International Journal of Research in Pharmaceutical Sciences

An evaluation on the association between sleep and dietary patterns with obesity - an online cross-sectional study

Karthik V.[1], Sridevi G.[*2], Leslie Rani S.[3]

[1]Saveetha Dental College, SIMATS, Chennai – 600 077, Tamil Nadu, India
[2]Department of Physiology, Saveetha Dental College, SIMATS, Chennai – 600 077, Tamil Nadu, India
[3]Department of General Pathology, Saveetha Dental College, SIMATS, Chennai – 600 077, Tamil Nadu, India

Abstract

This survey was taken up to analyze the association between food habits and sleep with obesity. The survey involved 200 healthy participants of both genders. A cross sectional study was planned among the saveetha university students. Generalised questionnaires which assess the food habits of the participants was designed to find how it relates with obesity and PITTSBURGH sleep quality index (PSQI) was used to assess sleep habits of the subject during the past one month. The responses of the questions were tabulated and the correlation of food habits and sleep with the tendency of obesity and gender-related analysis was done using SPSS software version 22 and the statistical test used was chi-square test and the significance value was fixed at $p < 0.05$. The results revealed that about 49% of people have trouble sleeping. 51% of people less than once a week face trouble. 53 % of people use the bathroom in the middle of sleep. 56% of people drink soft drinks two times per day. There were also significant changes among genders in the intake of junk food intake, appetite and sleep rating. Thus the study concluded that food habits with the intake of junk food and sleep deprivation with gender correlation predispose to obesity.

*Corresponding Author

Name: Sridevi G.
Phone: 9840325676
Email: sridevig.sdc@saveetha.com

INTRODUCTION

Sleep is a restorative process done by the brain, of the brain and for the brain (Finucane *et al.*, 2011). Decrease in sleep duration and increase in sleep complaints to be a problem in modern society (Morselli *et al.*, 2010). Sleep is one of the most important modulators or regulators of neuroendocrine function and the glucose metabolism obesity epidemic has grown in trending modern society with reduced sleep duration (Patel *et al.*, 2006; Samuel and Devi, 2015). Obesity is strongly associated with both genders throughout their lifespan and the tendency of obesity is high in females (Baheerati and Devi, 2018).

Obesity has become a major health problem which shows the increasing prevalence of multiple medical consequences like diabetes, heart disease, arthritis and cancer (Fathima and P, 2016; Ilankizhai and GayatriDevi, 2016). Short sleep duration also is becoming a major factor for obesity in developed countries. (Harsha *et al.*, 2015).

Most of the studies found a significant relationship between sleep and obesity. Mainly short sleep which increases the risk of obesity. Dental surgeons often seem to be in static postures. Even in

optimal seated postures, more than one-half of the muscles of the body are contracted statically (Abigail *et al.*, 2019; David *et al.*, 2019). In a previous analysis, it had been shown that for each additional hour of sleep, Body Mass Index decreased by 0.35kg/m^2. (Shruthi and Preetha, 2018). In Buxton analysis, it is proved that a 6% increase of obesity will probably reduce 7 hours of sleep duration at night (Choudhari and Jothipriya, 2016). Australian study confirmed that the increased risk of obesity for the short sleep duration mainly in the 55 - 64 age group (Dave and Preetha, 2016; Iyer *et al.*, 2019) prospective study, Nishura had analysed that the dietary patterns also lead to obesity (Devi and Sethu, 2018). Severe obesity seems to be in association with marked sleep disturbances. Sleep disturbances in obese people lead to sleep debt and dysregulation (Swathy and Sethu, 2015). The decreased sleep duration among individuals gives a negative impact on chronic disturbances to health. Sleep is a restorative process of the brain and is generally associated with mental health. (Renuka and Sethu, 2015; Timothy *et al.*, 2019).

The current study planned to investigate the association between food habits and sleep cycle of participants with the tendency to get obese and also analyse whether gender influences obesity.

MATERIALS AND METHODS

A cross sectional study was done among the students of saveetha university. The study involves about 200 participants of both genders. A set of questionnaires were created by the use of google sheets software and two sets of questionnaires were used as tools to assess the association between food habits and sleep quality of the subjects. A generalised questionnaire which assesses anthropometric measurements of the subjects with the physical food habits and behavioural changes and a standard tool PITTSBURGH sleep quality index (PSQI) was used to assess sleep habits of the subject during the past one month.

The responses of the questions were analysed statistically using SPSS software, version 22. Descriptive statistics as number and percent were calculated to summarise the data. Chi-square test was used to analyse the gender-related changes with obesity and sleep index and dietary habits. The confidence level was fixed at p,0.05

RESULTS AND DISCUSSION

General questions on dietary habits

After getting a statistical analysis, it has been shown

that 45% of people haven't skipped their breakfast for the past seven days. Majority of people (58%) have fruits two times per day. 67% of people eat vegetables two times per day. 34% of people drink milk 3-4 days per week. (Table 1)
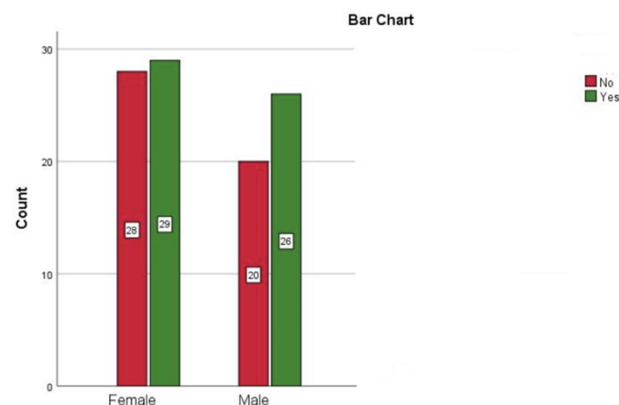
Figure 1: Bar graph represents the association between gender and individual awareness towards their change in appetite
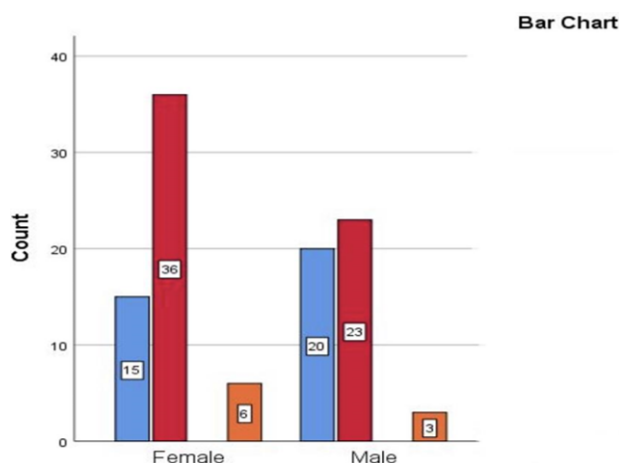
Figure 2: Bar graph represents the association between gender and individuals awareness towards carbonated soft drinks
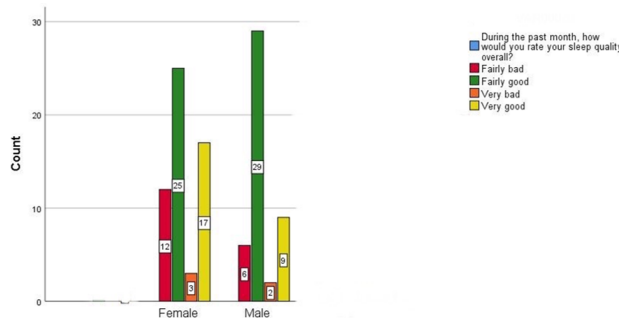
Figure 3: Bar graph represents the association between gender and individuals rating towards their sleep

Majority of people 48% had agreed that they sleep 6 hours per day. Majority of people (55%) drink car-

Table 1: Cumulative percentage responses for the questions

S. No	Question	Response	Cumulative percentage
1	Age	Below 18	54%
		18 years of age	68%
		above 18 years of age	32%
2	Sex	Male	43%
		Female	53%
3	Occupation	Student	35%
		Private	41%
		Government	21%
		Business	2%
4	During the past 7 days, how many days have you didn't had breakfast?	1 day	30%
		none	45%
		2 day	21%
		more than 2 day	3%
5	How many times per day do you usually eat fruit?	1 time	36%
		2 times	58%
		None	5%
6	How many times per day do you usually eat vegetables?	1 time	23%
		2 times	66%
		None	9%
7	How many days per week did you drink milk ?	Less than a day	22%
		2 days	32%
		3 - 4 days	37%
		More than 4 days	6%
8	How many times per day do you usually drink carbonated soft drinks?	1 time	33%
		2 times	56%
		None	9%
9	How many hours do you sleep per day?	Less than 6 hours	35%
		6 hours	48%
		More than 6 hours	15%
10	How many times per day do you usually have junk food?	1 time	24%
		2 times	67%
		None	7%
11	Do you check your weight every month?	Yes	54%
		No	45%
12	Do you think fatigue and restlessness affect sleep deprivation?	Yes	45%
		No	53%

Table 2: Cumulative percentage responses for the questions. *(Continued from Table 1)*

S. No	Question	Response	Cumulative Percentage
13	Do you think the change in appetite leads to obesity?	Yes	53%
		No	46%
14	Does increased food intake lead to obesity?	Yes	52%
		No	47%
15	Do you think decreased sleep duration affects your mental health?	Yes	49%
		No	50%
16	Which age group is usually affected by obesity?	Below 12 years	30%
		12 - 30 years	20%
		More than 3 times	8%
17	How many times do you eat per day?	2 time	33%
		3 time	57%
		More than 3 time	8%
18	Do you consume alcohol, tobacco or any other forms of a drug?	Yes	52%
		No	46%
19	Do you think obesity leads to cardiac disease?	Yes	54%
		No	44%
20	How many hours do you sleep during day time?	Less than 1 hours	38%
		2 hours	50%
		More than 2 hours	10%

bonated soft drinks 2 times per day. 55% of People agree that they eat three times per day. Based on the consumption of junk food per day, 65% of people agree that they have times one day. (Table 1)

Majority of people (48%) say that they often sleep 2 hours during daytime, 55% of people agree that change in appetite leads to obesity. 54% of people often used to check their weight every month. 55% of people agree that obesity leads to cardiac disease (Table 1)

Pittsburgh Sleep Quality Index (PSQX)

It is clear that the majority of individuals (45%) have trouble sleeping more than three times a week. 46% of individuals who can't get to sleep within 30 minutes had trouble once or twice a week. 39% of people agree that they had breathing problems once or twice a week, which disturbed their sleep. Majority of people (42%) agree that they take medicine once or twice a week to go to sleep.

Based on the rating of individuals' sleep past month, 52% agree less than once a week. Majority of the people (39%) wake up less than once a week. 49% of people get up to use the bathroom once or twice a week. 45% of people agree that they cough or snore loudly once or twice a week.

43% of people fell too cold once or twice a week. 39% of people agree that they had a bad dream once or twice a week while sleeping.

Association between gender and appetite awareness done using the chi-square test (p = 0.00) was found to be statistically significant. Out of 53% of people who agree the change in their appetite leads to obesity, 28 % of people were female and 26 % of people were male.

Association between gender and carbonated soft drink awareness has done using the chi-square test (p = 0.00) found to be statistically significant. Out of 55% of people who agree that they had carbonated

soft drinks two times per day, 36 % of people were female and 23 % of people were male.

Association between gender and individuals sleep rating done using the chi-square test (p = 0.00) was found to be statistically significant. Out of 51% of people who rated their sleep as fairly good, 29% of the people were male and 25% of people were female.

Our findings showed that there was trouble in sleeping within the individuals during the past month. 45% of people agree that they had trouble more than three times a week. The National Sleep foundation suggests that healthy adults need between 7 and 9 hours of sleep per night, whereas children and teens need even more (Michels *et al.*, 2014). The results also showed that the individuals who can't get to sleep within 30 minutes. 46% of people had that trouble once or twice a week. Sleep deprivation leads to serious health problems like heart disease, heart attack, heart failure, irregular heartbeat, high blood pressure, stroke, Diabetes and other physiology risks include impulsive behaviour, anxiety, depression, paranoia, suicidal thoughts (Mota and Vale, 2009). The results also revealed that individuals who can't get to sleep due to breathing problems. 39% of individuals agree that they can't breathe comfortably once or twice a week.

The present study also showed that the individuals took medicine to go to sleep. 42% of people agree that they take medicine once or twice a week. Silenor is an asleep drug approved for use in people who have trouble staying asleep. Silenor helps with sleep maintenance by blocking histamine receptors. The adverse effects of these drugs are dizziness, drowsiness, dry mouth, blurred vision, constipation and trouble in urinating. Prevailing medicine issues may affect physiologically and lead to adverse effects (Gupta *et al.*, 2002).

Also, the findings showed that individuals' ratings of their sleep past month. 52% agree less than a week, which shows fairly good grading. People who have a BMI at 95% seem to be obese with sleeping problems (Knutson, 2007). Individuals of our study also showed that they had a habit of frequently having carbonated soft drinks. 55% of individuals drink two times per day. Weight gain may offer the reducing occurrence related morbidity. Consumption of carbonated soft drinks may be a mild contributor to the epidemic of overweight and obesity. Soda and other sweetened drinks are full of sugar such as high-fructose corn syrup. It may contain caffeine, which acts as a diuretic that may cause dehydration. (Chen *et al.*, 2008). Our study showed the people's vision towards their appetite; the majority of

people (53%) thinks that change in appetite leads to obesity. The main aspects of the Mediterranean diet were high consumption of legumes, unrefined cereals, olive oil, unrefined cereals, vegetables and fruits, moderate to high consumption of fish, consumption of dairy products, a small amount of wine consumption, and low consumption of non-fish meat products. Increase in nutrient-poor, energy-dense foods can lead to stunted growth along with weight gain in children, adolescents, and adults, resulting in higher BMI and worse health outcomes throughout an individual's lifespan. From the previous similar article, it had shown that there is an association between sleep duration and overweight had proven that obesity at age 7 to 8 leads to side-effects (Hales *et al.*, 2007).

Sleep duration has decreased, and the quality of sleep has been decreasing (Van Cauter and Knutson, 2008). Sleep is a naturally occurring process of mind and body. (Hirshkowitz *et al.*, 2015). From the Pittsburgh sleep quality index, it has been shown that the majority of people had disturbances during sleep. Effect of sleep on the body that affects growth, stress hormones, immune system, and alters the appetite. It also influences breathing and blood pressure, cardiovascular health.

Based on the mechanism which relates sleep and obesity, it had been suggested that short sleep duration positively correlated with leptin and negatively correlated with gherkin, and changes in leptin and gherkin levels may increase appetite, which could be related to increased BMI.

Based on stress affecting the sleep, it had been shown that the examination stress affects the psychophysiological variables in both genders and the effect was equal in both the genders with elevated sympathetic activity. Counseling, yoga and meditation may be useful in combating these stress effects and prevent future complications (Davies *et al.*, 1992)

Thus, from the survey, regarding overweight, proved that altered diet and sleep deprivation leads to obesity.

Limitations of the study

The study was conducted in a limited group of the student population and in a particular geographical area. Also, that anthropometric measurements with BMI and obesity index should have been correlated with the sleep duration.

Future scope

This study can further be extended to evaluate the sleep-wake cycle by neurophysiological analysis, determination of body mass index, stress factors

---

like work pressure and other variables like socioeconomic and lifestyle variables can also be studied to further associate as a predisposing cause of obesity.

CONCLUSION

The present study concludes that there was a significant increase in the change of appetite, intake of carbonated soft drinks and also a decrease in sleep quality among female participants compared to male participants. This tendency of the female has been the main predisposing and triggering factors that lead to obesity among them.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

Funding Support

The authors declare that they have no funding support for this study.

REFERENCES

Abigail, *et al.* 2019. Evaluation of Muscular Endurance among Dentists. *Indian Journal of Public Health Research & Development*, 10(10):258–261.

Baheerati, M. M., Devi, R. G. 2018. Obesity in relation to Infertility. *Research Journal of Pharmacy and Technology*, 11(7):3183–3185.

Chen, X., Beydoun, M. A., Wang, Y. 2008. Is Sleep Duration Associated With Childhood Obesity? A Systematic Review and Meta-analysis. *Obesity*, 16(2):265–274.

Choudhari, S., Jothipriya, M. A. 2016. Non-alcoholic fatty liver disease. *Research Journal of Pharmacy and Technology*, 9(10):1782–1785.

Dave, P. H., Preetha 2016. Pathogenesis and Novel Drug for Treatment of Asthma - A Review. *Research Journal of Pharmacy and Technology*, 9(9):1519–1523.

David, *et al.* 2019. Physical Fitness among the Dental Physician, Dental Undergraduates and Postgraduates Students. *Indian Journal of Public Health Research & Development*, pages 223–223.

Davies, R. J., Ali, N. J., Stradling, J. R. 1992. Neck circumference and other clinical features in the diagnosis of the obstructive sleep apnoea syndrome. *Thorax*, 47(2):101–105.

Devi, R. G., Sethu, G. 2018. Evaluation of Adenoids by Oronasal and Nasal Spirometry. *Asian Journal of Pharmaceutical and Clinical Research*, 11(10):272–274.

Fathima, F., P, P. 2016. Evaluation of Thyroid Function Test in Obese Patients. *Asian Journal of Pharmaceutical and Clinical Research*, 9(9):353–355.

Finucane, M. M., *et al.* 2011. National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9·1 million participants. *The Lancet*, 377(9765):557–567.

Gupta, N. K., *et al.* 2002. Is obesity associated with poor sleep quality in adolescents? *American journal of human biology: the official journal of the Human Biology Council*, 14(6):762–768.

Hales, C. M., *et al.* 2007. Trends in Obesity and Severe Obesity Prevalence in US Youth and Adults by Sex and Age. *JAMA: the journal of the American Medical Association*, 319(16):1723–1725.

Harsha, L., *et al.* 2015. Systemic Approach to Management of Neonatal Jaundice and Prevention of Kernicterus. *Research Journal of Pharmacy and Technology*, 8(8):1087–1092.

Hirshkowitz, M., *et al.* 2015. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health*, 1(1):40–43.

Ilankizhai, R. J., GayatriDevi, R. 2016. Role of environmental factors on sleep patterns of different age groups. *Asian Journal of Pharmaceutical and Clinical Research*, 9(6):124–126.

Iyer, P. K., Devi, R. G., Priya, A. J. 2019. A Survey Study on Causes, Treatment and Prevention of Onychocryptosis. *Indian Journal of Public Health Research & Development*, 10(8):807–811.

Knutson, K. L. 2007. Impact of Sleep and Sleep Loss on Glucose Homeostasis and Appetite Regulation. *Sleep Medicine Clinics*, 2(2):187–197.

Michels, N., *et al.* 2014. Children's sleep quality: relation with sleep duration and adiposity. *Public Health*, 128(5):488–490.

Morselli, L., *et al.* 2010. Role of sleep duration in the regulation of glucose metabolism and appetite. *Best practice & research. Clinical endocrinology & metabolism*, 24(5):687–702.

Mota, J., Vale, S. 2009. Associations between sleep quality with cardiorespiratory fitness and BMI among adolescent girls. *American Journal of Human Biology*, 22(4):473–475.

Patel, S. R., *et al.* 2006. Association between reduced sleep and weight gain in women. *American journal of epidemiology*, 164(10):947–954.

Renuka, S., Sethu, G. 2015. Regeneration after Myocardial Infarction. *Research Journal of Phar-*

macy and Technology, 8(6):738–741.

Samuel, A. R., Devi, M. G. 2015. Geographical distribution and occurrence of Endemic Goitre. *Research Journal of Pharmacy and Technology*, 8(8):973–978.

Shruthi, M., Preetha, S. 2018. Effect of Simple Tongue Exercises in Habitual Snorers. *Research Journal of Pharmacy and Technology*, 11(8):3614–3616.

Swathy, S., Sethu, V. G. 2015. Acupuncture and lower back pain. *Research Journal of Pharmacy and Technology*, 8(8):991–993.

Timothy, C. N., Devi, R. G., Priya, A. J. 2019. Evaluation of Peak Expiratory Flow Rate (PEFR) in Pet Owners. *Indian Journal of Public Health Research & Development*, 10(8):803–806.

Van Cauter, E., Knutson, K. L. 2008. Sleep and the epidemic of obesity in children and adults. *European Journal of Endocrinology*, 159(suppl_1):S59–S66.