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www.commprac.com
ISSN 1462 2815

EATING HABITS AND SLEEP PATTERNS AMONG COLLEGE STUDENTS IN TAMIL NADU DURING THE COVID-19 PANDEMIC LOCKDOWN: A CROSS-SECTIONAL STUDY

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Abstract

This cross-sectional study aimed to investigate the impact of the COVID-19 lockdown on student sleep patterns, eating attitudes, and body mass index (BMI) in Tamilnadu, India. A total of 263 students participated in the study, which was conducted online using a self-reported questionnaire encompassing sociodemographic factors, the Pittsburgh Sleep Quality Index (PSQI), the Eating Attitude Test (EAT-26), and measures of sleep quality and academic self-efficacy. Statistical analysis revealed that the majority of students experienced unintentional weight gain during the lockdown, with notable changes in dietary habits and psychological well-being. Results showed a significant association between lower family income and abnormal eating attitudes, as well as between underweight status and poor sleep quality. Correlation analysis indicated a positive relationship between abnormal eating attitudes and higher weight/BMI scores, while poorer sleep quality was associated with lower weight/BMI scores. However, the relationship between eating attitudes and sleep quality was weak and not significant. These findings highlight the complex interplay between eating habits, sleep quality, and weight outcomes among students during the COVID-19 lockdown, underscoring the importance of comprehensive approaches to promote overall well-being in student populations.

Keywords: COVID-19, Sleep Patterns, Eating Attitudes, Sleep Quality, Psychological Well-Being.

INTRODUCTION

The Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) infection was declared a pandemic by the World Health Organisation (WHO) on March 11, 2020[1]. COVID-19 is a fatal disease that is still plaguing many countries worldwide. This is brought on by the novel coronavirus strain SARS-CoV-2, which is now a major global public health concern[2]. As of July 13, 2021, there have been 30.5 million instances of the coronavirus disease 2019 (COVID-19) pandemic, which began to hit India in March 2020 [3]. The Indian government has imposed a number of social distancing, physical distancing, and extensive societal restrictions in an effort to stop the COVID-19 virus from spreading. Extended mandatory social distancing was selected based on scientific data indicating that the primary means of virus transmission was through air, respiratory secretions, droplets, aerosol, and saliva released by infected individuals [4], as noted in the March WHO recommendation and validated [5,6].

In order to limit viral transmission, prevent, or minimise the impact of infectious disease, avoid the collapse of health facilities, and contain deaths, lockdown actions, which impeded people's movements and social activities, were deemed appropriate from the start in Italy [7], Spain a few days later [8], and other countries like China and South Korea also adopted them in the early stages of the spread of this disease [9].

Short- and long-distance travel bans, the closure of businesses, eateries, schools, offices, and other services deemed unnecessary, social distancing, and home isolation abruptly decreased the amount of daily activities one could engage in, changed eating and lifestyle habits, and had additional social and economic repercussions. Extended lockdown periods have been shown in several studies to have a negative impact on people's health and welfare [9, 10], and an increasingly sedentary lifestyle has been linked to poor psychophysical conditions and a lower quality of life [11]. Due to its correlation with an increased risk of cardiovascular and metabolic disease onsets, which may put a person at higher risk of developing a serious illness from COVID-19, physical inactivity is a crucial research issue in social isolation situations [12–14]. Along with the closure of fitness clubs and gyms, most outdoor and social activities were outlawed, and walking distances were restricted as part of a series of restrictive measures. Thus, without modifying eating patterns to fit the lockdown conditions, there was a sharp decline in physical activity, which led to weight gain and other negative effects [15].

The everyday circumstances of digital schooling, e-learning, and smart working are also linked to an increase in the amount of time spent in sedentary activities [16]. In particular, a study by Cellini and colleagues [17] found that young adults (both employees and students, aged 18 to 35) reported a decrease in sleep quality and a change in time management, with an increase in digital media use and more time spent in bed beginning in the second week of lockdown. On the latter subject, it is well known that frequent use of media devices interferes with sleep, particularly in the two hours before bed [19]. Siversten and colleagues [18] reported a significant and rising prevalence of insomnia and sleep issues in young adults. Nutritional habits changed during periods of quarantine and isolation as a result of restricted grocery shopping and resulting reduced access to food. A shift in diet towards unhealthy foods deficient in fresh fruit and vegetables resulted from this decreased availability [20]. In addition to consuming more foods high in sugar and fat to make themselves feel better, people who react to stress by drinking alcohol, which can have detrimental effects on their health and cause weight gain [21]. There is widespread evidence of an increase in the consumption of unhealthy food and binge eating, which is linked to a documented decrease in physical activity and an increase in sedentary (sitting) behaviours. Food choices and meal patterns were found to be more unhealthy during the COVID-19 confinement periods in various parts of the world [22]. During the COVID-19 lockdown across various nations, Zupo and colleagues [23] found a common tendency regarding food practices. Obesity has been linked to stress and sleep deprivation in addition to aberrant eating behaviours [24]. Not only can lockdown circumstances cause changes in the type, quantity, and timing of food consumed, but they can also result in poorer sleep quality. Insulin resistance is weakened by sleep disturbances and physical inactivity, which lowers rates of skeletal muscle protein synthesis and weakens the immune system [25]. It has been shown that COVID-19 home confinement causes significant changes in the quantity, quality, and timing of sleep, which in turn causes changes in lifestyle choices [26]. Effects on sleep quality, including disruptions like

sleeplessness linked to symptoms of worry and despair, have previously been noted by a survey carried out during the final 14 days of the Italian lockdown [27]. We aimed to assess the relationship between some of these factors in the lockdown situation and weight conditions in a sample of students and employees of an academic community in Tamilnadu, since it has been demonstrated that physical activity, nutrition, and sleep play fundamental roles in human health and physiology and that poor sleep, physical inactivity, and time spent indoors may be determined by a condition of isolation [28]. The primary objective of this study was to examine the effects of house confinement during the COVID-19 lockdown on changes in weight that were noticed more than two months after the isolation period started. Although this topic has been researched by academics worldwide, this study makes a distinction amongst students. Assessing the impact of the Body Mass Index (BMI), the amount of time spent doing sedentary activities, and the quality of sleep on perceptions of weight changes was another goal.

Aim of the Study:

1. To investigate student sleep patterns and the incidence of eating attitudes disorder during the COVID-19 pandemic lockdown.
2. To investigate student eating patterns during the COVID-19 pandemic lockdown.
3. To investigate the relationship between students' body mass index and their eating and sleep habits during the COVID-19 pandemic lockdown.
4. To investigate the relationship between student demographics, eating habits, and sleep quality during the COVID-19 pandemic lockdown.
5. To look into the relationship between BMI, WEIGHT, and Eating Attitude and Sleep Quality.

METHODOLOGY

This is a cross-sectional descriptive study conducted online. All voluntarily participating students in Tamilnadu participated in the study. Owing to the pandemic scenario, the study was carried out virtually. Every college faculty member has been asked to encourage their students to participate in this study. Every student received the online surveys by email and social media (WhatsApp). It will be carried out using a Google Form in an entirely anonymous manner. Every participant has the option to view the outcomes of the tests conducted and to withdraw from the study at any moment. In order to preserve spatial separation and appropriate precaution throughout the epidemic, the scientists chose to gather data online rather than in person. Respondents first give their informed consent through an online survey. All Tamilnadu-based students were required to meet two inclusion criteria in order to be included: i) They had to voluntarily participate. Among the exclusion criteria were questionnaires that were not completed and non-willingness. A three-section, semi-structured, self-reported questionnaire with informed consent was used. It included parts on sociodemographics, the Pittsburgh Sleep Quality Index (PSQI), the Eating Attitude Test (EAT-26), and sleep quality measurement. and the Academic Self-Efficacy Questionnaire were used to gather data. Weight prior to the lockdown was helpful in calculating Body Mass Index (BMI) to assess the incidence of weight classes using BMI international cut-off values, specifically: 18.5 kg/m2 underweight, 18.5–24.9 kg/m2 normal weight, and 25 kg/m2 overweight/obese; information on lifestyle habits

regarding the amount of time spent in sedentary activities in a week (answer options were: Never, 1 h, 2/3 h, 4/5 h, 6/8 h, and >8 h); SIT-Q by Wijndaele and colleagues[29] detailing various possible

Statistical analysis

Demographic variables in categories were given in frequencies with their percentages. Eat-26 attitude score and PSQI score was given in mean, SD, median. Association between demographic variables and level of attitude score was analysed using Mann whitney U-test/Kruskal wallis H-test. Association between demographic variables and level of PSQI score was analysed using Mann whitney U-test/Kruskal wallis H-test. Association between demographic variables and level of attitude score was analysed using chi square test Association between demographic variables and level of PSQI score was analysed using chi square test. Pie diagram, Simple bar diagram and multiple bar diagram were used to represent the data. A p-value of ≤0.05 was considered statistically significant, and two-tailed tests were used for significance testing. Statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS, version 22) and STATA (version 12) softwares. All statistical tests will be considered significant at 95% confidence interval with a p-value less than .05.

Ethical Considerations

All subjects were recruited from the study following obtaining an informed consent. All consenting formalities were completed using digital platform only.

RESULTS AND DISCUSSION

The presents research study participants reveals that the majority of students are female (66.54%), with males comprising the remaining 33.46%. Age distribution shows a significant proportion of students at ages 19 and 20, together constituting over 60% of the population. When examining weight, the data indicates a relatively balanced distribution across different weight categories, with the highest percentage falling within the 51-60 kg range (36.50%). Notably, a considerable portion of students (80.99%) experienced unintentional weight gain during the COVID-19 lockdown, with most gaining between 0-2 kg (66.92%). Reasons for this weight gain vary, including excess sleep (14.07%), homemade food consumption (11.41%), and lack of exercise combined with overeating (28.90%). Height distribution shows a concentration between 151-170 cm (81.68%), while the BMI distribution reflects a majority of students within the normal range (62.36%)9 (figure-1). These insights provide valuable information for understanding the health behaviors and challenges faced by the student population, particularly in the context of the COVID-19 pandemic.

In terms of family structure, the majority of students come from nuclear families (75.67%), while a smaller proportion reside in joint (17.11%) or extended families (7.22%). Regarding their place of residence, the distribution indicates a relatively balanced representation across rural (37.26%), semi-urban (29.28%), and urban areas (33.46%). Family income varies widely, with a notable portion of families earning between Rs 21,000-40,000 per month (29.28%) and a significant proportion earning more than Rs 90,000 monthly (13.31%). When it comes to the students' fields of study, the majority are pursuing medical courses (79.85%), followed by allied health courses (13.31%). Other fields such as arts & science, engineering, and nursing have smaller representation. Additionally, the data shows that most students are in their first year of study (76.81%), with smaller percentages in the second (11.41%), third (7.98%),

and fourth years (3.80%) of their respective programs. This comprehensive overview provides valuable insights into the socioeconomic backgrounds and academic pursuits of the student population under consideration. Our results are matched with previous study by Wood et al.,[30].

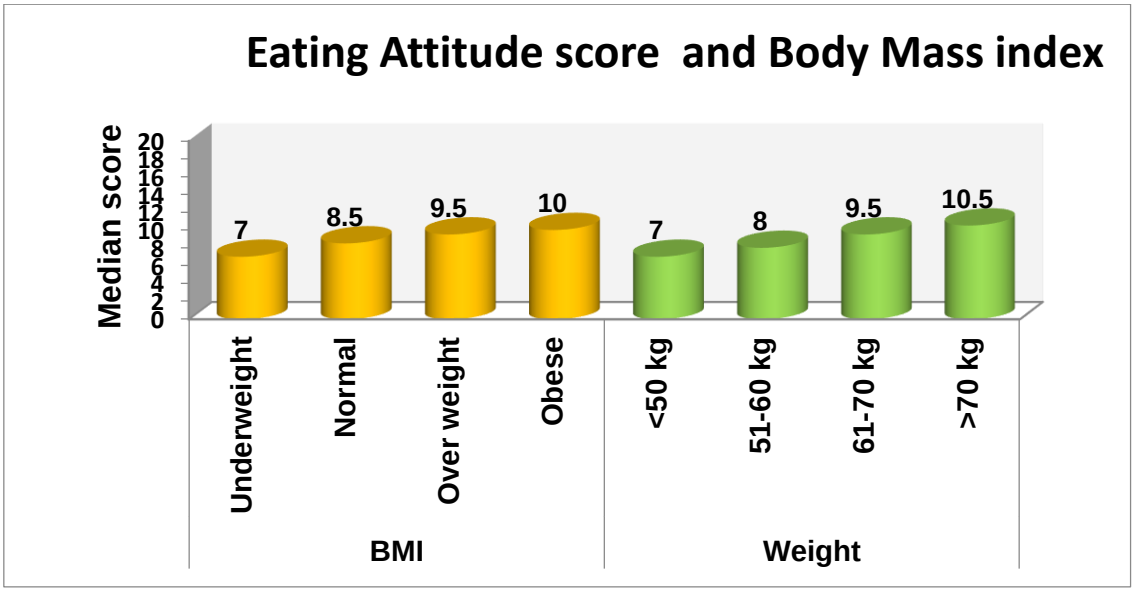

Figure 1: Eating Attitude score and Body Mass index

The table provides a detailed analysis of the dietary habits and psychological impacts experienced by students during the COVID-19 lockdown. In terms of dietary habits, the majority of students follow a mixed diet (82.13%), with smaller percentages adhering to either a vegetarian diet with or without eggs. Additionally, a significant portion of students (72.62%) consume pre-packaged, processed, or fast food, with most reporting a frequency of consumption ranging from once a week to multiple times a week during the lockdown period. Interestingly, despite the increased availability and consumption of such foods, a majority (80.99%) reported no increase in their consumption during the lockdown. However, there were notable changes in eating habits, with a considerable portion of students (36.88%) reporting an increase in their diet quantity compared to pre-lockdown levels. Regarding changes in diet quality, the data suggests a mixed response, with significant proportions reporting increased protein intake and no change in overall diet quality. Furthermore, the lockdown appears to have had a significant psychological impact, with the majority of students (66.16%) experiencing stress, anxiety, or other negative feelings. Despite this, sleep quality among students varied, with a sizable portion rating it as either good (44.11%) or very good (28.90%). Overall, the table sheds light on the complex interplay between dietary habits, psychological well-being, and sleep quality during the COVID-19 lockdown among students. Previous studies match with our finding [31-35].

Table 1: Eatıng Attıtude Test (EAT-26)

Eating attitude	No. of students	%
Normal (<20)	228	86.69%
Abnormal (≥20)	35	13.31%
Total	263	100.00%

Table 1 presents the results of the Eating Attitude Test (EAT-26) administered to a group of students. The EAT-26 is a screening tool used to assess attitudes and

behaviors related to eating disorders. In this table, the data is divided into two categories based on the test scores: normal and abnormal. A score of less than 20 is considered normal, while a score of 20 or higher is considered abnormal and may indicate the presence of disordered eating attitudes and behaviors. The table shows that out of the total 263 students who took the test, the majority, 86.69% (228 students), scored within the normal range. However, a notable proportion, 13.31% (35 students), scored above the threshold for abnormal eating attitudes. These findings suggest that while the majority of students have healthy eating attitudes and behaviors, there is still a significant minority experiencing issues that may warrant further assessment and intervention. It's important for healthcare professionals and educators to be aware of these results to provide appropriate support and resources for students who may be at risk for or experiencing eating disorders.

Table 2: Association Between Eating Attitude Test (Eat-26) And Demographic Variables

Demographic variables		Eat -26 score				n	Chi square test
		Normal <20)		Abnormal (≥20)			
		n	%	n	%		
10. Type of Family:	Nuclear family	171	85.93%	28	14.07%	199	χ2=0.41 p=0.81(NS)
	Joint family	40	88.89%	5	11.11%	45	
	Extended family	17	89.47%	2	10.53%	19	
11. Place of living:	Rural	86	87.76%	12	12.24%	98	χ2=3.10p=0.21(NS)
	Semi urban	70	90.91%	7	9.09%	77	
	Urban	72	81.82%	16	18.18%	88	
12.Monthly family income Rs:	Less than 10,000	24	82.76%	5	17.24%	29	**χ2=15.56 p=0.02*(S)**
	11,000-20,000	35	77.78%	10	22.22%	45	
	21,000-40,000	73	94.81%	4	5.19%	77	
	41,000-60,000	35	87.50%	5	12.50%	40	
	61,000-75,000	19	100.00%	0	0.00%	19	
	76,000-90,000	16	88.89%	2	11.11%	18	
	More than 90,000	26	74.29%	9	25.71%	35	
13. Course studying :	Allied health Course	29	82.86%	6	17.14%	35	χ2=2.84 p=0.59(NS)
	Arts & Science	5	83.33%	1	16.67%	6	
	Engineering	5	100.00%	0	0.00%	5	
	Medical	184	87.62%	26	12.38%	210	
	Nursing	5	71.43%	2	28.57%	7	
14. Year of study	1st year	177	87.62%	25	12.38%	202	χ2=1.14 p=0.77(NS)
	2nd year	25	83.33%	5	16.67%	30	
	3rd year	17	80.95%	4	19.05%	21	
	4th year	9	90.00%	1	10.00%	10	

Table 2 and Figure 2 illustrate the association between the scores on the Eating Attitude Test (EAT-26) and various demographic variables among a group of students. In Table 7, demographic variables such as sex, age, weight, unintentional weight gain during the COVID-19 lockdown, weight change, height, and BMI were analyzed alongside EAT-26 scores. The results suggest no significant association between sex, age, unintentional weight gain during lockdown, weight change, height, and EAT-26 scores. However, there were significant associations found between weight in kilograms and BMI categories. Specifically, students with lower weight (less than 50 kg) and those categorized as underweight based on BMI were more likely to have abnormal EAT-26 scores. Conversely, in Table 8, demographic variables including

type of family, place of living, monthly family income, course of study, and year of study were analyzed. The results indicate no significant associations between these variables and EAT-26 scores, except for monthly family income. Students from families with lower monthly incomes (less than 10,000 Rs) were more likely to have abnormal EAT-26 scores compared to those from higher income brackets. These findings highlight potential risk factors for disordered eating attitudes and behaviors among students, particularly related to weight, BMI, and socioeconomic status. It underscores the importance of addressing these factors in promoting healthy eating habits and overall well-being among students.

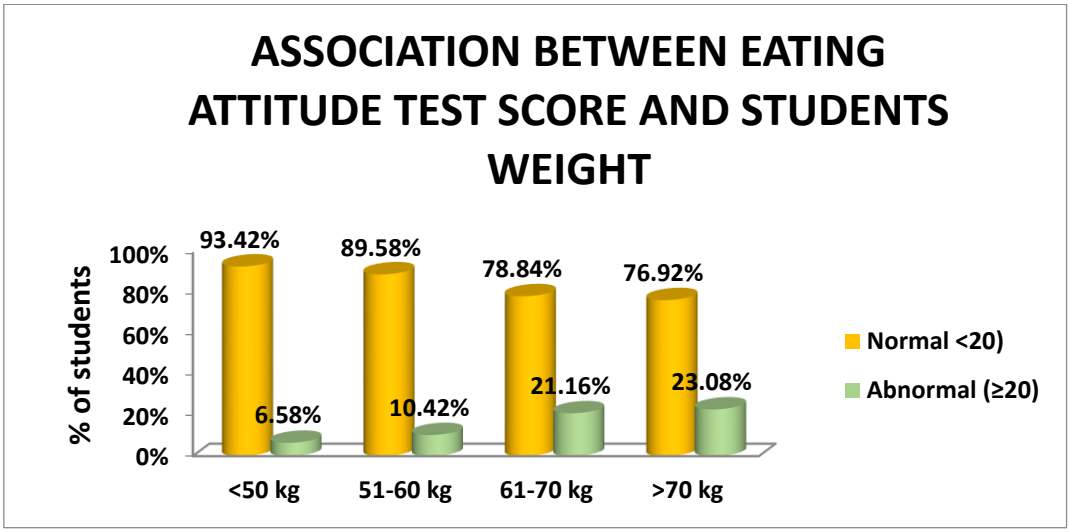

Figure 2: Association Between Eating Attitude Test Score And Students Weight

Table 3: PSQI Questionnaire and Body Mass index(n= 263)

		PSQI score			Median Mann whitney U-test/Kruskal wallis H-test
		n	Median	IQR(25-75)	
Age:	18 years	62	4.00	3.00-6.00	$\chi 2$=1.16 p=0.32 (NS)
	19 years	72	5.00	2.00-6.50	
	20 years	86	5.00	3.00-8.00	
	21 years	24	5.50	1.00-7.50	
	>21 years	19	6.00	5.00-9.00	
Sex	Male	88	5.00	3.00-7.00	z=0.92 p=0.36 (NS)
	Female	175	5.00	2.00-7.00	
BMI	Underweight	76	6.50	3.00-9.00	**$\chi 2$=9.47 p=0.05* (S)**
	Normal	96	6.00	2.00-8.00	
	Over weight	52	4.00	3.00-7.00	
	Obese	39	2.00	3.00-6.00	
Weight in Kg	<50 kg	45	6.50	3.00-9.00	**$\chi 2$=9.36 p=0.05* (S)**
	51-60 kg	164	5.00	2.00-8.00	
	61-70 kg	46	3.50	3.00-6.00	
	>70 kg	8	3.00	2.50-7.00	

Fig6*p≤0.05 significant S= significant NS= not significant

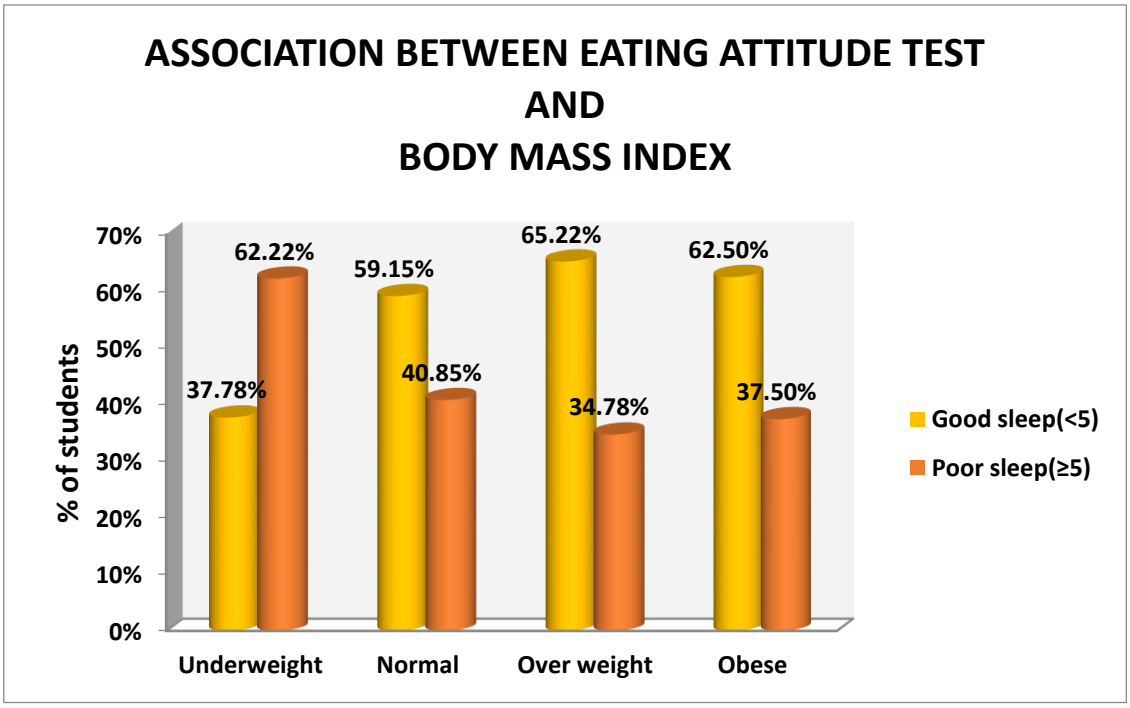

Figure 3: Association Between Eating Attitude Test And Body Mass Index

Tables 3 and figure 3 provide insights into the association between sleep quality, as measured by the PSQI (Pittsburgh Sleep Quality Index) score, and various demographic variables among a group of students. In Table 10, the Mann-Whitney U-test or Kruskal-Wallis H-test was used to analyze the median PSQI scores across different age groups, genders, BMI categories, and weight ranges. The results show that age and gender were not significantly associated with sleep quality, while BMI and weight were significant factors. Specifically, students categorized as underweight or weighing less than 50 kg tended to have higher PSQI scores, indicating poorer sleep quality. Further explores the association between sleep quality and demographic variables, including sex, age, unintentional weight gain during lockdown, weight change, height, BMI, type of family, place of living, monthly family income, course of study, and year of study.

The findings reveal that sex, age, unintentional weight gain during lockdown, weight change, and height were not significantly associated with sleep quality. However, BMI was a significant factor, with underweight students more likely to report poor sleep quality. Additionally the association between sleep quality and demographic variables such as type of family, place of living, monthly family income, course of study, and year of study. The results indicate no significant associations between these variables and sleep quality, except for monthly family income, where students from families with monthly incomes of less than 10,000 Rs were more likely to report poor sleep quality. Overall, these findings suggest that BMI and weight are important factors associated with sleep quality among students, highlighting the need for interventions targeting sleep hygiene and overall health, particularly among underweight individuals.

Table 4: Correlatıon Between EAT-26 , PSQI, Weıght And BMI Score

Correlation between	Mean± SD	ρ- value	Interpretation
Eat-26 Vs weight	10.91± 8.63 Vs 58.47± 11.61	0.32 p=0.01	There is a significant, positive, fair correlation between Eat attitude score and weight score. It means eat attitude score increases their weight score also increases fairly.
Eat-26 Vs BMI	10.91± 8.63 Vs 22.10± 4.05	0.29 p=0. 01	There is a significant, positive, fair correlation between Eat attitude score and BMI score. It means eat attitude score increases their BMI score also increases fairly.
PSQI Vs weight	5.17± 3.39 Vs 58.47± 11.61	-0.25 p=0.05	There is a significant, negative, fair correlation between Sleep score and weight score. It means weight score decreases their sleep score also increases fairly.
PSQI Vs BMI	5.17± 3.39 Vs 22.10± 4.05	-0.27 p=0.05	There is a significant, negative, fair correlation between Sleep score and BMI score. It means BMI score decreases their sleep score also increases fairly
EAT-26 Vs PSQI	10.91± 8.63 Vs 5.17± 3.39	-0.14 p=0.21	There is not significant, negative, poor correlation between Sleep score and Eating attitude score.

The correlation analysis presented in Table 4 among the student population indicates significant relationships between EAT-26 scores, PSQI scores, weight, and BMI. The results reveal a noteworthy positive fair correlation between EAT-26 scores and weight/BMI scores, suggesting that as abnormal eating attitudes increase, there is a corresponding rise in weight and BMI.

Conversely, a significant negative fair correlation is observed between PSQI scores and weight/BMI, indicating that poorer sleep quality is associated with lower weight and BMI scores. However, the correlation between EAT-26 scores and PSQI scores is not significant, suggesting a weak relationship between eating attitudes and sleep quality in students.

These findings align with research by Quick et al., [37] which emphasizes the importance of understanding the connections between eating behaviors, sleep quality, and weight status among college students. Such insights can guide the development of interventions for promoting health and managing weight in young adults. Additionally, studies by Faris et al.[36] and Saleh-Ghadimi et al.[38] further support the interplay between eating habits, sleep quality, and emotional eating, highlighting the need for comprehensive approaches to address these factors collectively.

Moreover, the research by Wu et al.[39] underscores the complex relationships between sleep quality, disordered eating behaviors, and psychological distress, emphasizing the need to explore underlying mechanisms. Understanding these associations is crucial for designing effective interventions to improve both sleep quality and eating behaviors among college students..

CONCLUSION

Overall, the synthesis of these studies underscores the intricate interrelationships between eating attitudes, sleep quality, and weight outcomes, emphasizing the importance of holistic approaches to promote overall well-being in student populations. These findings suggest that abnormal eating attitudes are associated with higher weight and BMI scores, while poorer sleep quality is associated with lower weight and BMI scores.

However, the relationship between eating attitudes and sleep quality appears to be weak and not significant in this study. These correlations highlight the complex interplay between eating habits, sleep quality, and weight status among students, emphasizing the need for comprehensive approaches to address both physical and psychological factors influencing health and well-being.

Limitations

One of the key limitations of this study was with a comparatively short sample size, results of this study cannot be generalized. Generalization requires the support of results from similar large studies

Acknowledgments

The authors would like to thank all of the study participants and the administration of Government Erode Medical College, Perundurai , Tamilnadu, India for granting permission to carry out the research work.

Conflicts of interest: There are no conflicts of interest**.**

Ethical statement

Institutional ethical committee accepted this study. The study was approved by the institutional human ethics committee. Informed written consent was obtained from all the study participants and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained.

Funding: Nil.

Authors' contributions

Bagavathiammal Periyasamy and Sasikala Gunasekaran - conceptualization, data curation, investigation, methodology, project administration, visualization; ***Rajput S.A Kiran singh and A.Purna Singh -*** methodology, Data Analysis, writing—original draft, writing—review and editing; ***Panneerselvam Periasamy*** - conceptualization, visualization, supervision; ***Kousikha Palanikumar*** - literature review collection, Critique, Visualization, Presentation, writing—original draft, writing—review and editing. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work. All authors have read and agreed to the published version of the manuscript***.***

Data Avaılabılıty:

All datasets generated or analyzed during this study are included in the manuscript.

Informed Consent:

Written informed consent was obtained from the participants before enrolling in the study

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