

## RESEARCH ARTICLE



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\* **Corresponding author.**

[jainkhushboo2006@gmail.com](mailto:jainkhushboo2006@gmail.com)

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# Impact of COVID-19 Home Confinement on Eating Behavior, Mental Health, and Physical Activity of the Indian Population

Khushboo D Jain<sup>1\*</sup>, Megha Kapoor<sup>2</sup>

<sup>1</sup> Dietetics and Food Service Management, Indira Gandhi National Open University, Delhi, India

<sup>2</sup> Dietician, Tata Memorial Hospital, Mumbai, India

## Abstract

The emergence of the COVID -19 pandemic had a severe impact on people from all walks of life. The rapid spread of the disease in almost all parts of the country resulted in people having to stay at home, becoming socially distant, and cities being closed, creating enormous health, economic, environmental, and social challenges for the entire population. The aim of this study was to examine how these preventive measures affected the mental, physical, and nutritional health of the Indian population. A cross-sectional web-based study was conducted on the Indian population to assess the impact of COVID -19 on mental health, and changes in daily lifestyle such as diet, physical activity, and sleep patterns using a validated questionnaire. Data were collected between August 15, 2020, and October 15, 2020, using the Google Form platform. A total of 772 participants (394 men and 378 women) completed the study. The median age of the participants in the study was 32 years and the majority of the participants belonged to the age group of 21–30 years. Out of 772 participants, 286 participants (37%) had no change in their dietary intake. And 384 participants (49.70%) increased their dietary intake. There was a significant association seen between dietary intake and change in BMI ( $p < 0.001$ ). There was a significant change observed in the sleeping pattern when compared pre and during the covid phase ( $p < 0.001$ ). We conclude that there were few positive and negative impacts of covid-19 on the dietary pattern, mental health, and physical activity. These observations have potential implications that could help to identify the possible factors for change in the dietary, mental and physical behavior and impede through proper counseling.

**Keywords:** Eating patterns; Nutritional health; Physical activity; Stress; Sleep patterns; Coronavirus; Pandemic; Lockdown

# 1. Introduction

The novel coronavirus (COVID -19) that emerged in the Chinese city of Wuhan in 2019 spread rapidly worldwide, causing 1.4 million deaths worldwide<sup>(1)</sup>. COVID-19 infection poses a serious public health threat. In response to the global outbreak, a wave of quarantine and house arrest orders were issued to contain the rapid worldwide spread.

The majority of countries worldwide, including India, have imposed quarantine and social isolation. Quarantine and social isolation can be important stressors that contribute to widespread lifestyle changes in the population<sup>(2)</sup>. The temporary closure of workplaces, restaurants, fitness facilities and other public places forces abrupt changes in routine dietary and exercise patterns. In addition, social isolation has negative effects on psychological well-being. Stress is associated with sleep disturbance, consumption of highly palatable foods, and increased snacking, which often leads to weight gain<sup>(3)</sup>. Consequently, increased anxiety, frustration, panic attacks, loss of appetite or sudden increase in appetite, insomnia, and depression have been reported during the lockdown. Recent studies have shown that people who suffer from aggressive self-isolation are more vulnerable to mental health problems when they experience trauma triggers and anger<sup>(4,5)</sup>.

Because of the interdiction, there was limited access to fresh foods and less consumption of various food groups<sup>(6)</sup>. Instead, people might be more likely to consume processed foods, which can be high in energy and low in nutrients<sup>(4,5)</sup>. Boredom or stress can lead to emotional overeating and high-energy cravings<sup>(7,8)</sup> and ultimately affect well-being. Therefore, changes in lifestyle and dietary behavior were expected due to the COVID -19 lockdown<sup>(9)</sup>. This unprecedented time was certainly tough and it was crucial to maintain a healthy lifestyle, especially for those with predisposed health conditions and the elderly<sup>(10)</sup>.

## 1.1 Objectives

The objective was to assess the wide-ranging impact of the COVID -19 pandemic on health behavior. The study aimed to examine changes in dietary behaviors, BMI, physical activity, sleep pattern, sedentary behaviors, and mental health before and during the COVID-19 pandemic.

# 2. Methodology

## 2.1 Study design and participants

A cross-sectional web-based study was conducted on the Indian population to assess the impact of COVID -19 on mental health, and changes in daily lifestyle such as diet, physical activity, and sleep patterns using a validated questionnaire. Data were collected between August 15, 2020,

and October 15, 2020, using the Google Form platform and a telephone survey.

A standardized study invitation message with a link to the online survey was distributed through personal and social networks via email, Facebook, Instagram, and WhatsApp. A total of 772 responses were collected anonymously.

## 2.2 Study Questionnaire

An electronic survey was created on the Google platform. The form was used to collect demographic data, mental health, physical activity, dietary habits, sleep patterns, and changes in BMI before and during the covid lockdown. The differentiated questionnaire was used in this study. The questionnaire consists of four sections that capture socio-demographic information, and lifestyle changes (mental activity, physical activity, dietary habits, and behavioral changes). Participants' consent was taken through the survey form.

## 2.3 Statistical analysis

The data was analyzed using SPSS version 25.0 (IBM SPSS Statistics, Version 25.0, Armonk, NY: IBM Corp.). Qualitative data were expressed in percentages and compared using the chi-square test to examine the impact of COVID-19 on dietary behaviors, physical activity, sleep, sedentary behaviors, and mental health. Qualitative pre and during covid data were tested using McNemar-Bowker Test and Continuous pre and post data tested using a paired-t-test. Determinants of predictors of post covid obesity and stress status were analyzed by multivariate logistic regression analyses, by estimating odds ratios and their 95% confidence intervals. p-value <0.05 was considered statistically significant.

# 3. Results

## 3.1 Participants details

### 3.1.1 Socio-demographic details of Participants

On October 15, 2020, the web survey responses were closed and the collected data were analyzed. A total of 772 responses were recorded. Almost equal participation was observed, 394 (51.2%) were males and 378 (48.8%) were females.

The median age of the participants in the study was 32 years and the majority of the participants belonged to the age group of 21- 30 years (41.4%, n=320) followed by the age group of 41-50 years (22.8%, n=176) of the total participants. Out of 772 participants, 20.47% were students and 15.28% were working from home.

### 3.1.2 Participants with pre-existing conditions

It was found that 74.7% of the participants did not have any pre-existing conditions. Out of 772 Respondents, 11% were hypertensive, 4.8% were diabetic and 5% had thyroid

ailments.

### 3.2 Impact of the lockdown on the BMI pattern of the participants

The survey recorded the weight of the subjects at specific time points, i.e., March 2020 and during the lockdown. BMI was calculated using the formula:  $BMI = \text{weight}/(\text{height})^2$ . Mean BMI was almost similar in both pre ( $24.6 \pm 5.2$  SD) and during COVID ( $24.8 \pm 5.1$  SD) phase. 342 participants (44.3%) were obese before covid. There was a marginal increase in the number of participants with  $BMI > 25 \text{ kg/m}^2$  during the covid phase (1.73%).

There was a significant association seen between the age group and change in BMI pre and during covid phase ( $p < 0.001$ ). There was an increase in the BMI of the following age group: 21–30 yrs ( $N = 320$ , 53.12%), <20 years ( $N = 110$ , 56.36%), and 41–50 yrs ( $N = 176$ , 34.09%).

There was a significant association seen between the professions and change in BMI pre and during covid phase ( $p < 0.001$ ). Almost 50 percent of students ( $N = 168$ , 49.3%), shopkeepers ( $N = 166$ , 48.2%), service classes ( $N = 164$ , 46.3%), and homemakers' ( $N = 104$ , 44.1%) BMI increased during the covid phase.

### 3.3 Changes in dietary pattern and intake during the lockdown and its impact on BMI

Predominantly, 59.2 % of participants were vegetarians, while 35.4% were non-vegetarians. A small proportion of participants were lacto-ovo vegetarians (4.9%), and vegans (0.5%).

Change in dietary intake was classified as an increase in intake, marginal increase in intake, no change in intake of food, or reduced drastically or reduced marginally. It was observed that out of 772 participants, 286 participants (37%) had no change in their dietary intake. And 384 participants (49.70%) increased their dietary intake, And 102 participants (13.20%) reduced their food intake during the lockdown period.

There was a significant association seen between dietary intake and change in BMI ( $p < 0.001$ ). Out of 384 participants whose intake increased during the lockdown, 246 participants (66.50%) had an increase in their BMI.

#### 3.3.1 Changes in food choices during the lockdown and its impact

It was observed that participants preferred various food items during the lockdown (see Figure 1). It was observed that there was a three times increase in consumption of fried foods (254, 36.92%) and refined flour food items (218, 33.03%) and higher intake of sweets (220, 31.25%), cheese (224, 34.57%), and alcohol (32, 12.70%) during the lockdown.

Interestingly, it was observed that during lockdown more than half of the participants included immunity boosters

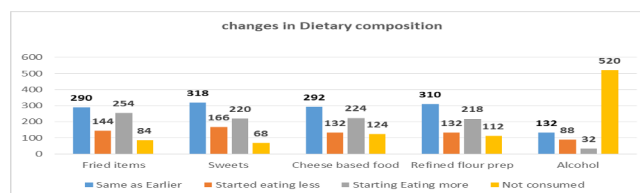


Fig 1. Changes in dietary composition during lockdown

(376, 62.46%) in their daily diet. On the other hand consumption of fruits (326, 43.58%) had marginally reduced. Also, an increase in consumption of nutritional supplements (180, 42.06%), dry fruits (260, 36.11%), and spices (212, 29.69%) was observed as compared to pre covid phase (see Figure 2).

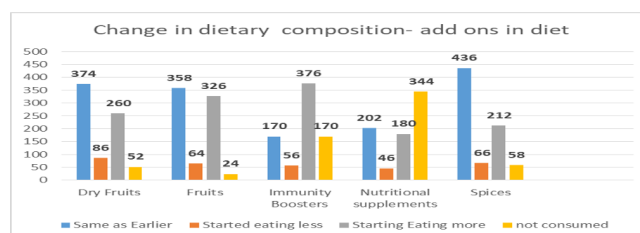


Fig 2. Changes in dietary composition

Dietary food choices vary from person to person, so it was not necessary that all participants consumed all mentioned food items. So, the missing values were not considered finding the association between dietary food choices and changes in BMI. Tests revealed that there was a strong association between the consumption of fried, sweet, cheese-based, and refined flour food items and a change in the BMI of the participants ( $p < 0.001$ ). A higher percentage of participants who had increased BMI during lockdown consumed fried (36.92%), sweet (31.25%), cheese-based (34.57%), and refined flour (33.03%) food items more frequently.

### 3.4 Impact of Covid-19 on lifestyle of participants

#### 3.4.1 Change in activities during the lockdown and its impact

Activities were divided into walking, jogging, gym workouts, yoga, reading newspaper, watching entertainment, screen time usage, and cooking. The time spent by each person on each of the physical activities was recorded in the survey. The amount of time spent was accounted as 0 for 0 minutes and 4 for more than an hr. Interestingly, there was a significant slight increase ( $t(771) = -6.97$ ,  $p < 0.001$ ) in the duration of physical activity during the covid phase ( $2.161 \pm 0.488$ ) as compared to before covid ( $2.057 \pm 0.448$ ) in the total participants.

### 3.4.2 Covid-19 impact on mental health and day-to-day leisure activity:

It was reported that Covid-19 had highly impacted 140 participants (18.19%) and an extremely high impact on 76 participants (9.84%). Only 64 participants (8.2%) felt no impact. More than 50 % of participants (n=492) felt quite a little impact of covid. There was a significant association seen between the covid-19 impact on leisure activities and mental health ( $p < 0.001$ ). There was an extremely high impact on 176 participants (30.13%) out of 584, who missed out the feeling of being with friends. Similarly, out of 268 participants, 94 participants (35.07%) expressed the feeling of missing out on grocery shopping, going to market.

## 3.5 Change in sleep activity during the lockdown

There was a significant change observed in the sleeping pattern when compared pre and during the covid phase ( $p < 0.001$ ). There was a decrease in the percentage of people who slept only at night for 8 hours during covid (82.9% vs 46.3%). The percentage of participants who slept both day and night was more during covid (7.2% vs 23.8%), as seen in (Figure 3)

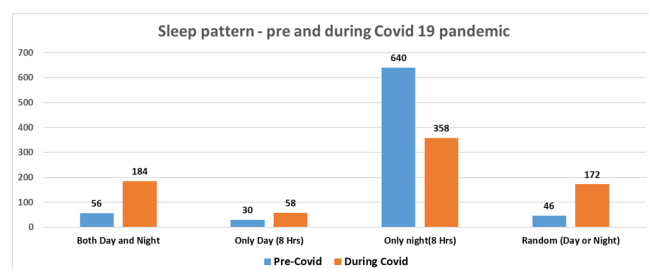


Fig 3. Change in sleep pattern

## 4. Discussion

The present cross-sectional web-based study with a sample size of 772 participants, (51.2% were males and 48.8% were females) was conducted on the Indian population to study the impact of COVID -19 on the dietary pattern, physical activity, mental health, and changes in daily lifestyle using a differentiated questionnaire created in the google form.

The age group of the majority of participants was between 21-30 years and 41-50 years. The majority of internet users in India belong to this age group (21-30)<sup>(11)</sup>. By occupation, the majority of participants belong to the service classes, shopkeepers, students, and work from home. Most of the participants had no history of pre-existing as the majority of participants belong to the age group between 21-30. Hypertension and diabetes were reported by only a few of the participants. Among all the age groups, maximum increase in BMI was observed in the age group 21-30.<sup>(11)</sup>

By occupation, the majority of participants belong to the service classes, shopkeepers, students, and work from home. Most of the participants had no history of pre-existing as the majority of participants belong to the age group between 21-30. Hypertension and diabetes were reported by only a few of the participants.

In our study, it was found that a predominant number of participants (49.70%) reported an increase in their food intake during the lockdown. Similar reports were found in Renzo LD et al<sup>(9)</sup>.

The lockdown led to changes in the eating habits and overall lifestyle of the population. It was found that there is an increase in consumption of fruits, vegetables, nutritional supplements, and immunity boosters. The spike in immunity boosters in food is primarily potentially tied up with overall wellness and immunity to fight Covid-19. Spices consumption such as garlic, cinnamon, turmeric, ginger, lemon was among the most prominent used out of all. Although on the other hand participants also increased their consumption of high-fat and sugar food items. Out of 254 participants (160, 48.78%) started consuming more fried items during lockdown. Similarly, out 224 participants (132, 41.77%) consumed more Cheese based food items. Out of 218 participants (146, 46.02%) increased consumption of refined flour. All the above food items correspond to increase in BMI as due lockdown physical activity is restricted. All these contribute to weight gain in an individual. In our study, it was found that there was a considerable decrease in physical activities during the lockdown. 82.6% were walking before covid, which dropped to 63% during covid19. Similarly, 33.9% of the participant's jogged pre-covid which dropped to 21.8% during the lockdown. 33% of the participants went to gym for workouts and during lockdown, it dropped to 31.9%. 34.7% of the participants performed Yoga which dropped marginally to 34.1% during the lockdown.

Lockdown measures and mobility restrictions were found to be effective to control the spread of COVID-19, but from an individual's perspective, it had some harmful consequences too, as the majority of the participants reported an increase in their BMI, which could be because of an increase in their food intake during the lockdown, exacerbated by a decrease in their physical activity. Increase in social media and overall screen time was observed, could be due to work from home, online schools and also boredom.

There was an increase in time spent on watching TV contributed by 85.7% increase in participants spending >1 hr. Using mobile phones, social media, playing games, and cooking also considerably increased. These all activities contribute to a lifestyle being more sedentary. This could also be the reason for a significant increase in activities during covid ( $t(771) = 6.97, p < 0.001$ ) as compared to before covid.

According to the findings of the study, 216 participants reported a high impact of covid-19 on day to day life. 114



participants belong to the age group between 21–30 years. And, participants reported that they missed the feeling of meeting friends, going grocery shopping.

Due to lockdown, there is a steep decrease in the number of participants (n=640)s sleeping only at night dropped to (n=358) participants. There was an exponential increase in the sleep pattern of people both day and night. Sleep only was reduced to sleeping at random times this could be due to stress and anxiety induced by lockdown, work from home, free time (no work, no employment), reduced physical activity.

These could explain that pandemics can make the public more sedentary and less active which could lead to increase in BMI and consequent weight gain.

**Limitation of the study:** As the design of survey questionnaires was limited to only in English language and to whom internet the outreach was confined to selected population.

## 5. Conclusion

In this study “Covid-19 Impact on dietary habit, mental health, and physical activity”, we conclude that there was few positive and negative impact of covid-19 on the dietary pattern, mental health, and physical activity. These observations have potential implications that could help to identify the possible factors for change in the dietary, mental and physical behavior and impede through proper counseling.

## 6. Acknowledgment

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