

## RESEARCH ARTICLE

### Sleep duration and its association with obesity and overweight in medical students: A cross-sectional study

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#### ABSTRACT

**Background:** The prevalence of sleep deprivation is rising globally as is that of obesity. The association between the two is also gaining much evidence. The medical students may be specifically affected due to decreased sleep duration. **Aims and Objectives:** The aim is to study the association between decreased sleep duration and obesity by means of body mass index (BMI) as a measure of obesity among the medical students. **Materials and Methods:** This is a cross-sectional study among 199 medical students. The participants reported their sleep duration, and their height and weight were noted. BMI was calculated from data obtained. Students were categorized according to BMI into underweight, normal, overweight, and obese and according to sleep duration into >8 h, 6-8 h, and <6 h per night. Statistical analysis was done using ANOVA and unpaired *t*-test using GraphPad software, and  $P < 0.05$  was considered statistically significant. **Results:** About 22.6% of the participants had a BMI >25 kg/m<sup>2</sup>. Of all the obese students, 61.54% were sleeping <6 h per night. None of the students was obese who were sleeping >8 h per night. On comparison of mean BMIs between the sleep duration groups, the difference was found to be highly significant ( $P < 0.00001$ ). **Conclusion:** The present work found significant negative association between short sleep duration and overweight and obesity in medical students. Furthermore, creating awareness among medical students regarding this correlation and adoption of healthy lifestyle including proper sleep, diet, and physical activity are the need of the hour.

**KEY WORDS:** Sleep Duration; Overweight; Obesity; Body Mass Index


#### INTRODUCTION

College duration is the transition time in most of the students, from direct supervision, and healthy lifestyle to freedom and autonomy leading to changes in lifestyle which many times are unhealthy and detrimental to health. Furthermore, these students are exposed to increased stress including academic,

as well as they are having decreased sleep; perhaps, both the things being more pronounced in medical students.

Sleep, a vital process of our life, helps to restore and maintain normal functioning of the immune, endocrine, nervous, skeletal, and muscular systems.<sup>[1]</sup> Thus, sleep deprivation may result in disturbances pertaining to these systems.

Lifestyle changes and changes in eating habits have led to the epidemic of obesity. Even as India battles malnutrition, the number of obese people has almost doubled in the country in the past decade, according to the National Family Health Survey 4.<sup>[2]</sup> This preventable condition, with excess body fat accumulation, causes significant mortality and is

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associated with various morbid conditions such as diabetes mellitus Type 2, cardiovascular diseases, asthma, and osteoarthritis.<sup>[3]</sup> Among the various methods to measure it, body mass index (BMI) is considered one of the most important.<sup>[4]</sup> A highly significant association has also been found between hypertension, a comorbid condition of obesity, and BMI.<sup>[5]</sup>

The prevalence of sleep deprivation is rising globally<sup>[6-8]</sup> as is that of obesity.<sup>[9,10]</sup> The decrease in sleep duration has also been observed in India; here, 93% of urban population in 35-65 years of age were found to be getting less than the 8 h of sleep per night.<sup>[11]</sup> Likewise, the 2004-2007 National Health Interview Survey had found approximately 28.3% of adults sleeping 6 h or less per night.<sup>[7]</sup>

Over the past decade, short sleep duration is increasingly being found as a risk factor for weight gain and obesity by reducing physical activity,<sup>[12,13]</sup> and increasing caloric intake.<sup>[14]</sup>

Due to the paucity of literature on information and little awareness about the association between lack of sleep and obesity in college students, particularly, in medical students - the future doctors; we decided to conduct the present study.

## MATERIALS AND METHODS

This is a cross-sectional study among medical students to assess the relationship between sleep duration and obesity by means of BMI at Mamata Medical College, Khammam, Telangana. Initially, a total of 200 medical students were taken up for study, one of them dropped out. Thus, finally, 199 students were assessed. The participants reported their sleep duration, and their height and weight were noted.

Sleep requirements for an average adult are approximately 8 h regardless of environmental or cultural differences.<sup>[15-17]</sup> Thus, the same was considered here.

BMI is considered here as a predictor of obesity, as it is generally regarded as a satisfactory tool for measuring obesity. BMI was calculated as follows:  $BMI = x \text{ KG} / (y \text{ M})^2$ . Where:  $x$  = bodyweight in KGs and  $y$  = height in meters.

According to the WHO, BMI falls into one of the following nutritional status categories (for adults >20 years): Below 18.5 kg/m<sup>2</sup> - underweight; 18.5 to 25 kg/m<sup>2</sup> - normal weight; 25.0-30 kg/m<sup>2</sup> - overweight; and >30.0 kg/m<sup>2</sup> - obesity. The same categories were followed here.<sup>[18]</sup>

Statistical analysis was done using ANOVA and unpaired *t*-test using GraphPad. The  $P < 0.05$  was considered statistically significant.

## RESULTS

A total of 199 medical students were assessed for self-reported sleep duration and BMI. The number of males ( $n = 99$ ) and females ( $n = 100$ ) was almost equal (Table 1). Age of the participants ranged between 18 and 23 years, and most of the students with higher BMI (>25 in kg/m<sup>2</sup>) were in the age group of 20-22 years. Almost 80.91% of students are sleeping <8 h per night.

About 22.6% of the participants had a BMI >25 kg/m<sup>2</sup>, constituted by 16.08% ( $n = 32$ ) overweight and 6.53% ( $n = 13$ ) obese (Table 2). Of all the obese students, 61.54% were sleeping <6 h per night. Of all the overweight students, 87.5% were having sleep duration of <8 h, and 37.5% were having sleep duration of <6 h per night (Table 2).

None of the students was obese who were sleeping >8 h per night.

Negative correlation between BMI and hours of sleep per night is also evident from Figure 1. Gender-wise BMI was not

**Table 1:** Gender-wise case distribution with relation to BMI

BMI in Kg/m <sup>2</sup>	Females	Males	Overall
	Total number of students	Total number of students	Total number of students (%)
<18.5	12	16	28 (14.070)
18.5-25	61	65	126 (63.317)
25-30	19	13	32 (16.083)
>30	8	5	13 (6.533)
Total	100	99	199 (100)
Mean BMI (BMI±SD)	27.569±4.003	21.890±3.552	

BMI: Body mass index, SD: Standard deviation

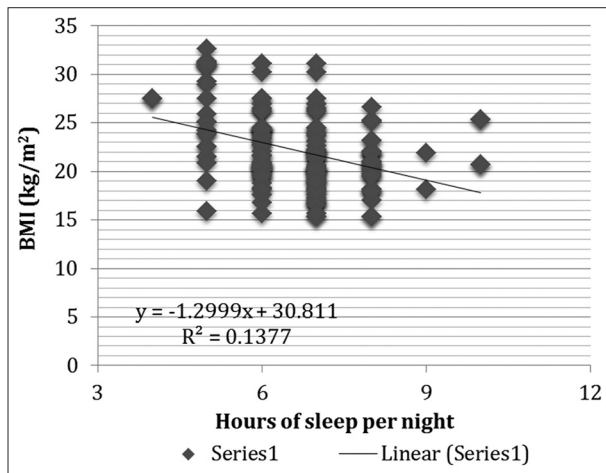
**Table 2:** Association of BMI and duration of sleep

BMI in Kg/m <sup>2</sup>	Duration of sleep in hours per night			Total
	<6	6-8	≥8	
	Total number of students	Total number of students	Total number of students	
<18.5	1	20	7	28
18.5-24.9	6	83	27	126
26-30	12	16	4	32
>30	8	5	0	13
Total	27	134	38	199

BMI: Body mass index

statistically different ( $P = 0.151$ ). However, of the students with BMI >25, 60% were females.

The mean BMI was highest in students having sleep <6 h ( $26.195 \pm 4.442$ ) (Table 3). When all the three sleep duration groups were compared using ANOVA, the difference was found to be highly significant ( $P < 0.00001$ ). The difference



**Figure 1:** Scatter diagram showing negative association of sleep duration and body mass index

**Table 2a: BMI and duration of sleep among female medical students**

BMI in Kg/m <sup>2</sup>	Duration of sleep in hours per night			Total
	<6	6-8	≥8	
	Total number of students	Total number of students	Total number of students	
<18.5	0	9	3	12
18.5-24.9	4	43	14	61
25-30	5	12	2	19
>30	5	3	0	8
Total	14	67	19	100

BMI: Body mass index

**Table 2b: BMI and duration of sleep among male medical students**

BMI in Kg/m <sup>2</sup>	Duration of sleep in hours per night			Total
	<6	6-8	≥8	
	Total (%)	Total (%)	Total (%)	
<18.5	1	11	4	16
18.5-24.9	2	50	13	65
26-30	7	4	2	13
>30	3	2	0	5
Total	13	67	19	99

BMI: Body mass index

was not statistically significant when students with 6-8 h and ≥8 h sleep were compared ( $P = 0.0531$ ). In contrast, the comparisons between <6 and 6-8 h ( $P < 0.00001$ ) and <6 and ≥8 h ( $P < 0.00001$ ) were having highly significant difference.

**DISCUSSION**

Of 199 medical students, about 22.6% had BMI >25 kg/m<sup>2</sup> constituted by 16.08% ( $n = 32$ ) overweight and 6.53% ( $n = 13$ ) obese. Of all the obese students, none were sleeping >8 h per night, and 61.54% were sleeping <6 h per night. On comparison of mean BMIs between all the sleep duration groups, the difference was found to be highly significant ( $P < 0.00001$ ).

This study finds that there is a significant negative association between duration of sleep per night in medical college students and overweight and obesity. The finding is concordant with various studies in adults worldwide.<sup>[19-23]</sup> The similar results may validate the role of sleep deprivation as an important risk factor for obesity and overweight, independent of increased calorie intake and lack of physical activity.<sup>[24]</sup> Few similar researches have been done in medical students, results of which are corroborative with the present one.<sup>[25,26]</sup>

The college students are more vulnerable to sleep disorders, as they are facing great academic pressure, social pressure, new environment, erratic schedules, and lifestyle changes. Most of the studies examining sleep among them have focused on the relationship between sleep habits and academic performance and mental health problems with the recognition that they are experiencing sleep problems that negatively impact their health and well-being.<sup>[27-33]</sup> Our study focuses on the duration of sleep and its association with obesity and overweight in medical students. Many of them are not familiar with this aspect and other problems arising from short sleep duration. Awareness regarding this should be created, which may inspire them for adopting a healthy lifestyle and improving their sleeping habits, which in turn can build good health and well-being. Students should also be encouraged for increasing physical activity and healthy eating habits.

Further work is needed on a larger scale in various regions to explore the possible effects of the duration of sleep on weight gain and obesity in medical students.

**CONCLUSION**

A negative correlation was found between sleep duration, and obesity and tendency to become overweight in medical students. However, larger scale works are further required. Furthermore, awareness should be created among medical students regarding this correlation; adoption of healthy lifestyle including proper sleep, diet, and physical activity should be emphasized.

**Table 3:** Comparison of BMI in relation to hours of Sleep per night

Hours of sleep per night (n=number of students)	<6 (n=27)	6-8 (n=134)	≥8 (n=38)	P
Mean BMI	26.19593	21.75119	20.78234	<0.00001
SD	4.44157	3.393372	2.648984	

BMI: Body mass index, SD: Standard deviation

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