

Correlation of sleep pattern and duration with obesity in students: A clinical study

¹ Raj Kumar, ² Sanjay Nagar

¹ Professor, Department of Physiology, Rajshree Medical Research Institute, Bareilly, Uttar Pradesh, India

² Assistant Professor, Department of Physiology, Rajshree Medical Research Institute, Bareilly, Uttar Pradesh, India

Abstract

Background: Obesity is reaching epidemic proportions throughout the developed world and is attributed largely to industrialization with reduced acute and chronic disease, increased food consumption, and lowered levels of physical activity. The present study was conducted to evaluate the correlation of sleep with obesity in students.

Materials & Methods: It included 250 students in age range of 18-24 years. Students suffering from hypothyroidism and diabetes, psychological related disorders, and on medications such as steroids, sleep inducing, antihistaminic were also excluded from the study.

Assessment of Obesity was determined by using the body mass index (BMI) formula. Pittsburgh sleep quality index (PSQI) was used for assessment of sleep durations and patterns.

Results: Out of 250 subjects, males were 120 and females were 130. Subjects were underweight (males- 21, females- 24), normal weight (males- 50, females- 46), over weight (males- 22, females- 32), pre- obese (males- 13, females- 17) and obese (males- 14, females-11). The 21.6% of students were overweight, 12% were pre- obese and 10% were obese. The total hours of sleep of students was < 5 hours (10%), 5-6 hours (50%), 6-7 hours (25%) and >7 hours (15%). The difference was significant ($P < 0.05$). Fig 2 shows Pittsburgh sleep quality index (PSQI). 4% had score 1-3, 45% had 4-6, 41% had 7-9 and 10% had 10-12. The difference was significant ($P < 0.05$). 8 Out of the 24 obese (BMI >30) students and 12 of the 30 students who were overweight (BMI 25-29.9) had PSQI scores ranging from 7-9, indicating higher difficulties in sleep patterns. Fig 4 shows that 7 obese students, 5 pre obese, 3 overweight, 6 normal weight and 4 underweight had sleep less than 5 hours. 35 overweight students had 5-6 hours of sleep. While on association with BMI groups there was no significant association however it was observed that a near majority students being overweight had low sleep duration.

Conclusion: Students usually sleep for less hours and develops obesity or become overweight due to long hours of study. Abnormal sleep pattern also contribute to obesity. Hence proper sleep is required to prevent developing obesity among students.

Keywords: obesity, sleep, underweight

1. Introduction

Obesity is reaching epidemic proportions throughout the developed world and is attributed largely to industrialization with reduced acute and chronic disease, increased food consumption, and lowered levels of physical activity. Early humans were likely to have gotten more sleep per night on average, since their circadian rhythms were more closely synchronized to the rising and setting of the sun^[1]. Today we have artificial light to extend our active phases and many other distractions that prevent us from getting adequate sleep. It has a negative effect on an individual's physical fitness and mental abilities and it associated with major health risk factors. Research on obesity shows its correlation with parameters like diet, lifestyle, hereditary factors, physical activities of a person^[2].

Because of life style and time consuming demands of studies, students are at a higher risk of developing obesity. The average lifestyle of a student involves sleep deprivation and irregular sleep patterns, leading to lethargy and decreased concentration. Sleep is an important factor for many of the normal physiological processes.³ Sleep loss has also been linked to decreased glucose tolerance, a risk factor for obesity. Depriving normal subjects of sleep has been shown to result in insulin responses to hyperglycemia characteristic of insulin resistance and a pre-diabetic metabolic state. Spiegel *et al.*,

found that healthy men whose sleep was restricted to 4 hours per night for 6 nights experienced a 30% reduction in insulin response to glucose^[4].

Directly or indirectly, insufficient sleep can lead to obesity. Increased levels of appetite stimulating hormone ghrelin and decreased levels of satiety inducing hormone leptin have been observed in sleep deprived individuals, Whereas Sleep deprivation may also give people more time to eat and decrease exercise due to disturbed sleep patterns^[5].

The present study was conducted to evaluate the correlation of sleep with obesity in students.

2. Materials & Methods

This study was conducted in the department of Physiology in year 2015. It included 250 students in age range of 18-24 years. They were informed regarding the study and written consent was taken. Information such as name, age, gender etc was recorded. History of disease, drug and psychology was also recorded. Students suffering from hypothyroidism and diabetes, psychological related disorders, and on medications such as steroids, sleep inducing, antihistaminic were also excluded from the study.

Assessment of Obesity was determined by using the body mass index (BMI) formula:

BMI = weight (kg) / Height (m²). BMI (< 18.5) – Underweight, BMI (18.5-22.9) – Normal, BMI (23-24.9) – Overweight, BMI (25-29.9) - Pre- obese, BMI (> 30) - obese.

Pittsburgh sleep quality index (PSQI) was used for assessment of sleep durations and patterns.

The PSQI contained 19 self-rated questions, which were combined to form seven “component” scores. Having a range of 0-3, “0” indicating no difficulty while “3” indicating severe difficulty. The seven component scores were then added together to yield one “global” score with a range of 0-21 points, “0” indicating no difficulties and “21” indicating severe difficulties in all areas of sleep. The seven components of the PSQI which were used to analyze various aspects of sleep patterns and durations are subjective sleep quality, sleep latency, sleep duration and habitual sleep. Results were tabulated and subjected for correct inferences. P value < 0.05 was considered significant.

3. Results

Table I shows that out of 250 subjects, males were 120 and females were 130. The difference was non - significant (P = 1). Table II shows BMI of subjects. Subjects were underweight (males- 21, females- 24), normal weight (males- 50, females-46), over weight (males- 22, females- 32), pre- obese (males-13, females- 17) and obese (males- 14, females-11). The 21.6% of students were overweight, 12% were pre- obese and 10% were obese. The difference among both genders was non-significant (P > 0.05). Fig 1 shows the total hours of sleep of students. It was < 5 hours (10%), 5-6 hours (50%), 6-7 hours (25%) and >7 hours (15%). The difference was significant (P< 0.05). Fig 2 shows Pittsburgh sleep quality index (PSQI). 4% had score 1-3, 45% had 4-6, 41% had 7-9 and 10% had 10-12. The difference was significant (P< 0.05).

Fig 3(a & b) shows that 8 Out of the 24 obese (BMI >30) students and 12 of the 30 students who were overweight (BMI 25-29.9) had PSQI scores ranging from 7-9, indicating higher difficulties in sleep patterns. Fig 4 shows that 7 obese students, 5 pre obese, 3 overweight, 6 normal weight and 4 underweight had sleep less than 5 hours. 35 overweight students had 5-6 hours of sleep. While on association with BMI groups there was no significant association however it was observed that a near majority students being overweight had low sleep duration.

Table 1: Distribution of subjects

Total - 250		
Male	Female	P value
120	130	1

Table 2: BMI of subjects

Classification	BMI (Kg/m ²)	Total	Male	Female
Underweight	<18.4	45	21	24
Normal weight	18.5- 22.9	96	50	46
Over weight	23- 24.9	54	22	32
Pre- obese	25- 29.9	30	13	17
Obese	>30	25	14	11
Total		250	120	130

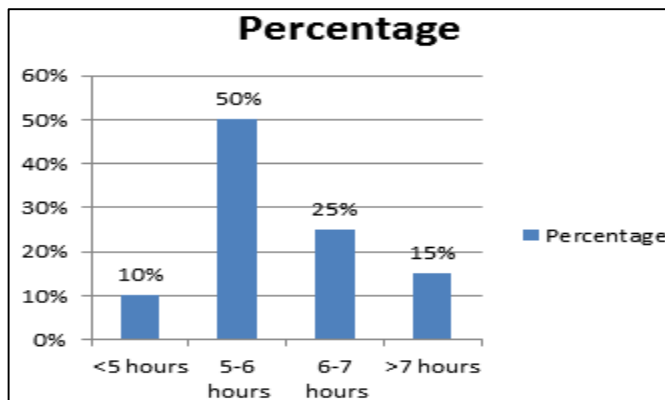


Fig 1: Sleep pattern of students

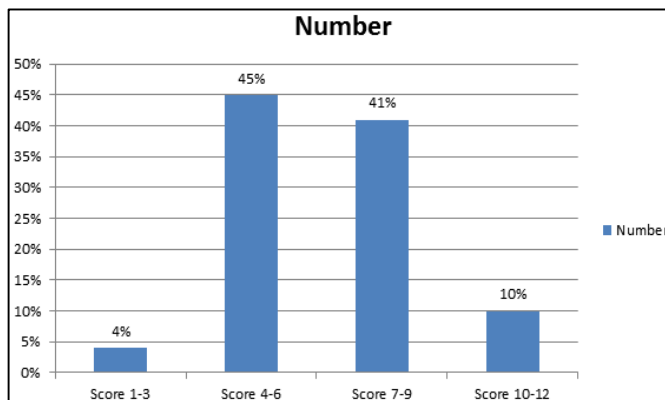


Fig 2: Pittsburgh sleep quality index (PSQI)

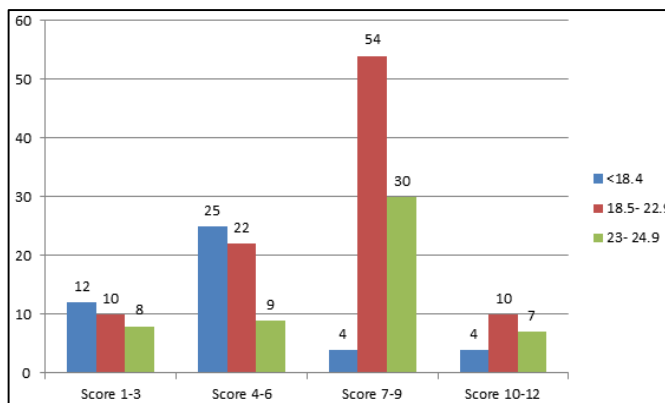


Fig 3(A): Association between PSQI and BMI

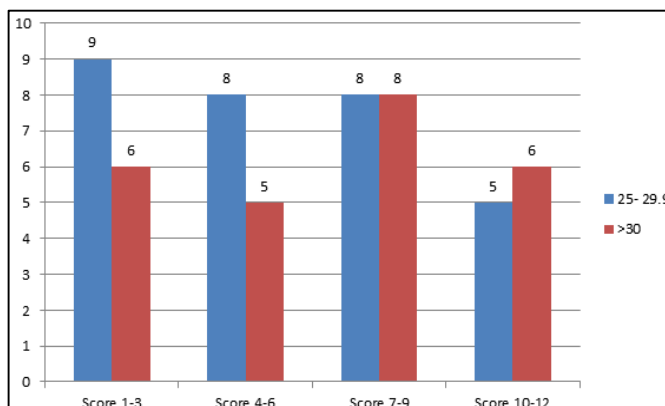


Fig 3(B): Association between PSQI and BMI

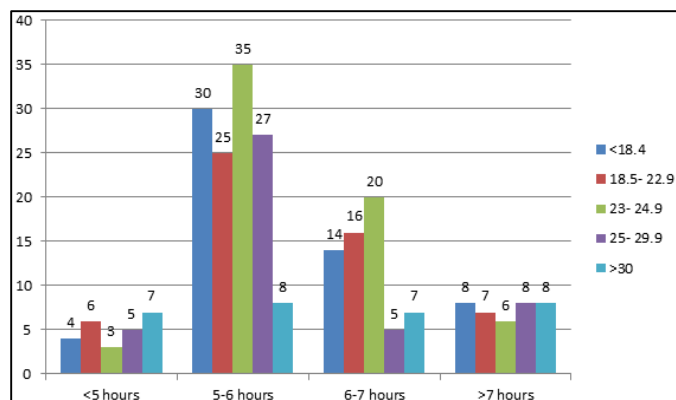


Fig 4: Association between duration of sleep and BMI

4. Discussion

Students are trained to improve the health of others but they themselves succumb to the development of obesity and its complications, due to the irregular sleep patterns and low sleep durations. This mainly happens because students are placed in stressful conditions as memorizing large portions of content in a small period of time, competition and rigorous examination periods [6]. The present study was conducted to evaluate the correlation of sleep patterns with obesity in students.

In our study, out of 250 subjects, males were 120 and females were 130. We evaluated BMI of subjects. Subjects were either underweight (males- 21, females- 24), normal weight (males- 50, females- 46), over weight (males- 22, females- 32), pre-obese (males- 13, females- 17) and obese (males- 14, females- 11). The 21.6% of students were overweight, 12% were pre-obese and 10% were obese. This is in accordance to William H *et al.*, [7].

We also evaluated the total hours of sleep of students. It was < 5 hours (10%), 5-6 hours (50%), 6-7 hours (25%) and >7 hours (15%). A study conducted by Andrew s *et al.* [8] found that most of students have sleep of 5-6 hours. Similar results were seen in our study.

We tried to study the sleep pattern in students and found that Pittsburgh sleep quality index (PSQI) in 4% had score 1-3, 45% had 4-6, 41% had 7-9 and 10% had 10-12. This is in accordance to Dean WB *et al.* [9] we found that students who were overweight (BMI 25-29.9) had PSQI scores ranging from 7-9, indicating higher difficulties in sleep patterns. A study conducted by Scott R [10] in 2013 found that overweight students usually have PSQI score between 7-9.

We found no significant association between BMI and sleep of students however it was observed that a near majority students being overweight had low sleep duration.

Previous studies have shown that both acute sleep deprivation and chronic partial sleep deprivation can cause a decrease in serum leptin concentrations. Development of obesity due to low sleep durations may also be due to the increased number of hours one is awake at night, giving more time for unhealthy late night snacking [11].

5. Conclusion

Students usually sleep for less hours and develops obesity or become overweight due to long hours of study. Abnormal sleep pattern also contribute to obesity. Hence proper sleep is required to prevent developing obesity among students.

6. References

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