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Original article

## Alteration of dietary habits and lifestyle pattern during COVID-19 pandemic associated lockdown: An online survey study



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### SUMMARY

**Background & aim:** A few population-based studies have looked at how the Corona virus disease (COVID-19) pandemic and outbreak-related lockdown has impacted people's daily eating habits and lifestyles. Due to the emergence of the Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2), continuous lockdown or social isolation can alter dietary consumption patterns and lifestyle routines, resulting in significant negative health consequences. Focused on the COVID-19 and disease related lockdown effects, this study aims to reflect the evolving trend in dietary habits and lifestyle status during the COVID-19 lockdown in West Bengal through a population mediated retrospective survey distributed via social media platforms.

**Methods:** This survey was conducted using Google form via online platform from July 7 to July 31, 2020, with 1059 participants reported their eating habits and lifestyle preferences, as well as basic socio-demographic details. Entire variables were qualitatively examined and uttered as frequency (f) and percentage (%). The Chi-square test was performed to conclude whether categorical variables differed.

**Results:** A high number of participants reported that they were consumed healthy foods and physically active during this pandemic situation. Females were more likely to be involved in exercise and consume protein-rich food, as well as the majority of them, maintain basic dietary and Ayurvedic home remedies precautions like consumption of lemon, consumption of herbs, taking warm water, etc. A majority of older participants were tried to maintain a healthy lifestyle with extra protective essential protection during the COVID-19 stage. The frequency of going to market was decreased by the participants. Females were more likely to decrease their frequency of going to market than males. In terms of hygiene and sanitization of food items after buying from the market, females were more careful than males. Participants with higher education were more likely to be careful regarding the hygiene of food preparation and eating during this situation.

**Conclusion:** From this study, dieticians, legislators, and public health experts can have a better understanding of the current situation of food intake and lifestyle trends in communities of West Bengal, India. It also has the potential to have a significant impact on future public health research.

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## 1. Introduction

The unprecedented global outbreak of coronavirus named COVID-19 by the World Health Organization (WHO) that began in Wuhan, Hubei Province, China in December 2019 is still a mystery to humanity. COVID-19, an infectious disease caused by the SARS-CoV-2, has become a significant public health threat that has resulted in a worldwide death toll [1]. SARS-CoV-2 was apparently transmitted

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from animals to humans at a seafood market in Huanan, China, according to reports [2]. COVID-19 was declared a pandemic by the WHO on March 11, 2020, due to the infection's alarming spread and severity (WHO 2020). Previous health emergencies have shown that as a pandemic develops, it is critical to improve all health facilities prior to direct medical supervision and to wrap the primary concept of administration and source exploitation [3].

Notably, quarantine and isolation are two important methods for preventing or reducing the devastating effects of dangerous infectious disease outbreaks. In the medical field, “quarantine” refers to the separation of people who have been exposed to an infected person and “isolation” refers to the separation of people who have been exposed to an infected person [4]. On March 24, 2020, the Government of India announced a nationwide lockdown as a precautionary measure against the SARS-CoV-2 pandemic, keeping in mind the devastating effects of this epic pandemic [5]. According to an Indian government survey, the first COVID-19 exposed patient was discovered on January 30, 2020, and after a year (February 23, 2021), the total number of coronavirus positive cases had risen to 1,10,16,434 in India, with 1,56,463 deaths. Despite the lockdown, the number of COVID-19 positive cases steadily increased day after day. India, with a population of 1.3 billion people spread across various states, has a large financial system, as well as communal disparities, social health disparities, and distinct ethnicities, all of which face a significant burden during this lockdown era [6]. People were cramped in their homes as a result of the ‘Lockdown’ programme, with very little desirable access, causing major lifestyle complications [7].

Because of the massive lockdown, normal living conditions have been disrupted, and non-infected people have also experienced significant physical and mental changes [8]. Lockdown was introduced as a precaution to protect relatives, friends, and other members of the group from virus infection, but it has resulted in dramatic behavioural changes such as physiological disease [9], dietary changes [10], and economic losses [11]. Due to the repression steps, lifestyle can be significantly skewed, with the risk of deskbound activities, changes in smoking habits, alcohol intake rates, physical inactivity, and sleeping habits.

Limited access to regular grocery shopping can lead to a reduction in the consumption of necessary healthy foods, such as fruits, fresh vegetables, and protein-rich components, in favour of highly processed foods, such as junk foods and ready-to-eat foods, which are high in fat and sugar. Furthermore, the physical and mental effects of lockdown and the COVID-19 pandemic [12] could increase the risk of developing unhealthy eating habits. In this material, negative familiarity with self isolation can make people more likely to seek recompense through food spending, as well as other signs of hunger and satiety. However, boredom emotions, as well as the immense monotony of sitting at home for an extended period of time, are frequently associated with eating disorders and dietary changes [13].

Based on this online survey, we highlighted the troubling implications of emergency lockdown in this report. Furthermore, the effects of lockdown (self isolation and social avoidance) on average people have been explored. We hypothesized that remaining at home with retracted mobility during a pandemic and lockdown may be one of the leading causes of lifestyle, nutritional, psychological, and physical changes in non-infected people on a large scale.

## 2. Methods

### 2.1. Study design and data collection

This survey was conducted among the Bengalee population of West Bengal, India, from July 7 to July 31, 2020. With a population of

more than 91 million (91, 276, 115) people, West Bengal is the fourth most populous state in India (Census of India 2011) [14]. To achieve the objectives of the study with sufficient statistical power, the required sample size was calculated using the following assumptions; rapid weight gain (16.7%) during the COVID-19 lockdown period in West Bengal, a confidence level of 99%, margin of error of 3% and population of West Bengal of 91,276,115. So, the estimated sample size for the study requires 1029 (rounded to 1050) volunteers [15].

A questionnaire was framed using the Google form web survey framework based on similar questionnaires published in the literature and data was collected by online filling of the Google form by the participants [16]. The Google form link was distributed via electronic mail (e-mail), WhatsApp, and personal contacts among the members of the research group. Participants were also asked to share the survey link with their friends and family in order to increase the number of participants for the current survey. More people were able to participate in the survey as a result of sharing the survey links. Before the start of the questionnaire, the participants were given a brief description of the survey and its intent, as well as the study protocol and the declaration of anonymity and privacy. The participants were not compensated in any way for taking part in the study. This survey was also conducted in accordance with the Helsinki declaration.

Participants living in West Bengal, India and having age of 18 years or above were considered as inclusion criteria. Participants suffering from COVID-19 and post COVID-19 were excluded from the study.

The survey consisted of 39 questions divided into four parts. The first section of the questionnaire asked about the participants' demographic details, such as their age, gender, residence, education, and occupation. The second section of the questionnaire asked about the participants' anthropometric data and health status, such as height, weight, addiction behaviours, chronic diseases, and so on. The third section included 12 questions that sought information on participant food preferences during the COVID-19 and lockdown periods, such as total daily food consumption, types of food consumed, snack consumption, salad or raw vegetable consumption, fruit consumption, and so on. The fourth section included ten questions about lifestyle changes such as changes in addiction patterns, physical activity, cooking skills, sanitising food products, market frequency, level of hygiene, and special care for the elderly and children during the lockdown. The entire research was conducted in accordance with the Institutional Ethics Committee (Human) of the University of Gour Banga, Malda, West Bengal, India (Approval no. UGB/IEC (Human)/0001-21).

### 2.2. Statistical analysis

A total of 1287 responses were received for this survey. The authors excluded 228 respondents for a variety of reasons, including living outside of India (122), being under the age of 18 (86) and giving duplicate answers (20). Finally, a total of 1059 participants were included in the study for further analysis.

All of the variables were qualitatively evaluated and expressed as frequency (f) and percentage (%). The Chi-square test was used to determine whether categorical variables differed. To account for the possibility of confounding, researchers used univariate and multivariate logistic regression analyses in three phases to examine the variables that affect participant food preferences and lifestyle changes during the COVID and lockdown periods. The participants' sexes, ages, and educational levels were used as independent variables in logistic regression analyses. The results of logistic regression analyses were expressed as crude odd ratios (COR) or adjusted odd ratios (AOR) with 95% confidence intervals (95% CI). The <0.05

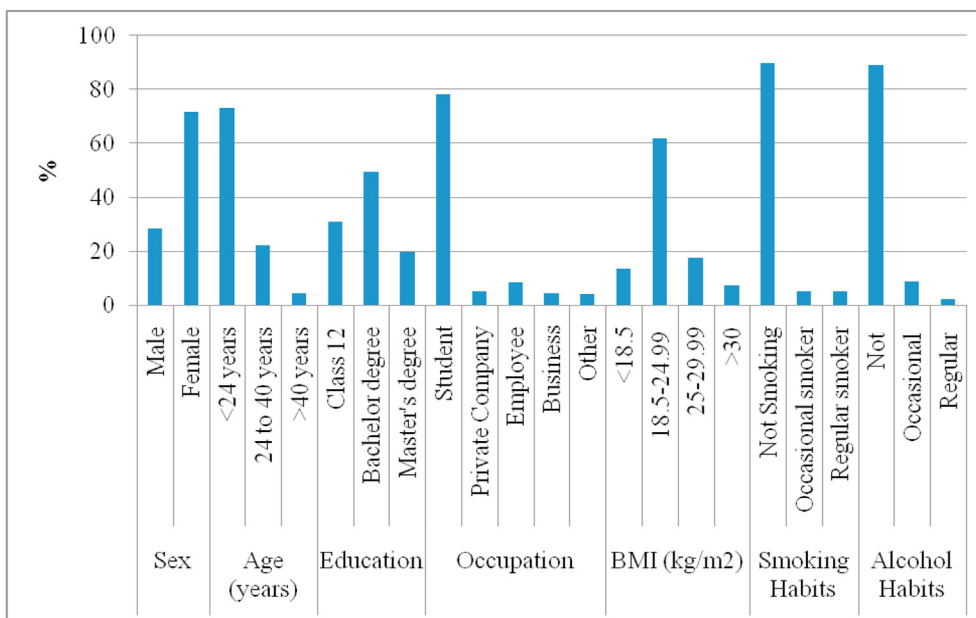


Fig. 1. Descriptive characteristics of the study participants.

amount was used for the p-value. Statistical studies were carried out using IBM SPSS version 20 statistical software.

3. Results

The total number of participants (n = 1059) were made up of 78.09% students and 73.18% (n = 775) participants under the age of 24 years (Fig. 1). A small percentage of participants (5.19%) were addicted to frequent smoking, but smoking frequency increased by more than 20.56% ( $\chi^2$ : 10.8;  $p < 0.01$ ) during the current pandemic

period (Fig. 2). During the COVID-19 lockdown, daily dietary intake patterns were drastically altered, with several notable increases and decreases in the studied proportion (Fig. 3).

In order to investigate the factors associated with the lifestyle change patterns of participants during the lockdown period, both bivariate and multivariate logistic regression analyses were undertaken (Tables 1–3). Physical activity during the lockdown period of the studied population was significantly associated with sex and education. A majority of participants reported that they were physically active (male: 54.3%; female: 49.11%) or partially active

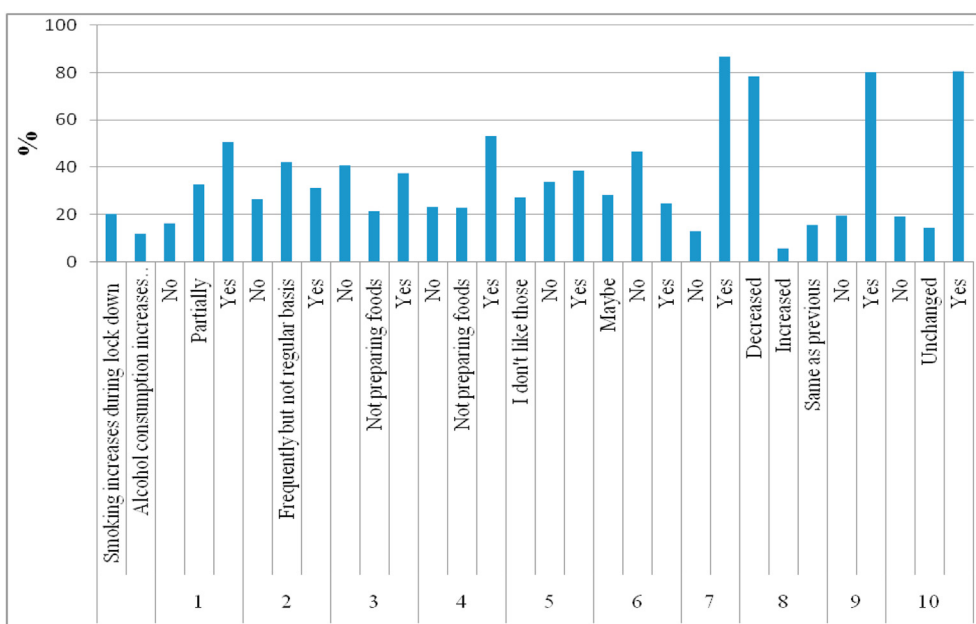
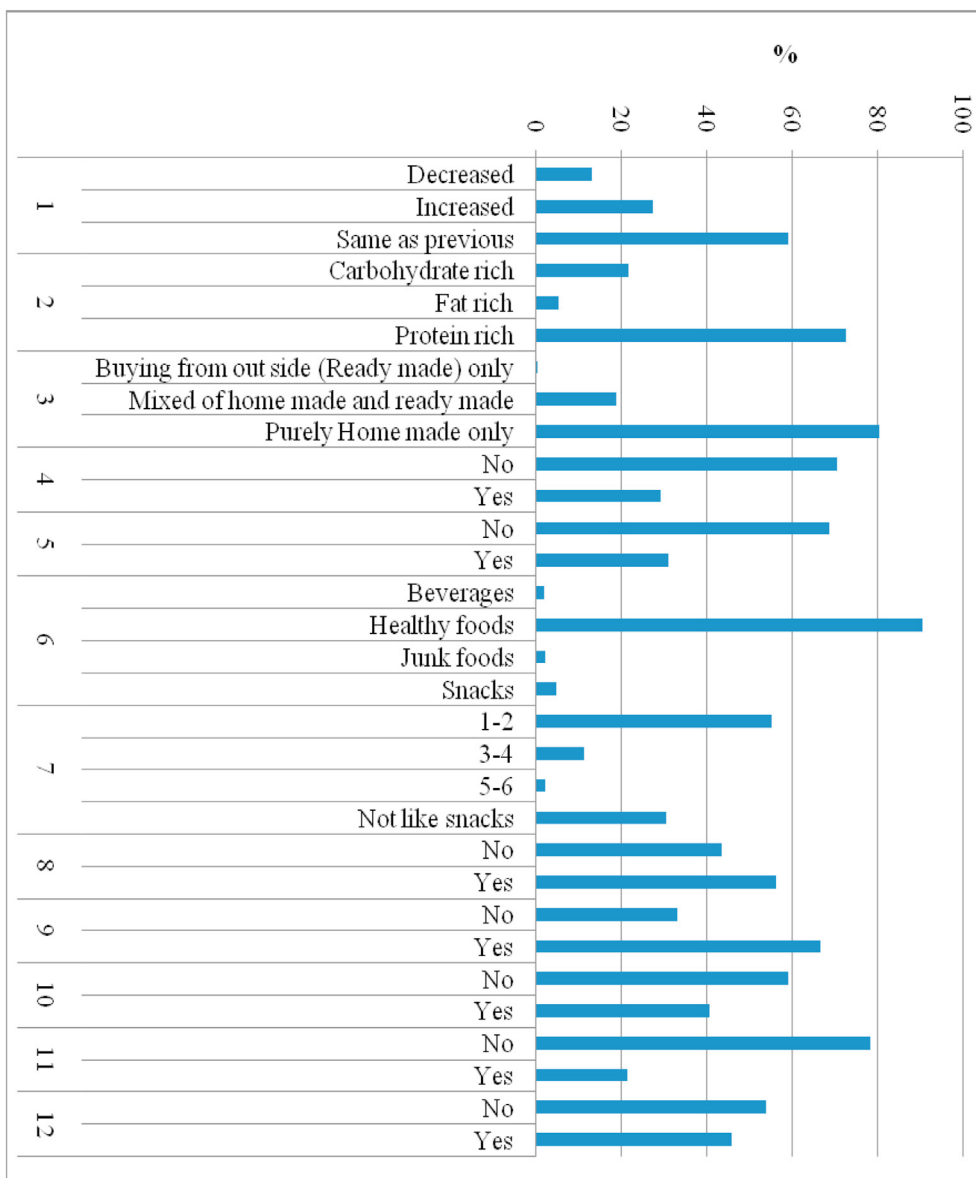


Fig. 2. Life style changes patterns of people during lock down period. 1: Are you physically active during lock down; 2: Are you involved in regular exercise (including walking, running) in this lock down?; 3: Are you spending much time in kitchen than usual?; 4: In the lock down your cooking skills and regularity improved? 5: You browsing frequency to Food blogging or Food preparation channels has increased in Lock down; 6: Do you think you are getting obese (over weight) during the lock down?; 7: Are you regularly sanitizing your food items (grocery) after buying from market?; 8: Frequency for going to market during this period; 9: Level of hygiene during food preparation and eating has increased during current time.; 10: Taking extra care of older and children in term of quality of foods given to them in this Lock down.



**Fig. 3.** Dietary changes patterns of people during lock down period. **1:** In current time overall daily consumption of food; **2:** Types of food preferred during current pandemic situation; **3:** You are taking your food which are; **4:** Are you taking Ayurvedic home remedies?; **5:** Whether lock down resulted in increased food consumption; **6:** You are preferring which types of foods in this pandemic & lock down situation?; **7:** Daily consumption of snacks between meals; **8:** Daily intake of salads or raw vegetables; **9:** Consumption lemon or citrus fruit in daily basis; **10:** At present time you are using extra spices (garam masala) or herbs in your dish?; **11:** Is sweet consumption is increased from earlier; **12:** Are you taking Warm water in regular basis ?.

(male: 26.28%; female: 35.01%) during the lockdown period. In contrast, a lower proportion (male: 18.87%; female: 15.59%) reported that they were not active during the lockdown. Compared to the males, females were more likely to be physically active. Regarding the education status of the participants, those with a master's degree education were less likely to be active (AOR: 0.55; CI: 0.3–0.99) compared to those with education up to class 12 during the lockdown period (Table 3). In terms of regular exercise in the lockdown, females were significantly more likely to be involved in exercise (AOR: 1.57; CI: 1.09–2.25) compared to males (Table 1). A large proportion of the participants reported that they spent much more time in the kitchen than usual and their cooking skills improved in this lockdown (Fig. 2). In terms of time spent in the kitchen, the females spent more time in the kitchen than the males

(AOR: 3.02; CI: 2.08–4.38) (Table 1). The proportion of going to market was decreased by 57.83% for males and 79.52% for females of the study population, while the proportion of going to market was increased by 4.64% for males and 6.47% for females, respectively. Females were more likely than males to reduce their frequency of going to market (AOR: 1.57; CI: 1.07–2.32) during this time period. When it came to sanitising food items after purchasing them at the market, the females were more conscientious than the males (AOR: 3.02; CI: 2.02–4.53) (Table 1). Compared to the age of the participants, those aged between 24 and 40 years were less likely to be careful (AOR: 0.43; CI: 0.25–0.74) in regularly sanitising food items after buying from market than those aged less than 24 years (Table 2). In terms of the level of hygiene, the females were more careful (AOR: 2.16; CI: 1.51–3.07) during food preparation and

**Table 1**  
Associations between sex and lifestyle changes patterns of people during lock down period.

Variables		Male (Reference) (n = 302)	Female (n = 757)	COR (95th CI)	p	AOR <sup>a</sup> (95th CI)	p
Frequency of smoking increases during lock down	Yes	14 (15.73)	8 (27.59)	2.04 (0.75–5.52)	0.16	2.78 (0.85–9.11)	0.092
	No	75 (84.27)	21 (72.41)	Reference			
Frequency of alcohol consumption increases during lock down	Yes	9 (10.59)	5 (9.8)	0.92 (0.29–2.91)	0.884	0.82 (0.22–3.02)	0.769
	No	76 (89.41)	46 (90.2)	Reference			
Are you physically active during lock down	No	57 (18.87)	118 (15.59)	Reference			
	Partially	81 (26.82)	265 (35.01)	1.58 (1.06–2.36)	0.026	1.66 (1.06–2.59)	0.025
	Yes	164 (54.3)	374 (49.41)	1.1 (0.76–1.59)	0.604	1.12 (0.74–1.68)	0.589
Are you involved in regular exercise in this lock down?	No	96 (31.79)	185 (24.44)	Reference			
	Frequently but not regular basis	107 (35.43)	340 (44.91)	1.65 (1.19–2.29)	0.003	1.57 (1.09–2.25)	0.015
Are you spending much time in kitchen than usual?	Yes	99 (32.78)	232 (30.65)	1.22 (0.86–1.71)	0.261	1.12 (0.76–1.64)	0.568
	No	147 (48.68)	285 (37.65)	Reference			
In the lock down your cooking skills and regularity improved?	Yes	64 (21.19)	335 (44.25)	2.7 (1.93–3.77)	0.000	3.02 (2.08–4.38)	0.000
	No	95 (31.46)	154 (20.34)	Reference			
You browsing frequency to Food blogging or Food preparation channels has increased in Lock down	Yes	94 (31.13)	472 (62.35)	3.1 (2.21–4.34)	0.000	3.41 (2.33–4.99)	0.000
	No	119 (39.4)	240 (31.7)	Reference			
Do you think you are getting obese (over weight) during the lock down?	Yes	78 (25.83)	331 (43.73)	2.1 (1.51–2.93)	0.000	2.44 (1.69–3.52)	0.000
	Maybe	94 (31.13)	208 (27.48)	1.15 (0.84–1.57)	0.396	1.1 (0.77–1.56)	0.603
Are you regularly sanitizing your food items (grocery) after buying from market?	Yes	66 (21.85)	195 (25.76)	1.3 (0.93–1.83)	0.122	1.28 (0.88–1.86)	0.189
	No	77 (25.5)	63 (8.32)	Reference			
Frequency for going to market during this period	Yes	225 (74.5)	694 (91.68)	3.77 (2.62–5.43)	0.000	3.02 (2.02–4.53)	0.000
	Decreased	229 (75.83)	602 (79.52)	1.46 (1.03–2.08)	0.034	1.57 (1.07–2.32)	0.022
	Increased	14 (4.64)	49 (6.47)	1.95 (0.99–3.82)	0.052	2.61 (1.2–5.64)	0.015
Level of hygiene during food preparation and eating has increased during current time.	Same as previous	59 (19.54)	106 (14)	Reference			
	Yes	84 (27.81)	125 (16.51)	Reference			
Taking extra care of older and children in term of quality of foods given to them in this Lock down	Yes	218 (72.19)	632 (83.49)	1.95 (1.42–2.67)	0.000	2.16 (1.51–3.07)	0.000
	No	71 (23.51)	135 (17.83)	Reference			
	Yes	231 (76.49)	622 (82.17)	1.42 (1.02–1.96)	0.036	1.69 (1.19–2.41)	0.004

<sup>a</sup> After adjusting the effect of age, education, and occupation.

eating than males (Table 1). Compared to education, participants with higher education were more likely to be careful (bachelor's degree AOR: 1.64; CI: 1.16–2.32 and master's degree AOR: 2.37; CI: 1.36–4.15) regarding hygiene of food preparation and eating compared to the participants having education up to class 12 during the lockdown period (Tables 2 and 3). Females were more likely to take extra care (AOR: 1.69; CI: 1.19–2.41) of older people and children in terms of the quality of food given to them during the lockdown (Table 1).

Bivariate and multivariate logistic regression analyses were performed to study the association between different factors and the dietary pattern changes of participants during the COVID-19 lockdown (Tables 4–6). The analyses revealed that the sex, age, and education of the participants were significantly associated with dietary pattern change during the COVID-19 lockdown. During this pandemic lockdown situation, a large proportion of participants (90.65%) reported eating healthy foods, with a preference for protein-rich diets (72.71%), whereas the preference for junk food was found to be low (2.46%) (Fig. 3). Participants over the age of 40 years were less likely to prefer junk food (AOR: 0.1; CI: 0.01–0.81) in their dietary consumption pattern compared to those aged under 24 years (Table 5). Reference to the males, females were more likely to be consume protein rich food (AOR: 1.85; CI: 1.31–2.61) as well as majority of them maintain the basic dietary and Ayurvedic home remedies precautions like, consumption lemon or citrus fruit, consumption of herbs, taking warm water, taking Ayurvedic home

remedies etc. all over the lockdown phase (Table 4). Moreover, in the educational category (Class 12, Bachelor's degree and Master's degree), overall daily consumption of food in the pandemic lockdown situation was significantly increased (AOR: 1.64; CI: 1.02–2.66) among the participants with master's degree education compared to the participants having education up to class 12. In the analysis for daily individual dietary consumption changes, we noted that participants having Bachelor's degree were improve their daily dietary intake less likely than the masters' degree participants and more likely to the class 12 participants (AOR: 1.36; CI: 0.01–0.81) (Table 6). A majority of older (>40 years) and female (all the age group) participants in the study population were tried to maintain the healthy lifestyle with extra protective measures during COVID-19 lockdown. In this context, females were more likely preferred Ayurvedic home remedies (AOR: 1.66; CI: 1.17–2.34) and daily uses of warm water (AOR: 2.49; CI: 1.81–3.41) compared to the male as well as significantly a large proportion of older participants were taking similar protective approaches compared to the below 24 years participants (AOR: 2.81; CI: 1.33–5.97 & AOR: 2.62; CI: 1.22–5.62) (Tables 4 and 5).

#### 4. Discussion

The main goal of this study was to look at how Indian participants' dietary habits and lifestyle preferences changed during the long lockdown era, as well as the social behavioural effects. Several



**Table 2**  
Associations between age and lifestyle changes patterns of people during lock down period.

Variables		<24 years (Reference) (n = 778)	24–40 years (n = 235)	>40 years (n = 46)	24–40 years				>40 years			
					COR (95th CI)	p	AOR <sup>a</sup> (95th CI)	p	COR (95th CI)	p	AOR <sup>a</sup> (95th CI)	p
frequency of smoking increases during lock down	Yes	10 (19.23)	11 (17.46)	1 (33.33)	0.89 (0.34–2.29)	0.807	1.23 (0.26–5.85)	0.796	2.1 (0.17–25.5)	0.56	2.82 (0.15–53.18)	0.489
	No	42 (80.77)	52 (82.54)	2 (66.67)	Reference							
frequency of alcohol consumption increases during lock down	Yes	11 (17.46)	2 (2.99)	1 (16.67)	0.14 (0.03–0.68)	0.015	0.06 (0.005–0.7)	0.029	0.94 (0.1–8.91)	0.961	1.41 (0.05–43.29)	0.845
	No	52 (82.54)	65 (97.01)	5 (83.33)	Reference							
Are you physically active during lock down	No	132 (16.97)	38 (16.17)	5 (10.87)	Reference							
	Partially	250 (32.13)	82 (34.89)	14 (30.43)	1.14 (0.73–1.77)	0.56	1.56 (0.84–2.91)	0.162	1.48 (0.52–4.19)	0.462	2.11 (0.63–7.09)	0.229
	Yes	396 (50.9)	115 (48.94)	27 (58.7)	1.01 (0.66–1.53)	0.967	1.38 (0.76–2.48)	0.287	1.8 (0.68–4.77)	0.237	2.21 (0.71–6.84)	0.168
Are you involved in regular exercise in this lock down?	No	193 (24.81)	73 (31.06)	15 (58.7)	Reference							
	Frequently but not regular basis	335 (43.06)	102 (43.4)	10 (21.74)	0.8 (0.57–1.14)	0.223	1.18 (0.72–1.94)	0.510	0.38 (0.17–0.87)	0.022	0.57 (0.22–1.48)	0.249
	Yes	250 (32.13)	60 (25.53)	21 (45.65)	0.63 (0.43–0.94)	0.022	1.12 (0.64–1.95)	0.687	1.08 (0.54–2.15)	0.825	1.67 (0.69–4.03)	0.254
Are you spending much time in kitchen than usual?	No	310 (39.85)	101 (42.98)	21 (45.65)	Reference							
	Yes	289 (37.15)	92 (39.15)	18 (39.13)	0.98 (0.71–1.35)	0.889	1.14 (0.71–1.84)	0.594	0.92 (0.48–1.76)	0.8	1.01 (0.45–2.28)	0.983
In the lock down your cooking skills and regularity improved?	No	180 (23.14)	53 (22.55)	16 (34.78)	Reference							
	Yes	424 (54.5)	122 (51.91)	20 (43.48)	0.98 (0.68–1.41)	0.902	1.48 (0.87–2.52)	0.146	0.53 (0.27–1.05)	0.068	0.75 (0.32–1.77)	0.509
You browsing frequency to Food blogging or Food preparation channels has increased in Lock down	I don't like those	217 (27.89)	60 (25.53)	14 (30.43)	0.93 (0.63–1.36)	0.698	0.87 (0.51–1.5)	0.623	1.14 (0.54–2.41)	0.732	1.06 (0.42–2.67)	0.901
	No	265 (34.06)	79 (33.62)	15 (32.61)	Reference							
	Yes	296 (38.05)	96 (40.85)	17 (36.96)	1.09 (0.77–1.53)	0.628	1.32 (0.81–2.15)	0.271	1.01 (0.5–2.07)	0.968	1.08 (0.45–2.58)	0.861
Do you think you are getting obese (over weight) during the lock down?	Maybe	231 (29.69)	64 (27.23)	7 (15.22)	0.87 (0.61–1.23)	0.424	0.85 (0.52–1.4)	0.533	0.43 (0.18–1.02)	0.055	0.4 (0.15–1.07)	0.067
	No	357 (45.89)	114 (48.51)	25 (54.35)	Reference							
	Yes	190 (24.42)	57 (24.26)	14 (30.43)	0.94 (0.65–1.35)	0.736	0.88 (0.52–1.47)	0.622	1.05 (0.53–2.07)	0.883	0.99 (0.42–2.34)	0.987
Are you regularly sanitizing your food items (grocery) after buying from market?	No	73 (9.38)	63 (26.81)	4 (8.7)	Reference							
	Yes	705 (90.62)	172 (73.19)	42 (91.3)	0.28 (0.19–0.41)	0.000	0.43 (0.25–0.74)	0.002	1.09 (0.38–3.12)	0.876	1.5 (0.45–4.98)	0.505
Frequency for going to market during this period	Decreased	612 (78.66)	181 (77.02)	37 (80.43)	0.91 (0.61–1.35)	0.632	0.71 (0.41–1.24)	0.233	1.03 (0.45–2.36)	0.948	0.69 (0.25–1.9)	0.478
	Increased	47 (6.04)	14 (5.96)	2 (4.35)	0.91 (1.45–1.83)	0.788	0.97 (0.36–2.6)	0.946	0.72 (0.14–3.61)	0.693	0.55 (0.09–3.48)	0.526
	Same as previous	119 (15.3)	39 (16.6)	7 (15.22)	Reference							
Level of hygiene during food preparation and eating has increased during current time.	No	154 (19.79)	50 (21.28)	5 (10.87)	Reference							
	Yes	624 (80.21)	185 (78.72)	41 (89.13)	0.91 (0.64–1.31)	0.62	0.84 (0.5–1.4)	0.499	2.02 (0.79–5.21)	0.144	2.05 (0.7–5.98)	0.189
Taking extra care of older and children in term of quality of foods given to them in this Lock down	No	159 (20.44)	41 (17.45)	6 (13.04)	Reference							
	Yes	619 (79.56)	194 (82.55)	40 (86.96)	1.21 (0.83–1.78)	0.313	1.47 (0.87–2.5)	0.15	1.71 (0.71–4.11)	0.229	2.05 (0.74–5.65)	0.166

<sup>a</sup> After adjusting the effect of sex, education, and occupation.

**Table 3**  
Associations between education and lifestyle changes patterns of people during lock down period.

Variables		Class 12 (Reference) (n = 327)	Bachelor degree (n = 525)	Master's degree (n = 207)	Bachelor degree				Master's degree			
					COR (95th CI)	p	AOR <sup>a</sup> (95th CI)	p	COR (95th CI)	p	AOR <sup>a</sup> (95th CI)	p
frequency of smoking increases during lock down	Yes	4 (22.22)	12 (18.75)	6 (16.67)	0.81 (0.22–2.89)	0.743	0.64 (0.16–2.46)	0.512	0.7 (0.17–2.88)	0.621	0.57 (0.08–4.01)	0.572
	No	14 (77.78)	52 (81.25)	30 (83.33)	Reference							
frequency of alcohol consumption increases during lock down	Yes	6 (21.43)	7 (10.61)	1 (2.38)	0.43 (0.13–1.44)	0.172	0.61 (0.17–2.14)	0.437	0.09 (0.01–0.79)	0.03	0.41 (0.04–4.5)	0.463
	No	22 (78.57)	59 (89.39)	41 (97.62)	Reference							
Are you physically active during lock down	No	49 (14.98)	91 (17.33)	35 (16.91)	Reference							
	Partially	97 (29.66)	168 (32.00)	81 (39.13)	0.93 (0.61–1.43)	0.749	0.92 (0.6–1.4)	0.711	1.17 (0.69–1.97)	0.559	0.97 (0.52–1.81)	0.919
	Yes	181 (55.35)	266 (50.67)	91 (43.96)	0.79 (0.53–1.17)	0.246	0.77 (0.51–1.15)	0.195	0.7 (0.43–1.16)	0.17	0.55 (0.3–0.99)	0.048
Are you involved in regular exercise in this lock down?	No	71 (21.71)	139 (26.48)	71 (34.3)	Reference							
	Frequently but not regular basis	128 (39.14)	230 (43.81)	89 (43)	0.92 (0.64–1.31)	0.639	0.92 (0.64–1.33)	0.676	0.69 (0.45–1.1)	0.094	0.72 (0.43–1.2)	0.212
	Yes	128 (39.14)	156 (29.71)	47 (22.71)	0.62 (0.43–0.9)	0.012	0.6 (0.4–0.88)	0.009	0.37 (0.23–0.59)	0.000	0.31 (0.18–0.55)	0.000
Are you spending much time in kitchen than usual?	No	136 (41.59)	213 (40.57)	83 (40.1)	Reference							
	Yes	111 (33.94)	197 (37.52)	91 (43.96)	1.13 (0.82–1.56)	0.439	1.21 (0.87–1.68)	0.254	1.34 (0.91–1.98)	0.137	1.41 (0.87–2.29)	0.165
In the lock down your cooking skills and regularity improved?	No	82 (25.08)	119 (22.67)	48 (23.19)	Reference							
	Yes	160 (48.93)	293 (55.81)	113 (54.59)	1.26 (0.9–1.77)	0.181	1.33 (0.93–1.9)	0.112	1.21 (0.78–1.85)	0.392	1.11 (0.66–1.89)	0.686
You browsing frequency to Food blogging or Food preparation channels has increased in Lock down	I don't like those	110 (33.64)	129 (24.57)	52 (25.12)	0.63 (0.44–0.89)	0.009	0.62 (0.43–0.88)	0.008	0.76 (0.48–1.19)	0.238	0.8 (0.47–1.38)	0.431
	No	103 (31.5)	192 (36.57)	64 (30.92)	Reference							
	Yes	114 (34.86)	204 (38.86)	91 (43.96)	0.96 (0.69–1.34)	0.809	0.98 (0.7–1.37)	0.897	1.285 (0.85–1.95)	0.238	1.21 (0.73–2)	0.466
Do you think you are getting obese (over weight) during the lock down?	Maybe	109 (33.33)	135 (25.71)	58 (28.02)	0.73 (0.53–1.02)	0.063	0.75 (0.54–1.04)	0.086	0.83 (0.55–1.24)	0.359	0.9 (0.55–1.48)	0.68
	No	149 (45.57)	251 (47.81)	96 (46.38)	Reference							
	Yes	69 (21.1)	139 (26.48)	53 (25.6)	1.2 (0.84–1.7)	0.32	1.23 (0.86–1.77)	0.247	1.19 (0.77–1.85)	0.434	1.14 (0.67–1.94)	0.617
Are you regularly sanitizing your food items (grocery) after buying from market?	No	31 (9.48)	69 (13.14)	40 (19.32)	Reference							
	Yes	296 (90.52)	456 (86.86)	167 (80.68)	0.69 (0.44–1.08)	0.108	0.85 (0.53–1.37)	0.501	0.44 (0.26–0.72)	0.001	0.81 (0.43–1.53)	0.523
Frequency for going to market during this period	Decreased	247 (75.54)	417 (79.43)	167 (80.68)	1.25 (0.86–1.82)	0.246	1.32 (0.9–1.95)	0.154	1.24 (0.77–2.01)	0.374	1.39 (0.77–2.49)	0.27
	Increased	23 (7.03)	31 (5.9)	9 (4.35)	0.99 (0.53–1.89)	0.994	1.03 (0.54–1.99)	0.919	0.72 (0.3–1.74)	0.467	0.86 (0.3–2.48)	0.781
	Same as previous	57 (17.43)	77 (14.67)	31 (14.98)	Reference							
Level of hygiene during food preparation and eating has increased during current time.	No	83 (25.38)	96 (18.29)	30 (14.49)	Reference							
	Yes	244 (74.62)	429 (81.71)	177 (85.51)	1.52 (1.09–2.12)	0.014	1.64 (1.16–2.32)	0.005	2.01 (1.27–3.18)	0.003	2.37 (1.36–4.15)	0.002
Taking extra care of older and children in term of quality of foods given to them in this Lock down	No	65 (19.88)	100 (19.05)	41 (19.81)	Reference							
	Yes	262 (80.12)	425 (80.95)	166 (80.19)	1.05 (0.74–1.49)	0.766	1.02 (0.72–1.46)	0.891	1 (0.65–1.55)	0.984	0.82 (0.49–1.39)	0.472

<sup>a</sup> After adjusting the effect of sex, age, and occupation.



**Table 4**  
Associations between sex and dietary changes patterns of people during lock down period.

Variables		Male (n = 302) reference	Female (n = 757)	COR (95th CI)	p	AOR <sup>a</sup> (95th CI)	p
In current time overall daily consumption of food	Decreased	39 (12.91)	102 (13.47)	1.04 (0.69–1.56)	0.854	1.13 (0.72–1.77)	0.603
	Increased	85 (28.15)	207 (27.34)	0.97 (0.71–1.31)	0.833	1.01 (0.712–1.41)	0.966
	Same as previous	178 (58.94)	448 (59.18)	Reference			
Types of food preferred during current pandemic situation	Carbohydrate rich	88 (29.14)	143 (18.89)	Reference			
	Fat rich	19 (6.29)	39 (5.15)	1.26 (0.69–2.32)	0.452	1.48 (0.74–2.97)	0.267
	Protein rich	195 (64.57)	575 (75.96)	1.81 (1.33–2.48)	0.000	1.85 (1.31–2.61)	0.000
You are taking your food which are	Buying from outside (Ready made) only or Mixed of homemade and ready made	69 (22.85)	136 (17.97)	0.74 (0.53–1.02)	0.07	0.96 (0.66–1.4)	0.833
	Purely Home made only	233 (77.15)	621 (82.03)	Reference			
Are you taking Ayurvedic home remedies?	No	228 (75.5)	521 (68.82)	Reference			
	Yes	74 (24.5)	236 (31.18)	1.4 (1.03–1.89)	0.032	1.66 (1.17–2.34)	0.004
Whether lock down resulted in increased food consumption	No	213 (70.53)	516 (68.16)	Reference			
	Yes	89 (29.47)	241 (31.84)	1.12 (0.84–1.49)	0.453	1.19 (0.86–1.64)	0.299
You are preferring which types of foods in this pandemic & lock down situation?	Beverages/Junk foods/Snacks	35 (11.59)	64 (8.45)	0.7 (0.46–1.09)	0.115	0.78 (0.48–1.27)	0.321
	Healthy foods	267 (88.41)	693 (91.55)	Reference			
Daily consumption of snacks between meals	1–2	156 (51.66)	431 (56.94)	1.38 (1.03–1.85)	0.032	1.38 (0.99–1.91)	0.051
	>2	38 (12.58)	110 (14.53)	1.45 (0.94–2.24)	0.096	1.56 (0.96–2.55)	0.073
	Not like snacks	108 (35.76)	216 (28.53)	Reference			
Daily intake of salads or raw vegetables	No	148 (49.01)	314 (41.48)	Reference			
	Yes	154 (50.99)	443 (58.52)	1.36 (1.04–1.77)	0.026	1.3 (0.96–1.75)	0.085
Consumption lemon or citrus fruit in daily basis	No	127 (42.05)	226 (29.85)	Reference			
	Yes	175 (57.95)	531 (70.15)	1.71 (1.29–2.25)	0.000	1.79 (1.32–2.43)	0.000
At present time you are using extra spices (garam masala) or herbs in your dish?	No	196 (64.9)	430 (56.8)	Reference			
	Yes	106 (35.1)	327 (43.2)	1.41 (1.07–1.85)	0.016	1.43 (1.05–1.94)	0.021
Is sweet consumption is increased from earlier	No	239 (79.14)	591 (78.07)	Reference			
	Yes	63 (20.86)	166 (21.93)	1.07 (0.77–1.48)	0.703	1.1 (0.77–1.58)	0.596
Are you taking Warm water in regular basis?	No	201 (66.56)	372 (49.14)	Reference			
	Yes	101 (33.44)	385 (50.86)	2.06 (1.56–2.72)	0.000	2.49 (1.81–3.41)	0.000

<sup>a</sup> After adjusting the effect of age, education and occupation.

of the study participants stated that their eating habits had changed during the COVID-19 lockdown period, but there was one notable lifestyle abnormality among them. According to the study, a large proportion of younger participants were more likely than older participants to change their dietary habits during the COVID-19 lockdown period. During the lockout time, however, significant dietary discrepancies were observed, with females being more aware of the importance of eating a balanced diet than male participants.

During the lockdown, a significant number of study participants did not note any changes in their eating or food consumption patterns. Despite daily lifestyle changes and endemic stressors, only a small percentage of people returned to their previous routine. A previous study found that individual attempts to alter eating patterns had mixed results [17]. This emphasizes the importance of changing difficult-to-change eating habits. A previous study found that habits are strong predictors of dietary consumption trends [18,19] and can explain roughly 20% of dietary

deviations [20]. This recent research survey in West Bengal, India, discovered unmistakable changes in food consumption habits among young and middle-aged participants, which strongly correlated with the previous research hypothesis that lockdown and social distancing imposed in many countries could have a negative impact on adherence to healthy dietary intake routines [21]. Despite some modest national changes in recent decades, India's dietary and lifestyle quality remains suboptimal at the population level, with excessive consumption of readymade or junk food and insufficient consumption of vegetables, fruits, and balanced diets [22–24]. Nutraceuticals have been discovered to have anti-diabetic [25,26], anti-obesity [27,28], and lipid-lowering benefits [29,30]. Magnesium, Omega-3 fatty acids, rice bran oil, and probiotic supplements have also been shown to have lipid-lowering and antioxidant properties, making them potential cardioprotective agents [31–33]. So, in this pandemic situation, people should stick to those healthy diets along with regular physical activities to avoid various health complications. According to the

**Table 5**  
Associations between age and dietary changes patterns of people during lock down period.

Variables		<24 years (n = 778) (Reference)	24–40 years (n = 235)	>40 years (n = 46)	24–40 years				>40 years			
					COR (95th CI)	p	AOR <sup>a</sup> (95th CI)	p	COR (95th CI)	p	AOR <sup>a</sup> (95th CI)	p
In current time overall daily consumption of food	Decreased	99 (12.72)	35 (14.89)	7 (15.22)	1.29 (0.84–1.99)	0.244	1.49 (0.81–2.74)	0.195	1.1 (0.47–2.58)	0.821	1.53 (0.53–4.41)	0.435
	Increased	211 (27.12)	72 (30.64)	9 (19.57)	1.25 (0.9–1.74)	0.191	0.89 (0.55–1.43)	0.629	0.66 (0.31–1.43)	0.295	0.5 (0.2–1.23)	0.132
Types of food preferred during current pandemic situation	Same as previous	468 (60.15)	128 (54.47)	30 (65.22)	Reference							
	Carbohydrate rich	162 (20.82)	58 (24.68)	11 (23.91)	Reference							
	Fat rich	44 (5.66)	11 (4.68)	3 (6.52)	0.7 (0.34–1.44)	0.332	0.46 (0.16–1.33)	0.153	1.004 (0.27–3.756)	0.995	0.58 (0.11–2.95)	0.508
You are taking your food which are	Protein rich	572 (73.52)	166 (70.64)	32 (69.57)	0.81 (0.57–1.15)	0.234	0.92 (0.57–1.49)	0.727	0.82 (0.41–1.67)	0.591	0.89 (0.38–2.1)	0.794
	Buying from outside only or Mixed of homemade and ready made	141 (18.12)	58 (24.68)	6 (13.04)	1.48 (1.04–2.1)	0.027	1.17 (0.69–1.97)	0.559	0.68 (0.28–1.63)	0.385	0.44 (0.16–1.19)	0.105
Are you taking Ayurvedic home remedies?	Purely Home made only	637 (81.88)	177 (75.32)	40 (86.96)	Reference							
	No	556 (71.47)	63 (26.81)	21 (45.65)	Reference							
Whether lock down resulted in increased food consumption	Yes	222 (28.53)	172 (73.19)	25 (54.35)	0.92 (0.66–1.27)	0.606	0.86 (0.54–1.37)	0.527	2.98 (1.63–5.44)	0.000	2.81 (1.33–5.97)	0.007
	No	537 (69.02)	73 (31.06)	30 (65.22)	Reference							
You are preferring which types of foods in this pandemic & lock down situation?	Yes	241 (30.98)	162 (68.94)	16 (34.78)	1.004 (0.73–1.38)	0.980	0.71 (0.45–1.11)	0.135	1.19 (0.64–2.22)	0.589	0.88 (0.4–1.92)	0.744
	Beverages/Junk foods/Snacks	70 (9)	28 (11.91)	1 (2.17)	1.37 (0.86–2.18)	0.186	0.84 (0.43–1.66)	0.617	0.225 (0.03–1.65)	0.143	0.1 (0.01–0.81)	0.031
Daily consumption of snacks between meals	Healthy foods	708 (91)	207 (88.09)	45 (97.83)	Reference							
	1–2	434 (55.78)	127 (54.04)	26 (56.52)	0.93 (0.67–1.3)	0.684	0.86 (0.54–1.37)	0.521	0.77 (0.42–1.44)	0.423	0.74 (0.34–1.6)	0.443
Daily intake of salads or raw vegetables	>2	111 (14.27)	35 (14.89)	2 (4.35)	1.01 (0.63–1.6)	0.978	1.02 (0.53–1.96)	0.961	0.23 (0.05–1.02)	0.054	0.25 (0.05–1.26)	0.094
	Not like snacks	233 (29.95)	73 (31.06)	18 (39.13)	Reference							
Consumption lemon or citrus fruit in daily basis	No	319 (41)	117 (49.79)	26 (56.52)	Reference							
	Yes	459 (59)	118 (50.21)	20 (43.48)	0.7 (0.52–0.94)	0.017	0.93 (0.61–1.4)	0.73	0.53 (0.29–0.97)	0.041	0.67 (0.32–1.39)	0.283
At present time you are using extra spices (garam masala) or herbs in your dish?	No	255 (32.78)	83 (35.32)	15 (32.61)	Reference							
	Yes	523 (67.22)	152 (64.68)	31 (67.39)	0.893 (0.66–1.21)	0.469	1.06 (0.68–1.64)	0.794	1.01 (0.53–1.9)	0.981	1.16 (0.54–2.49)	0.702
Is sweet consumption is increased from earlier	No	452 (58.1)	149 (63.4)	25 (54.35)	Reference							
	Yes	326 (41.9)	86 (36.6)	21 (45.65)	0.8 (0.59–1.08)	0.147	0.76 (0.49–1.16)	0.204	1.16 (0.64–2.12)	0.617	0.99 (0.48–2.05)	0.98
Are you taking Warm water in regular basis?	No	610 (78.41)	180 (76.6)	40 (86.96)	Reference							
	Yes	168 (21.59)	55 (23.4)	6 (13.04)	1.11 (0.78–1.57)	0.557	1.32 (0.8–2.16)	0.272	0.54 (0.23–1.31)	0.173	0.55 (0.2–1.47)	0.232
	No	420 (53.98)	137 (58.3)	16 (34.78)	Reference							
	Yes	358 (46.02)	98 (41.7)	30 (65.22)	0.84 (0.62–1.13)	0.244	1.11 (0.73–1.71)	0.623	2.2 (1.18–4.1)	0.013	2.62 (1.22–5.62)	0.013

<sup>a</sup> After adjusting the effect of sex, age, and occupation.

**Table 6**  
Associations between education and dietary changes patterns of people during lock down period.

Variables		Class 12 (Reference) (n = 327)	Bachelor degree (n = 525)	Master's degree (n = 207)	Bachelor degree				Master's degree			
					COR (95th CI)	p	AOR <sup>a</sup> (95th CI)	p	COR (95th CI)	p	AOR <sup>a</sup> (95th CI)	p
In current time overall daily consumption of food	Decreased	42 (12.84)	70 (13.33)	29 (14.01)	1.09 (0.72–1.67)	0.673	1.04 (0.68–1.61)	0.84	1.3 (0.77–2.2)	0.331	1.1 (0.58–2.09)	0.774
	Increased	80 (24.46)	143 (27.24)	69 (33.33)	1.17 (0.85–1.63)	0.333	1.18 (0.85–1.64)	0.329	1.62 (1.09–2.41)	0.017	1.64 (1.02–2.66)	0.043
	Same as previous	205 (62.69)	312 (59.43)	109 (52.66)	Reference							
Types of food preferred during current pandemic situation	Carbohydrate rich	60 (18.35)	125 (23.81)	46 (22.22)	Reference							
	Fat rich	18 (5.5)	30 (5.71)	10 (4.83)	0.8 (0.41–1.55)	0.508	0.84 (0.43–1.66)	0.626	0.72 (0.31–1.72)	0.465	0.97 (0.35–2.73)	0.961
	Protein rich	249 (76.15)	370 (70.48)	151 (72.95)	0.71 (0.5–1.01)	0.056	0.74 (0.52–1.06)	0.097	0.79 (0.51–1.22)	0.29	0.84 (0.5–1.41)	0.512
You are taking your food which are	Buying from outside only or	63 (19.27)	110 (20.95)	32 (15.46)	1.11 (0.79–1.57)	0.552	1.04 (0.72–1.48)	0.841	0.77 (0.48–1.22)	0.263	0.6 (0.34–1.06)	0.078
	Mixed of homemade and ready made											
	Purely Home made only	264 (80.73)	415 (79.05)	175 (84.54)	Reference							
Are you taking Ayurvedic home remedies?	No	230 (70.34)	380 (72.38)	139 (67.15)	Reference							
	Yes	97 (29.66)	145 (27.62)	68 (32.85)	0.9 (0.67–1.23)	0.52	0.92 (0.68–1.26)	0.624	1.16 (0.8–1.69)	0.438	1.24 (0.78–1.97)	0.357
Whether lock down resulted in increased food consumption	No	241 (73.7)	357 (68)	131 (63.29)	Reference							
	Yes	86 (26.3)	168 (32)	76 (36.71)	1.32 (0.97–1.79)	0.077	1.36 (0.99–1.86)	0.053	1.63 (1.12–2.36)	0.011	1.82 (1.16–2.87)	0.01
You are preferring which types of foods in this pandemic & lock down situation?	Beverages/Junk foods/Snacks	23 (7.03)	58 (11.05)	18 (8.7)	1.64 (0.99–2.72)	0.054	1.62 (0.97–2.71)	0.066	1.26 (0.66–2.39)	0.483	1.11 (0.51–2.38)	0.795
	Healthy foods	304 (92.97)	467 (88.95)	189 (91.3)	Reference							
Daily consumption of snacks between meals	1–2	177 (54.13)	289 (55.05)	121 (58.45)	1.12 (0.82–1.52)	0.473	1.18 (0.86–1.61)	0.313	1.2 (0.81–1.77)	0.362	1.42 (0.88–2.29)	0.149
	>2	43 (13.15)	80 (15.24)	25 (12.08)	1.28 (0.82–1.99)	0.283	1.31 (0.83–2.07)	0.238	1.02 (0.57–1.83)	0.948	1.27 (0.63–2.56)	0.505
	Not like snacks	107 (32.72)	156 (29.71)	61 (29.47)	Reference							
Daily intake of salads or raw vegetables	No	130 (39.76)	222 (42.29)	110 (53.14)	Reference							
	Yes	197 (60.24)	303 (57.71)	97 (46.86)	0.9 (0.68–1.19)	0.466	0.92 (0.69–1.22)	0.566	0.582 (0.41–0.83)	0.003	0.69 (0.45–1.06)	0.088
Consumption lemon or citrus fruit in daily basis	No	117 (35.78)	166 (31.62)	70 (33.82)	Reference							
	Yes	210 (64.22)	359 (68.38)	137 (66.18)	1.2 (0.9–1.6)	0.21	1.24 (0.92–1.67)	0.156	1.09 (0.76–1.57)	0.643	1.13 (0.72–1.76)	0.595
At present time you are using extra spices (garam masala) or herbs in your dish?	No	187 (57.19)	321 (61.14)	118 (57)	Reference							
	Yes	140 (42.81)	204 (38.86)	89 (43)	0.85 (0.64–1.12)	0.253	0.89 (0.66–1.18)	0.405	1.01 (0.71–1.43)	0.967	1.2 (0.78–1.84)	0.412
Is sweet consumption is increased from earlier	No	257 (78.59)	406 (77.33)	167 (80.68)	Reference							
	Yes	70 (21.41)	119 (22.67)	40 (19.32)	1.08 (0.77–1.5)	0.667	1.04 (0.74–1.47)	0.802	0.88 (0.57–1.36)	0.562	0.75 (0.44–1.28)	0.3
Are you taking Warm water in regular basis?	No	163 (49.85)	292 (55.62)	118 (57)	Reference							
	Yes	164 (50.15)	233 (44.38)	89 (43)	0.79 (0.6–1.05)	0.101	0.8 (0.6–1.07)	0.133	0.75 (0.53–1.06)	0.107	0.71 (0.46–1.1)	0.129

<sup>a</sup> After adjusting the effect of sex, age, and occupation.

findings, certain changes have aided in the current suboptimal meal patterns, such as less intake of fruits and vegetables, while others seem to be positive (e.g., less intake of junk food or an unhealthy diet), though the overall dietary intake outline needs more investigation for a comprehensive assessment of the COVID-19 lockdown's effects on dietary intake changes.

In our research, we found that the dietary consumption habits of the older participants were less likely to be affected during the COVID-19 lockdown phase than those of the younger participants. This finding was strongly associated with report of Di Renzo et al.'s [34] analysis during the lockdown era. Despite having more habitual food consumption and preferring a significant fiber rich diet, another study indicated that older people do not have as many perceptive satiety signals as younger people [35]. Perhaps, in this context, our examined finding represents a lower proportion of drinks and junk foods consumed by older participants during the pandemic compared to younger adults. Notably, we discovered that the daily average food consumption rate of younger participants increased more frequently than that of older participants, while the level of snack intake increased marginally among the older generation compared to the younger generation. This finding may support the notion that, while middle-aged or older people may consume meals or foods with some punctuation or have a pattern of eating on a regular basis, students or younger participants may consume food more randomly, possibly scheduling their meals around other activities [36–38]. The most common symptoms in children and adolescents with COVID-19 infection are gastrointestinal symptoms and liver enzyme abnormalities [39]. As a result, the presence of those problems along with COVID-19 infection could exacerbate pathological effects and worsen disease prognosis.

Another major goal of this research project was to identify the lifestyle effects of the pandemic in this monotonous climate. The troubling conditions most logical to the consequences of imprisonment were home confinement and less physical activity. According to the survey respondents' accounts, they made a number of major adjustments during the lockdown. Perhaps the constraints imposed by the long-term lockdown anticipated and hypothesised these investigated outcomes [40]. In a recent study, males registered more substantial changes in different lifestyle habits, such as physical activity, daily exercise, smoking, and alcohol consumption. Many previous studies found similar findings during recent outbreaks across Asia [41,42]. Furthermore, various studies performed during the emergency or post-situation period noted an increased proportion of smoking and drinking problems [43,44]. These trends were also found among the daily smoker participants in our study groups, with 20.56% reporting increased smoking frequency. In addition, 12.17% of the alcohol-consuming community reported that their frequency of alcohol consumption increased during the lockdown period compare to the pre-COVID era. Furthermore, our findings were moderately related to the definition proposed by Rodgers et al. [45]. The abnormality of everyday life has a significant influence on eating patterns, daily routines, physical activity, and physical sports, all of which have a negative impact on people's lives and lifestyles. Increased loneliness and decreased transparency or obligation resulted from home isolation and social estrangement [46]. Taking all of the most recent studies and combining them with the current findings could mean that long-term lockdown is directly linked to global shifts in lifestyle habits.

The study's main strength was that it was performed during the COVID era, and it provides extremely valuable knowledge about the critical period of the COVID-19 lockdown in India. The current study's drawback is that participants are measured by self-reported results, which may lead to misreported interpretation.

## 5. Conclusions

According to the findings of this longitudinal e-survey-based research, the key two pillars of healthy living, dietary activity and lifestyle pattern, were negatively impacted during the lockdown time among various groups of Indian participants. In contrast to the pre-COVID-19 scenario, far fewer participants retained their food intake patterns and lifestyle during the lockdown process. This finding denotes a high degree of food intake habit persistence as well as a very acceptable occurrence of lifestyle among them. Our findings have suggested that males are more likely than females to have an unhealthy lifestyle pattern, which results in dietary disruption. According to the previous discussion, the COVID-19 associated lockdown has caused a significant socio-demographic change, which may be the root cause of the social tension. Thus, this study comes at a critical juncture and it will be useful for politicians, dieticians and public health researchers to better understand the current state of food intake and lifestyle patterns among the different groups of Indian participants. Furthermore, it has the potential to have a major impact on future public health studies.

## Authors contribution

Sandeep Kr. Dash, Amitava Pal and Kazi Monjur Ali developed the study concept and the study design; Sovan Samanta, Jhimli Banerjee, SK. Nazibar Rahaman and Rubai Ahmed involved in collection and communication; Amitava Pal, Sovan Samanta, Jhimli Banerjee performed data analysis and Sovan Samanta, Amitava Pal, Sandeep Kr. Dash and Rubai Ahmed participated in data interpretation and manuscript writing; Biplab Giri, SK. Nazibar Rahaman, Jhimli Banerjee, and Kazi Monjur Ali performed review and editing; Amitava Pal and Sandeep Kr. Dash supervised the entire research work. All authors approved the final version of the manuscript.

## Ethical approval

As this study involved secondary data analyses of data that was collected by online survey method using Google form. The data collection was not invasive and had been performed in accordance with the declaration of Helsinki. The study design described herewith was approved by the Institutional Ethics Committee (Human) University of Gour Banga, Malda, West Bengal, India (Approval no. UGB/IEC (Human)/0001-21).

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## Declaration of competing interest

Authors have no conflicts of interests.

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## List of Abbreviations

COVID-19 Coronavirus disease

## SARS-CoV-2 Severe acute respiratory syndrome coronavirus 2

COR	Crude odd ratio
AOR	Adjusted odd ratio
CI	Confidence intervals

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