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Altered dietary habits and lifestyle patterns during COVID-19 pandemic associated lockdown: An online survey study

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Article history:
Received 12 August 2021
Accepted 9 February 2022

Keywords:
COVID-19
Lockdown
Dietary changes
Lifestyle changes
Public health

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
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
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. 1. Descriptive characteristics of the study participants.

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: Is 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.
(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

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?.
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 1

| Variables | Male (Reference) | Female (n = 757) | COR (95th CI) p | AOR (95th CI) p |
|-----------|------------------|-----------------|---------------|----------------|
| Frequency of smoking increases during lock down | Yes | 14 (15.73) | 8 (27.59) | 2.04 (0.75–5.52) | 0.13 |
| Frequency of alcohol consumption increases during lock down | Yes | 9 (10.59) | 5 (9.8) | 0.32 (0.29–2.91) | 0.884 |
| Are you physically active during lock down | No | 75 (84.27) | 21 (72.41) | Reference |
| Are you involved in regular exercise in this lock down? | Yes | 107 (35.43) | 340 (44.91) | 1.65 (1.19–2.29) | 0.003 |
| Are you spending much time in kitchen than usual? | Yes | 99 (32.78) | 232 (30.65) | 1.22 (0.86–1.71) | 0.261 |
| In the lock down your cooking skills and regularity improved? | Yes | 94 (31.13) | 472 (62.35) | 3.1 (2.21–4.34) | 0.000 |
| You browsing frequency to Food blogging or Food preparation channels has increased in Lock down | I don't like those | 105 (34.77) | 186 (24.57) | 0.88 (0.63–1.21) | 0.434 |
| Do you think you are getting obese (over weight) during the lock down? | No | 119 (39.4) | 240 (31.7) | 2.1 (1.51–2.93) | 0.000 |
| Are you regularly sanitizing your food items (grocery) after buying from market? | Yes | 94 (31.13) | 472 (62.35) | 3.1 (2.21–4.34) | 0.000 |
| Frequency for going to market during this period | Decreased | 229 (75.83) | 602 (79.52) | 1.46 (1.03–2.08) | 0.034 |
| Level of hygiene during food preparation and eating has increased during current time | 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 | No | 71 (23.51) | 135 (17.83) | 1.42 (1.02–1.96) | 0.036 |

* After adjusting the effect of age, education, and occupation.
**Table 2**

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

| Variables                                                                 | <24 years (n = 778) | 24–40 years (n = 235) | >40 years (n = 46) | COR (95th CI) p | AOR* (95th CI) p | COR (95th CI) p | AOR* (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 (0.26–5.85) | 0.796 (0.17–25.5) | 0.56 (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 (0.005–0.7) | 0.029 (0.01–0.91) | 0.961 (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 (0.04–9.29) | 0.162 (0.05–4.19) | 0.462 (0.06–7.09) | 0.229 |
| Yes                                                                       | 396 (50.9)          | 115 (48.94)           | 27 (58.7)         | 1.01 (0.66–1.53) | 0.967 (0.76–2.48) | 1.25 (0.68–7.47) | 0.237 (0.71–6.84) | 0.168 |
| **Are you involved in regular exercise in this lock down?**               |                     |                       |                   |                 |                 |                 |                 |
| No                                                                        | 193 (24.81)         | 73 (31.06)            | 15 (33.7)         | Reference       |                 |                 |                 |
| Frequently but not regular basis                                         | 335 (43.06)         | 102 (43.4)            | 10 (21.74)        | 0.8 (0.57–1.14)  | 0.223 (0.11–0.49) | 0.510 (0.17–0.87) | 0.022 (0.22–1.48) | 0.249 |
| **Are you spending much time in kitchen than usual?**                      |                     |                       |                   |                 |                 |                 |                 |
| No                                                                        | 250 (32.13)         | 60 (25.53)            | 21 (45.65)        | 0.63 (0.43–0.94) | 0.022 (0.01–1.0) | 0.87 (0.45–2.15) | 0.825 (0.69–4.03) | 0.254 |
| Yes                                                                       | 310 (39.85)         | 101 (42.98)           | 21 (45.65)        | Reference       |                 |                 |                 |
| **In the lock down your cooking skills and regularity improved?**         |                     |                       |                   |                 |                 |                 |                 |
| No                                                                        | 289 (37.15)         | 92 (39.15)            | 18 (39.13)        | 0.98 (0.71–1.35) | 0.889 (0.71–1.84) | 0.594 (0.48–1.76) | 0.8 (0.45–2.28) | 0.983 |
| Yes                                                                       | 180 (23.14)         | 53 (23.55)            | 16 (32.61)        | Reference       |                 |                 |                 |
| **You browsing frequency to Food blogging or Food preparation channels has improved?** |                     |                       |                   |                 |                 |                 |                 |
| I don't like those                                                        | 217 (27.89)         | 60 (25.53)            | 14 (30.43)        | 0.93 (0.63–1.36) | 0.698 (0.51–1.5) | 0.623 (0.54–2.41) | 0.732 (0.42–2.67) | 0.901 |
| No                                                                        | 265 (34.06)         | 79 (33.62)            | 15 (32.61)        | Reference       |                 |                 |                 |
| **Do you think you are getting obese (over weight) during the lock down?**|                     |                       |                   |                 |                 |                 |                 |
| No                                                                        | 357 (45.89)         | 114 (48.51)           | 25 (54.35)        | 0.87 (0.61–1.23) | 0.424 (0.52–1.4) | 0.353 (0.75–2.49) | 0.055 (0.15–0.7) | 0.067 |
| Yes                                                                       | 190 (24.42)         | 57 (24.6)             | 14 (30.43)        | Reference       |                 |                 |                 |
| **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 (91.2)         | 0.28 (0.19–0.41) | 0.000 (0.25–0.74) | 0.002 (0.38–3.12) | 0.876 (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 (0.41–1.24) | 0.233 (0.45–2.36) | 0.948 (0.25–1.9) | 0.478 |
| Increased                                                                | 47 (6.04)           | 14 (5.96)             | 2 (4.35)          | 0.91 (1.45–8.3)  | 0.788 (0.36–2.6) | 0.946 (0.72–3.61) | 0.693 (0.55–3.48) | 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 (0.59–1.4) | 0.499 (0.79–5.21) | 0.144 (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 (0.14–1.78) | 0.15 (0.71–4.11) | 0.229 (0.74–5.65) | 0.166 |

*A 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 = 527) | Bachelor degree (n = 207) | Master's degree (n = 327) | Bachelor degree | Master's degree |
|------------------------------------------------|---------------------------------|---------------------------|---------------------------|-----------------|-----------------|
| frequency of smoking increases during lock down |                                |                           |                           |                 |                 |
| Yes                                            | 4 (22.22)                       | 12 (18.75)                | 6 (16.67)                 | 0.81 (0.22–2.89) | 0.81 (0.22–2.89) |
| No                                             | 14 (77.78)                      | 52 (81.25)                | 30 (83.33)                | Reference       | 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) | 0.43 (0.13–1.44) |
| No                                             | 22 (78.57)                      | 59 (89.39)                | 41 (97.62)                | Reference       | Reference       |
| Are you physically active during lock down?     |                                |                           |                           |                 |                 |
| No                                             | 49 (14.98)                      | 91 (17.33)                | 35 (16.91)                | Reference       | Reference       |
| Partially                                     | 97 (29.66)                      | 168 (32.00)               | 81 (39.13)                | 0.93 (0.61–1.43) | 0.93 (0.61–1.43) |
| Yes                                            | 181 (55.35)                     | 266 (50.67)               | 91 (43.96)                | 0.79 (0.53–1.17) | 0.79 (0.53–1.17) |
| Are you involved in regular exercise in this lock down? |                                |                           |                           |                 |                 |
| No                                             | 7 (21.71)                       | 139 (26.48)               | 71 (34.3)                 | Reference       | Reference       |
| Frequently but not regular basis               | 128 (39.14)                     | 230 (43.81)               | 89 (43)                   | 0.92 (0.64–1.31) | 0.92 (0.64–1.31) |
| Yes                                            | 128 (39.14)                     | 156 (29.71)               | 47 (22.71)                | 0.62 (0.43–0.9) | 0.62 (0.43–0.9) |
| Are you spending much time in kitchen than usual? |                                |                           |                           | Reference       | Reference       |
| No                                             | 136 (41.59)                     | 213 (40.57)               | 83 (40.1)                 | Reference       | Reference       |
| Yes                                            | 111 (33.94)                     | 197 (37.52)               | 91 (43.96)                | 1.13 (0.82–1.56) | 1.13 (0.82–1.56) |
| In the lock down your cooking skills and regularity improved? |                                |                           |                           | Reference       | Reference       |
| No                                             | 82 (25.08)                      | 119 (22.67)               | 48 (23.19)                | Reference       | Reference       |
| Yes                                            | 160 (48.93)                     | 293 (55.81)               | 113 (54.59)               | 1.26 (0.9–1.77) | 1.26 (0.9–1.77) |
| You don't like those                          |                                 |                           |                           |                 |                 |
| Food blogging or Food preparation channels has increased in Lock down |                                |                           |                           |                 |                 |
| Maybe                                          | 110 (33.64)                     | 129 (24.57)               | 52 (25.12)                | 0.63 (0.44–0.89) | 0.63 (0.44–0.89) |
| No                                             | 103 (31.5)                      | 192 (36.57)               | 64 (30.92)                | 0.64 (0.44–0.89) | 0.64 (0.44–0.89) |
| Yes                                            | 114 (34.86)                     | 204 (38.86)               | 91 (43.96)                | 0.96 (0.69–1.34) | 0.96 (0.69–1.34) |
| Do you think you are getting obese (over weight) during the lock down? |                                |                           |                           | Reference       | Reference       |
| No                                             | 109 (33.33)                     | 135 (25.71)               | 58 (28.02)                | 0.73 (0.53–1.02) | 0.73 (0.53–1.02) |
| Yes                                            | 149 (45.57)                     | 251 (47.81)               | 96 (46.38)                | 1.2 (0.84–1.7)  | 1.2 (0.84–1.7)  |
| Are you regularly sanitizing your food items (grocery) after buying from market? |                                |                           |                           | Reference       | Reference       |
| No                                             | 31 (9.48)                       | 69 (13.14)                | 40 (19.32)                | Reference       | Reference       |
| Yes                                            | 296 (90.52)                     | 456 (86.86)               | 167 (80.68)               | 0.69 (0.44–1.08) | 0.69 (0.44–1.08) |
| Frequency for going to market during this period |                                |                           |                           |                 |                 |
| Decreased                                     | 247 (75.54)                     | 417 (79.43)               | 167 (80.68)               | 1.25 (0.86–1.82) | 1.25 (0.86–1.82) |
| Increased                                     | 23 (7.03)                       | 31 (5.9)                  | 9 (4.35)                  | 0.99 (0.53–1.89) | 0.99 (0.53–1.89) |
| Same as previous                              | 57 (17.43)                      | 77 (14.67)                | 31 (14.98)                | Reference       | 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       | Reference       |
| Yes                                            | 244 (76.62)                     | 429 (81.71)               | 177 (85.51)               | 1.52 (1.09–2.12) | 1.52 (1.09–2.12) |
| Taking extra care of older and children in term of quality of foods given to them in this Lock down |                                |                           |                           | Reference       | Reference       |
| No                                             | 65 (19.88)                      | 100 (19.05)               | 41 (19.81)                | 1.05 (0.74–1.49) | 1.05 (0.74–1.49) |
| Yes                                            | 262 (80.12)                     | 425 (80.95)               | 166 (80.19)               | 0.76 (0.55–1.07) | 0.76 (0.55–1.07) |

* After adjusting the effect of sex, age, 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 4
Associations between sex and dietary changes patterns of people during lock down period.

| Variables | Male (n = 302) | Female (n = 757) | COR (95th CI) | p | AOR* (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 | Reference | Reference | Reference |
| Types of food preferred during current pandemic situation | Carbohydrate rich | 88 (29.14) | 143 (18.89) | Reference | Reference | Reference | 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 | Reference | Reference | Reference |
| Are you taking Ayurvedic home remedies? | No | 228 (75.5) | 521 (68.82) | Reference | Reference | Reference | 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 deviations | No | 213 (70.53) | 516 (68.16) | Reference | Reference | Reference | 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 | Reference | Reference | 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 |
| Daily intake of salads or raw vegetables | No | 108 (35.76) | 216 (28.33) | Reference | Reference | Reference | Reference |
| | Yes | 148 (49.01) | 314 (41.48) | Reference | Reference | Reference | Reference |
| Consumption of lemon or citrus fruit in daily basis | No | 127 (42.05) | 226 (29.85) | Reference | Reference | Reference | 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 | Reference | Reference | 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 increased from earlier | No | 239 (79.14) | 591 (78.07) | Reference | Reference | Reference | 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 | Reference | Reference | Reference |
| | Yes | 101 (33.44) | 385 (50.86) | 2.06 (1.56–2.72) | 0.000 | 2.49 (1.81–3.41) | 0.000 |

* After adjusting the effect of age, education and occupation.
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 |
|------------------------------------------------|---------------------------------|-----------------------|-------------------|-------------|-----------|
| 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 | Same as previous 468 (60.15) 128 (54.47) 30 (65.22) | Reference | | |
| Types of food preferred during current pandemic situation | 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) 0.313 0.46 (0.16–1.33) 0.153 1.004 (0.27–3.756) 0.995 0.58 (0.11–2.95) 0.508 | 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 | Consumption of food during current pandemicsituation | You are taking your food which are | Mixed of homemade and ready made | Purely Home made only 637 (81.88) 177 (73.52) 40 (86.96) Reference | | |
| Are you taking Ayurvedic home remedies? | No 556 (71.47) 63 (26.81) 21 (45.65) 0.666 0.86 (0.54–1.37) 0.527 2.98 (1.63–5.44) 0.000 2.81 (1.33–5.97) 0.007 | Yes 222 (28.53) 172 (73.19) 25 (54.35) 0.92 (0.66–1.27) | 0.060 0.86 (0.54–1.37) 0.527 2.98 (1.63–5.44) 0.000 2.81 (1.33–5.97) 0.007 | |
| Whether lock down resulted in increased food consumption | No 537 (69.02) 73 (31.06) 30 (65.22) Reference | Yes 241 (30.98) 162 (68.94) 16 (34.78) 1.004 (0.73–1.38) 0.980 0.71 (0.45–1.1) 0.135 1.19 (0.64–2.22) 0.589 0.88 (0.4–1.92) 0.744 | You are preferring which types of foods in this pandemic & lock down situation? Beverages/Junk foods/Snacks | Mixed of homemade and ready made | Beverages/Junk foods/Snacks Healthy foods 708 (91) 207 (88.09) 45 (97.83) Reference | | |
| Daily consumption of snacks between meals | 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 | >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 | No like snacks 233 (29.95) 73 (31.06) 18 (39.13) Reference | | | |
| Daily intake of salads or raw vegetables | Yes 459 (59) 118 (50.21) 20 (41.48) 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 | No 319 (41) 117 (49.79) 26 (56.52) | Reference | | | |
| Consumption lemon or citrus fruit in daily basis | Yes 523 (67.22) 152 (64.68) 31 (67.39) 0.893 (0.66–1.12) 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 | No 452 (58.1) 149 (63.4) 25 (54.35) Reference | | | | |
| At present time you are using extra spices (garam masala) or herbs in your dish? | Yes 326 (41.9) 96 (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 | No 610 (78.41) 180 (76.6) 40 (86.96) Reference | | | | |
| Is sweet consumption is increased from earlier in regular basis? | Yes 168 (21.59) 35 (23.4) 6 (13.04) 1.11 (0.78–1.57) 0.955 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 | | | | |
| Are you taking Warm water in your diet? | 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 | No 712 (90.3) 290 (119.89) 16 (34.78) Reference | | | | |

*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 | AOR' (95th CI) | p      | AOR' (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  |
| 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  |
| Same as previous                                                         | 205 (62.69)                     | 312 (59.43)               | 109 (52.66)               | Reference        | Reference        |                |        |                |        |
| Types of food preferred during current pandemic situation                 |                                 |                           |                           |                 |                 |                |        |                |        |
| Carbohydrate rich                                                        | 60 (18.35)                      | 125 (23.81)               | 46 (22.22)                | Reference        | Reference        |                |        |                |        |
| Fat rich                                                                 | 18 (5.5)                        | 50 (7.51)                 | 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  |
| 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   |
| Buying from outside only or Mixed of homemade and ready made              | 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  |
| You are taking your food which are                                       |                                 |                           |                           |                 |                 |                |        |                |        |
| Only                                                                     | 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  |
| Beverages/Junk foods/Snacks                                              | 23 (7.03)                       | 58 (11.05)                | 18 (8.7)                  | Reference        | Reference        |                |        |                |        |
| Are you taking Ayurvedic home remedies?                                  |                                 |                           |                           |                 |                 |                |        |                |        |
| No                                                                       | 230 (70.34)                     | 380 (72.38)               | 139 (67.15)               | Reference        | 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  |
| Whether lock down resulted in increased food consumption                  |                                 |                           |                           | Reference        | 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  |
| No                                                                       | 241 (73.7)                      | 357 (68)                  | 131 (63.29)               | Reference        | Reference        |                |        |                |        |
| You are preferring which types of foods in this pandemic & lock down situation? |                                 |                           |                           | Reference        | Reference        |                |        |                |        |
| Healthy foods                                                            | 304 (92.97)                     | 467 (88.95)               | 189 (91.3)                | Reference        | Reference        |                |        |                |        |
| Beverages/Junk foods/Snacks                                              | 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  |
| Daily consumption of snacks between meals                                 | 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  |
| 1–2                                                                      | 107 (32.72)                     | 156 (28.71)               | 61 (29.47)                | Reference        | Reference        |                |        |                |        |
| >2                                                                       | 130 (39.76)                     | 222 (42.29)               | 110 (53.14)               | Reference        | Reference        |                |        |                |        |
| Daily intake of salads or raw vegetables                                  |                                 |                           |                           | Reference        | 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  |
| No                                                                       | 117 (35.78)                     | 166 (31.62)               | 70 (33.82)                | Reference        | Reference        |                |        |                |        |
| Consumption lemon or citrus fruit in daily basis                         |                                 |                           |                           | Reference        | 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  |
| No                                                                       | 187 (57.19)                     | 321 (61.14)               | 118 (57)                  | Reference        | Reference        |                |        |                |        |
| At present time you are using extra spices (garam masala) or herbs in your dish? |                                 |                           |                           | Reference        | 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  |
| Is sweet consumption is increased from earlier                           | 257 (78.59)                     | 406 (77.33)               | 167 (80.68)               | Reference        | 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  |
| No                                                                       | 163 (49.85)                     | 292 (55.62)               | 118 (57)                  | Reference        | Reference        |                |        |                |        |
| Are you taking Warm water in regular basis?                               |                                 |                           |                           | Reference        | 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  |
| * 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 more snacks 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

Sanddeep Kr. Dash, Amitava Pal and Kazi Monjur Ali developed the study concept and the study design; Sovan Samanta, Jhimli Banerjee, SK. Nazibur 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. Nazibur 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 here-with was approved by the Institutional Ethics Committee (Human) University of Gour Banga, Malda, West Bengal, India (Approval no. UGB/IEC (Human)/0001-21).

Funding

No funding was received for conducting this study. However, Sovan Samanta greatly acknowledges the Govt. of West Bengal, India for obtaining State Government Fellowship under Swami Vivekananda Merit Cum Means Scholarship programme.

Declaration of competing interest

Authors have no conflicts of interests.

Acknowledgements

Authors are highly grateful to the entire study participants and questioner distributors for their active participation or contribution during this survey based study.

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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