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Research Article

Assessment of Dietary Intake to Boost the Immune System during the COVID- 19 Pandemic Lockdown in Lucknow, Uttar Pradesh: Online Survey Study

Sunita Mishra[1]* and Abhishek Yadav[2]

[1]*Professor, Department of Food and Nutrition, School of Home Science, Babasaheb Bhimrao Ambedkar University, Lucknow, India*

[2]*MSc Student, Department of Food and Nutrition, School of Home Science, Babasaheb Bhimrao Ambedkar University, Lucknow, India*

***Corresponding Author:** Sunita Mishra, Professor, Department of Food and Nutrition, School of Home Science, Babasaheb Bhimrao Ambedkar University, Lucknow, India.

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Abstract

People's diets and lifestyles have been disrupted by the Corona virus SARS-CoV-2 (COVID-19) pandemic. This study's objectives were to examine any changes brought on by the COVID-19 pandemic, to quantify food consumption among people of different ages using the Food Consumption Score, and to determine the factors that affected those changes. Additionally, it evaluated the use of immune-stimulating food supplements as a virus-prevention strategy, such as gooseberries and spices. For the current study, information was gathered from adults in India between the ages of 15 and 50 (divided into young and middle-aged adults) via an online survey in the form of a questionnaire. The study found that young adults had higher Food Consumption Scores than their middle-aged counterparts over the two time points before COVID-19 and during COVID-19. The pandemic also resulted in an increase in the intake of foods renowned for their immune-boosting properties, including as spices, gooseberries, and Neem. The study's findings show an increase in nutritional awareness across all age categories, particularly in terms of consumption of immune-boosting foods during the COVID-19 pandemic.

Keywords: COVID-19; Immune System; Vitamin C; Lockdown; Pandemic

Introduction

Lucknow, like the rest of Uttar Pradesh, was affected by the COVID-19 pandemic. The city witnessed a significant number of COVID-19 cases, and the healthcare system faced challenges in managing the surge [1]. Hospitals and healthcare facilities were strained due to the increased demand for medical resources, including hospital beds, oxygen, and medications [2]. To curb the spread of the virus, lockdowns and various restrictions were implemented in Lucknow [3]. These restrictions included the closure of non-essential businesses, educational institutions, and public places [4]. The pandemic had a considerable impact on the local economy [5]. Many businesses, especially those in the hospitality, tourism, and retail sectors, faced significant disruptions and financial losses [6]. The closure of businesses and reduced economic activities resulted in job losses and reduced income for many individuals and families [7].

Educational institutions, including schools and colleges, were closed during the lockdowns to ensure the safety of students [8]. Online classes and remote learning methods were adopted to continue educational activities [9]. However, access to digital resources and infrastructure posed challenges for many students, especially those from marginalized communities [10]. The pandemic brought about changes in people's daily lives and social interactions [11]. Physical distancing measures, wearing masks, and avoiding gatherings became the new norm [12]. Social events, festivals, and religious gatherings were either canceled or held with limited participation to prevent large gatherings and minimize the risk of virus transmission [13].

Unexpected alterations in our daily routine can have an impact on our well-being. In the current pandemic, maintaining an appropriate nutritional state is critical for improving immunity and disease recovery [14]. According to a recent study, the fear of becoming infected with COVID 19 during the lockdown encouraged people to adopt several healthy strategies that resulted in changes in their daily routine, such as meditation, brisk exercises, and a nutritious diet [15]. A great emphasis was placed on nutrition and dietary intake to limit the spread and consequences of COVID 19 [16]. People were encouraged to have a well-balanced diet because proper nutrition can contribute to better recovery and outcomes [17].

The pandemic has also led to an increase in the consumption of immune-boosting foods as a preventive measure against contracting the virus [18]. Some nutrients that help confer immunity are Vitamins A and C [19]. Vitamin A is known to enhance antibody responses to antigens and also prevents apoptosis, and deficiency of this vitamin brings about an alteration in immune function [20]. Vitamin C plays a vital contributor to immunity [21]. There is substantial evidence of vitamin C's role in potentiating B-cell and T-cell proliferation in addition to the prevention of respiratory infections. Spices are known to play a role in the maintenance of immunity [22]. A study conducted during the progression of COVID-19 showed that countries with higher consumption of spices had a higher recovery rate from the condition [23]. A higher death rate was also observed in those countries which had a lower per capita spice consumption [24].

Therefore, the current studies on the basis of online survey were assessed for the data of boosting immune system during the pandemic lockdown of Lucknow people.

Method and Survey Design

This online cross-sectional survey was conducted between May 03, 2021 to May 05, 2021. The responses of 58 participants were received on the basis of questions asked via a Google form link [25].

All the respondents were received from the district of Lucknow, Uttar Pradesh, India. An online Google form was circulated by creating a link and circulating on various social media platforms to record the responses [26].

The data obtained from the responses was thus solely available to the authors. The study made no use of participants' personal identification.

The study comprised a validated questionnaire that collected information such as age, gender, socioeconomic status, anthropometric measures (height and weight), food intake pattern, and immune-boosting dietary practices [27].

The study population was divided into two groups: young individuals (15-30 years old) and middle-aged adults (31-50 years old). Prior to data collection, age groups were classified. Responses on food consumption patterns and the use of immune boosters were evoked at two separate time intervals, namely before and during the first wave of the COVID-19 pandemic [28]. During the latter period, data was collected, and participants were asked to recollect their nutrition patterns prior to the pandemic [29]. Each participant submitted one response, and the information they gave was analysed.

The sociodemographic information recorded comprised location of residence, marital status, family type, educational qualification, occupation, and income class [30]. The Socio-Economic Status (SES) was estimated on the basis of educational qualification, occupation of the head of the household, and family income class [31].

To understand the change in the dietary pattern observed in order to boost immunity during the COVID-19 pandemic, the intake of various dietary patterns were also recorded [32].

Variables	Number
Male	34
Female	24
Age (Young adult)	16
(Middle aged)	42
Locality	
Rural	51
Urban	07
Educational Qualification	
10th	04
12th	13
Graduation	25
Post Graduation	16
Religion	
Hindu	42
Muslim	13
Christian	03
Others	00
Marital Status	
Married	38
Unmarried	16
Widowed	04
Locality	
Rural	51
Urban	07
Monthly income	
5000-15000	05
15001- 30000	20
30001-70000	21
70001- 150000	12
If the lockdown or pandemic affected one's job	
Yes	28
No	20

Table 1: Personal information of the participants.

Results

Sociodemographic and Personal information

Table 1 consists of personal information of the participants. The major sampling population was male (60%). COVID-19 has a significant impact on many people's employment status [33]. Due to the pandemic, 28% of respondents' occupations were impacted in terms of lower pay, longer working hours, or unforeseen job termination.

Anthropometric measurements

Male and female participants' average heights were 178.23 ± 0.16 cm and 162.12 0.12 cm, respectively, while their average weights were 73.15 ± 02.46 Kg and 66.06 ± 0.31 Kg. 2.7% of the total population were underweight, 46% were overweight, and 22.8% were categorised as obese.

Diet pattern

The survey collected information about the individuals' dietary habits. Non-vegetarian eating patterns had a higher participation rate (54.7%) than other diet patterns. Lacto-vegetarian (29.7%), Ovo-lactovegetarian (6.8%), Ovo-vegetarian (1.8%), Pescatarian (1.6%), and Vegan (5.4%) food patterns were also followed.

Pairwise comparison tests were done for the two time points - before and during COVID-19 - to assess the consumption pattern of meal, snack, and non-homemade food intake. A paired t-test revealed that meal frequency did not differ significantly between pre-COVID and COVID timeframes ($p = 0.18$). The frequency of snack consumption increased significantly ($p = 0.012$) from before to during COVID-19 periods.

Food consumption score

Individuals with normal sugar/oil diets had their Food Consumption Scores classified as "Poor" (0-23 points), "Borderline" (20.5-25 points), or "Acceptable" (>37 points). Individuals who ingested oil and sugar on a daily basis and were thus classed as "High sugar/oil" had satisfactory Food Consumption Scores (>44 points) at both time points.

Consumption of immune boosters

The study concentrated on the consumption of immune boosters at the two time points. It considered whether or not a specific immune booster was used, as well as how its intake evolved throughout the course of the study [34].

The detailed representation has been represented in Figure 1 and 2 for boosting immune system during COVID -19 Pandemic.

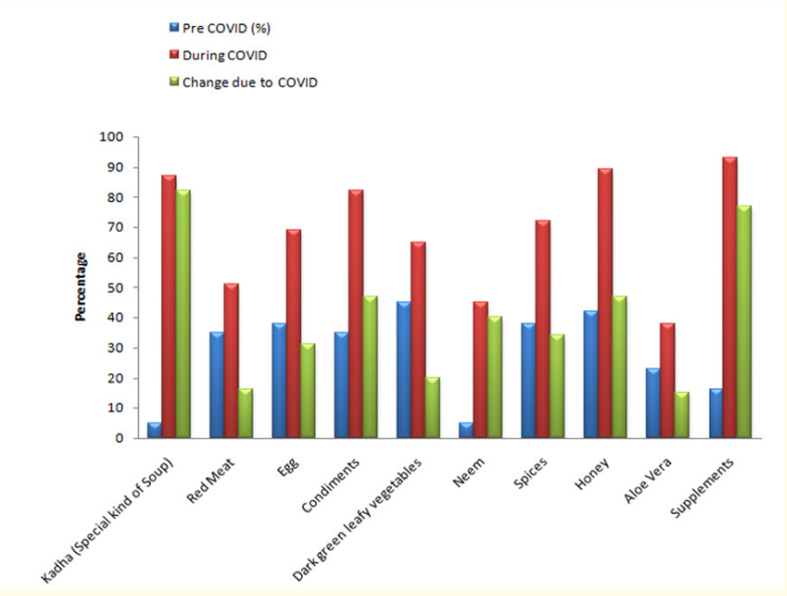

Figure 1: Graphical representation of comparison of various immune-boosting food during the two points.

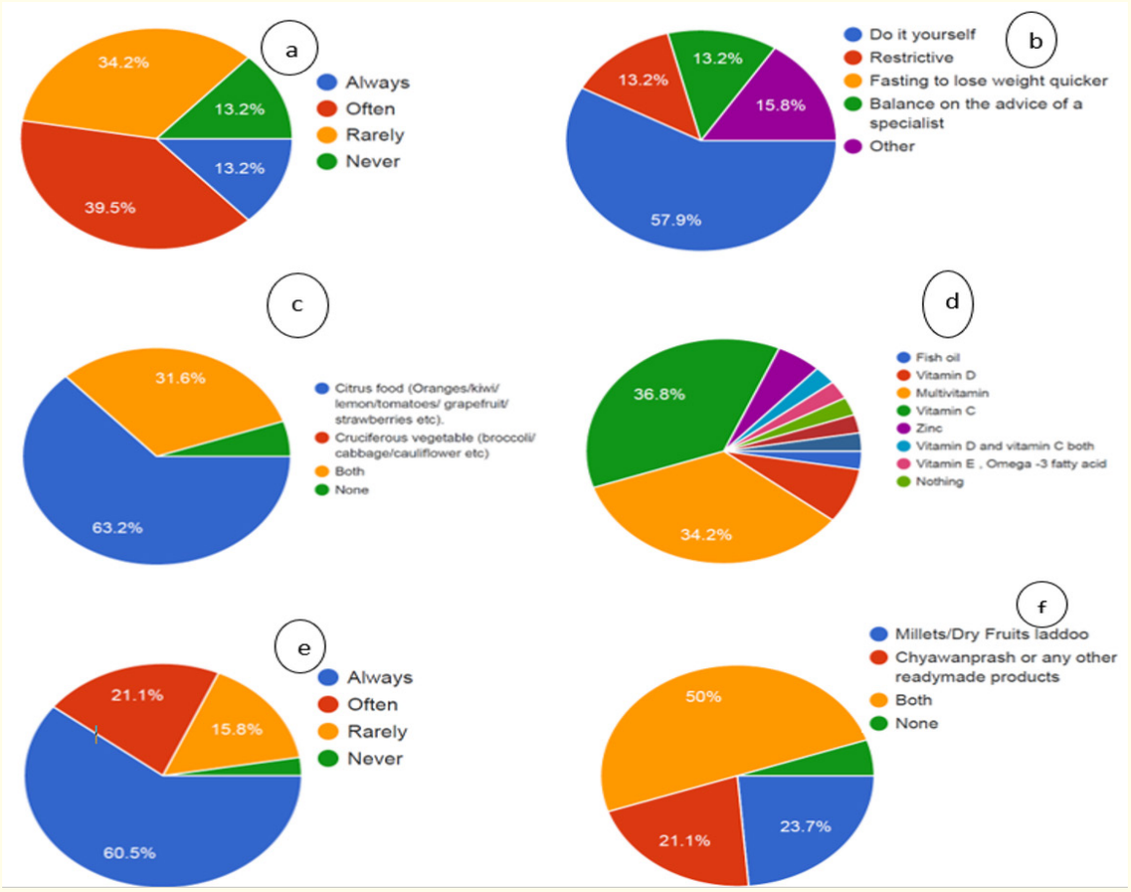

Figure 2: Pie graph for other parameters for boosting immune system during COVID 19 (a) Avoidance of carbohydrate food (b) type of diet during pandemic (c) source of protein during pandemic (d) type of dietary supplements (e) Avoid of street food (f) source of minerals.

Table 2 shows that intake of condiments, fruit, gooseberries, honey, neem, and spices increased significantly during COVID-19. Although consumption of aloe vera and dark green leafy vegetables increased during the pandemic, the difference was not statistically significant [35].

Kadha (Special kind of Soup)	05	87	82
Red Meat	35	51	16
Egg	38	69	31
Condiments	35	82	47
Dark green leafy vegetables	45	65	20
Neem	05	45	40
Spices	38	72	34
Honey	42	89	47
Aloe Vera	23	38	15
Supplements	16	93	77

Table 2: Comparison of various immune-boosting foods during the two points.

Discussion

Individuals' lifestyles were altered as a result of the COVID-19 pandemic [36]. This has had an impact on eating habits, which were studied in this study to find a probable cause for specific micronutrient deficits [37]. Participants in the study were largely from the urban areas and had educational backgrounds ranging from intermediate or diploma degrees to professional degrees. Many people had lost their employment or had their salary lowered as a result of the nationwide lockdown [38]. This has a direct impact on their income [39]. The impact of the COVID-19 pandemic on jobs and the subsequent lockdown were evaluated to see if these events influenced the Food Consumption Score [40]. In the current study, around 28% of total participants had their workplace routine disrupted by a reduction in compensation, unsuitable and excessive working hours, challenges owing to insufficient transportation, stress, anxiety, and depression, or job termination [41]. The family's SES score was also utilized to determine the proportion of individuals belonging to different socioeconomic strata.

A study conducted in Northern Italy during a COVID- 19 lockdown found considerable evidence of increased consumption of meals, snacks, and unhealthy foods, lesser activity, greater self-reported boredom and anxiety, all of which were significantly connected with weight gain [42].

A substantial difference in the frequency of consumption of non-homemade foods was detected in the current study, with a drop in the frequency during COVID-19 [43].

The Food Consumption Score was used to measure household food security among participants [44]. The current investigation found no significant difference in Food Consumption scores between the two age groups. COVID - 19 studies employed either an online survey or a telephone interview to gather data [45]. This restriction was underlined in a recent study conducted in Addis Abeba, where there was no significant difference in the food consumption score between the two subsequent years 2019 and 2020 [46].

According to the current study, work status and age group had a substantial effect on FCS. A similar outcome was reported in a research conducted on a population in Northern Lao PDR during the COVID-19 pandemic, where Food Consumption Score was exacerbated by poor income and increased difficulties in obtaining food [47].

The COVID-19 pandemic also provided an opportunity to investigate the kitchen for immune-boosting purposes [48]. Communication and social media were found to be effective in spreading awareness about the efficacy of several home remedies in the prevention and treatment of COVID-19 [49]. We collected information on the intake of immune-boosting foods, herbal juice or concoction consumption, and other food items viewed as immune boosters that were not included in our questionnaire [50]. During COVID-19, there was a statistically significant rise in the intake of herbal juice/concoctions [51].

A similar conclusion was recorded in a survey done across multiple nations, in which around 71.8% of total participants consumed Kadha (spices/herbal concoction) during COVID-19 because they believed it would help treat the viral infection, hence improving immunity [52].

Aside from the foods listed above, many fruits and vegetables, such as oranges, guava, papaya, kiwi, beetroot, eggplant, broccoli, and mushrooms, are known as immune boosters during COVID-19 because they are high in minerals such as zinc, magnesium, and vitamins C, D, and E [19].

As the current study was based on an online survey, it was impossible to verify the validity of the replies, making it impossible to validate the predictions that were generated. Self-reported height and weight were used to calculate BMI, which may not be accurate. The pre-COVID era information was acquired based on the person's memory and may not be accurate. The socioeconomic status (SES) statistics could be underestimated or overestimated because it was determined by the participant's response. Because of this, even though the goal of the study was to investigate how the pandemic affected people's eating patterns, the findings might not accurately reflect the community as a whole. There were a total of 58 participants. Perhaps more accurate findings can be obtained with a greater number.

Conclusion

Every person has been profoundly affected by the COVID-19 pandemic's unexpected destruction. All schools, colleges, offices, stores, and markets were closed as the nationwide lockdown went into effect. The individuals' social, financial, and personal lives were further impacted by this. With the new lifestyle, the shift in eating habits was inevitable. Therefore, the purpose of this study was to look into how young and middle-aged people's diets changed generally and how they used immune system boosters both before and after the COVID-19 pandemic.

The findings showed that while the difference was not concerning, the majority of individuals' eating habits had significantly changed. Snack consumption was one area where there was an increase, which may be explained by the fact that individuals overate because they spent the lockdown inside their houses all day. However, there was also a considerable drop in the consumption of non-homemade food, probably as a result of misinformation or fear regarding the pandemic's safety procedures in restaurants.

Individuals' Food Consumption Scores were evaluated, and it was found that most young adults had kept their FCS scores within acceptable ranges both before and during the lockdown, whereas more middle-aged adults, on average, fell into the borderline category before the lockdown, and many of their scores fell even lower during the pandemic. Lower scores in middle-aged adults may be due to the lockdown's poor market accessibility as well as bad affordability because many people's jobs were affected.

People became more wary about taking precautions to avoid getting the virus during the pandemic. This includes eating a variety of foods recognised for strengthening the immune system, with the media persistently bringing attention to the same. Spices and condiments, fruit, gooseberries, honey, and Neem leaves all saw a rise in consumption. The usage of herbal mixtures increased as a result of the pandemic.

This research provides a bird's-eye view of the nutritional alterations brought on by the pandemic. More thorough analysis, including precise causes for these changes, will be provided by multicentric research.

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