

## Changes in Dietary and Lifestyle Habits during the First Lockdown of COVID Pandemic: A Reflection of Public Health Status from India

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### ABSTRACT:

**Background:** India declared a complete lockdown during the first wave of COVID-19, leading to unprecedented socio-economic transformations. **Objectives:** The aim of this study was to document the changes in the dietary and lifestyle factors observed among Indians during the lockdown period of the first wave of COVID-19. **Method:** An online survey was conducted among Indians above 18 years of age, shared through social media platforms. **Results:** Out of 1118 complete responses, 53.7% were 21 to 40 years old, 79.2% were female, and 37.9% were students. About 75% and 78.9% observed changes in eating habits and became conscious of healthy food choices, respectively. A major proportion of participants found no self-perceived changes in appetite, frequency of meal consumption, snacking frequency, and the quantity of food consumed. About 41% perceived changes in body weight. Consumption of home-cooked meals increased and intake of processed cereals, bakery products, sweets, chips, and carbonated beverages reduced. Increased quantity and frequency of meals, appetite, sleep and reduced physical activity were significantly associated with changes in body weight. About three-fourths purchased groceries from local markets, and 89.1% resorted to thinking about food wastage and reuse. About 40.5% started indulging in physical activity during the lockdown. About 6-7 hours of sleep was reported by 36.2% of participants, while delayed sleeping was observed in 56.3%. **Conclusion:** Notable dietary and lifestyle changes have been observed in Indians. Longitudinal studies and systematic reviews will help assess the long-term health concerns arising in society due to the COVID-19 lockdown.

**Keywords:** Pandemic, first wave, dietary habits, meal pattern.

**Key Messages:**

- About 78.9% of participants resorted to making conscious decisions about healthy food choices.
- A major proportion of participants found no self-perceived changes in appetite, frequency of meal consumption, snacking frequency, and the quantity of food consumed.
- About 80.2% (n=93) of smokers and 68.2% (n=88) of alcohol consumers quit their habit while 40.5% started exercising during the lockdown.
- Increased appetite, increased frequency of meals, snacking thrice a day, increased quantity of consumed food, decreased fluid intake, reduction in physical activity, increased sleeping of more than 8 hours a day, and staying up late at night were found to be significantly associated with increased body weight.

**INTRODUCTION:**

COVID-19 was declared a global pandemic on March 2020 by the WHO resulting in a nationwide lockdown in India from March 25th 2020.<sup>1</sup> The Indian government's response was one of the highest, imposing stringent containment according to 'Oxford COVID-19 Government Response Tracker' records.<sup>2</sup> In India, schools, colleges, restaurants and other common gathering places were closed during the first wave, initially for 21 days which extended to four months.<sup>3</sup> The sudden unrest and changes in the socio-economic aspects due to COVID-19 lockdown might pose a long-term impact on health, causing public health problems.<sup>4</sup>

Food availability, accessibility and affordability have been affected due to the lockdown, having repercussions on food security in India. Prices of food commodities increased as much as 6% for pulses, 3.5% for edible oils, 4% for iodized salt, 28% for tomatoes, 15% for potatoes and less than 1 % for rice, wheat flour and milk.<sup>9</sup> Bulk buying and stocking up of food ingredients were prevalent because of their availability being once a week or ten days. People also resorted to menu planning to reduce the visits to the supermarket for groceries.<sup>1</sup>

Several lifestyle factors have been reported to have positive and negative consequences during the lockdown. Changes in dietary habits such as increased or decreased consumption of certain food items/groups and changes in lifestyle such as physical activity, sleep pattern, smoking and alcohol consumption have been observed worldwide.<sup>5,6</sup> Increased food frequency can be healthy or unhealthy, according to a multi-centre study from 16 countries.<sup>7</sup> Detrimental changes in food habits such as higher intake of calories, fats, oils and sugars, have been observed worldwide that could affect people's health over time.<sup>8</sup> On the contrary, healthy eating habits such as including salads, vegetables, fruits and immunity-related foods

such as lemon, ginger and garlic have also been observed.<sup>1</sup> Changing consumer behaviour has also led to a sudden rise in household and solid waste, another global concern.<sup>10</sup>

The pandemic lockdown has been an unforeseen and unprecedented social change that must be documented. Therefore, the present research postulated that the first lockdown during COVID-19 pandemic brought about changes in the dietary and lifestyle practices among Indians.

## **MATERIALS AND METHODS:**

### **Study Design and Data Collection**

The present study was carried out at a government tertiary care hospital in Chennai, Tamil Nadu, India. The study was observational in nature, conducted online from 4<sup>th</sup> to 9<sup>th</sup> of August 2020, among Indians aged 18 and above. A brief description of the survey was provided at the beginning of the questionnaire, fully informing the participants about the study and consent was obtained. The participants were also informed that their responses would be kept confidential, and that anonymity would be maintained. Participating in the survey was purely voluntary, and the liberty was provided to skip any question if the participants did not feel the need to answer. The survey questionnaire comprising forty-nine questions was made into Google forms. The study aimed to determine the impact of the COVID-19 pandemic on the dietary and lifestyle habits such as smoking, alcohol consumption, exercise, and sleep patterns of the subjects. The variables mentioned above were analyzed for their association with self-reported changes in the body weight of the subjects. Other components such as the impact of the COVID-19 pandemic on food purchase, food wastage, food safety practices, growth of edible plants at the household level and following a qualified nutritionist's advice were also assessed. The link was shared via the social media platforms such as WhatsApp, Instagram, and Facebook, accessible to anyone with internet connectivity. The survey was conducted in accordance with the Declaration of Helsinki and did not evoke any sensitive responses that may cause harm in any way. Also, anonymity was ensured in this study since participants' responses could not be traced back to the individuals in any way. Hence, the current online survey does not require ethical committee approval. After responses were obtained, the final dataset was downloaded in Excel format.

### **Statistical analysis**

Statistical analysis was performed using SPSS Statistics for Windows, version 22.0 (SPSS Chicago, IL, USA). Descriptive analysis was conducted on sociodemographic, dietary data, lifestyle habits, food purchase attitude and behaviour, food wastage, and food safety represented as frequency and percentages. The relationship between body weight and other variables such as increased or decreased consumption of food items/groups, appetite, number of meals consumed in a day, snacking habit and frequency per day, consumption of

immunity-boosting foods, the quantity of food consumed, fluid intake, changes in smoking and alcohol consumption, exercise, sleeping pattern, and food purchase were analyzed using chi-square test.

## RESULTS:

The survey was completed, and data was obtained on 10<sup>th</sup> August 2020. Out of the 1135 responses received, seventeen were incomplete, and a final of 1118 was considered for statistical analysis. **Table 1** describes the characteristics of the participants and some of the lifestyle changes observed among the participants. The study results showed that majority of the participants were of the age group 21 to 40 years (n=600, 53.7%), female (883, 79.2%), students by occupation (n=423, 37.9%) and those consuming non-vegetarian food (n=767, 68.6%).

Table 1. Characteristic profile of participants and important changes in lifestyle factors and consumer behaviour among participants during the first lockdown period in India.

Variables	n (N=1115)	%
Age		
≤ 20	218	19.5
21-40	600	53.7
41-60	201	18.0
>60	49	4.4
Gender		
Male	232	20.8
Female	883	79.2
Occupation		
Student	423	37.9
Homemaker	172	15.4
Working from home	247	22.1
Going to work as usual	203	18.2
Unemployed	71	6.4
Science graduate	695	62.5
Healthcare professional	422	38.1
Vegetarian	351	31.4
Non-Vegetarian	767	68.6

Observed changes in eating habits during lockdown period	836	75.0
Conscious about healthier food choice after pandemic	878	78.9
Exercising during lockdown period	658	58.9
Staying awake till late night and waking up late in the morning	628	56.3
Able to buy all food items needed during lockdown period	991	88.6

N= Total sample for the study; n=number; %-percentage

The participants were asked if any changes were observed in diet, lifestyle, sleep, and purchase of food items (**Supplementary Table 1**). About 75% (n=836) observed changes in their eating habits, while 59% (n=657) started consuming specific immunity-boosting food items. Consciousness about choosing healthy food options (n=878, 78.9%) and an increase in a positive attitude towards the consumption of nutritious foods (n=952, 85.4%) were observed in the majority of participants. Notably, 80.2% (n=93) of smokers and 68.2% (n=88) of alcohol consumers quit their habit during the pandemic. About 58.9% (n=658) of the participants indulged in physical activity during lockdown with home workouts; walking and jogging were the most preferred type of exercise. The lockdown period witnessed a surge in people beginning to exercise first-hand (40.5%). About 36.2% reported having six to seven hours of sleep. Notably, half of the participants (n=628, 56.3%) admitted staying up late at night and waking up late in the morning.

Supplementary Table 1. Changes in attitude and practice of diet, sleep, lifestyle, and purchase of food items

Variables	n	%
<b>Eating habits</b>		
Consumption of snacks per day		
Once	520	46.6
Twice	357	32.0
Thrice	110	9.9
None	129	11.6
Consumption of specific foods for immunity during pandemic	657	59.0
Feel that consumption of nutritious food should be increased	952	85.4
<b>Lifestyle</b>		
Changes observed in smoking (n=116)*		
Number of times of smoking has increased	4	3.4
Number of times of smoking has reduced	16	13.8

No changes	3	2.6
Quit smoking	93	80.2
Changes observed in alcohol consumption (n=129)*		
Number of times of consumption has increased	4	3.1
Number of times of consumption has reduced	28	21.7
No changes	9	7.0
Quit alcohol consumption	88	68.2
Habit of exercising prior to lockdown period	546	49.3
Type of exercise*		
Walking/jogging	337	30.5
Yoga/meditation	154	13.9
Home workouts	359	32.5
None	254	23.0
<b>Sleep pattern</b>		
Sleeping hours		
>8 hours	249	22.3
8 hours	333	29.8
6-7 hours	405	36.2
<6 hours	131	11.7
<b>Purchase attitude and behaviour</b>		
Impact of expenditure on food		
Positive	203	18.2
Negative	221	19.8
No, it did not affect my food intake	691	61.8
Purchase of perishables during pandemic		
Online	61	5.5
Nearby local market	875	78.3
Both a and b	182	16.3
Frequency of buying perishables foods during pandemic		
Daily	196	17.6
Alternate days	254	22.8

Once in three days	292	26.2
Weekly	374	33.5
Purchase of essentials during pandemic		
Online	85	7.6
Nearby local market	857	76.9
Both a and b	172	15.4
Frequency of buying essentials foods during pandemic		
Alternate days	136	12.2
Once a week	336	30.2
Once in 2 weeks	271	24.3
Once in a month	371	33.3
Prefer to continue purchasing perishables and essentials from nearby local markets even after pandemic	1011	91.2
Purchasing meal outside	106	9.5
Prefer continuing the habit of not buying outside meals even after pandemic <sup>†</sup>	475	42.5
Ponder on food wastage during lockdown	989	89.1
Handling left-over food		
Use it for another meal	908	81.7
Discard it	203	18.3
Ways to reducing food wastage		
Try making the right quantity of food	467	42.0
Make use of left over for the next meal	75	6.7
Both the above options	570	51.3
Increased consciousness in buying foods than before	1014	91.4
Sanitizing all essentials after purchasing	984	88.4
Method of sanitizing essentials <sup>†</sup>		
Separate and leave them in open air for some time	192	17.2
Wash with plain water	381	34.1
Wash with turmeric and salt in water	355	31.8
Wash with vinegar or baking soda in water	85	7.6
Methods of cleaning meat/poultry/seafood <sup>†</sup>		

With plain water	206	18.4
With salt and turmeric	571	51.1
None	135	12.1
No, I am a vegetarian	171	15.3
Started growing small edible plants	546	49.3

\*Response by those who smoke, consume alcohol, and perform exercise currently during the lockdown period

†Missing data

n=number; %-percentage

A higher proportion of participants resorted to buying perishables (n=875, 78.3%) and essential food items (n=857, 76.9%) once a week from local marketplaces. Sixty-two percent of our study participants reported that an increase in food price had not affected their food intake, and 88.6% could buy all the necessary food items. Only a small section of participants bought outside meals (9.5%), and 42.5% (n=475) preferred not to buy outside meals even after the pandemic. About 89.1% (n=989) reported pondering reducing food wastage by using it for another meal or making the right quantity of food. Conscious buying had increased among the participants (91.4%), with several of them using different methods to sanitize essentials and food ingredients (88.4%). The importance of following qualified nutritionist advice during the pandemic was acknowledged by 87.2% (n=970) of the participants. Improving immunity during the pandemic, for good health, lifestyle reasons, and diet for specific diseases were the reasons reported by participants for following a nutritionist (58%) (data not shown). About 75% (n=836) of the participants felt that the expenditure on fruits and vegetables increased, while 4.1% (n=46) felt it decreased and 20.9% (n=233) considered it to be the same (data not shown).

The participants were questioned on their self-perception of changes in diet and lifestyle factors observed during the lockdown period. A higher proportion of participants opined that their appetite (n=548, 49.4%), frequency of meal consumption (n=669, 59.9%), snacking frequency (n=420, 37.7%), the quantity of food consumed (n=539, 48.3%) and sleeping hours (n=435, 38.9%) were same before and during the lockdown period. With regards to body weight, about 41% (n=457) felt an increase, while 40.4% (n=450) of the participants felt no change (**Figure 1**). Visible increases in the consumption of home-cooked meals and nutritious foods such as millets, pulses, vegetables, fruits, milk, egg, meat & poultry, fish, nuts, and turmeric milk have been reported among the participants. Notably, cheese and other milk products, natural sweeteners like sugar, jaggery and honey, fats & oils like ghee, butter and cooking oil consumption have also increased. On the contrary, there is a conspicuous decrease in the intake of packaged foods like processed/instant cereals, fruit juices in tetra



packs, bakery products, sweets, chips, carbonated beverages, flavored drinks, and energy drinks among participants (**Figure 2**).

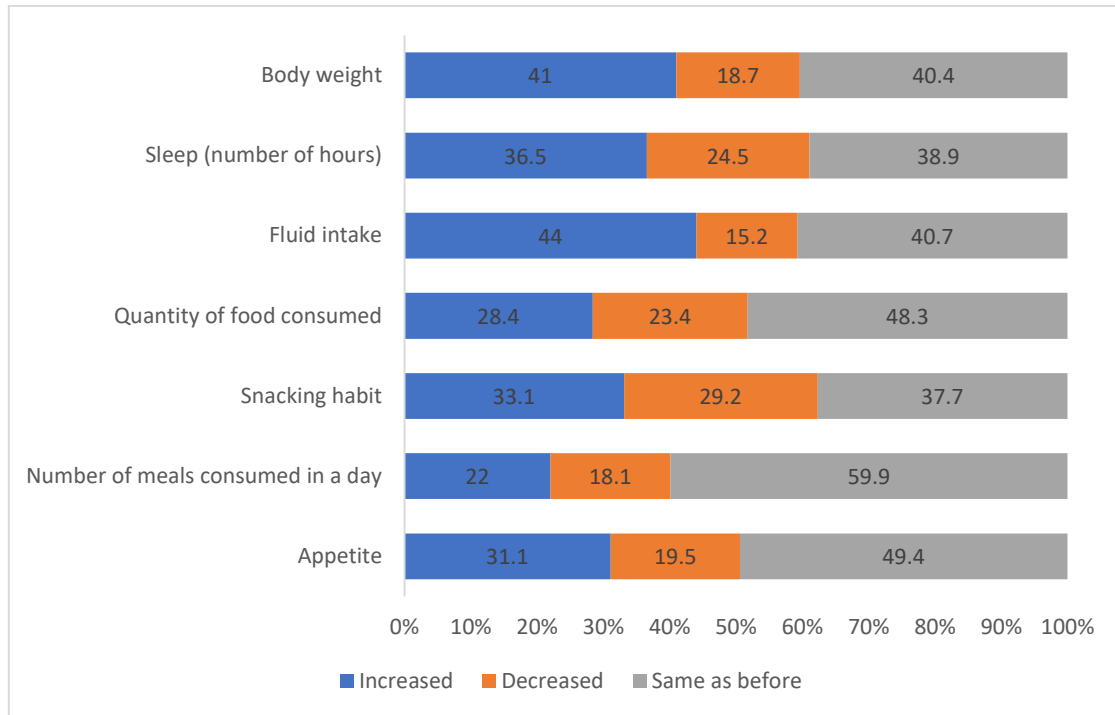


Figure 1. Self-perception of changes observed during the pandemic period.

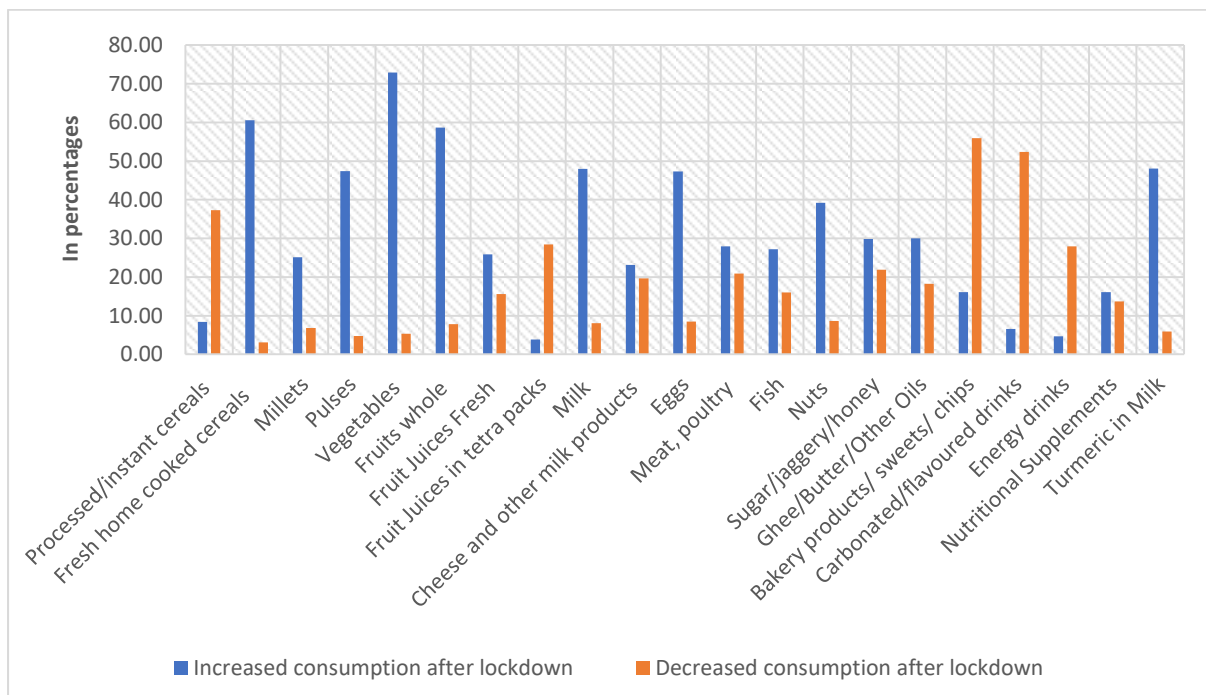


Figure 2. Increased and decreased consumption of various food items/groups after lockdown.

A significant association between increased consumption of certain food items/groups such as processed/instant cereals, eggs, meat/poultry, sugar/jaggery/honey, processed foods such as bakery products/sweets/chips, carbonated/flavored drinks and increased body weight could be observed (Table 2). Similarly, decreased consumption of fruits, milk, and turmeric milk was significantly associated with an increase in participants’ body weight during the lockdown. Changes in other dietary and lifestyle factors in participants such as increased appetite, increased frequency of meals, snacking thrice a day, increased quantity of consumed food, decreased fluid intake, reduction in physical activity, increased sleep time of more than 8 hours a day and staying up late at night were found to be associated with increased body weight, significant at P=0.000 (Supplementary Table 2). Indisputably the participants who felt that their appetite, frequency of meal consumption, snacking habit, quantity of food consumed, and sleeping hours were the same as before felt that their body weight was unchanged.

Table 2. Association among changes in body weight vs increased/decreased consumption of certain food items/groups among participants during the first lockdown period in India.

Variables	Increased consumption						P value	Decreased consumption						P value
	Increased Body weight		Decreased Body weight		Body weight same as before			Increased Body weight		Decreased Body weight		Body weight same as before		
	n	%	n	%	n	%		n	%	n	%	n	%	
Processed/instant cereals	48	51.10	21	22.30	25	26.60	0.017*	175	42.10	78	18.80	163	39.20	0.811
Freshly prepared home cooked cereals	272	40.20	130	19.20	274	40.50	0.758	19	54.30	6	17.10	10	28.60	0.241
Fruits whole	251	38.40	121	18.50	282	43.10	0.060	46	52.90	17	19.50	24	27.60	0.029*
Fruit Juices in tetra packs	24	55.80	9	20.90	10	23.30	0.056	137	43.10	63	19.80	118	37.10	0.375
Milk	224	41.90	98	18.30	213	39.80	0.846	38	42.20	28	31.10	24	26.70	0.002*
Cheese and other milk products	117	45.20	55	21.20	87	33.60	0.039	91	41.40	38	17.30	91	41.40	0.836
Eggs	239	45.40	95	18.00	193	36.60	0.016*	35	36.80	27	28.40	33	34.70	0.038*
Meat, poultry	146	46.80	52	16.70	114	36.50	0.049*	93	39.70	46	19.70	95	40.60	0.871
Sugar/jaggery/honey	153	45.80	66	19.80	115	34.40	0.028*	101	41.20	45	18.40	99	40.40	0.991
Ghee/Butter/Other Oils	149	44.50	60	17.90	126	37.60	0.292	87	42.60	35	17.20	82	40.20	0.791
Processed foods (Bakery products/ sweets/ chips)	100	55.60	26	14.40	54	30.00	0.000†	255	40.80	126	20.20	244	39.00	0.308
Carbonated beverages/ flavoured drinks (e.g., Pepsi, 7up)	40	55.60	13	18.10	19	26.40	0.021*	256	43.80	102	17.40	227	38.80	0.133
Energy drinks	23	44.20	10	19.20	19	36.50	0.841	130	41.80	69	22.20	112	36.00	0.083
Turmeric in Milk	219	40.80	93	17.30	225	41.90	0.447	37	56.90	8	12.30	20	30.80	0.025*

\*Significant at P<0.05

†Significant at P<0.001

n=number; %-percentage

Supplementary Table 2. Association among changes in body weight and other variables

Variables	Body weight						P value
	Increased		Decreased		Same as before		
	n	%	n	%	n	%	
<b>Appetite</b>							
Increased	213	61.90	28	8.10	103	29.90	0.000 <sup>†</sup>
Decreased	74	34.10	78	35.90	65	30.00	
Same as before	165	30.20	101	18.50	280	51.30	
<b>Number of meals</b>							
Increased	158	64.20	20	8.10	68	27.60	0.000 <sup>†</sup>
Decreased	76	37.60	69	34.20	57	28.20	
Same as before	222	33.30	119	17.90	325	48.80	
<b>Snacking habit</b>							
Increased	226	61.40	40	10.90	102	27.70	0.000 <sup>†</sup>
Decreased	100	30.70	109	33.40	117	35.90	
Same as before	130	31.10	58	13.90	230	55.00	
<b>Snacking frequency per day</b>							
Once	163	31.30	117	22.50	240	46.20	0.000 <sup>†</sup>
Twice	178	50.00	48	13.50	130	36.50	
Thrice	71	65.10	10	9.20	28	25.70	
None	43	33.60	33	25.80	52	40.60	
<b>Quantity of food consumed</b>							
Increased	215	67.80	19	6.00	83	26.20	0.000 <sup>†</sup>
Decreased	87	33.30	110	42.10	64	24.50	
Same as before	155	28.90	79	14.70	302	56.30	
<b>Fluid intake</b>							
Increased	211	43.10	103	21.00	176	35.90	0.000 <sup>†</sup>
Decreased	96	56.50	33	19.40	41	24.10	
Same as before	149	33.00	71	15.70	232	51.30	
<b>Changes in smoking frequency (n=116)</b>							
Increased	2	50.00	1	25.00	1	25.00	0.214
Decreased	6	37.50	0	0.00	10	62.50	
No changes	2	66.70	0	0.00	1	33.30	
Quit smoking	46	49.50	18	19.40	29	31.20	

<b>Changes in alcohol consumption frequency (n=129)</b>							
Increased	1	25.00	3	75.00	0	0.00	0.095
Decreased	13	46.40	5	17.90	10	35.70	
No changes	4	44.40	1	11.10	4	44.40	
Quit alcohol consumption	46	52.30	13	14.80	29	33.00	
<b>Currently exercising</b>							
Yes	233	35.50	145	22.10	279	42.50	0.000 <sup>†</sup>
No	223	48.80	63	13.80	171	37.40	
<b>Type of exercise</b>							
Walking/jogging	135	40.10	70	20.80	132	39.20	0.407
Yoga/meditation	56	36.60	33	21.60	64	41.80	
Home workouts	148	41.20	68	18.90	143	39.80	
None	114	45.20	36	14.30	102	40.50	
<b>Sleep hours</b>							
>8 hours	133	53.60	42	16.90	73	29.40	0.000 <sup>†</sup>
8 hours	122	36.70	55	16.60	155	46.70	
6-7 hours	143	35.40	86	21.30	175	43.30	
<6 hours	59	45.00	25	19.10	47	35.90	
<b>Changes in sleeping hours</b>							
Increased	206	50.60	75	18.40	126	31.00	0.000 <sup>†</sup>
Decreased	129	47.30	65	23.80	79	28.90	
Same as before	121	27.90	68	15.70	245	56.50	
<b>Staying awake till late night and waking up late during pandemic</b>							
Yes	324	51.80	114	18.20	188	30.00	0.000 <sup>†</sup>
No	133	27.30	93	19.10	261	53.60	
<b>Consumption of non-vegetarian food</b>							
Vegetarian	123	35.10	75	21.40	152	43.40	0.023*
Non-vegetarian	334	43.70	133	17.40	298	39.00	
<b>Able to buy all food items needed</b>							
Yes	391	39.60	181	18.30	416	42.10	0.002*
No	66	52.40	27	21.40	33	26.20	

<b>Expenditure of fruits and vegetables</b>							
Increased	361	43.20	159	19.00	315	37.70	0.011*
Decreased	22	47.80	7	15.20	17	37.00	
Same as before	74	32.00	42	18.20	115	49.80	
<b>Impact of expenditure on food intake</b>							
Positively	79	38.90	44	21.70	80	39.40	0.000 <sup>†</sup>
Negatively	124	56.10	38	17.20	59	26.70	
No, it did not affect my food intake	254	36.90	125	18.20	309	44.90	
<b>Noticed changes in food habits</b>							
Yes	370	44.30	167	20.00	298	35.70	0.000 <sup>†</sup>
No	84	30.40	41	14.90	151	54.70	
<b>Prefer continuing the habit of not buying outside meals even after pandemic</b>							
Yes	180	38.00	82	17.30	212	44.70	0.039*
No	136	44.70	60	19.70	108	35.50	
<b>Ponder on food wastage during lockdown</b>							
Yes	403	40.80	194	19.70	390	39.50	0.059
No	49	40.50	14	11.60	58	47.90	

\*Significant at  $P < 0.05$

<sup>†</sup>Significant at  $P < 0.001$

n=number; %-percentage

## DISCUSSION:

The present study is one of the largest cross-sectional studies among Indians, bringing out vital information on lifestyle changes during the first lockdown. It was found that there were no self-perceived changes in sleeping hours, the quantity of food consumed, food frequency per day, snacking habits, appetite, and fluid intake before and during the lockdown period. However, changes in body weight were significantly associated with dietary factors, increased, or decreased consumption of certain foods, sleep, and exercise.

It should be noted that the study was conducted at a time when measures of government response, stringency and containment were at their peaks in India.<sup>3</sup> Hence, the present study's findings are important in documenting the dietary and lifestyle adaptations to lockdown among Indians during the early days of the first wave of the COVID-19 pandemic. The lifestyle factors did not get affected much among our study participants, which might be

because it was conducted during the initial days of the first lockdown period when changes had just commenced.

### Eating habits and body weight

A pattern of increased food consumption was observed worldwide during the lockdown period due to several factors. Food experimentation and time spent in the kitchen reportedly increased among the household food gatekeepers because of various reasons like surplus free time, inability to eat out, and excessive time spent by the family members at home.<sup>1</sup> Besides, there was a necessity to buy foods with longer shelf life and a lesser rate of spoilage, leading to a higher purchase and the intake of processed/junk foods.<sup>8</sup> With the pretext of boredom, fatigue, anxiety and stress, overeating escalates when the home environment is conducive to easy access to energy-dense foods.<sup>11,12</sup> Increased consumption of salted snacks in Western India was significantly correlated with 'work from home' condition and income.<sup>13</sup> However, our study results indicated that increased food consumption could be healthy and not necessarily unhealthy, as reported by several studies.<sup>14-17</sup> Supporting our study results, a review of Indian studies has revealed reduced consumption of junk foods, fried foods and fast foods complemented with an increased intake of fruits, vegetables and a balanced diet.<sup>18</sup> A drastic increase in freshly prepared home-cooked meals, a reduction in processed/junk foods consumption, reusing foods and reduced food wastage were observed in our study. This indicates a shift in the attitude and practice of people adapting to conscious buying and usage, owing to the limited availability and accessibility of food sources during the lockdown. Consumption of fruits, vegetables, turmeric in milk and immunity-boosting foods increased in our study, indicating heightened awareness of healthy eating among Indians, specifically during the pandemic when food and immunity have been established to have a strong link.<sup>19</sup>

There is a mismatch in the perception between altered food consumption patterns and increased body weight among our study participants. Only about one-third of the participants reported an increase in the quantity of food consumption, snacking habits, and appetite, although two-fifths of the participants (41%) perceived a rise in body weight. One-fifth of the participants reported an increased frequency of food consumption. Such incongruency in self-perception might be because a gradual increase in food consumption becomes unnoticed, unlike changes in body weight that could be evident from the fitting of clothes. Weight gain due to inadequate physical activity, increased quantity of food consumed and increased junk food consumption have been common in adults and children.<sup>20</sup> A study conducted in four major metropolitan cities in India revealed self-reported weight gain by 65% of the participants in the pandemic.<sup>21</sup> In global studies, about 22% to 44.5% of the sample gained weight, and in some studies, the entire sample gained weight ranging from 0.5 Kg to 3 kg during the lockdown.<sup>8</sup>

## Physical activity and other lifestyle factors

Our study result was one of the few studies to report an increased proportion of participants engaging in physical activity during the lockdown. Contrarily, according to Chopra et al. (2020), physical activity had reduced significantly in India among men and those from upper socio-economic status.<sup>22</sup> Duration of physical activity was also reduced among Indians during the lockdown, which could result in weight gain.<sup>18</sup> Reviews worldwide have also reported decreased physical activity alongside increased sedentary behaviour.<sup>23</sup> Yoga, walking and running have been reported to be the preferred exercises among Indians during the lockdown, supporting our study findings.<sup>21</sup> In our study, quitting smoking (about 80.2%) and alcohol consumption (68.2%) by a major proportion of the participants is of significance and not reported elsewhere. A similar study in India reported that smoking habits remained the same while alcohol consumption had reduced among the participants during the lockdown.<sup>22</sup> Consequently, such lifestyle habit changes strongly influence public health outcomes with regard to malnutrition and lifestyle-associated non-communicable diseases.<sup>16</sup>

## Sleep

In our study, change in weight was significantly associated with sleeping hours and changes in sleep pattern. About half of the participants have reported staying awake late into the night and waking up late in the morning. Sleep pattern has been affected in both urban and rural Indian populations.<sup>24</sup> Disrupted sleep behaviour such as delayed sleeping time, extended sleeping time into the day, and increased sleepiness have also been reported among Indians.<sup>25,26</sup> Rawat et al. also reported a decline in sleep quantity and quality among Indians during the lockdown in the review study.<sup>18</sup> Sleep could be affected due to numerous reasons like the decline in positivity due to confinement, dearth of destressing activities and social engagement, hormonal changes, exposure to bright light, low physical activity levels and stress.<sup>25,27</sup>

## Consumer behaviour

There has been a favorable shift in perspective towards home-cooked meals among Indians. Higher consumption of home-cooked meals during the lockdown period has been reported in our and other Indian studies.<sup>1,21</sup> Online grocery shopping has received mixed reviews for the ease of purchase and, on the other hand, for the poor and unsatisfactory quality of food delivered.<sup>1</sup> The rate of ordering outside food online in the Indian urban scenario decreased by 75%, with the influencing factors being the type of family, education status, income, and occupation. Online shopping for groceries increased by 27-44.9%, indicating the preference for home-cooked meals.<sup>9,19,28</sup>

Local and regional markets, also known as 'territorial markets', have dramatically risen to truncate the supply chain and meet the gap between supply and demand, especially in developing countries.<sup>29</sup> In the current study, about three-fourths of the participants resorted to

buying groceries from local markets and the food intake of 62% was not affected by the increase in the price. The purchase of food items depends on accessibility as well as affordability. Affordability of food during lockdown did not seem to impact families with multiple earning members, those currently employed and type of occupation.<sup>30</sup> Most of our study participants (91.2%) expressed their desire to continue purchasing from local markets even after the relaxation of lockdown policies. On that account, building and stabilizing territorial markets by the government would be beneficial to both consumers and regional producers over time.

While large sample size is the biggest strength of the study, there are a few limitations. Since the survey was conducted online, equal representation of participants from different sectors was not likely, for example, gender or socio-economic status. Reporting bias could have been possible as some of the questions relied on self-perception. Also, the increased and decreased consumption of food items/groups could not be quantified as the tool used for the study was a self-administered one rather than an interview schedule.

## CONCLUSION:

Self-perceived dietary and lifestyle factors were quantitatively the same before and during the first lockdown, although qualitative changes were observed. Change in body weight was significantly associated with appetite, frequency, and quantity of food, reduced physical activity, increased sleep duration and staying awake till late at night. More systematic reviews and meta-analyses are required to determine the actual trend toward which the lifestyle habits are leaning. Follow-up studies could study the public's adherence to new conventions and revert to former habits, thus helping predict public health problems and take preventive measures for the entire nation.

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