



**ASSOCIATION OF SLEEP DURATION WITH OBESITY: A CROSS SECTIONAL  
STUDY IN MEDICAL STUDENTS**

**Iram Jaan MD<sup>1\*</sup>, Mumtaz Gowhar MD<sup>2</sup> and Saima Nazir MD.<sup>3</sup>**

<sup>1</sup>Senior Resident, Department of Physiology, SKIMS Medical College, Bemina, Srinagar - 190018.

<sup>2</sup>Lecturer, Department of Physiology, SKIMS Medical College, Bemina, Srinagar - 190018.

<sup>3</sup>Senior Resident, Department of Community Medicine, SKIMS Medical College, Bemina, Srinagar - 190018.

**\*Corresponding Author: Iram Jaan MD.**

Senior Resident, Department of Physiology, SKIMS Medical College, Bemina, Srinagar - 190018.

Article Received on 06/07/2020

Article Revised on 27/07/2020

Article Accepted on 16/08/2020

**ABSTRACT**

**Background:** The latest threat to global health is the ongoing obesity pandemic. Cross-sectional studies support an association between less sleep and obesity. However, results from these studies are inconsistent. **Methods:** This cross-sectional study was conducted among medical students of SKIMS Medical College, Srinagar. As it was not possible to do a community based survey, owing to the restrictions of COVID lockdown, we decided to collect the data online. This survey consisted of voluntary nature of participation, declarations of anonymity and confidentiality, and the questionnaire. Persons above 18 years of age and agreed to participate in the study after completion of the questionnaire were included in the study. Body type was categorized according to the World Health Organization. **Results:** Two hundred students were enrolled in this study. The mean age of the respondents was  $19.86 \pm 0.64$  years. Ninety students (45%) were sleeping less than 8 hours/night. The mean BMI was highest in students having sleep < 6 hours ( $27.285 \pm 3.741$ ). The prevalence of overweight and obesity in our study was 20% with 15% being overweight and 5% obese. the prevalence of underweight was zero, and that of normal weight was 2 (8.69%), that of overweight were 15 (65.21%) and that of obesity was 6 (26.08%) in students who slept less than 6 hours per night. **Conclusion:** In conclusion, we see that sleep deprivation is well associated with obesity and overweight, but it requires a detailed survey to further substantiate the facts.

**KEYWORDS:** Obesity; Sleep duration; Medical Students; Kashmir.

**INTRODUCTION**

Obesity is mainly caused by lifestyle and genetic factors. The major lifestyle risk factors for obesity are excessive food intake and lack of physical activity.<sup>[1]</sup> At present, we are facing a major obesity pandemic around the globe. The prevalence of obesity has more than tripled over the past 4 decades (5.2% to 18.4%).<sup>[2]</sup> With this trend, the American Medical Association (AMA) categorized obesity as a disease in 2013. The rise in obesity has been paralleled by decreases in the amount of time that people have spent sleeping, leading to the hypothesis that short sleep duration has contributed to the rise in adolescent obesity.<sup>[1,2]</sup> The American National Sleep Foundation recommended that the ideal sleep duration for adults (20-64) is 7 to 9 hours a day.<sup>[3]</sup> Medical college life brings many new and stressful challenges. In order to deal with these challenges, students voluntarily change their sleeping habits. Previous studies have found that 67% of students suffer from sleep disturbances and poor sleep quality.<sup>[4-10]</sup>

Cross-sectional studies support an association between less sleep and obesity.<sup>[7-10]</sup> However, results from these studies are inconsistent. While some studies have shown

a negative association between sleep duration and BMI, others have found U-shaped or even no association. Most of the studies have come from the western developed countries.<sup>[4-10]</sup> Data from developing countries are scarce, and there are insufficient data on medical college students. In order to understand the relationship between body mass indexes (BMI) and sleep quality in students, we conducted this cross-sectional study on medical college students in Kashmir.

**MATERIALS AND METHODS**

This cross-sectional study was conducted among medical students of SKIMS Medical College, Srinagar, Kashmir in May 2020. The authors carried out the present study in their individual capacity. As it was not possible to do a community based survey, owing to the restrictions of COVID lockdown, we decided to collect the data online. A survey was created using "Google forms" and was distributed via social media including "WhatsApp", "Facebook" and "Twitter" among the students of the said medical college. This survey consisted of voluntary nature of participation, declarations of anonymity and confidentiality, and the questionnaire. Persons above 18 years of age and agreed to participate in the study after

completion of the questionnaire were included in the study. Demographic variables like age, gender, and place of current residence (rural versus urban) were noted.

The questionnaire per-se consisted of questions on duration of sleep, height and weight of the individuals. The Cronbach's alpha coefficient of the questionnaire was 0.82 in our sample, indicating good internal consistency. The BMI was computed using the standard equation ( $BMI = \text{weight in kg}/\text{height squared in meters}$ ). Body type was categorized according to the World Health Organization<sup>[11]</sup> as follows: underweight ( $BMI < 18.5$ ); normal ( $18.5 < BMI < 24.9$ ); overweight ( $25.0 < BMI < 29.9$ ); and obese ( $BMI \geq 30$ ). The cutoff points for overweight and obesity were 25 and 30, respectively.

The data thus collected was compiled and analyzed using SPSS version 21 for Mac (IBM Corporation, 2012). For

quantitative data, mean and standard deviation was calculated. The association between variables was calculated for 95% confidence intervals by using "Chi square test". "Unpaired t – test" was used to compare the means. A P-value  $< 0.05$  was taken as significant. As this study was done in an individual capacity, an approval from the Institutional Ethical Committee was not obtained, however, an e-consent was obtained from the participants.

## RESULTS

Out of a total of 218 participants who responded to the survey, 18 were excluded (14 did not consent, and 4 had not given the complete information). Thus the final sample consisted of 200 respondents. The mean age of the respondents was  $19.86 \pm 0.64$  years. Ninety students (45%) were sleeping less than 8 hours/night. The gender-wise distribution of BMI is shown in Table 1.

**Table 1: Gender distribution of BMI**

BMI ( $\text{Kg}/\text{m}^2$ )	Males (N=100)	Females (N=100)	P value
< 18	15	18	0.0423
18 – 24.9	62	63	0.8781
25 – 29.9	17	15	0.0512
> 30	6	4	0.0311
Mean BMI	$23.86 \pm 1.84$	$22.09 \pm 2.61$	0.0031

The mean BMI was highest in students having sleep  $< 6$  hours ( $27.285 \pm 3.741$ ) (Table 2). When all the three sleep duration groups were compared using ANOVA, the difference was found to be highly significant ( $P < 0.0001$ ). The difference was not statistically significant

when students with 6-8 hours and  $\geq 8$  hours sleep were compared ( $P = 0.0922$ ). In contrast, the comparisons between  $< 6$  and 6-8 hours ( $P < 0.0001$ ) and  $< 6$  and  $\geq 8$  hours ( $P < 0.0001$ ) were highly statistically significant.

**Table 2: Distribution of BMI vis-à-vis sleep duration.**

BMI ( $\text{Kg}/\text{m}^2$ )	Duration of Sleep in hours/night (N)			P value
	> 8 hours	6 – 8 hours	< 6 hours	
< 18	16	7	0	$< 0.0001$
18 – 24.9	92	43	2	$< 0.0001$
25 – 29.9	2	13	15	0.0037
> 30	0	4	6	0.0093
Total	110 (55%)	67 (33.5%)	23 (11.5%)	$< 0.0001$
Mean BMI	$23.86 \pm 1.84$	$22.09 \pm 2.61$	$27.28 \pm 3.74$	$< 0.0001$

## DISCUSSION

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>[12]</sup> The prevalence of sleep deprivation is rising globally as is that of obesity. The decrease in sleep duration has also been observed in India, with, 93% of urban population in 35-65 years of age found to be getting less than the 8 hours of sleep per night.<sup>[7-9]</sup> The current study was designed to investigate the effect of sleep duration on changes in BMI in medical college students.

The prevalence of overweight and obesity in our study

was 20% with 15% being overweight and 5% obese. We also found that the prevalence of overweight and obesity in male students was higher than that in females (23% versus 19%). Previous studies have also observed that gender is a contributing factor for the classification of BMI.<sup>[13-16]</sup> The two main explanations for this phenomenon are that medical students have unhealthy eating behavior and inadequate nutrient intake, and that females may have higher leptin concentrations than males.<sup>[13]</sup> In addition, we found that the prevalence of obesity among senior students was higher than in other years, and that the prevalence of obesity in first-year students was lower than in other years. This could be because of increasing stress during the progression of medical studies.

The prevalence of overweight was 2 (1.81%) and that of obesity was zero in students who slept for more than 8 hours per night. Similarly, the prevalence of overweight was 13 (19.40%) and that of obesity was 4 (5.97%) in students who slept for more than 6 hours but less than 8 hours per night. On the contrary, the prevalence of underweight was zero, and that of normal weight was 2 (8.69%), that of overweight were 15 (65.21%) and that of obesity was 6 (26.08%) in students who slept less than 6 hours per night. Thus, 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.

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.<sup>[7-10]</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.

## CONCLUSION

In conclusion, we see that sleep deprivation is well associated with obesity and overweight, but it requires a detailed survey to further substantiate the facts.

## REFERENCES

1. Singh M, Drake CL, Roehrs T, Hudgel DW, Roth T. The association between obesity and short sleep duration: A population-based study. *J Clin Sleep Med*, 2005; 1(4): 357-63. cr
2. Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999-2008. *JAMA*, 2010; 303(3): 235-41.
3. National Sleep Foundation: National sleep foundation recommends new sleep times [Internet]. Washington DC: National sleep foundation; [Cited 2020 Aug 10]. Available from: <https://sleepfoundation.org/press-release/national-sleep-foundation-recommends-new-sleep-times>.
4. Haslam DW, James WP. Obesity. *Lancet*, 2005; 366(9492): 1197-209.
5. Knutson KL, Van Cauter E, Rathouz PJ, DeLeire T, Lauderdale DS. Trends in the prevalence of short sleepers in the USA: 1975-2006. *Sleep*, 2010; 33(1): 37-45.
6. Patel SR, Malhotra A, White DP, Gottlieb DJ, Hu FB. Association between reduced sleep and weight gain in women. *Am J Epidemiol*, 2006; 164(10): 947-54.
7. Nyer M, Farabaugh A, Fehling K, Soskin D, Holt D, Papakostas GI, et al. Relationship between sleep disturbance and depression, anxiety, and functioning in college students. *Depress Anxiety*, 2013; 30(9): 873-80.
8. Buboltz WC Jr, Brown F, Soper B. Sleep habits and patterns of college students: A preliminary study. *J Am Coll Health*, 2001; 50(3): 131-5.
9. Vargas PA, Flores M, Robles E. Sleep quality and body mass index in college students: The role of sleep disturbances. *J Am Coll Health*, 2014; 62(8): 534-41.
10. Peltzer, K.; Pengpid, S. Sleep duration and health correlates among university students in 26 countries. *Psychol Health Med*, 2016; 21: 208–220.
11. WHO: BMI classification [Internet]. World Health Organization, 2014 [cited2020,Aug10].
12. Nazir S, Mittal A, Anand BK, Goel RKD, Singh J, Rashid A. Determinants of unmet need for family planning in a developing country: An observational cross sectional study. *Natl J Community Med*, 2015; 6(1): 86-91.
13. Taheri, S.; Lin, L.; Austin, D.; Young, T.; Mignot, E. Short sleep duration is associated with reduced leptin, elevated ghrelin, and increased body mass index. *PLoS Med*, 2004; 1: 210–217.
14. Chaput JP, Despres JP, Bouchard C, Tremblay A. The association between sleep duration and weight gain in adults: a 6-year prospective study from the Quebec Family Study. *Sleep*, 2008; 31: 517-23.
15. Ford ES, Li C, Wheaton AG, Chapman DP, Perry GS, Croft J. Sleep duration and body mass index and waist circumference among US adults. *Obesity (Silver Spring)*, 2014; 22: 598-607.
16. Park YJ, Yim HW, Park YM, Lee WC. The association between sleep and obesity in Korean Adults. *J Prev Med Public Health*, 2007; 40: 454-60.