Assessment of quality of sleep and its association with body mass index among medical consultants working in a medical college in northern India

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INTRODUCTION

Sleep is a recurring process characterized by a decrease in consciousness, altered muscle tone, and autonomic changes that is necessary for normal brain functioning.[1] It is not a passive process but requires the collaboration of various regulatory mechanisms. Interference with regular sleep pattern can be dangerous as well as expensive.[2] Sleep disturbance is one of the most common complaints encountered these days, and significant variation in sleep has been reported among different population and age groups. Numerous studies have shown that sleep disorders are common in the specific community such as older adults, women, and patients with comorbid medical, psychiatric, and neurological disorders.[3-7] Occupations with increasing demand and shifts are more commonly associated with poor quality of sleep and sleep disorders.[8]
Long working hours, on-call duties, emergency duty stress, and examination stress in medical professionals are the main factors associated with sleep problems and have led to decreased cognitive functions, daytime sleepiness, poor academic performance, a decrease in efficiency, and productivity at work with the poor quality of life. Poor sleep is not only common among medical students but also its prevalence is higher than in nonmedical students and the general population.

As of now, there is no fixed number of hours that can be considered as the average duration of sleep. However, in a Gallup poll conducted in the USA in the year 2015, it was found that among 1500 adults (age ≥18 years; mean age = 49 years), the average self-reported duration of sleep was 6.8 h on weekdays and 7.4 h on weekends.

Some epidemiological studies have investigated the working schedule and sleep situations of the residents. A survey comprising of 2737 medical residents was conducted in the USA that with an increase in extended duration of working hours of the medical residents, there was a reduction in the total duration of sleep available to them, leading to an increase in the number of medical errors and decrease in overall efficiency at work.

There has been a sparse literature in the context of quality of sleep among the medical consultants, although it needs attention keeping in view the health hazards and the accidents occurring due to the poor quality sleep. The mishaps happening at the workplace might also be a result of the sleep deprivation. The living style is also compounding the intensity of the problem. Obesity, delay in the working office timings, and poor sleep hygiene are another factors that lead to the poor sleep quality. These all add up to the already existing gap in the knowledge of sleep quality among medical consultants.

Given the above, this study was planned to assess the quality of sleep among consultants in a medical college in northern India because of the increase in the number of the consultants seeking consultation for sleep problems and to investigate the relationship of body mass index (BMI) with quality of sleep.

MATeRIAls AND METHODS

This cross-sectional study was conducted between February 2018 and April 2018 in a medical college in northern India. The Institutional Ethics Committee approval was obtained prior to the data collection. The working schedule of college is 8 h daily with a once a weeknight/emergency duty for clinical departments, and total working hours are 48 h/week with no regular shift workers. Convenient type of sampling was used for the data collection. All the consultants of either gender who gave the written informed consent working in the clinical, para-clinical, and nonclinical departments were included in the study. However, the consultants on treatment for diagnosed primary insomnia and those regularly using benzodiazepines or hypnotics or any other drug that alters sleep architecture were excluded from the study sample.

The sociodemographic profile (age, gender, height, and weight), BMI, and the comorbid medical conditions (chronic obstructive pulmonary disease/diabetes mellitus/hypertension/others) of all the recruited samples were noted. The quality of sleep was assessed by the Pittsburgh Sleep Quality Index (PSQI), a self-administered questionnaire. It is a scale to assess the quality and pattern of sleep. It was developed by the Hartford Institute for Geriatric Nursing, New York University. The PSQI has an internal consistency and a reliability coefficient (Cronbach’s alpha) of 0.83. It differentiates “poor” from “good” sleep by measuring seven domains: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction over the past month. The subject self-rates each of these seven areas of sleep. Scoring of answers is based on a 0–3 on the Likert scale. Each domain is scored as: 0 (very good), 1 (good), 2 (poor), and 3 (very bad). The sum of scores varies between 0 and 21 and determines the PSQI. A global sum of “5” or greater indicates a “poor” sleep.

An e-mail was sent to the head of the department mentioning the aims and objectives of the study. A request was made to inform all faculty members in the department regarding this study. A particular time and date were reported to them to be available in the psychiatry department (during lunchtime, to avoid any disturbance in the working schedule). At the particular date and time, a brief introduction was given to all the available consultants regarding the need for the study and its objectives and was informed that their participation was voluntary by the principal investigator (MB). After that, the study questionnaire was distributed, and the time allotted to fill the same was 20 min.

Statistical analysis

Frequency and percentage tables were used for the presentation of qualitative data. Chi-square test and regression analysis were used to analyze the relation between PSQI score and age, gender, BMI, and chronic illness. P <0.05 was considered as statistically significant. The Statistical Package for the Social Sciences software, (IBM Corp., Version 20.0. Armonk, NY) was used for data entry and analysis.

RESULTS

Of the total 67 responses obtained, majority were females (n = 38) and majority were aged more than 40 years of age (n = 36). Majority of the participants were overweight or
obese ($n = 58$) and without chronic disease ($n = 57$) [Table 1]. The parameters such as the mean height and the mean weight were statistically significant ($P = 0.004$ and $P = 0.000$, respectively) [Table 2]. The majority ($n = 62$) of the participants have not used any medication for sleep for the past 1 month; the majority ($n = 57$) did not find any difficulty in staying awake while eating, driving, or engaging in the social activity. Almost half of the participants ($n = 35$) did not see much problem in keeping up the enthusiasm to get things done, and nearly half of the participants self-reported a reasonably good quality of sleep ($n = 33$) and good quality ($n = 23$) [Table 3].

Good sleep quality was more often seen among females (47.4%) as compared to males (34.5%). The good sleep quality was also observed among the older age group (45.9%) as compared to the younger age group (36.7%). Furthermore, even the overweight participants reported good sleep quality (44.8%) as compared to participants with normal BMI (22.2%). The absence of any comorbid chronic medical illness reported good sleep quality (47.4%) as compared to only 10% of those who reported good sleep with a chronic medical disease [Table 4]. Good sleep quality is reported by participants who sleep within 15 min of going to bed (50%) as compared to those who take more time to sleep (41.8%). The participants who go to bed early (before 10.30 PM) report good quality 64.7% as compared to only 34% who go to bed later. Of the participants, those who spent more than 85% of the time in bed as sleeping reported good quality sleep (56.7%) as compared to those who spent <85% time as sleeping [Table 5].

The pattern of sleep latency (how long [in minutes], it takes to go to sleep) with change in physiological parameters such as BMI, age, and gender were calculated. However, the mean of the whole sample compared in terms of BMI

### Table 1: The sociodemographic profile of the study sample

| Gender | Male (29) | Female (38) |
|--------|-----------|-------------|
| Age (years) | | |
| <40 | 13 | 18 |
| >40 | 16 | 20 |
| BMI (kg/m²) | | |
| Normal | 4 | 5 |
| Overweight | 25 | 33 |
| Chronic disease | | |
| Yes | COPD | 1 | 2 |
| | DM | 2 | 1 |
| | HTN | 2 | 2 |
| No | | 24 | 33 |

BMI – Body mass index; COPD – Chronic obstructive pulmonary disease; DM – Diabetes mellitus; HTN – Hypertension

### Table 2: The mean age, height, weight, and body mass index of the study sample

| Gender | Mean age±SD (years) | Mean height±SD (cm) | Mean weight±SD (kg) | Mean BMI±SD (kg/m²) |
|--------|---------------------|---------------------|---------------------|---------------------|
| Female ($n = 38$) | 39.90±7.29 | 158.93±26.26 | 67.21±9.64 | 20.90±8.87 |
| Male ($n = 29$) | 41.66±9.94 | 172.20±7.46 | 80.80±11.23 | 27.2±3.63 |
| Total ($n = 67$) | 40.90±8.87 | 166.45±19.18 | 74.92±12.50 | 28.7±17.20 |
| $P$ | 0.425 | 0.004 | 0.000 | 0.418 |

SD – Standard deviation; BMI – Body mass index

### Table 3: The various parameters of Pittsburgh Sleep Quality Index scale

| Parameter | Responses | Not during the past month | Less than once a week | Once or twice a week | Three or more times a week | Total |
|-----------|-----------|---------------------------|-----------------------|----------------------|--------------------------|-------|
| Medicine (prescribed or OTC) | Frequency, $n$ (%) | 62 (92.5) | 2 (3.0) | 1 (1.5) | 2 (3.0) | 67 (100) |
| Had trouble staying awake | Frequency, $n$ (%) | 57 (85.1) | 9 (13.4) | 1 (1.5) | 0 (0) | 67 (100) |
| How much of a problem to keep up enthusiasm | Frequency, $n$ (%) | 35 (52.2) | 25 (37.3) | 6 (9.0) | 1 (1.5) | 67 (100) |
| How would you rate your sleep quality | Frequency, $n$ (%) | 23 (34.3) | 33 (49.3) | 9 (13.4) | 2 (3.0) | 67 (100) |
| OTC – Over the counter | | | | | | |

### Table 4: The quality of sleep among various physiological variables

| Variable | Subcategory | Good (28 [41.8]) | Poor (39 [58.2]) | Total (67 [100]) | OR | CI | Chi-square test value (df=1) | P < 0.05 |
|----------|-------------|------------------|-----------------|-----------------|----|----|-----------------------------|---------|
| Gender   | Male | 10 (34.5) | 19 (65.5) | 29 (100) | 0.58 | 0.19-1.77 | 1.12 | 0.289 |
| | Female | 18 (47.4) | 20 (52.6) | 38 (100) | Reference | | | |
| Age      | <40 | 11 (36.7) | 19 (63.3) | 30 (100) | 0.68 | 0.23-2.04 | 0.59 | 0.443 |
| | >40 | 17 (45.9) | 20 (54.1) | 37 (100) | Reference | | | |
| BMI      | Normal | 2 (22.2) | 7 (77.8) | 9 (100) | 0.35 | 0.05-2.11 | 0.84 | 0.359 |
| | Overweight | 26 (44.8) | 32 (55.2) | 58 (100) | Reference | | | |
| Any chronic disease | Yes | 1 (10.0) | 9 (90.0) | 10 (100) | 0.12 | 0.01-1.08 | 3.47 | 0.062 |
| | No | 27 (47.4) | 30 (52.6) | 57 (100) | Reference | | | |

OR – Odds ratio; CI – Confidence interval; BMI – Body mass index
Table 5: Association of quality of sleep with various individual parameters of Pittsburgh Sleep Quality Index

| Variable          | Subcategory | Sleep quality | OR     | CI       | Chi-square test value (df=1) |
|-------------------|-------------|---------------|--------|----------|-----------------------------|
|                   |             | Good (28) 28 (41.8) | Poor (39) 58.2 | Total (67) 100 |                     |
| How long you take to sleep (min) | <15 | 19 (50.0) | 19 (50.0) | 38 (100) | 2.22 | 0.72-6.95 | 2.43 | 0.119 |
|                   | >15 | 9 (31.0) | 20 (69.0) | 29 (100) | Reference |          |       |
| When do you go to bed | Till 10:30 PM | 11 (64.7) | 6 (35.3) | 17 (100) | 3.56 | 1.02-13.29 | 4.92 | 0.026 |
|                   | After 10:30 PM | 17 (34.0) | 33 (66.0) | 50 (100) | Reference |          |       |
| How much percentage of the total time is spent in sleep (total number of hours asleep)/(total number of hours in bed) × 100 | >85 | 21 (56.7) | 16 (43.3) | 37 (100) | 4.31 | 1.32-14.54 | 7.61 | 0.006 |
|                   | <85 | 7 (23.3) | 23 (76.7) | 30 (100) | Reference |          |       |

OR – Odds ratio; CI – Confidence interval

Table 6: Pattern of sleep latency (how long [minutes], it takes to go to sleep) with change in physiological parameters

| Parameter                  | Frequency (n) | Mean±SD |
|----------------------------|---------------|---------|
| BMI (kg/m²)                |               |         |
| Normal                     | 9             | 23.33±10.89 |
| Obese                      | 47            | 22.66±10.31 |
| Overweight                 | 11            | 21.82±7.83 |
| Total                      | 67            | 22.61±9.89 |
| Age (years)                |               |         |
| <40                        | 30            | 21.00±8.44 |
| >40                        | 37            | 23.92±10.87 |
| Total                      | 67            | 22.91±9.89 |
| Gender                     |               |         |
| Female                     | 29            | 22.76±11.06 |
| Male                       | 38            | 22.50±9.06 |
| Total                      | 67            | 22.61±9.89 |

BMI – Body mass index; SD – Standard deviation

(normal/obese/overweight); Age (<40 years/>40 years and Gender (female/male) were also calculated [Table 6].

DISCUSSION

In our study, it is observed that more females participated in the study which is consistent with the results of another study,[14] whereas some studies have shown contrary results.[15] It is also seen that not many participants used sleeping or over-the-counter drugs for inadequate sleep, and to the contrary, there is much use of such medications in another study.[16,17]

It is observed that among gender, 47.4% of females have good quality sleep as compared to 34.5% of males, although the results were statistically not significant (odds ratio: 0.58; P = 0.289). However, the study by Barger et al[18] states that poor quality of sleep is seen more among females as compared to males beyond psychosocial disparity as women are involved in multiple tasks along with psychological stress and hormonal changes which account for the poor quality of sleep. However, this study was done in participants who have extended work shifts, but in our study sample, the working hours were more or less the same throughout the week.

Among age, 36.7% consultants age <40 years have good quality sleep as compared to 45.9% aged >40 years, indicating the better sleep quality among the older participants, although the results were statistically not significant (odds ratio = 0.68; P = 0.443). Contrary to these findings, a higher prevalence of sleep problems has been reported in the elderly with a few more studies emphasizing the direct impact of age on poor quality of sleep.[19-22] The difference could be because these studies were done in a larger study sample, and we have a very small sample to justify. Moreover, the current era of digitalization and the rampant use of social media may be contributing to the poor sleep quality among the younger age group.

There are also reports that poor quality sleep and long working hours have led to difficulty in remaining awake while driving and attending to activities which are decidedly less seen with our participants,[23] about 47% of participants found it difficult to engage with enthusiasm in events which are consistent with findings of other reports.[24]

There was no significant association observed with BMI and chronic disease. Similar results have been found in some studies which concluded that organic disease per se does not explain the prevalence of sleep disorders in patients with chronic illnesses, and there is no significant association of BMI with sleep quality as various other factors such as psychological and social contributions to the poor quality of sleep,[25-27] although the results were statistically not significant (odds ratio = 0.35; P = 0.359). An inverse association between BMI and sleep difficulty and sleep duration was reported in another study which was performed among the university students in the west which can be explained by the fact that ours is small sample along with the cultural variations and dietary factors might have contributed which led to the difference in the results.[28]

The participants who go to bed early have reported the good quality sleep, and the results were statistically significant (odds ratio = 3.56; P = 0.026). It was also observed that a significant association was seen with those who spend more than 85% of time in the sleep of the total time in bed, that is, 56.7% are found to have good quality sleep as compared to 23.3% of those who spend...
more than <85% of the time in sleep. Similar results were observed in another study conducted on Indian medical students stating poor quality sleep with increased sleep latency. The results were statistically significant (odds ratio = 4.31; \( P = 0.006 \)).

Therefore, it is necessary to find the factors which contribute to poor quality sleep such as irregularity of sleep, use of bed as a study or recreation place, use of television or computer before bed, physical activity at night, use of stimulant drugs during night time, late-night meals, use of electronics which lead to increase in screen time, and staying for extended periods lying down on bed without sleep.

Hence, in today’s scenario, there is a need for proper education about sleep hygiene and health hazards related to poor quality sleep. Various efforts are needed to curtail down barriers to good quality sleep such as encourage recreational activities, physical activity, yoga, and meditation as well as curtail down long duty hours, a good and balanced diet, sleep hygiene to be practiced, and free time to spend with family instead of on social media.

**Limitations**

The study did not segregate the participants as per the stream into clinical, para-clinical, and nonclinical groups as well as per the designation. Academic and clinics were not separately taken into account. Sleep hygiene of various participants, their alcohol use history, and the medication being used in case of the comorbid medical illness were not taken into account.

**CONCLUSION**

Thus, we conclude from our study that among medical consultants, poor sleep quality is observed in younger male consultants (aged <40 years), being overweight (BMI more than 25), with chronic medical illness, although the results are not statistically significant, but still these factors need to be taken care off as these may turn out to be a predictor of poor sleep in the future. Going late to bed (after 10.30 PM) and spending <85% of the total time in bed as sleeping are the predictors of poor sleep and should be taken care off.

Despite the significant burden of the problem, less has been investigated into the issue. Sleep is necessary for a healthy mind and the proper functioning of the body. Multiple factors such as genetic, environmental, social, occupational, and behavioral affect our health overall and sleep in particular. Therefore, more attention and research are needed to look into the clinical problem as it is affecting our health and quality of life, which can further predispose to significant complications in the near future. Thus, not only the general population but also people of various professional streams need to be addressed about sleep problem and awareness regarding sleep hygiene. If such an issue is appropriately resolved, it will be a milestone in the field of sleep medicine.

**Acknowledgment**

None.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

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