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Research Article

Lock down impact on Student

Impact of Lockdown On College Students Sleep Quality, Physical Activity and Eating Attitudes in South India—A Cross-Sectional Observational Study

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Abstract: The COVID-19 pandemic has forced the public health authorities to impose a lockdown as an epidemiological containment strategy. Due to COVID-19, the world is facing an unprecedented challenge that has changed people's lifestyles. This study aimed to evaluate how the COVID-19 pandemic lockdown affected students in Tamilnadu in terms of changes to their eating habits, sleeping patterns, and level of physical activity. A cross-sectional study was conducted using a random representative sample of 263 undergraduate students (mean age 19.63+1.86 years, males 33.46%) from Tamilnadu voluntarily filling out an online questionnaire. The Pittsburgh Sleep Quality Index (PSQI) and The International Physical Activity Questionnaires, Eating Attitude Test (EAT-26) were used to assess sleep quality, Physical Activity, and Eating Attitude disorder, respectively. The prevalence of poor sleep quality among participants was 43.3% (males: 44.32% and females: 42.86%). The mean score of the participants' EAT-26 score was found to be 10.92 ± 8.63. Students' high body weight and BMI risk factors for eating disorders ($\chi 2=9.68$ p=0.02, $\chi 2=9.59$ p=0.02). 46% of students did not do any physical activity. There is no significant correlation between sleep and Eating attitude scores (p=0.21). 66.16% of participants experienced Psychological stress due to lock down. Findings from this study indicate that a lockdown period due to COVID-19 negatively impacted young undergraduate adults' physical activity levels and sleep quality. Finally, body weight, BMI, monthly family income, and poor physical activity with excess eating during the COVID 19 lockdown were the common exposures that are significantly associated with a higher risk of developing sleep disturbances and eating disorders. Several efficient strategies, programs, and coordinated efforts must be rigorously executed to encourage a seamless transition between school and daily life.

Keywords: COVID 19, Lockdown, Sleep Quality, Physical Activity and Eating Attitude

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1. INTRODUCTION

On 11 March 2020, the WHO defined the Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) infection as a pandemic[1]. Coronavirus disease (COVID- 19) is a deadly disease that continues to affect many countries in the world. This is caused by the new coronavirus strain SARS-CoV-2, which has become a serious public health concern worldwide[2]. Since March 2020, India has been affected by the coronavirus disease 2019 (COVID-19) pandemic, which resulted in 30.5 million cases as of July 13, 2021[3]. The Indian Government has implemented various measures to prevent the spread of COVID-19, including Thus social and physical distancing. Social distancing is a term that was used earlier in the pandemic period as many people stayed home to help prevent the spread of the virus]. Physical distancing is staying at least 6 feet away from others to avoid catching a disease such as COVID-19 by physical contact and large-scale social restrictions. Prolonged mandatory social distancing was chosen according to scientific evidence that the main transmission of the virus was via direct and indirect contact through air, saliva, and respiratory secretions, droplets and aerosol, emitted by infected subjects[4], as pointed out in March WHO recommendation and confirmed[5,6]. Lockdown actions, which inhibited people's movements and social activities, were considered suitable right from the beginning in Italy[7], in Spain a few days later[8], and other countries such as China and South Korea also adopted them in the early stages of the spread of this disease in order to limit viral transmission and to prevent, or minimize, the impact of infectious disease, to avoid the collapse of health facilities and to contain deaths[9]. Forbidding both long-distance and short trips, closing shops, restaurants, schools, workplaces, and any service considered nonessential social distancing and isolation at home suddenly reduced the number of daily activities one could do, altered lifestyle and dietary habits, and additionally caused social and economic consequences. Different studies have pointed out how extended lockdown periods can adversely affect human health and wellbeing[9,10], with an increasingly sedentary lifestyle negatively impacting psychophysical conditions and life quality[11]. Physical inactivity is an important research topic in social isolation conditions, as it is associated with a higher risk of cardiovascular and metabolic disease onsets that may predispose one to a greater risk of severe illness from COVID-19[12-14]. A series of restrictive measures were imposed with the closure of gyms and sports centers and the ban of most outdoor and social activities, with restrictions on walking distance. Therefore, a drastic reduction in physical activity occurred without adjusting dietary habits to lockdown conditions, resulting in weight gain and unhealthy consequences[15]. Increasing the time spent in sedentary activities is also associated with the daily conditions of digital education, e-learning, and smart working[16]. In particular, a study by Cellini and colleagues[17] reported that starting from the second week of lockdown, young adults (both students and workers aged 18–35) stated they had changed their time management, increasing the use of digital media and spending more time in bed, and reported poorer sleep quality. Regarding the latter topic, Silverstone and colleagues[18] documented a high and growing prevalence of sleep problems and insomnia in young adults; it is thus known that extensive use of media devices interacts with sleep, especially in the two hours before bedtime[19]. In quarantine and isolation periods, nutritional habits changed because of the limited access to food caused by the restrictions on grocery shopping. This reduced availability consequently led to a diet switch to unhealthy food, poor in fresh fruit and vegetables[20]. When individuals respond to stress by eating more, the selected foods are typically high in sugar and fat, and people also drink alcohol to feel better, leading to weight gain and negative health consequences[21]. Food choices and meal pattern changes were documented as unhealthier during the COVID-19 confinement periods in several parts of the world, with widespread evidence of an upsurge in the intake of unhealthy food and out-of-control eating, associated with a documented decline in physical activity and increased sedentary (sitting) behaviour[22]. Zupo and colleagues[23] identified a common trend in dietary behavior during the COVID-19 lockdown in many countries. It is known that obesity is related not only to abnormal eating behavior but also to stress and sleep deprivation[24]. Lockdown conditions can lead to alterations in food choice, timing, and quantity and loss of sleep quality. The sleep quality and quantity disruptions, together with physical inactivity, induce decreased rates of skeletal muscle protein synthesis and impair insulin resistance, compromising immune defense[25]. Significant changes in sleep quality, quantity and timing associated with COVID-19 home confinement were demonstrated and consequently, changes in lifestyle habits occurred[26]. A survey conducted during the last 14 days of the Italian lockdown has already highlighted effects on sleep quality with disturbances such as insomnia associated with symptoms of depression and anxiety[27]. Since it has been shown that physical activity, nutrition, and sleep play fundamental roles in human health and physiology and a condition of isolation28 may determine that poor sleep, physical inactivity, and time spent indoors, we intended to evaluate the relationship between some of these aspects in the lockdown situation and weight conditions in a sample of students and workers of an academic community in Tamilnadu. In particular, the first aim of the current research was to analyze the impact of home confinement during the COVID-19 lockdown on weight changes perceived over two months after the beginning of the isolation period. The academic community has studied this aspect, but the present study distinguishes between students. Another aim was to evaluate factors associated with weight change perception, such as the role of the Body Mass Index (BMI), the time spent in sedentary activities, and sleep quality. The current study aims to evaluate the prevalence and factors associated with body mass index (BMI), dietary habits, sleep quality, and the level of physical activity among college students in Tamilnadu, India.

2. METHODOLOGY

2.1 Study Design

This is an online descriptive cross-sectional study. The study was carried out by willing college students in Tamilnadu. Participating Students from different district of Tamilnadu like Chennai (14.62%), Coimbatore (2.34%), Cuddalore (2.92%), Dharmapuri (4.09%), Erode (17.54%), Kallakurichi (1.17%), Kanchipuram (2.92%), Kanyakumari (2.34%), Karur (0.58%), Krishnagiri (3.51%), Madurai (0.58%) Namakkal (5.26%), Pudukkottai (1.75%), Salem (8.77%), Thanjavur (2.34%), Theni (1.17%), Thoothukudi (2.34%),Tiruchirapalli (4.09%), Tirunelveli (6.43%), Tirupur (3.51%),Tiruvallur (2.34%), Tiruvannamalai (1.17%),Vellore (4.68%), Viluppuram (1.75%) and Virudhunagar (1.75%). In the current pandemic emergency, a straightforward web-based snowball sampling approach has been used to recruit the target samples because we lacked the contact information for all college students [29-31]. Due to the pandemic situation, the research was conducted

online. The study period was July 15, 2020, to July 30, 2020. A total of 317 participants volunteered for this online survey because incomplete filled forms were excluded, and the sample sizes were reduced to 263 (Arts & Science 13.31%, Engineering 18.25% and Medical 68.44%) out of 317 (83%). Out of 263 participants, 33.46% (88) are male, and 66.54% (175) are female students. In this study, volunteer students aged between 18-24 years. A Google Form with a questionnaire was created to collect the data for this cross-sectional study.

2.2 Data Collection

All the college faculties requested that their students get equal opportunities to participate in this study. The online questionnaires were sent to each student through email and social media (WhatsApp). It was conducted fully anonymously using a Google Form. Each participant could opt out of the research at any time and have the opportunity to see the results of the tests performed. For data collection, the investigators used online approaches (as opposed to face-to-face data collection) to maintain spatial distancing and proper precautions during the pandemic. Initially, respondents provided informed consent via an e-survey.

Inclusion criteria	Exclusion criteria
Given consent to participate in the study	**Does not provide consent for the participation in the study**
Undergraduate college students	Psychological distress prior to COVID-19
Age 18 – 24 Years	Not willing to provide Personal information
Both male & Female	Incomplete surveys
Tamilnadu students only	Suffering any Disease at the time of the survey
physically and mentally normal	Any Mental Illness under treatment

2.3 Study Tool

2.3.1 International Physical Activity Questionnaire

The International Physical Activity Questionnaire was successively submitted (IPAQ). The IPAQ questionnaire was created to evaluate the degree of self-reported physical activity in individuals between 18 and 79[32]. The IPAQ questionnaire gathers data on the amount, frequency, and intensity of physical activity for the previous seven days in four different contexts: (1) work, (2) transportation, (3) domestic and gardening, and (4) leisure. In addition, this instrument evaluated daily sitting time and low, moderate, and strong intensity amounts (days/week, hours, and minutes). We determined the total number of physical activities per week from these values.

2.3.2 Eating Attitude Test (EAT-26) Questionnaire

A self-report questionnaire is the EAT-26. The inquiries deal with attitudes, convictions, and actions related to eating, body image, and weight. Dieting, bulimia, and oral control are the three subscales created, along with a total score. With the subscales providing a profile, a score of 20 or higher shows the presence of abnormal eating attitudes and behavior, which may indicate the occurrence of eating-related psychopathology[33].

2.3.3 Pittsburgh Sleep Quality Index (Psqi)

A popular self-reported questionnaire to assess sleep quality is the Pittsburgh Sleep Quality Index (PSQI)[34]. The PSQI is a valuable and condensed tool that provides a single score for overall sleep quality, considering both qualitative and quantitative elements of sleep. Scores above 5 are recommended to indicate a possible sleep issue[35]. The PSQI contains open-ended questions that can be used to determine the nature and potential causes of sleep problems in order to guide treatment[36], and it also provides subscale scores that can indicate the specific type of sleep problems (sleep duration, latency, disturbances, quality, efficiency, daytime dysfunction, and use of sleep medication), as well as some questions on signs of sleep apnea. A semi-structured and self-reported questionnaire are containing informed consent along with four sections (i.e., socio-demographics, The International Physical Activity Questionnaires, eating attitude test (EAT-26), and the sleep quality measured using the Pittsburgh sleep quality index (PSQI) was utilized during data collection. To adapt the questions and all the parameters related to our research objectives, we did, however, consider similar prior studies when designing the questionnaire[37-39]. Additionally, several BMI-related parameters were adjusted in the Indian perspective following WHO expert consultation[40]. Weight before the lockdown was useful in calculating Body Mass Index (BMI) to evaluate the incidence of weight classes using BMI international cut-off values, specifically: <18.5 kg/m^2 underweight, 18.5–24.9 kg/ m^2 normal weight, and 25 kg/m2 overweight/obese[41]; information on lifestyle habits concerning 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), referring to SIT-Q by Wijndaele and colleagues[42] detailing various potential static activities (with or without the use of digital media devices), such as reading newspapers/watching the news; watching movies and series; making video calls; surfing social networks; sleep quality, with an ad hoc question to evaluate if the perception of sleep quality had changed (No; Yes, positive changes/negative changes) referred to the home confinement obligatory period, as was similarly carried out by other studies in the same context.

2.4 Ethics Approval

Informed consent was taken from all students for being included in the study. This research was approved by the institutional ethical committee. This study was ethically approved by the institutional ethical committee Government Erode Medical College and Hospital, Perundurai, Erode, Institutional Ethics Committee (Ref No-IEC/001/GEMC& H/2020. Dated: 31.07.2020) In addition, depending on the study's target population[43-50], hypotheses have been synthesized to examine the relationship between the covariates of the current study and the outcome variables.

3. STATISTICAL ANALYSIS

Demographic variables in categories were given in frequencies with their percentages.EAT-26 attitude score and PSQI score were given in mean, SD, median, and IQR. The Association

between demographic variables and level of attitude score& level of PSQI score was analyzed using chi square. A p-value of ≤0.05 was considered statistically significant, and two-tailed tests were used for significance testing. Statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS, version 22) and STATA (version 12) software.

4. RESULTS

A total of 263 students participated in the study. In the present study, 33.46% of the participants were male, and 66.54% were female, 76.81% of them were first-year students. The mean age of the study participants was 19.63+1.86 years of age (Male:19.70+1.74 and female:19.60+1.92 years).

Table: 1 Demographic information of participants

Demographic Information		Number of students	%
Gender	Male	88	33.46%
	Female	175	66.54%
Age	18 years	62	23.57%
	19 years	72	27.38%
	20 years	86	32.70%
	21 years	24	9.13%
	>21 years	19	7.22%
Did you Gain unintentional weight gain in coronavirus lockdown?	Yes	213	80.99%
	No	50	19.01%
What may be the reason for your unintentional weight gain	Don't know	19	7.22%
	Excess sleep	74	28.14%
	Junk food	3	1.14%
	Lack of exercise	26	9.89%
	Lack of exercise and excess Eating	96	36.50%
	Eating More food while sitting simply	7	2.66%
	No physical activities and healthy food in the home	8	3.04%
	Unhealthy food, inadequate sleep	30	11.41%
Weight change	Gained 5- 10 % of weight	98	37.26%
	Gained Less than 5% of weight	87	33.08%
	Gained more than 10% of weight 5 - 10%	4	1.52%
	Lost Less than 5% of weight	5	1.90%
	No change	69	26.24%
BMI	Underweight	45	17.11%
	Normal	164	62.36%
	Overweight	46	17.49%
	Obese	8	3.04%
Type of Family	Nuclear family	199	75.67%
	Joint family	45	17.11%
	Extended family	19	7.22%
Place of living:	Rural	98	37.26%
	Semi-urban	77	29.28%
	Urban	88	33.46%
Monthly family income Rs	Less than 10,000	29	11.03%
	11,000-20,000	45	17.11%
	21,000-40,000	77	29.28%
	41,000-60,000	40	15.21%
	61,000-75,000	19	7.22%
	76,000-90,000	18	6.84%
	More than 90,000	35	13.31%
Year of Study	1st year	202	76.81%
	2nd year	30	11.41%
	3rd year	21	7.98%
	4th year	10	3.80%

Table-1 shows the mean BMI was 22.10+4.05 kg/m2. (Male: 22.58+4.44 and female :21.89+3.83 kg/m2). 151 (57.42%) students' average monthly family income was less than Rs 40,000. 81% of students Gained unintentional weight gain in coronavirus lockdown. The prevalence of BMI among students 62.36%, 17.49%, and 3.04% are normal BMI, Overweight and Obese, respectively.

Table 2: DIETARY HABITS OF PARTICIPANTS

Dietary habits		Number of students	%
Dietary habits	Mixed diet	216	82.13%
	Vegetarian with Egg	18	6.84%
	Vegetarian without Egg	29	11.03%
Habit of consuming pre-packaged / processed / fast food	No	72	27.38%
	Yes	191	72.62%
Frequency of consumption of pre-packaged/processed/fast food during Covid-19 pandemic lockdown:	Nil	72	27.38%
	1 day/week	137	52.09%
	2-3 days/week	45	17.11%
	4-7 days/week	9	3.42%
Are you taking same quantity of diet as before lockdown	Eating less than before lockdown	50	19.01%
	Eating more than before lockdown	97	36.88%
	Same level	116	44.11%
Any changes in the quality of diet	More carbohydrate intake (rice/roti/grains)	60	22.81%
	More fat intake (ghee, butter, fried foods)	29	11.03%
	More fruits and vegetable intake (>3 servings)	26	9.89%
	More protein intake (eggs, fish, mutton, pulses, soybean, chickpea flour)	47	17.87%
	No change	101	38.40%
Frequency of eating during lockdown	Decreased less than before lockdown	25	9.51%
	Increased more than before lockdown	134	50.95%
	Same as before Lockdown	104	39.54%
Did you experienced any Psychological impact like stress, anxiety, or feeling due to lockdown	No	89	33.84%
	Yes	174	66.16%
How do you rate your sleep quality during lockdown	Very poor	27	10.27%
	Poor	23	8.75%
	No change	21	7.98%
	Good	116	44.11%
	Very good	76	28.90%

The present study shows in Table 2 that 82.13% of the participants consume a mixed vegetarian and non-vegetarian diet, whereas 11% are vegetarians without eggs. 72.62% of participants Habit consuming pre-packaged food with a frequency of 1 day/week (52.09%). 44.11% of them consumed the same quantity of diet as before the lockdown, and 51% of them increased the frequency of eating during the lockdown. 66.16% of participants experienced Psychological stress, anxiety, and feeling due to lockdown (Table-2). Dietary habits of our study reveal 36.88% of students are eating more than before lockdown, 50.95% frequency of food intake increased more than before lockdown, and 23% of students changed the quality of diet to more carbohydrates (Table-2). 46% of students didn't do any physical activity whereas reaming 54% of students did various moderate levels of exercise in the last seven days, 37.26% of participants walked 10 minutes per day for seven days a week, whereas 22.81% did not walk for at least 10 minutes at a time in a week. 80% of students have spent more than 6 hours per day during the last seven days.

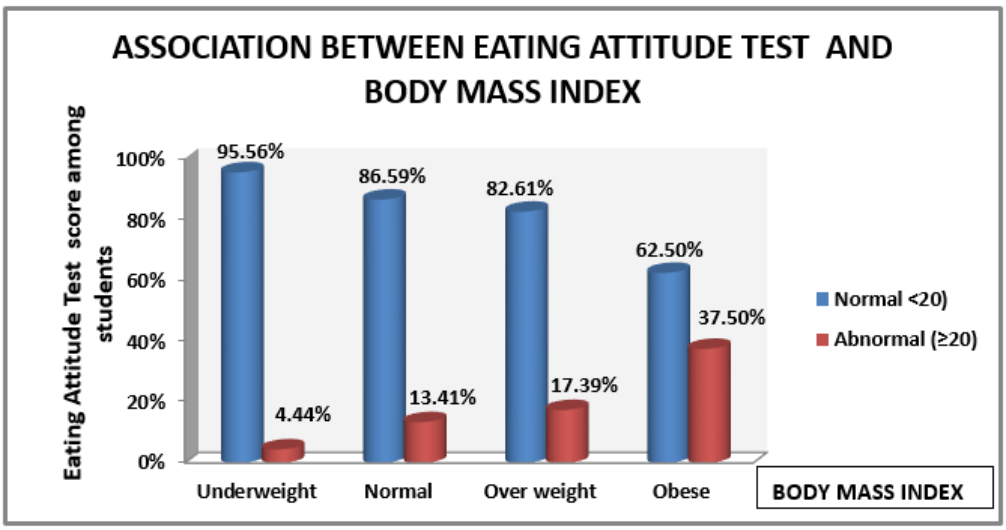

Fig 1: Association Between Eating Attitude Test and Body Mass Index

Figure-1 shows 86.7% of the participants had an EAT-26 score between 3-20 and had no risk of eating disorder, 13.3% had an EAT-26 score higher than 20 and had an eating disorder risk. Overweight and Obese students have more eating attitude scores. The mean Eating attitudes score is 10.92 ± 8.63.

Table 3: Eating Attitude Test score and Body Mass index

		EAT -26			Mann whitney U-test/Kruskal wallis H-test
		n	Median	IQR(25-75)	
Age:	18 years	62	7.50	5.00-14.00	$\chi2$=3.87 p=0.27 (NS)
	19 years	72	9.00	5.00-15.50	
	20 years	86	9.00	6.00-19.00	
	21 years	24	7.00	2.00-13.00	
	>21 years	19	8.00	3.00-17.00	
Sex	Male	88	9.00	4.00-15.50	z=0.07 p=0.95 (NS)
	Female	175	8.00	5.00-16.00	
BMI	Underweight	45	7.00	5.00-13.50	$\chi2$=9.59 p=0.02* (S)
	Normal	164	8.50	3.00-19.00	
	Overweight	46	9.50	5.00-15.50	
	Obese	8	10.00	4.00-19.90	
Weight in Kg	<50 kg	76	7.00	5.00-12.00	$\chi2$=9.68 p=0.02* (S)
	51-60 kg	96	8.00	4.00-15.00	
	61-70 kg	52	9.50	7.00-19.00	
	>70 kg	39	10.50	2.00-27.50	

p≤0.05 significant S= significant NS= not significant

Table-3 shows Eating Attitude Test score and Body Mass index not significant among Age and gender groups, whereas Weight and BMI were significant (p=0.02). Overweight and Obese students have more eating attitude score compared to normal weight students.

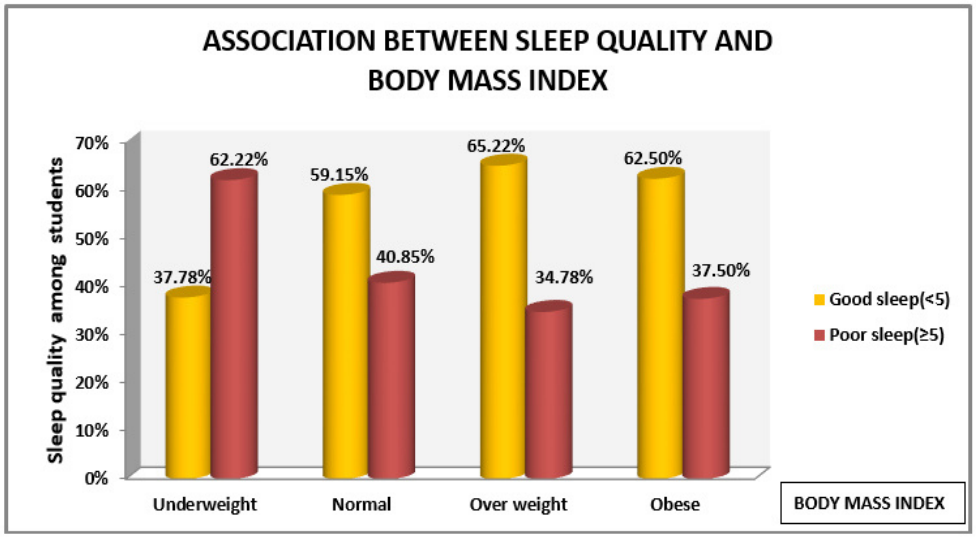

Fig 2: Association Between Sleep Quality and Body Mass Index

Our study shows, as given in figure-2, the prevalence of poor sleep quality among participants was 43.3% (males: 44.32% and females: 42.86%). Mean Pittsburgh Sleep Quality Index score is 5.17 ± SD is 3.39. Underweight and obese students have poor sleep scores.

Table 4: 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	%		
1. Gender	Male	76	86.36%	12	13.64%	88	$\chi2$=0.01 p=0.91(NS)
	Female	152	86.86%	23	13.14%	175	
2. Age:	18 years	56	90.32%	6	9.68%	62	$\chi2$=2.16 p=0.71(NS)
	19 years	63	87.50%	9	12.50%	72	
	20 years	71	82.56%	15	17.44%	86	
	21 years	21	87.50%	3	12.50%	24	

	>21 years	17	89.47%	2	10.53%	19	
4. Weight in Kg	<50 kg	71	93.42%	5	6.58%	76	$\chi 2$=9.68 p=0.02*(S)
	51-60 kg	86	89.58%	10	10.42%	96	
	61-70 kg	41	78.84%	11	21.16%	52	
	>70 kg	30	76.92%	9	23.08%	39	
5. Weight change during lockdown	Gained 5- 10 % of weight	83	84.69%	15	15.31%	98	$\chi 2$=6.50 p=0.16(NS)
	Gained Less than 5% of weight	76	87.36%	11	12.64%	87	
	Gained more than 10% of weight 5 - 10%	2	50.00%	2	50.00%	4	
	Lost Less than 5% of weight	4	80.00%	1	20.00%	5	
	No change	63	91.30%	6	8.70%	69	
6. Height in cm	< 150 cm	33	89.19%	4	10.81%	37	$\chi 2$=5.39 p=0.25(NS)
	151-160 cm	76	82.61%	16	17.39%	92	
	161-170 cm	74	86.05%	12	13.95%	86	
	171-180 cm	36	97.30%	1	2.70%	37	
	>180 cm	9	81.82%	2	18.18%	11	
7.BMI	Underweight	43	95.56%	2	4.44%	45	$\chi 2$=7.79 p=0.05*(S)
	Normal	142	86.59%	22	13.41%	164	
	Over weight	38	82.61%	8	17.39%	46	
	Obese	5	62.50%	3	37.50%	8	
8. Type of Family:	Nuclear family	171	85.93%	28	14.07%	199	$\chi 2$=0.41 p=0.81(NS)
	Joint family	40	88.89%	5	11.11%	45	
	Extended family	17	89.47%	2	10.53%	19	
9. Place of living:	Rural	86	87.76%	12	12.24%	98	$\chi 2$=3.10p=0.21(NS)
	Semi urban	70	90.91%	7	9.09%	77	
	Urban	72	81.82%	16	18.18%	88	
10.Monthly family income Rs:	Less than 10,000	24	82.76%	5	17.24%	29	$\chi 2$=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	
11. Course studying :	Allied health Course	29	82.86%	6	17.14%	35	$\chi 2$=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	
12. Year of study	1st year	177	87.62%	25	12.38%	202	$\chi 2$=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	

p≤0.05 significant S= significant NS= not significant

Table 4 shows that our study reveals a significant association between weight, BMI, and family income with eating attitude, but no association with eating attitude is not associated with gender, age, type of family, place of residence, course of study, and year of study.

Table5: CORRELATION BETWEEN EAT-26, PSQI and BMI SCORE

Correlation between	Mean± SD	〉- value	Interpretation
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 their attitude score increases, and their BMI 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 no significant, negative, poor correlation between sleep and eating attitude scores.

Interpretation for 〉-value(rho-value) Spearman rank correlation coefficient is denoted by "〉."

"〉" always lies between -1 to +10.0 – 0.2 Poor correlation, 0.2 - 0.4 Fair correlation, 0.4 - 0.6 Moderate correlation, 0.6 – 0.8 Substantial correlation, 0.8 - 1.0 Strong correlation

Table5 shows the correlation between EAT-26 Vs BMI mean± SD (10.91± 8.63 Vs 22.10± 4.05) and Spearman rank correlation coefficient 0.29 (p=0. 01). This shows there is a significant, positive, fair correlation between Eat attitude score and BMI score. It means their attitude score increases, and their BMI score also increases relatively. The correlation between PSQI Vs BMI mean± SD (5.17± 3.39 Vs 22.10± 4.05) and Spearman rank correlation coefficient -0.27 (p=0.05), shows a significant, negative, fair correlation between Sleep score and BMI score. It means their BMI score decreases, and their sleep score also increases relatively. Correlation between EAT-26 Vs PSQI mean± SD (10.91± 8.63 Vs 5.17± 3.39) and Spearman rank correlation coefficient -0.14 (p=0.05), shows there is no significant, negative, poor correlation between Sleep score and Eating attitude score.

5. DISCUSSION

To the authors' knowledge, this is the first study that provides information regarding the impact of the COVID-19 lockdown on weight, PA, dietary habits, and sleep quality in the undergraduate student population in Tamilnadu. According to this survey, 37% of people had gained at least 5% above their pre-lockdown weight. There is no gender difference in weight gain from pre-lockdown to post-lockdown. These results highlight the negative externalities of COVID-19 in terms of its influence on various health issues that affect population health and infections. Our results are in line with earlier research from other international locations[51-57]. Similar to our findings, Zachary et al.[51] and Flanagan et al.[58] in the United States discovered that roughly 22 and 27.5 percent of their samples had gained weight during the lockdown. In a longitudinal investigation of weight change in the United States from the "peak-lockdown" to the "post-lockdown" eras, Bhutani et al.[53] discovered a gain of 0.62 kg. Since we also employed longitudinal data from two-time points, "pre-2020 and post-2020," this is pertinent to our analysis. However, the data collection timing may help explain the discrepancy in average weight gain between Bhutani et al. study and ours. While we used retroactive data from before 2020 as our baseline data, they acquired their baseline data during the lockdown era. Additionally, their study may have overstated the weight gain since they relied on self-report data. The results shown here could help anticipate lifestyle changes during rapid outbreaks of highly infectious diseases, forcing the imposition of a strict confinement. According to Sidor et al.[54], 30% of their european sample gained 3 kg while being quarantined for COVID-19 in Poland. Our study demonstrates that gains were greater than what we discovered in previous studies, which can be related either to the times when data were collected (for example, during or shortly after the lockdown periods) or to a possible measurement mistake caused by self-report weight information. Women exhibited lower BMI values than men (28.57 3.89 vs. 30.64 2.87) in a study of 368 obese persons[59]. In contrast, our studies have shown no BMI difference among gender, and this may be our group of students' age group majority from 18 to 21 years. These statements are supported by a few study findings that suggested that students in the older age groups (>25 years) were more likely than those in, the younger age groups (22 years and 22–25 years) to be overweight or obese. The research is done on Bangladeshi[60] and Nepalese women supported this finding[61]. The new analyses further confirmed that kids from higher-income families (> Rs 20,000) had a significantly higher probability of being obese than students from the other two comparison groups (< Rs 25,000). This association between wealth and obesity was consistent with earlier studies[60-66] that found that the wealthy had a higher prevalence of obesity than the poor. Most private university students come from richer households and may lead sedentary lifestyles, have access to more processed foods, and avoid physical labor, which may be the main cause of higher BMI[65-66]. The current study demonstrates 66% of students are experiencing stress & anxiety, Feeling due to lockdown. Distress, social networking's unintended consequences, stigmatization, and psychosocial stress all substantially impact behaviors and psychosocial stressors that may be highly linked to general lifestyle and obesity/weight gain promoters[46,67,68]. Since the beginning of the pandemic, the COVID-19 restrictions have significantly influenced physical activities and prevented people from engaging in the minimum amount of physical activity needed to maintain a healthy lifestyle. According to the most recent data, 46% of the students drastically reduced their physical activity and exercise. During the COVID-19 lockdown, participants in 64 of the 66 research that Stockwell et al.[69] reviewed decreased their physical activity and increased their sedentary behavior. Additionally, we looked into sleep quality with different BMI levels, and found that 43.3 percent of subjects had poor sleep quality. The results of the current study further show that overweight and obese students had worse sleep scores and a substantial correlation between BMI and sleep quality. According to research that supports our findings, people who reported changes in their BMI status were more likely to have poor sleep, despair, and anxiety but not suicidality[70]. The findings from the online survey confirmed that the lockdown had a negative impact on almost all the assessed variables, as was initially expected. Heffernan & Young Jae hypothesized, that being confined at home imposed a structural barrier to maintaining a physically active lifestyle[71], while the combination of anxiety and stress triggered by the COVID-19 pandemic could be responsible for the observed reduction in sleep quality[72]. According to their studies, M. Baceviciene and R. Jankauskiene showed no differences in men's quality of life during the lockdown compared to the scenario prior to it, but there were improvements in women's overall and psychological quality of life dimensions[73]. Schaefer, Burke, and Thompson show that young female students typically have greater daily problems than men. Young women may benefit from staying home since they may be able to avoid the pressures associated with looks typically felt when going out[74]. The much longer sleep duration in women, which was increased from minimal levels, may also be related to their higher psychological and overall quality of life, according to Ahrens et al ., longitudinal study[75]. Compared to the pre-lockdown circumstances, M. Baceviciene found fewer lifestyle-related differences between men and women during the lockdown. Women showed stronger internalization of general media pressures, overweight preoccupation, and quality of life in the social sphere during the pre-lockdown period, whereas men showed greater physical activity, self-rated health, and fast-food consumption. The discrepancies between females' internalization of beauty ideals and social quality of life domains persisted during the lockdown, although characteristics relating to lifestyle grew more similar. These results imply that the lockdown significantly affected the pupils' way of life[73]. This ongoing pandemic brought out the role of a balanced diet for building a strong immune system as strengthening the immune system is not an overnight process[76]. Another article published by Jayawardena R and Misra A[77] highlighted the role of a balanced diet for COVID-19 prevention. Nair D.R, & Dey S., et al study reported prevalence of any kind of stress was

reported to be higher[78-79] almost correlated with our study finding. Stress induces the wrong (unhealthy) choices of food, which may be one of the factors contributing to the onset of NCDs'. Weight gain was observed in studies due to changes in lifestyle because of the ongoing pandemic. our finding is confirmed by previous studies by Nair D.R, & Dey S., et al., [78-79]. A cross-sectional study suggested that high body mass index (BMI) and stress are predictors of sleep deprivation, leading to a vicious cycle of poor health[80]. Sleep is the most important pillar for a healthy life, and the lack of sleep may impair body functions badly; hence as recommended by the National sleep foundation, 7–9 h of sleep by adults (18–64 years) should be considered by the National sleep foundation to recommend new sleep times. Sleep foundation[81]. No increased risk of developing eating disorders was found in the present study, probably due to their low prevalence, since it has been speculated that those who already showed eating disorders beforehand are the ones that are particularly at risk of being affected by the lockdown[82]. It is worth mentioning that the online survey was long and exhaustive, and some of the questions were not easy to answer, specifically those related to the amount of PA performed that appeared at the beginning of the online survey, which might have negatively affected the response rate[83] . Indeed, a negative relationship between completion rate and survey length, and question difficulty has been observed in previous studies using online surveys[84]. Several methodological weaknesses should be acknowledged. First of all, as previously mentioned, the sample was small and mostly made up of college students, which limits the generalization of the results. Secondly, the data were obtained employing a web-based survey. body weight was self-assessed, and self-perceived well-being data were gathered using an ad hoc questionnaire. Thus, information related to both variables should be interpreted with caution.

5.1 Practical Implications

The study's findings can be used to comprehend the BMI status, eating patterns, and level of physical activity among college students in different states in India that have the same demographic and socioeconomic characteristics. Last but not least, the findings of this study may have repercussions for future decisions regarding college students who would struggle in the wake of a pandemic due to the lost academic hours caused by lockdowns.

5.2 Study Limitations

This study was conducted in a specific sample of undergraduate members of undergraduate in Tamilnadu. This study evaluated the prevalence of risk factors of undergraduate students during the confinement period only. In self-reported surveys, a social desirability bias cannot be excluded. This is a particular type of response bias describing a tendency of survey respondents to answer questions in a manner that will be viewed favorably by others and may lead to underreporting of unhealthy lifestyle habits and over-reporting of healthy lifestyle habits. Another limitation of this study may be the lack of information about the current health status of the participants. Acute illness around the time of the survey may have interfered with normal PA levels or nutritional and sleeping habits.

6. CONCLUSION

Results of this survey may help the concerned officers of colleges and universities become aware of the burden and the clustering of unhealthy lifestyle habits in students during such a confinement period. Action plans are needed for health promotion campaigns for students to be better prepared if a similar confinement period is imposed. The findings of this study allow specific recommendations to be made: health promotion campaigns to increase PA, promote an adequate quality of sleep, healthy eating campaigns, and dietetics to empower them to practice healthier eating patterns, especially during a confinement period. Smooth academic activities must be ensured, in addition to expert counseling to raise awareness for avoiding inactive behaviors to reduce the study gap caused by the prolonged shutdowns.

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8. AUTHOR'S CONTRIBUTIONS STATEMENT

Dr. Vajiravelu Suganthi (VS) had the idea for this study. Panneerselvam Periasamy (PP) is the principal investigator of the research work. VS, PP, Sasikala Gunasekaran (GS) and Shajahan Ansar (SA) designed the study protocol. SA performed data collection, GS conducted the analyses and VS drafted the manuscript. PS, GS, and SA further edited the manuscript, giving final approval.

9. ETHICAL STATEMENT

The study followed all the research standards required by institutions. This study is ethically approved by the institutional ethical committee Government Erode Medical College and Hospital, Perundurai, Erode, Institutional Ethics Committee (Ref No-IEC/001/GEMC& H/2020. Dated: 31.07.2020). Informed consent was obtained from all individual participants included in the study, and data confidentiality was guaranteed.

10. CONFLICTS OF INTEREST

Conflict of interest declared none.

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