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**ASSOCIATION OF WEIGHT CHANGES AND DIETARY BEHAVIOUR DURING
COVID-19 AMONG COLLEGE STUDENTS**

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ABSTRACT

COVID-19 has affected everyone worldwide. First case of COVID-19 was seen in Wuhan, China in late December, 2019. The disease subsequently has been spreading since then and continues to alter the life of the people. The purpose of this study was to recognize how weight and dietary behaviour have been affected by the pandemic among college going students. The cross-sectional study was conducted on 130 college students aged 18-32 years. Demographic attribute, changes in weight and dietary behaviour were assessed using self-reported questionnaire. Half (50%) of students have reported weight gain. Increase in the quantity of food and frequency of snacking was found associated with weight gain of the students ($p < 0.001$). There is a tremendous increase reported by the participants in fruits and vegetable and water intake. This study among college going students concludes that simultaneous increase in weight gain might retrograde the overall health of the students in upcoming times whereas decline in the consumption of restaurant food, intake of home cooked food might improve their dietary habits in a long run.

Keywords: COVID-19, dietary habits, lifestyle changes, physical activity

INTRODUCTON

Corona viruses are single stranded RNA viruses that belong to family of *corona viridae*. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which belong

to the beta coronavirus genus caused the COVID-19 outbreak. This started spreading in December 2019 from a seafood market in Wuhan, china. Originally it was started

by zoonotic transmission but later it was seen that it was spreading via human-to-human transmission. This disease subsequently has been spreading since then and was announced as a pandemic in March, 2020 by WHO [1-2].

Dietary behaviour is the amount, variety, and the frequency at which a person usually consumes food. Dietary behaviour can affect an individual's health tremendously. Dietary pattern has been linked to various non communicable diseases particularly diabetes and cardiovascular diseases which are the leading cause of mortality. Obesity and dietary pattern have also been linked [3]. Weight status can be adversely affected by the unhealthy dietary habits in the young adulthood. Obesity has been identified as major health threat in the people between age of 20-39 years [4]. This was the situation prior to the pandemic. The COVID-19 pandemic has changed the dietary pattern extensively due to home confinement. A relevant amount of literature depicts changes in dietary habits during the COVID-19. First study conducted in India based on changes in dietary habits and lifestyle changes in covid-19 reported an increase in healthy meal intake and a limitation of unhealthy eating, especially in the younger population. This was a cross-sectional web-based survey conducted in Delhi in Sept, 2020 [5]. An observational retrospective

study was carried out on obese patients after one month of lockdown in northern Italy and the participants reported weight gain. Correlation was observed between consumption of snacks, unhealthy food, cereals, and sweets with weight gain [6]. L. Cheikh Ismail *et al.* conducted a study in United Arab Emirates, and it was seen there was a significant increase in the people consuming homemade food. Likewise, the proportion of participants consuming breakfast has risen from up to 74.2%, while those skipping meals was reduced from 64.5% to 46.2% during the COVID-19 [7]. Similar observations were made by J. Wang *et al.* in Hong Kong. Participants were found to cook at home more often during the pandemic [8]. It cannot be said that COVID-19 has just impacted the dietary habits negatively. As people had more time for preparing meals and more time for taking care of themselves many people have improved their eating habits. Along this line, Chopra *et al.* reported increase in nutritious food intake and a limitation of junk food items was also observed especially among youth [5].

The purpose of this study was to recognize changes in weight and dietary behaviour of the college students during the pandemic.

MATERIAL AND METHODS

A Cross-sectional study was conducted on college going students between the age of 18-32 years. Simple random sampling was

performed for the collection of data. Data was collected with the help of google forms and was floated through social media like WhatsApp and Facebook. A self-administered questionnaire was developed as a data collection tool based on review of literature and expert opinion. Kuppaswamy scale was used to assess the socio-economic status of the participants. Modified version of the Kuppaswamy scale was used which has been updated in the year 2020. A questionnaire was developed by Kumari A *et al.* particularly to assess the lifestyle behaviour changes during the COVID-19 in a population. It is a self-reported questionnaire. Validation of this questionnaire was carried out on 103 participants [9]. Another study conducted in Saudi Arabia to assess the changes in the weight, diet and lifestyle was conducted from which help was taken to frame the questionnaire [10]. Informed consent was obtained from each respondent, prior to data collection, by explaining the purpose and necessity of their participation in the study.

Data entry was done in MS Excel and SPSS version 21 was used for data analysis. Data was analysed and interpreted by using Descriptive analysis and further chi-square test was applied. The p value below 0.05 was considered significant.

RESULTS

Table 1 depicts demographic profile of the participants. A total of 130 college student subjects were studied. Majority (86.9%) of them were Females. Age of the participants varied from 18-32 years with 82% lying between 18-22 years and mean age came out to be 21 years. 74.6% of the individuals were graduates while 21.5% were post-graduates and only 3.8% were pursuing PhD. Most (74.6%) of them were living in a nuclear family. As for their marital status, 99.2% of them were unmarried and only 0.8% individuals married. **Figure 1** categorizes families of the participants into upper, upper middle, lower middle, upper lower and lower SES. Middle SES (Upper middle and lower middle) together constitutes 68.3% of the subjects. Upper socio-economic status constitutes 23.8% subjects while lower socio-economic status constitutes 0% of total subject. **Figure 2** categorizes participants based on their BMI. Participants were asked about their height and weight and BMI was calculated. 53.8% of the subjects fall under normal category whereas 27.8% are obese. Only 6.7% are underweight and 11.5% came out to be overweight. **Table 2** shows the changes in the weight of the students. Half (50%) of students have reported weight gain whereas 30.8% people have reported weight loss. 15.4% stated that they have no change in them during the COVID-19 and 13.8% did not know about their weight

change.. 40% of the participants gained weight below 1kg. The reasons for weight loss could be eating home cooked food, doing home workout, stressing less, more time for sleep, improved sleep quality.

Figure 3 illustrates changes in quantity of food consumed, changes in frequency of snacking, changes in intake of home cooked food, changes in intake of restaurant food and intake of healthy food. 73.8%, 56.2% and 78.5% of the participants increased the quantity of their food, frequency of snacking, and intake of home cooked food respectively as compared to their usual routines before the pandemic. **Table**

4 depicts the association of dietary behaviour with the changes in weight.

Increase in the quantity of food has shown increase in the weight of the participants. Frequency of snacking between the meals have also demonstrated a highly significant association with change in weight ($p < 0.001$). Intake of restaurant food have shown impact on the weight of the participants. **Figure 5** depicts the change in intake of various food groups and products during the pandemic. There is a tremendous increase reported by the participants in fruits and vegetable and water intake. Savoury, sweets, and soft drinks were reported to be decreased by 42,37 and 31 students, respectively. Consumption of tea was increased by 49 participants whereas decreased by 28 students.

Table 1: Demographic Profile of the Participants (N=130)

	N	%
Gender		
Female	113	86.9
Male	17	13.1
Age (21 ± 2.48)		
18-22	107	82.3
23-27	19	14.6
28-32	4	3.07
Location		
Faridabad	30	23.1
Gurugram	54	41.5
Noida	23	17.7
Delhi	23	17.7
Education		
Graduate	97	74.6
Post-Graduation	28	21.5
PhD	5	3.8
Type of family		
Nuclear	97	74.6
Joint	33	25.4
Marital Status		
Unmarried	129	99.2
Married	1	0.8

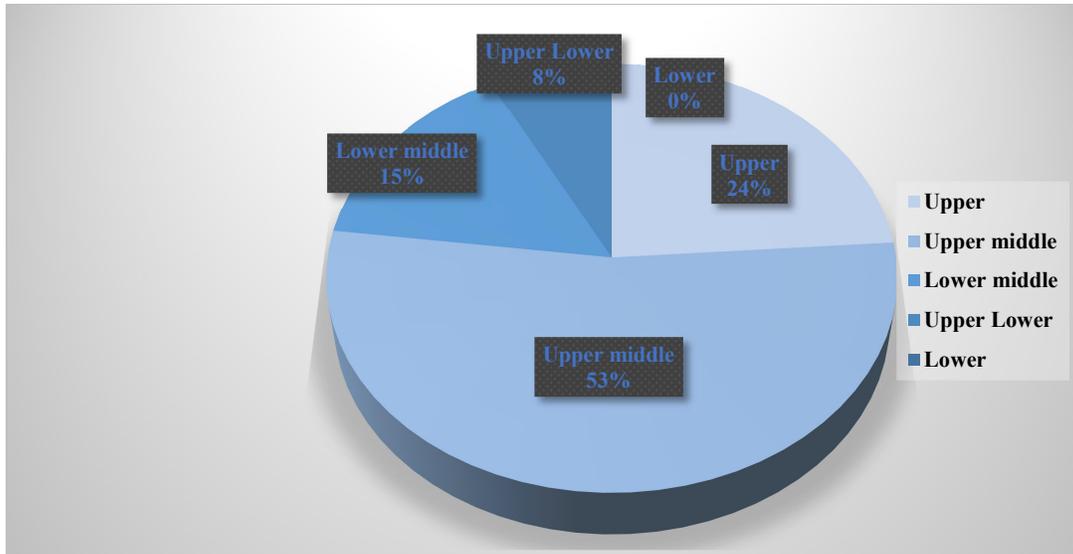


Figure 1: Distribution of Subjects According To SES

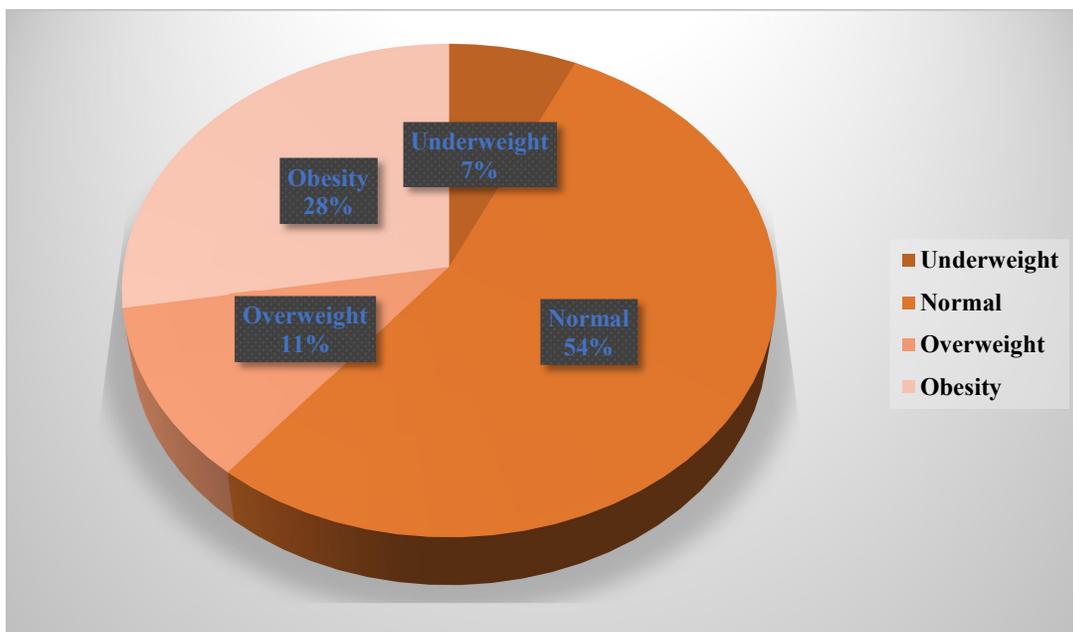


Figure 2: Distribution of Subjects According To BMI

Table 2: Changes in Weight of the Students

Variable	Answer	Frequency	Percentage (%)
Changes in Weight	Weight gain	65	50
	Weight loss	27	30.8
	No change in weight	20	15.4
	Maybe	18	13.8
Extent of changes in weight	0-1 kg	17	40
	1.1-3 kg	44	36.4
	3.1-5 kg	37	30.6
	More than 5 kg	23	19

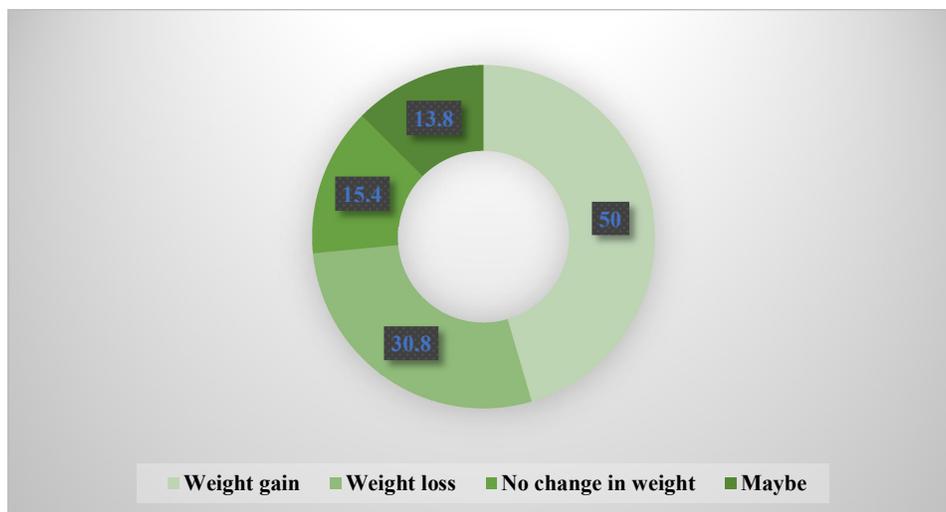


Figure 3: Distribution of Subjects According to Their Changes in Weight

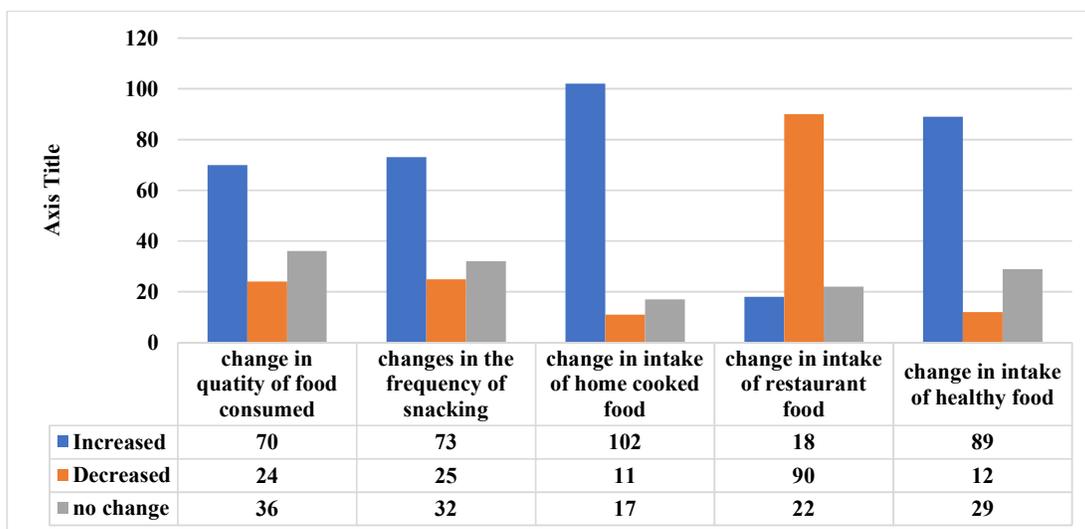


Figure 4: Distribution of Participants According to The Changes in Dietary Behaviour

Table 3: Association of Changes in Weight and Dietary Behaviour

Variables	Answers	Weight gain N=65	Weight loss N=27	No change in weight N=23	Maybe N=15	Chi-square
Quantity of food consumed	Increased	43	5	12	10	p=0.001** χ²=25.30
	Decreased	9	11	1	3	
	No change	14	11	10	2	
Frequency of snacking	Increased	43	8	12	10	p=0.001** χ²=21.58
	Decreased	9	11	1	4	
	No change	13	8	10	1	
Intake of home cooked food	Increased	48	24	20	10	p=0.388 χ²=6.326
	Decreased	8	0	1	2	
	No change	9	3	2	3	
Intake of food from restaurant	Increased	12	2	2	2	p=0.045* χ²=12.866
	Decreased	43	24	16	7	
	No change	10	1	5	6	
Intake of healthy food	Increased	42	22	16	9	p=0.272 χ²=7.560
	Decreased	9	1	2	0	
	No change	14	4	5	6	

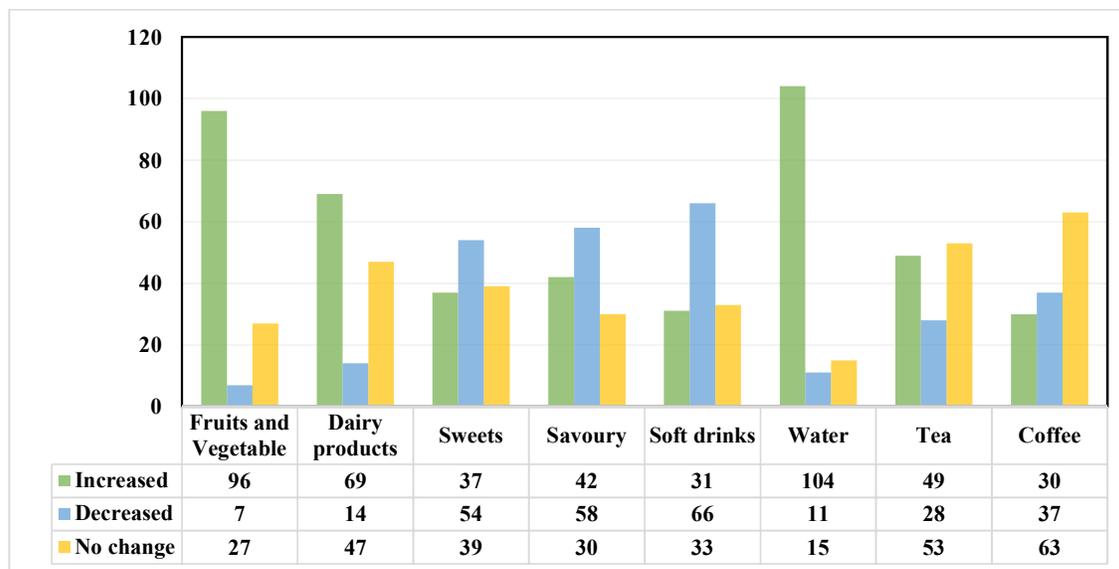


Figure 5: Distribution of Participants According to The Changes in Intake of Food Items

DISCUSSION

The study presents the impact of COVID-19 of dietary behaviour and lifestyle pattern on the college going students particularly private colleges. As majority of the participants were between 18-22 years of age so they were not married. As of their socio-economic status, nobody was from the lower SES as the data was collected from students at private university. Equivalent results were found with respect to **Table 2** among the Italian population in a survey where 48.6% of the participants gained weight whereas 13.9% of the people lost weight during the pandemic [11]. Predictors of weight gain can be overeating due to boredom, not exercising and excessive sitting time whereas a considerable number of students have reported weight loss too. Comparable results were observed in a study from

Canada. More than half of the participants reported changes in eating behaviour like eating more food, more snacking and less consumption of fast food [12]. This study could have various limitations too. As this study was conducted through online mode as a precaution against the corona virus, it could have affected the quality of the data. Another major limitation of this study could be the small sample size. Also, the COVID-19 situation is changing every month. Many things started opening in February- March 2021 and the data was collected during that period and in April-May the second wave of COVID-19 arrived in India which might have made other changes in students' diet and lifestyle.

CONCLUSION

This study among college going students concludes that simultaneous influence of increase in sitting time, screen time, weight

gain might retrograde the overall health of the students in upcoming times whereas decline in the consumption of restaurant food, intake of home cooked food might improve their dietary habits in a long run. A significant impact of COVID-19 has been observed in the study. Both negative and positive changes have happened among the students. Weight gain has been observed in many participants although there was an enormous decrease in the restaurant food and increase in the home cooked food. Therefore, these finding put emphasis on importance of doing greater research in this domain with large sample sizes. Also, public health policies need to be developed for healthy lifestyle and diet to decrease the further burden of non-communicable diseases.

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