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Original Research Article

Association of Sleep Quality to BMI in 1st Year Medical Students

Prafulla Chandak[1], Yash Chandak[2], Bhausaheb V Jagdale[3*], Vrushabh Daga[4]

[1]Professor, Department of Physiology, SMBT Institute of Medical Sciences and Research Centre, Dhamangaon, Nashik, Maharashtra, India

[2]Tutor, Department of Endocrinology, TNMC & BYL Nair Hospital, Mumbai, Maharashtra, India

[3]Associate Professor, Department of Physiology, SMBT Institute of Medical Sciences and Research Centre, Dhamangaon, Nashik, Maharashtra, India

[4]Osteopathic Medical Student III (OMS-III), University of New England College of Osteopathic Medicine, Biddeford, Maine, United States

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Corresponding author: Dr. Bhausaheb V Jagdale

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Abstract

Introduction: Sleep is a vital physiological process, which promotes and maintains good health. Sleep curtailment has increased widely especially among the students at medical colleges who have recently shifted to hostels. Sleep loss has been shown to result in metabolic and endocrine alterations. Hence, it is essential to correlate sleep quality with its adverse impacts like obesity and excessive daytime sleepiness so that timely corrective measures can be taken to create healthy future doctors.

Objectives: 1) to assess the sleep quality of the first year MBBS students. (2) Examine the correlation of sleep quality with BMI.

Methods: This is a Descriptive and Cross Sectional study. Study subjects are the first professional MBBS students, who are willing to participate in the study. BMI is calculated as per the standard protocol. Sleep quality is assessed by the "Pittsburgh Sleep Quality Index (PSQI)" questionnaire administered to the students via the Google forms. They are given instructions on how to correctly answer the questionnaire.

Results: No significant difference was detected in the PSQI sleep scores and sleep duration of the different BMI categories as tested by ANOVA. Pearson correlation coefficient showed a weak positive correlation between PSQI scores and BMI. Although the study does show, a trend towards longer sleeping hours in normal BMI subjects.

Conclusion: Present study shows the presence of low sleeping duration in overweight and obese population. PSQI scores were not significantly different among the different BMI categories. However, the PSQI scores were towards poor side for all the categories showing that the sleep quality is poorer in our students.

Keywords: Sleep Quality, BMI, PSQI Scores, Students.

Introduction

Our country is on the path of becoming the obesity capital. Even in young age group, obesity has a high prevalence. Major changes in the lifestyle of the population are responsible for this picture. However, in the life of a medical student, hectic study schedules and academic challenges add another dimension of stress. Irregular bedtime, early waking up, excessive intake of caffeine, reduced family supervision, exposure to new environment, psychological stress, sudden increase and vast study course, frequent examinations etc lead to high occurrence of sleep disturbances [1-2].

Sleep is a vital physiological process, which promotes and maintains good health. Sleep is modulator of neuroendocrine function and glucose metabolism [3]. Sleep loss has been shown to result in metabolic and endocrine alterations, including decreased glucose tolerance and alteration of appetite regulating hormones leading to obesity [3]. Also, circadian rhythms are linked with metabolism, so disturbance in sleeping schedule is bound to affect the metabolic system of the body [4]. Vice a versa, people who are obese are more likely to report insomnia and excessive daytime sleepiness [5]. In recent times, sleep curtailment has increased widely especially among the students at medical colleges who have recently shifted to hostels. Chronic partial sleep loss may increase the risk of obesity and weight gain [3]. Obesity is predisposing factor for Type 2 Diabetes, poor cardiovascular outcomes, heart attacks, increased medical comorbidity, depression, and increased risk of sleep disorders in turn [5].

Concentration and attention difficulties along with poor academic performance are also linked with poor sleep quality among students [6]. Sleep deprivation may compromise physical and mental wellbeing of budding doctors who may be prone to committing medical errors.

Hence, it is essential to correlate sleep quality with its adverse impacts like obesity and excessive daytime sleepiness so that timely corrective measures can be taken to create healthy future doctors.

Study objectives: (1) to assess the sleep quality of the first year MBBS students. (2) To estimate the correlation of sleep quality with BMI

Methodology

Study Design: This is a descriptive and cross-sectional study.

Criteria for Participants:

Inclusion Criteria: The students included in the study were the first year MBBS students, who are studying in the SMBT IMS & RC College Dhamangaon.

Exclusion Criteria: Students not willing to take part in study, Students suffering from any sleep disorders, for example insomnia, consuming sleep medications, Smokers, Intake of alcohol for past 15 days or any other type of medications, Suffering from juvenile diabetes.

Sample size calculation

Sample Size for Frequency in a Population

Population size (for finite population correction factor or fpc) (N):150

Hypothesized % frequency of outcome factor in the population (p): 50%+/-5

Confidence limits as % of 100(absolute +/- %) (d): 5%

Design effect (for cluster surveys-DEFF): 1

Sample Size (n) for Various Confidence Levels

Confidence Level (%) Sample Size

95% 109

Equation

Sample size n = [DEFF*Np (1-p)]/ [(d2/Z21-α/2*(N-1) +p*(1-p)]

The anthropometric measurements were recorded with the help of stadiometer and weighing machine. The body mass index (BMI) was calculated by the formula BMI = Weight (kg) / (Height in meter)^2. The Asian classification for BMI was used as suggested by Misra et al [7].

Normal BMI: 18.0-22.9 kg/m2, Overweight: 23.0-24.9 kg/m2, Obesity: >25 kg/m2

Sleep quality and sleep duration were assessed with the help of the Pittsburgh Sleep Quality Index (PSQI).

The Pittsburgh Sleep Quality Index is a self-report instrument that measures sleep quality and is applicable for use in both clinical and nonclinical settings. The index comprises 19 items, which are variously summed to form 7 component scores. The 7 components of the questionnaire include-sleep duration, sleep latency (10-15 min), habitual sleep efficiency (Total sleep hours/total hours in bed), subjective sleep quality (latency, efficiency, duration, wake after sleep onset), use of sleep medication if any with details, sleep disturbances, daytime disturbances. Each component was scored within a range of 0 (no difficulty) to 3 (severe difficulty). The 7 component scores were added to yield a global score, which ranged from 0 to 21. A global score greater than 5 is considered to represent poor sleep quality.

All the subjects were explained about the questionnaire and their doubts were solved. The questionnaire was distributed to those who were willing to take part in study in the form of Google Forms and the data was collected on that platform itself. This questionnaire has been validated in India [8].

Result

A total of 163 students participated in the study.

Table 1 represents the descriptive statistics of age, sleep duration and gender in different BMI categories.

Table 1: Descriptive Statistics of Age, Sleep duration and Gender in different BMI categories

Variable		Underweight	Normal Weight	Overweight	Obese	Statistical Significance
	n	26 (15.9%)	75 (46.01%)	19 (11.6%)	43 (11.6%)	
Age	Mean ± SD	19.27 ± 0.60	19.05 ± 0.71	19.21 ± 0.79	18.95 ± 0.62	F=1.62, p=0.193
Sleep Duration Hours	Mean ± SD	6.33 ± 0.75	6.19 ± 1.04	6.18 ± 1.10	6.06 ± 0.91	F=0.58, p=0.631
Gender	Female	38	12	7	22	χ^2 =1.3541, p=0.716
	Male	37	14	12	21	

Sleep Duration Hours: The study examined the sleep duration of participants across different weight categories. The mean sleep duration varied slightly across the BMI groups, with underweight individuals having a mean sleep duration of 6.33 hours (± 0.75 SD), normal weight individuals at 6.19 hours (± 1.04 SD), overweight individuals at 6.18 hours (± 1.10 SD), and obese individuals at 6.06 hours (± 0.91 SD). However, statistical analysis showed no significant difference in sleep duration among the BMI categories (F=0.58, p=0.631),

Gender Distribution: The study also assessed the gender distribution among participants across different BMI categories. The number of male and female participants varied across the weight groups, with underweight females constituting 38, normal weight females 12, overweight females 7, and obese females 22. Correspondingly, underweight males were 37, normal weight males 14, overweight males 12, and obese males 21. Statistical analysis indicated no significant difference in gender distribution among the BMI categories ($\chi2$=1.3541, p=0.716), suggesting that gender did not play a significant role in the distribution of weight categories among the participants.

Table 2: Association between BMI with Sleep Quality and Sleep Duration

PSQI	Normal Weight	Underweight	Overweight	Obese	Statistical Significance
< 5	19	7	5	14	$\chi2$ =3.04, p=0.803
05-10	51	17	11	24	
> 10	5	2	3	5	
Mean ± SD	6.33 ± 2.76	6.30 ± 2.79	7.31 ± 3.28	6.09 ± 3.08	F=0.63, p=0.596
Sleep Duration					
< 6	29	4	6	18	$\chi2$ =8.34, p=0.214
06-07	36	20	10	19	
> 7	10	2	3	6	
Mean ± SD	6.19 ± 1.04	6.33 ± 0.75	6.18 ± 1.1	6.06 ± 0.91	F=0.58, p=0.6311

PSQI- Sleep Quality: The Pittsburgh Sleep Quality Index (PSQI) scores were assessed across different BMI categories in the study. Participants were grouped based on their PSQI scores into three categories: scores less than 5, scores between 5 and 10, and scores greater than 10. The distribution of PSQI scores varied among the BMI categories, with normal weight individuals having 19 participants with scores less than 5, 51 participants with scores between 5 and 10, and 5 participants with scores greater than 10. Underweight individuals had 7, 17, and 2 participants in each respective category, while overweight individuals had 5, 11, and 3 participants, and obese individuals had 14, 24, and 5 participants. However, statistical analysis revealed no significant difference in PSQI scores among the BMI categories ($\chi2$=3.04, p=0.803). Additionally, the mean PSQI scores were calculated for each weight category, showing minor variations: normal weight (6.33 ± 2.76), underweight (6.30 ± 2.79), overweight (7.31 ± 3.28), and obese (6.09 ± 3.08). The statistical analysis indicated no significant difference in mean PSQI scores among the BMI categories (F=0.63, p=0.596). Only 45 (27.6%) students had PSQI < 5.

Only 15 (9.2%) students had a PSQI > 10, majority students (103, 63.2%) had a PSQI of 5-10.

Sleep Duration: The study also examined the distribution of sleep duration among participants across different BMI categories. Participants were categorized based on their reported sleep duration into three groups: less than 6 hours, 6 to 7 hours, and more than 7 hours. The distribution of sleep duration varied among the BMI categories, with normal weight individuals having 29 participants with less than 6 hours of sleep, 36 participants with 6 to 7 hours of sleep, and 10 participants with more than 7 hours of sleep. Underweight individuals had 4, 20, and 2 participants in each respective category, while overweight individuals had 6, 10, and 3 participants, and obese individuals had 18, 19, and 6 participants. However, statistical analysis revealed no significant difference in sleep duration among the BMI categories ($\chi2$=8.34, p=0.214). Additionally, the mean sleep duration was calculated for each weight category, showing slight variations: normal weight (6.19 ± 1.04 hours), underweight (6.33 ± 0.75 hours), overweight (6.18 ± 1.10 hours), and obese (6.06 ± 0.91 hours). The statistical analysis indicated no significant difference in mean sleep duration among the BMI categories (F=0.58, p=0.6311). Only 12.8% of subjects (including all categories) had >7 hours of sleep.

Table 3: Pearson Correlation Coefficient between BMI with PSQI and Sleep duration

Correlation with BMI	PSQI	Sleep Duration
Pearson's 'r'	0.05	-0.13
p-value	0.5386	0.0902

The table 3 represents Pearson's correlation coefficients (r) and associated p-values for the relationships between PSQI scores, sleep duration, and BMI (Body Mass Index). For PSQI scores and BMI, the correlation coefficient (r) is 0.05 with a p-value of 0.5386. This indicates a very weak positive correlation between PSQI scores and BMI, suggesting that there is little to no linear relationship between sleep quality and BMI among the participants. Similarly, for sleep duration and BMI, the correlation coefficient (r) is -0.13 with a p-value of 0.0902. This indicates a weak negative correlation between sleep duration and BMI, suggesting that there might be a slight tendency for individuals with higher BMIs to have slightly shorter sleep durations, but the relationship is not statistically significant at conventional level

Discussion

This study was a cross sectional observational study. The sleep duration and sleep quality were compared in subjects of different BMI. In the case of sleep duration, although a significant difference was not found nor was a statistically significant correlation present, our results do show a trend towards longer sleep hours in subjects with normal BMI.

When sleep quality was compared among different BMI categories, no clearcut trend was visible. Also, there was no correlation between sleep quality and BMI.

Previous authors have also found associations between shorter sleep duration and poor quality of sleep with higher BMI.

Kristiˇcevi´c et al (2018) conducted a cross sectional study in young college students (18-24 yrs) and found that both sleep quality and shorter sleep duration are associated with increased BMI or overweight and obesity [9]

Park et al (2018) conducted a large population-based study to examine the association between sleep duration and quality with BMI. Both poor sleep quality and shorter sleep duration were significantly associated with high BMI [10].

The association of sleep quality with BMI was also studied in a cross-sectional study by Wang et al (2018). This study showed that the prevalence of poor sleep quality among university students ranges from 36.5 – 39.1%. They found that females had a relation in BMI and sleep quality, but not in males. Moreover, this relationship was prominent in females who took hypnotic drugs. Therefore, they did not find a significant relationship [11].

Rathod et al (2018) studied the relationship of sleep duration with obesity in medical students in a cross-sectional study. They found a highly significant negative correlation between sleep duration and BMI [12].

Jain et al (2019) assessed the sleep duration in adolescents (10-19 years of age) and found a significantly higher proportion of obese/overweight subjects among those who slept < 6 hours [13].

The pathophysiological mechanisms, which might be responsible for the relationship between sleep qualities and sleep duration and BMI, are not fully understood. Shorter duration of sleep leads to decrease in the secretion of Leptin hormone from the adipose tissue. Leptin suppresses hunger and hence low levels of leptin might lead to increase in feeling of hunger and food intake [14]. A poor sleep quality also leads to disturbances in appetite regulating mechanism, which may lead to overeating and preferences for junk food [9].

This study shows that sleep duration of most medical students is insufficient and most of them are having somewhat poor sleep quality. As good and adequate sleep is important to maintain the students' physical and mental health, more awareness should be created and adequate measures should be taken for the same.

Conclusion

Our study shows the presence of low sleeping duration in overweight and obese population. PSQI scores were not significantly different among the different BMI categories. But the PSQI scores were towards poor side for all the categories showing that the sleep quality is poorer in our students. Therefore, educating our students about sleep hygiene and ill effects of less sleep is of paramount importance. Limitations of The Study: Sample size is comparatively smaller. In addition, apart from BMI, body fat composition can also be assessed for defining Normal weight obesity, but this is not possible due to unavailability of instruments.

PLANS: The authors plan to train students about sleep hygiene and then follow up on the change in BMI of these students to study if improved sleep helps in decreasing BMI.

The investigation of oxadiazole derivatives as potential anticancer drugs offers great promise for the development of new therapies. Following significant study and experimentation, these

chemicals have proven great promise for targeting cancer cells with high selectivity and potency. The many structural alterations accessible for oxadiazole derivatives provide several chances for further optimizing and fine-tuning their anticancer activities. Notwithstanding the difficulties that lie ahead, further research and development of molecules based on oxadiazole is imperative to progress cancer therapy approaches and eventually enhance patient outcomes. With continued efforts, the therapeutic potential of oxadiazole derivatives in cancer treatment remains an intriguing field of study that requires additional investigation and advancement.

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