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Original Research Article

Impact of COVID pandemic on lifestyle changes among college students of a tertiary care institution in Puducherry: an explanatory mixed method study

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ABSTRACT

Background: The emergence of COVID-19 pandemic has radically changed our lifestyle-related habits mainly physical activity, sedentariness, sleep, dependence on social media and dietary habits. To study the impact of COVID-19 on lifestyle changes before and during the Pandemic in terms of physical activity, sleep, diet, screen time and to explore the barriers and facilitating factors to it.
Methods: The study is an explanatory mixed method study which involved quantitative data collection among 453 young adults followed by qualitative data exploration of their views and experiences through focus group discussions among 12 young adults selected using maximum variation sampling. Integration of findings were done using joint displays to provide more insights.
Results: During COVID-19, the quantitative results revealed a drop in physical activity levels by one fifth. There was decrease in consumption of unhealthy food and number of main meals, while duration of sleep and screen time increased significantly. Qualitative findings revealed lack of motivation, poor access to healthy environment, threat of COVID-19 infection and dependence on social media as barriers while cues to action, shift towards healthy habits, local adaptations, supportive environment as facilitators for the healthy lifestyle behavior.
Conclusions: Three-fourth of the students were in moderate to high physical activity but there was an overall decrease in levels during the pandemic. There was reduction in the intake of unhealthy foods and increase in sleep during the pandemic. However, the use of social media and digital aids was found to have increased, resulting in more screen time.

Keywords: Coronavirus, Pandemic, Physical activity, Diet, Sleep, Screen time, Young adults

INTRODUCTION

The emergence of the COVID-19 pandemic has radically changed our lifestyle-related habits in a significant manner as it is gradually progressing in different stages of unlocking. Government and public health measures to halt the transmission had impacted our regular daily activities, accessibility to food and recreational locations, education, work, and financial security.[1] These elements had unintentionally affected our physical activity, sedentariness, sleep, dependence on social media and dietary changes, which are well-known risk factors for non-communicable diseases (NCD).[2] Also, some studies have shown that regular physical activity, a balanced and healthy diet, and good quality of sleep is some of the best approaches for protection from COVID-19.[3,4] Worldwide 31.1% of adults are physically inactive, whereas, in the Southeast Asian region, it is 17%.[5] Further, preliminary

studies have emphasized the negative impact of COVID 19 on lifestyle behaviours. Due to lockdown, quarantine, home isolation and closure of colleges, schools it wasn't easy to accomplish recommended physical activity levels among children and adolescents. Several studies from India have reported decreased exercises and physical activities during the COVID 19 pandemic.[6-8] In addition to physical activity, dietary changes were also prevalent, showing a mixed result. According to a survey done in Italy, there was increased consumption of junk foods among adults.[9] Several studies in India had shown increased frequency of meals and unhealthy snacks, whereas few studies also reported increased consumption of fruits and vegetables and decreased unhealthy food consumption.[6,7] Increased dependence on social media for both learning and entertainment purposes noted due to colleges' closure; this, in turn, increased screen time usage among adults.[6] COVID-19 pandemic also disrupted the duration of sleep.[6,8,10] Medical students usually have good knowledge about habits and physical activity compared to other students. However, there is no evidence to confirm that this theoretical knowledge transforms into good health practices. Studies have reported that physical inactivity and mental stress were very high among medical students.[11] Students' lifestyles during the pandemic may have changed due to the transition from hostel to home and then back to the institution. Behaviours are changeable and successful programmes and advice related to a healthy lifestyle can positively impact student health; there is insufficient evidence to determine the impact of COVID-19 on lifestyle changes and explanations for them. Therefore, COVID-19 on lifestyle changes among medical students investigated, followed by exploring the barriers and facilitating factors that will explain the quantitative findings and lay a solid basis for developing effective lifestyle change recommendations.

METHODS

Study design and setting

This was a mixed explanatory method study to explore the impact of COVID-19 on lifestyle behaviours among the medical students of a tertiary care institution of Puducherry. In this design, quantitative data (numeric) is collected, analyzed followed by qualitative data (text) collection and analysis, which helps to elaborate or explain the results obtained during the quantitative phase. The qualitative phase builds on the quantitative findings, and these two phases connected in intermediate stage in the study.[12]

Quantitative phase

Quantitative data was collected and analyzed using the following methodology.

Data collection

A web-based questionnaire in the English language using Google Forms was created, with a consent form displayed on the first page. The questionnaire was piloted before data collection and modified based on the responses of the participants. The universal sampling method used and google form link shared with all the undergraduate medical students 18 years and above, newly joined batch and interns excluded from the study. Ethical approval was obtained from the institutional ethics committee.

Study tools

The questionnaire used had three domains assessing sociodemographic details, dietary behaviour, sleep duration, and screen time and physical activity. The first section consisted of questions about general and demographic information. Section two had three parts. Part A involved dietary behaviour using Short dietary behavior questionnaire.[13] For the first four questions, the scoring criteria were never (0), often (1), most of the time (2), often (3), and for the last question, 1-2 (1), 3 (0), 4 (1), 5 (2), >5 (3). In contrast, Part B and C assessed the duration of sleep and screen time (educational and entertainment purposes). Section three-domain assessed using International physical activity questionnaire- short form (IPAQ-SF.[14] According to IPAQ guidelines; high PA (>1500 MET-minutes/week), moderate PA (600-1500 MET-minutes/week). Both section two and three were posed twice, i.e. during the pandemic and before the pandemic (March 2020).

Data analysis

Data were analyzed using SPSS version 25 (IBM Corp., Armonk, NY, USA). Continuous variables reported as mean and standard deviation or median and interquartile range, while categorical variables summarised as frequency with proportion. Paired t-test and Wilcoxon signed-rank test used for comparing before and during the pandemic. The statistical significance level was set at 0.05.

Qualitative phase

Two focus groups discussions were conducted, guided by pragmatism, to assess their views, perceptions, and experiences on the barriers and facilitating factors to a healthy lifestyle concerning COVID-19 pandemic.

Interview protocol development

The interview guide contents were made based on the quantitative phase of the study. As the main aim of the qualitative phase was to explain the results of the first phase, we wanted to understand what factors contributed to the participant's lifestyle behaviour. Before the sessions, probes and questions were built and validated.

Data collection

Selection of students done using statistical results obtained after quantitative data collection, based on maximum variation sampling using four key dimensions of variations- physical activity, dietary score and duration of sleep, and screen time usage. The FGDs held in person after obtaining written informed consent, and each session lasted around 45-60 minutes.

Data analysis

The audio recordings of FGDs were transcribed within one week. The transcript was analyzed using manual content analysis using a combination of inductive and deductive approach. Statements used as the unit of analysis; similar codes grouped to form sub-themes followed by themes.

Integrative phase

Integration through joint display analysis done which provided new perspectives beyond what could be gained from the data obtained separately based on quantitative and qualitative results.[12,15]

RESULTS

Quantitative phase

The study included 453 young adults with a response rate of 81.1%. The mean (SD) age of participants was 20.6 (1.6) years. Male participants found to be more in number (63.5). About three fourth of the participants were residing in a hostel. The median (IQR) of monthly family income was INR 70,000 (40000-100000).

Before the pandemic, 38% of students ate unhealthy food most of the time/always, which dropped to 13% during the pandemic (Table 1). At the same time, consumption of snacks in between meals and late-night snacks increased from 29% to 41% during the pandemic. Also, there was a decrease in the overall frequency of main meals/day and total dietary score significantly reduced during the pandemic. The current study shows that during the COVID-19 pandemic, total physical activity decreased by one-fifth, while vigorous, moderate, and walking activity decreased by 15%, 30%, and 15%, respectively, which is statistically significant (Table 2). During the COVID-19 pandemic, there was a 20% rise in sleep time, statistically significant. There was also an increase in screen time, which increased twice for academic purposes than entertainment (Table 2).

Qualitative phase

Based on two focus group discussions conducted among the 12 participants, we found four categories under the theme barriers and five themes in facilitators, summarised in table 4. A conceptual model created using frameworks based on subthemes and codes identified in our qualitative data and existing theories of behaviour change (Figure 1).

Integrative phase

A joint display of quantitative and qualitative findings was created with interpretation (Figure 2).

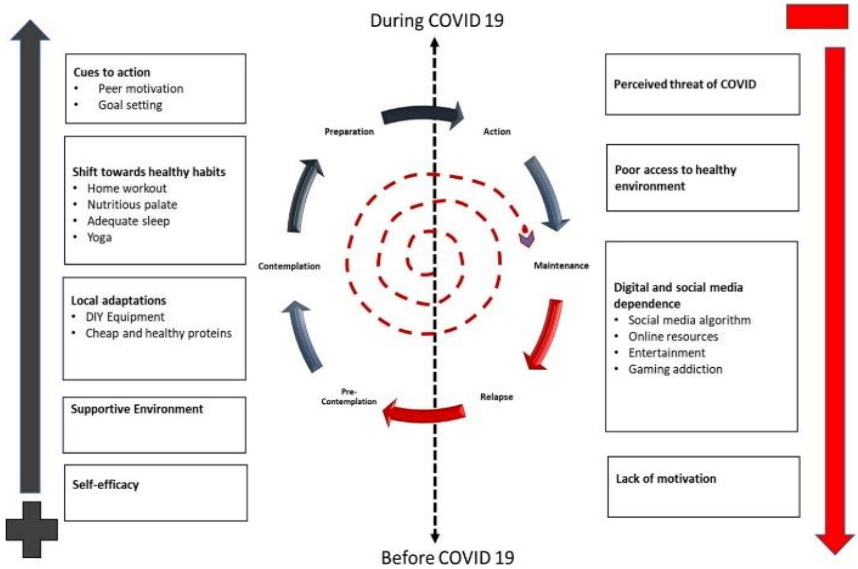

Figure 1: Conceptual model for change in healthy lifestyle among medical students of a tertiary care institution in Puducherry, during the COVID-19 pandemic.

The conceptual model describes a central spiral representing stages of change and a central vertical line representing the change in behaviour of students before and during COVID-19. Facilitators (on left) enables the progress from one stage to another towards health lifestyle whereas barriers (on right) leads to relapse of unhealthy behaviour.

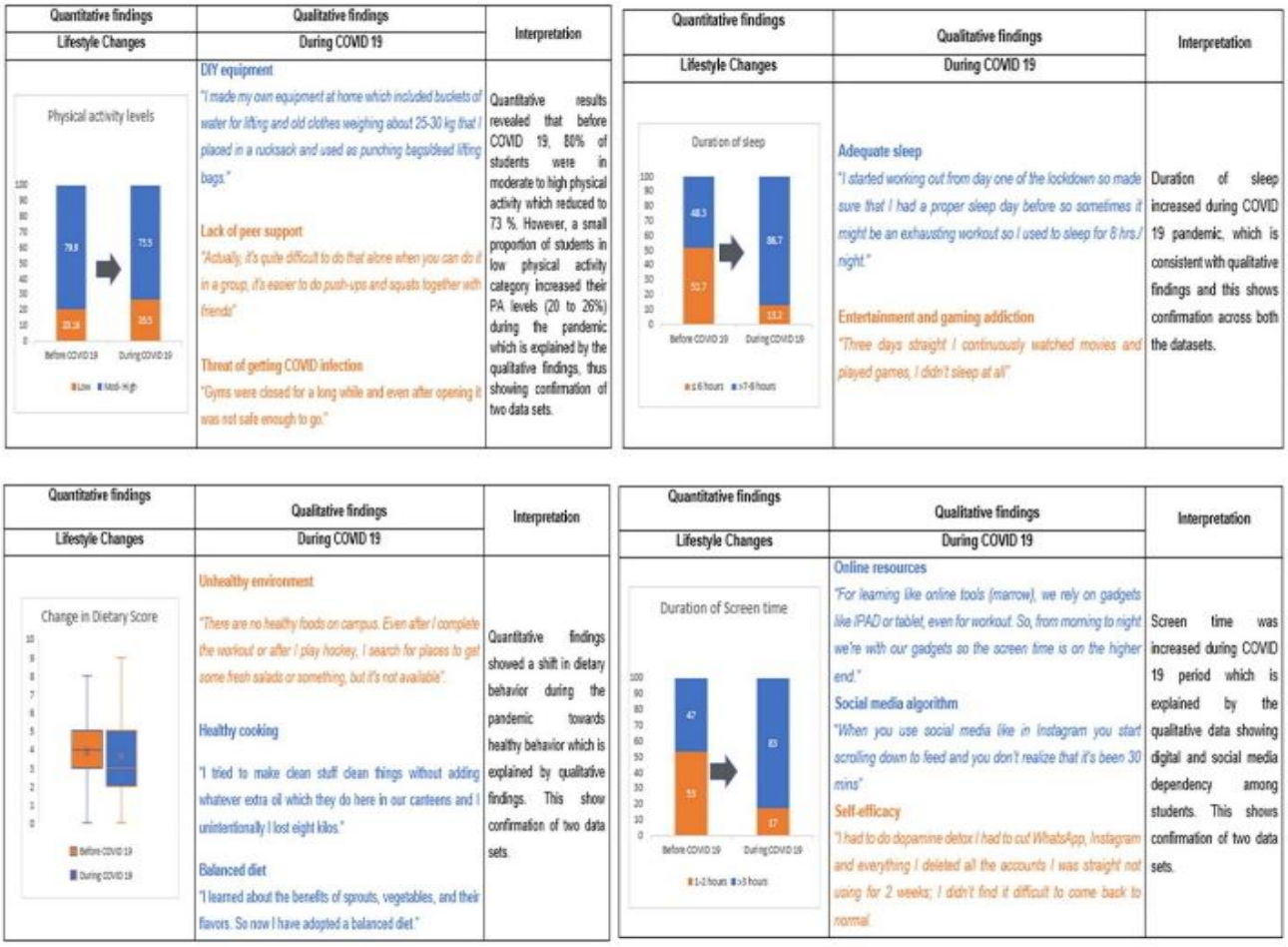

Figure 2: Joint display and meta inference of the changes in physical activity levels, diet, sleep and screen time during the COVID-19 pandemic.

DISCUSSION

The present study tried to assess the lifestyle changes before and during COVID-19 period among 453 medical students, followed by exploring their views and experiences through focus group discussions among 12 students.

The response rate for the quantitative part was 81.1%. During COVID-19, the quantitative results revealed a drop in physical activity levels. Students' eating habits changed in a healthy direction, while the duration of sleep and screen time also increased significantly. The qualitative follow-up identified the barriers and facilitators to a healthy lifestyle during the COVID-19 pandemic using manual content analysis. Quantitative findings revealed a one-fifth reduction in total physical activity levels during the COVID-19 period, which was in line with previous studies conducted in Italy.[16-19] Our study discovered a 30% reduction in moderate physical activity, consistent with a study conducted in India and can also explain through our qualitative findings in which they deprived of peer support due to COVID-19 restrictions and the closing of facilities such as grounds and gyms where they used to engage in physical activities.[6] According to our quantitative findings, during COVID-19 pandemic, approximately three-quarters of students were in the moderate to high physical activity group despite COVID-19 lockdown and restrictions. Our qualitative results could clarify this; they shared their success stories; for instance, one of the batchmates reduced her body weight, encouraging other students to do physical activities during the Pandemic. Also, due to various online learning programs, alternative equipment's for exercises, they could do home workouts. Before COVID-19, about 35% of people were eating unhealthy foods most of the time, but this dropped to 12% during the pandemic, consistent with previous studies among college students.[20] Qualitative findings also revealed increased intake of protein-rich foods and skipping sugars by students during the COVID-19 pandemic through healthier cooking and a balanced diet. However, during the pandemic, the percentage of people who consumed snacks between meals or late at night increased from 25% to 33%, while the proportion of people who ate one or two main meals increased from 16% to 62%, which might be due to late night sleep habits and decrease in diet due to unavailability of healthy food.

Table 1: Dietary changes among medical students in a tertiary care institution in Puducherry (n=453).

Variables	Never	Sometimes	Most of the time	Always	Score	Mean diff. (SD)	95 CI	Wilcoxon test	T test
	N (%)	N (%)	N (%)	N (%)	Median (IQR)			P value	P value
How likely are you to have an unhealthy diet/food?									
Before COVID-19	21 (4.6)	260 (57.4)	159 (35.1)	13 (2.9)	1 (1-2)	-0.47 (0.8)	-0.54 to -0.39	<0.001	<0.001
During COVID-19	116 (25.6)	276 (60.9)	55 (12.1)	6 (1.3)	1 (0-1)				
How often have you found yourself being eating out of control?									
Before COVID-19	125 (27.6)	249 (55.0)	70 (15.5)	9 (2.0)	1 (0-1)	-0.09 (0.8)	-0.09 to 0.06	0.78	0.82
During COVID-19	147 (32.5)	215 (47.5)	76 (16.8)	15 (3.3)	1 (0-1)				
How likely are you to have a snack between meals or a late-night snack?									
Before COVID-19	58 (12.8)	262 (57.8)	114 (25.2)	19 (4.2)	1 (1-2)	1.81 (0.9)	-0.9 to -0.27	<0.001	<0.001
During COVID-19	49 (10.8)	216 (47.7)	151 (33.3)	37 (8.2)	1 (1-2)				
Do you engage in binge alcohol drinking?*									
Before COVID-19	433 (95.8)	14 (3.1)	4 (0.9)	1 (0.2)	0	-0.35 (0.2)	-0.06 to -0.01	0.001	0.001
During COVID-19	442 (97.6)	9 (2)	0	0	0				
How many main meals do you eat a day?									
Number of meals	1 or 2	3	4	≥ 5					
Before COVID-19	74 (16.3)	311 (68.7)	61 (13.5)	7 (1.5)	0 (1-0)	0.91 (0.7)	0.03 to 0.16	0.005	0.005
During COVID-19	281 (62)	157 (34.7)	13 (2.9)	2 (0.4)	0 (1-0)				
Total dietary score									
Before COVID-19					4 (3-5)	-0.24 (2.1)	-0.44 to -0.05	0.012	0.015
During COVID-19					3 (2-5)				

* N=452, CI- Confidence interval, IQR- Interquartile range, SD- Standard deviation.

Table 2: Changes in physical activity, duration of sleep, screen among medical students in a tertiary care institution in Puducherry, during the COVID-19 pandemic (n=453).

Variables	Before COVID-19	During COVID-19	Mean Diff. (SD)	95 CI	Change (%)*	Wilcoxon test	T test
	Mean (SD)	Mean (SD)				P value	P value
Physical activity (MET-min/week)							
Total	2969.2 (3101)	2389.6 (2518)	-579.6 (3221.4)	-877 to -282	-19.5	<0.001	<0.001
Vigorous	1218.2 (2050)	1028.3 (1750.5)	-190 (2203.3)	-393 to 13.5	-15.5	0.029	0.067
Moderate	746.1 (987)	520.7 (843)	-225.4 (1094)	-326 to -124	-30.2	<0.001	<0.001
Walking	993.2 (1073)	840.5 (992)	-153.3 (1022.4)	-247 to -59	-15.4	<0.001	0.002
Duration of sleep and screen time (hrs./day)							
Sleep	6.52 (1)	7.8 (1.3)	1.3 (1.4)	1.2 to 1.4	+19.9	<0.001	<0.001
Screen time							
Learning	2 (1-3)	4 (3-6)	2.5 (2.6)	1.2 to 2.2	+115	<0.001	<0.001
Entertainment	3 (2-4)	5 (4-7)	2.1 (1.9)	2.3 to 2.7	+62.5	<0.001	<0.001

*(During COVID 19- Before COVID 19)/ (Before COVID 19) using mean, CI- Confidence interval, SD- Standard deviation

Table 3: Barriers and facilitators for healthy lifestyle among medical students in a tertiary care institution in Puducherry, during the COVID-19 pandemic.

Theme: Barriers for healthy lifestyle		
Subthemes	**Codes**	**Statements**
Lack of motivation	Lack of peer support	"It's easier to do pushups and squats together with friends instead of doing them alone."
Perceived threat of COVID	Threat of infection	"Gyms were closed for a long while, and even after opening it was not safe enough to go."
Poor access to healthy environment	Unhealthy environment	"There are no healthy foods on campus. After completing the workout, I search for places to get some fresh salads or something, but it's not available."
		"My daily diet relies on mess food inside the campus. They prioritize on cheapness and profit they can make by ration quality."
Digital and social media dependence	Social media algorithms	"When you use social media, you start scrolling down to feeds, and you don't realize that it's been 30 mins."
	Online resources	"We rely on gadgets like IPAD for educational purposes, even for a workout. So, from morning to night, we're with our devices, so the screen time is on the higher end."
	Entertainment and gaming addiction	"I bought pc games and movies from my friends, and I didn't sleep for three days."
Theme: Facilitators for healthy lifestyle		
Cues to action	Peer motivation	"I lost 18 kgs in the long term. So, seeing that few of my friends asked how is that possible? And I motivated them, and we encouraged each other to take up and do physical activities during the lockdown."
	Goal setting	"There were online programs that give you a two-week schedule with different types of exercises for each day, that encouraged me to do some physical exercises at home."
Shift towards healthy habits	Home workout	"I've switched to bodyweight exercises like pushups, pullups, and squats without weight, as well as aerobic exercises."
	Nutritious palate	"I have PCOS and a sugar allergy; I cut sugar out of my diet and have been eating sprouts and chana for breakfast for the past six or seven months."
Shift towards healthy habits	Adequate sleep	"I started working out from day one of the lockdown and made sure to have a proper sleep day so I used to sleep for 8 hrs/night."
	Yoga	"Anxiety had been a problem for me. As a result, I began to meditate. I also started performing yoga, which consisted of roughly ten Surya namaskars per day."
Local adaptations	DIY equipment	"I made equipment at home from whatever was available, such as old grinding stones that I used as dumbbells and pull up bars and buckets of water for lifting. We also had some old clothes that weighed about 25-30 kgs, so I placed them in a rucksack and used them as punching bags/deadlifting bags."
	Cheap and healthy proteins	"I took soya and other cheap proteins, like peanuts. It was around 3 kgs, and it contained around 600 grams of protein. So, I take one scoop with milk and take it every day; it gives me extra 20 grams of protein."
Supportive environment	Healthy cooking	"My parents didn't allow me to order anything from outside; instead, they got raw materials and told me to cook at home, which was relatively healthier."
Self-efficacy	Dopamine detox	"I had to do dopamine detox. I deleted all the social media accounts. I didn't use it for two weeks; I didn't find it difficult to come back to normal."

The significant barriers were unhealthy mess food, junk food accessibility, consistent with previous studies done among young adults and with student statements revealed in qualitative findings in which participants stated regarding the accessibility of unhealthy food in their campus compared to healthy foods.[21,22] Sleep duration during COVID-19 increased to 76% compared to the pre-pandemic period (47.2%) in the 7-9 hour period, which is the recommended amount of sleep for the 18-64 years age group according to National sleep foundation.[23]

This rise could be related to the widespread introduction of extensive infection-prevention measures, such as online classes and college closure. Change in duration of sleep increased by one-fifth compare to before COVID-19 period, which was in agreement with the

studies done in Hong Kong's.[18,24,6] However, 13% of students slept for less than 6 hours during the pandemic, which explained by qualitative findings in which students indicated a lack of sleep due to continuous movie watching and gaming addiction. As compared to before the pandemic, use of screen time more than six hours for learning increased from 3 to 34%, while screen time for entertainment risen from 11 to 42%, which is in agreement with previous studies conducted in the United Arab Emirates, India and the United States.[6,18,24]

The qualitative results showed that during COVID-19, there was an increase in digital and social media dependence. Increased screen time for learning attributed to a shift in learning styles from offline to online classes and numerous online medical tools that students consult for additional research. Increased screen time for entertainment purposes can be explained by categories identified by reviewing the qualitative transcripts in which they described social media platforms and their algorithms which lead to an increase in their screen usage. This rise in screen time use can have negative consequences for a person's health, including ophthalmological, overweight, or obesity, as well as mental wellbeing.[24-26] Therefore, there is a need to break away from habits.

Although, according to qualitative findings, few of them have been able to do a digital detox, which can be an excellent example for others to break away from increased screen usage, this may be because medical students were aware of the health behaviour and were willing to intervene. However, barriers to a healthy lifestyle among students exist on campus, which can suitably be studied to facilitate the maintenance of behaviour of students to prevent relapse. Strategies to focus on healthy behaviour like success stories and networking with other colleges, dopamine detox programmes and physical activity and diet-friendly campuses can promote healthy lifestyle behaviour. The main strength of this study is the use of joint display, validated questionnaire and Google forms which provided inbuilt checks that minimize chances of data entry error. Possibility of recall bias with response to behaviour before the pandemic, limited FGDs, lack of anthropometric measures were limitations of the study.

CONCLUSION

The study results indicate that during COVID-19 pandemic, three-fourth of the students were in moderate to high physical activity. Still, there was an overall decrease in levels during the pandemic. There was a reduction in the intake of unhealthy foods and an increase in sleep during the pandemic. However, the use of social media and digital aids found to have increased, resulting in more screen time. COVID-19 is a time of change in the living environment of young adults with an opportunity to attempt modification in their behaviour through insights Further research in these areas could advance in providing more insights in understanding behaviours and its coping strategies during the pandemics.

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