services.

All the anthropometric measurements were measured and classified according to World Health Organization (WHO) guidelines. (8) Blood pressure was measured for all the study subjects using digital blood pressure monitors, in the right arm in sitting posture with the subject in a relaxed state. Blood pressure was classified according to Joint National Committee (JNC) VIII criteria. (9)

Ethical approval: Institutional Ethical Committee clearance was obtained before the start of the study (KMC/IEC/89/2015).

Consent: Subject information sheets were given to the participants and written informed consent was obtained from all the study subjects.

Data analysis: Data was entered and analyzed using Statistical Package for Social Sciences (SPSS), version 15.0. All the categorical variables were summarized as proportions and quantitative variables were summarized using mean \pm standard deviation. Chi-square test was used to find out association between sleep quality and specific morbidities. Univariate analysis was done to find out the association between sociodemographic characteristics, anthropometry, morbidity and blood pressure levels. Factors significant on univariate analysis were included in multivariate analysis and unadjusted and adjusted odds ratio (UOR and AOR) have been presented with 95% confidence interval(CI). A p value of ≤ 0.05 was considered statistically significant.

Results

The study included a total of 310 families with 1176 eligible individuals, but only 614 subjects (52.2%) were available for interview. [Table 1](#) shows the distribution of participants according to PSQI components. According to PSQI, 39.5% of the study participants had a global sum of 5 or more indicating poor quality of sleep.

[Table 2](#) shows the association of sociodemographic characteristics with sleep quality. Among the participants, 67.9% were below the age of 60 years. Interviews involved predominantly females (65.8%) as they were available at the time of the survey. The literacy level of the study sample was good as only 12.4% were illiterate. As shown in [Table 2](#), sociodemographic variables were not associated with quality of sleep.

Results of univariate analysis between various anthropometric parameters, blood pressure and morbidities has been shown in [Table 3](#). On univariate analysis, participants with poor sleep were more likely to

have a BMI>25, to have elevated blood pressure > 140/90 mm Hg, have central obesity and have any morbidity.

As shown in [Table 4](#), multivariate analysis showed that participants with poor sleep were 1.4 times more likely to have a morbidity and this was statistically significant.

As observed in [Table 5](#), the morbidities significantly associated with poor sleep were found to be diabetes, musculoskeletal disorders, bronchial asthma/Chronic Obstructive Pulmonary Disease and persistent cough more than one month.

The various factors facilitating and hindering good sleep are shown in seen in [Figure 1](#) & [Figure 2](#). Almost two third of the study participants (67.5%) reported that presence of dim illumination or dark room to be a facilitating factor for good sleep. Less than a quarter of participants reported that performing yoga, brisk walking, reading books and listening to music promoted good sleep. Presence of vectors such as mosquitoes and bedbugs was the top most factor hindering sleep.

Discussion

Sleep quality is of public health concern as it not only affects daily routine of every individual but can also have an impact on quality of life. This community based cross sectional study included a total of 614 individuals from 310 families. The present study observed that 39.7% of the study participants had poor sleep. The prevalence of poor quality of sleep reported from India ranged from 6.2%-72.6% while in international studies it ranged from 21% to 44%. (4,11-14) This difference observed may be due to inclusion of population with varying characteristics like healthy population, elderly, patients with morbidity and working pattern of participants.

While our study findings showed that quality of sleep was not associated with any sociodemographic characteristics, several studies have shown that factors such as advancing age, female gender and being widowed to be associated with poor quality of sleep. (11-13,15-17) Due to similar distribution of these background characteristics among the people with good and poor sleep, no difference was observed with respect to these parameters in our study. Our study found that presence of morbidities was significantly associated with poor sleep. The symptoms associated with chronic morbidities and the associated complications are known to impair sleep quality. This observation is consistent with the findings of other studies done from India as well as China and Nigeria. (12,13,16,18) Our study observed that high BMI was not significantly associated with poor sleep which is similar to findings of Luo J et al from China. (16) However, studies by Shittu RO et al found that higher BMI was associated with poor sleep. (18)

Conclusion

Though most of the study participants were found to have good sleep, a considerable proportion was found to have poor quality of sleep. Since, presence of morbidity was

found to be a significant predictor of poor sleep, efforts should be made for appropriate management of existing morbidities to improve the quality of sleep. Findings of the study emphasize that simple measures such as taking a bath and drinking milk before bedtime can facilitate good sleep. The study has also identified both modifiable hindering factors such as presence of insect vectors and factors which are difficult to modify such as presence of debts, workplace conflicts which require complex social interventions.

Recommendation

Future studies can be done to identify other determinants of quality of sleep such as psychological factors and economic wellbeing.

Limitation of the study

There was a preponderance of females in the study and men were under represented as the study was conducted during working hours. The present study did not evaluate economic and psychological factors which could affect the quality of sleep.

Relevance of the study

The findings of this study provide a baseline information about quality of sleep and its determinants among the population in this region. The study identified specific facilitators and hindering factors for good sleep which was unique to this study. The quality of sleep identified in this study and its determinants may be applicable to similar population in other settings.

Authors Contribution

SS: Concept, definition of intellectual content, literature search, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing, manuscript review. CRR: Concept, design, definition of intellectual content, literature search, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing, manuscript review, guarantor. SDM: Concept, design, definition of intellectual content, literature search, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing, manuscript review, guarantor. UK: Definition of intellectual content, literature search, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing, manuscript review. AK: Design, definition of intellectual content, literature search, data analysis, statistical analysis, manuscript preparation, manuscript editing, manuscript review

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Tables

TABLE 1 DISTRIBUTION OF RESPONDENTS ACCORDING TO PSQI*(N= 614)

	Components of PSQI	Frequency	Percentage
Subjective sleep Quality (C1)	Very good	198	32.2
	Fairly good	369	60.1
	Fairly bad	38	6.2
	Very bad	9	1.5
Sleep Latency (C2)	<15 min	262	42.7
	15-30 min	205	33.4
	31-60 min	92	15.0
	>60 min	55	9
Sleep duration (C3)	>7 hours	356	58
	6-7 hours	177	28.8
	5-6 hours	61	9.9
	<5 hours	20	3.3
Habitual sleep efficiency (C4)	>85%	566	92.2
	75-84%	27	4.4
	65-74%	14	2.3
	<65	7	1.1
Sleep disturbance (C5)	Not in last month	103	16.8
	Once in a week	456	74.3
	1-2 times a week	55	9
	More than thrice a week	0	0
Use of sleeping medications (C6)	Not in last month	582	94.8
	Once in a week	9	1.5
	1-2 times a week	4	0.7
	More than thrice a week	19	3.1
Day time dysfunction (C7)	Not difficult	505	82.2
	Little difficult	68	11.1
	Difficult	31	5

	Components of PSQI		Frequency	Percentage
	Global PSQI Score	Very difficult		10
Less than 5		370	60.3	
5 or more		244	39.7	

*PSQI: Pittsburgh Sleep Quality Index

TABLE 2: ASSOCIATION OF SOCIO DEMOGRAPHIC CHARACTERISTICS WITH SLEEP QUALITY (N=614)

Characteristics	Category	Total	Good Sleep n (%)	Poor sleep n (%)	Unadjusted Odds Ratio (95% CI)	p value
Gender	Male	211	137 (37)	74 (30.3)	0.74 (0.52 – 1.04)	0.08
	Female	403	233 (63)	170 (69.7)	1	
Age group (years)	18 – 44	257	160 (43.2)	97 (39.8)	1	0.9
	45 - 60	175	108 (29.2)	67 (27.5)	1.02 (0.69-1.52)	
	> 60	182	102 (27.6)	80 (32.7)	1.29 (0.88-1.9)	
Type of Family	Nuclear	300	187 (50.5)	113 (46.3)	1	0.37
	Joint	191	111 (30.0)	80 (32.8)	1.18 (0.82-1.71)	
	Three generation	123	72 (19.5)	51 (20.9)	1.16 (0.76-1.78)	
Religion	Hindu	431	273 (73.8)	158 (64.8)	1	0.006
	Muslim	114	56 (15.1)	58 (23.7)	1.79 (1.18-2.71)	
	Christian	69	41 (11.1)	28 (11.5)	1.18 (0.7-1.98)	
Marital status	Married	457	277 (74.9)	180 (73.8)	1	0.59
	Unmarried	72	46 (12.4)	26 (10.6)	0.87 (0.52-1.46)	
	Others†	85	47 (12.7)	38 (15.6)	1.24 (0.78-1.98)	
Literacy status	Diploma and Graduate	153	100 (27)	53 (21.7)	0.75 (0.51-1.11)	0.15
	1-10 years of schooling	385	226 (61.1)	159 (65.2)	1	
	Illiterate	76	44 (11.9)	32 (13.1)	1.03 (0.62-1.70)	
Occupational Status	Employed	196	131 (35.4)	65 (26.6)	0.61 (0.42-0.89)	0.01
	House wife	337	187 (50.5)	150 (61.5)	1	
	Unemployed	81	52 (14.1)	29 (11.9)	0.69 (0.42-1.14)	

† “others” in marital status includes divorced, separated, widow/widower

TABLE 3: ASSOCIATION BETWEEN ANTHROPOMETRIC PARAMETERS AND MORBIDITY WITH SLEEP QUALITY (N=600‡)

Characteristic	Category	Total	Good Sleep n (%)	Poor sleep n (%)	Unadjusted Odds ratio (95% CI)	p value
BMI (kg/m ²)	< 25	380	248 (68.5)	132 (55.5)	1.00	<0.001
	≥25	217	115 (31.7)	105 (44.3)	1.74 (1.25-2.45)	
Blood pressure	Normal	93	65 (17.9)	28 (11.8)	1.00	0.04
	Elevated	507	298 (82.1)	209 (88.2)	1.61 (1.0-2.6)	
Truncal obesity	Present	419	248 (68.3)	171 (72.2)	1.21 (0.84-1.73)	0.29
	Absent	181	115 (31.7)	66 (27.8)	1.00	
Central obesity	Present	349	196 (54)	153 (64.6)	1.54 (1.1-2.15)	0.01
	Absent	251	167 (46)	84 (35.4)	1.00	
Morbidity	Present	281	152 (41.9)	129 (54.4)	1.63 (1.17-2.27)	0.004
	Absent	319	211 (58.1)	108 (45.6)	1.00	

‡Data was incomplete for few variables for 14 participants as they didn't agree for physical measurements and examination

TABLE 4. MULTIVARIATE LOGISTIC REGRESSION ANALYSIS OF SLEEP QUALITY AND ITS DETERMINANTS N=600‡

Characteristic	Category	Adjusted Odds ratio (95% CI)	p value
Religion	Hindu	1.00	0.811
	Muslim	0.94 (0.55-1.60)	
	Christian	1.48 (0.78-2.76)	
Occupational Status	Employed	1.44 (0.84-2.45)	0.184
	House wife	1.00	
	Unemployed	0.95 (0.53-1.67)	
BMI (kg/m ²)	< 25	1.00	0.051
	≥25	1.44 (0.99-2.09)	
Blood pressure	Normal	1.00	0.215

Characteristic	Category	Adjusted Odds ratio (95% CI)	p value
	Elevated	1.37 (0.83-2.23)	
Central obesity	Present	1.23 (0.83-1.85)	0.300
	Absent	1.00	
Morbidity	Present	1.48 (1.05-2.08)	0.025
	Absent	1.00	

#Data was incomplete for few variables for 14 participants as they didn't agree for physical measurements and examination

TABLE 5. PRESENCE OF MORBIDITY AND SLEEP QUALITY AMONG THE STUDY PARTICIPANTS (N= 614)

Morbidity	Good sleep (n=370) n(%)	Poor sleep (n=244) n(%)
Hypertension(n=163)	94 (25.4)	69 (28.3)
Diabetes § (n=103)	51 (13.8)	52 (21.3)
Musculoskeletal disorders § (n=60)	25 (6.8)	35 (14.3)
Bronchial Asthma/Chronic Obstructive Pulmonary Disease § (n=27)	11 (3)	16 (6.6)
Thyroid disorders (n=24)	13 (3.5)	11 (4.5)
Persistent cough > 1 month § (n=18)	6 (1.6)	12 (4.9)
Others (n=70)	33 (8.9)	34 (13.9)

Note: § Significant by Univariate Analysis

Figures

FIGURE 1. FACTORS FACILITATING GOOD SLEEP N=614

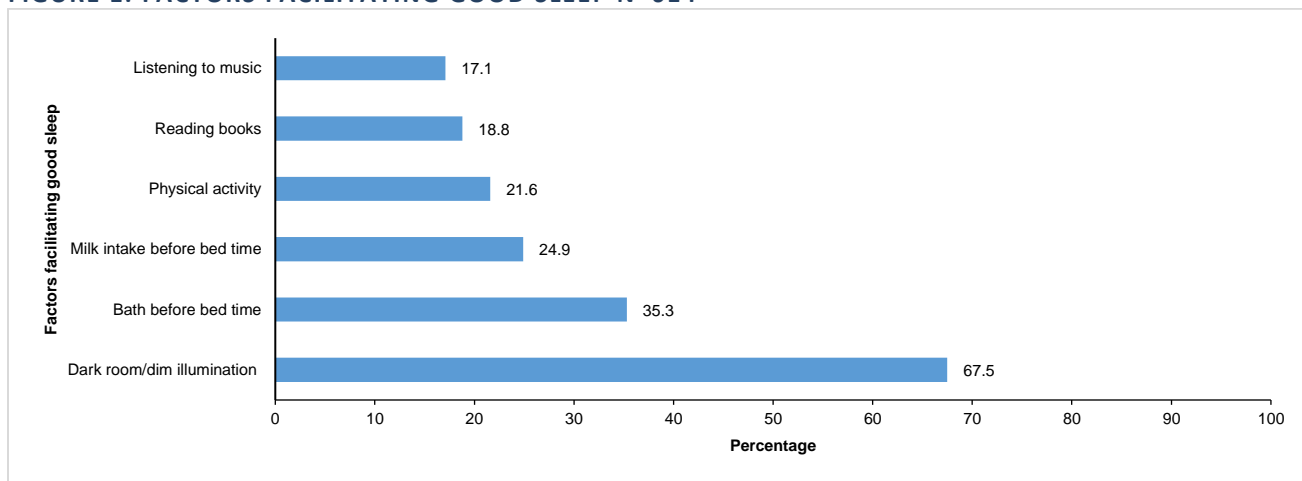


FIGURE 2. FACTORS HINDERING GOOD SLEEP N=614

