

**A Descriptive Survey to Analyze the Dietary Changes among the Indian Population during the COVID-19 Pandemic****Jay Jyoti<sup>1</sup>, Kumar Vikas<sup>2</sup>, Dinesh Kumar<sup>3</sup>, Amita Sinha<sup>4</sup>**<sup>1</sup>Tutor, Department of Community Medicine, Nalanda Medical College and Hospital, Patna, Bihar, India<sup>2</sup>Tutor, Department of Community Medicine, Nalanda Medical College and Hospital, Patna, Bihar, India<sup>3</sup>Tutor, Department of Microbiology, Patna Medical College and Hospital, Patna, Bihar, India<sup>4</sup>Associate Professor, Department of Community Medicine, Nalanda Medical College and Hospital, Patna, Bihar, India

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Conflict of interest: Nil

**Abstract****Aim:** The aim of the present study was to analyze the dietary habits and consumption of different food groups during the pandemic among the Indian population and to observe if there is any shift toward or away from the balanced diet.**Methods:** A cross-sectional study was conducted among 500 participants between the age group of 18 and 60 years through an online survey among the general population for a period of 1 month during the second lockdown for COVID-19. Participants were ensured of confidentiality and that no information was shared to any third party during and after the completion of the study. Permission from the Institutional Ethics Committee was obtained prior to conduction of the study.**Results:** Majority of the respondents belonged to the age group of 18-30 years. A large number of participants were females and undergraduate students. Metropolitan cities were observed to have highest number of respondents in our study. It was observed that majority participants had no change in consumption and almost 30% had raised their consumption of poultry. On the other hand, 17% reduced their intake during the pandemic. It was observed that a large number of respondents increased and less than half of respondents had no change in consumption of milk, whereas 12% decreased drinking it during the lockdown. A large number of participants turned up their consumption and 40% participants had no change in the consumption of breads and buns. In contrast, only 18% turned down their consumption during the pandemic. Change in consumption of fruits and vegetables. It was observed that almost two thirds of participants turned up their fluids consumption. In contrast, one third participants had no change and only a few participants turned down their consumption of water during the pandemic. Maximum difference was observed in case of intake of carbonated beverages where intake was lowered.**Conclusion:** There was a paradigm shift in consumption of certain products primarily to boost immunity and fight the COVID-19 pandemic. Majority of the participants have increased consumption of healthy foods like milk, fruits, vegetables, and nuts which is the need of the hour given that immunity has a big role to play in fighting against COVID-19.**Keywords:** COVID-19, Dietary Changes, Food Groups, Home Remedies, Pandemic, Traditional Medicine.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

The implementation of measures, such as closing borders, home confinement, quarantine, and physical (social) distancing, are crucial for controlling pandemics such as COVID-19, which has posed a global public health emergency threat since early 2019. Despite their apparent benefits to safety and health related to pandemics, these measures can have a significant repercussion on health and well-being because they can drastically and suddenly alter lifestyle behaviors of people in confinement, such as diet, physical activity,

smoking, mealtime, sleep pattern, and alcohol use. [1-5] During the COVID-19 pandemic, particularly when a home confinement policy was implemented by governments, people may have harder access to healthy foods and fitness facilities. They may also start habits that are associated with negative health impacts, such as more time spent watching TV and increased energy intake. [6,7]

A study conducted on 37,252 French adults showed that food intake increased, but diet diversity, intake of fresh produce, and physical activity decreased

during the COVID-19 confinement between April and May 2020. [8] Phillipou et al [9] also noted an increase in both food consumption restrictions and binge eating behaviors in the general population in Australia. Additionally, long-term isolation from staying home can negatively impact mental health, potentially leading to disorders such as depression and anxiety. The consequences of these behavior changes can be impactful if the negative habits established during this challenging time remain after lifting of the COVID-19-related policies. On the other hand, during the current COVID-19 pandemic, positive lifestyle behavior changes have emerged in some populations because of increased time at home and the threat of becoming ill with COVID-19. [10]

India is known for its poor performance in fighting against the problem of food insecurity due to which, it has the second highest number of under-nourished people In November 2020 (during mid of the 1st wave of COVID-19), India ranks the second most infected country in the world after USA with 9,291,068 confirmed cases. The increased infected cases might be due to poor diet quality. On the contrary, the death rate per one million population of India was much lower than other highly infected countries in the above-mentioned period. [11] Taking a cue from above statistics, it can be hypothesized that a definite change in the dietary pattern might have occurred (during the above-mentioned period) due to the physiological component of Corona phobia, that not only helped in enhancing the immune system but also declined the death rate; as dietary ingredients are determinants in shaping the characteristics of immune responses in the host body. [12]

The aim of the present study was to analyze the dietary habits and consumption of different food groups during the pandemic among the Indian population and to observe if there is any shift toward or away from the balanced diet.

**Materials and Methods**

A cross-sectional study was conducted Department of Community Medicine, Nalanda Medical College and Hospital, Patna, Bihar, India for among 500 participants between the age group of 18 and 60 years through an online survey among the general population for a period of 1 month during the second lockdown for COVID-19. Participants were ensured of confidentiality and that no information was shared to any third party during and after the completion of the study.

**Methodology**

**Sampling method and data collection**

Snowball sampling method was adopted for the study. The questionnaire was circulated online with the help of social media among the urban population in India. The questionnaire contained information regarding the socio-demographic details of the study participants, changes in consumption pattern of various food groups, along with junk food and processed carbohydrates, and information regarding inclusion of traditional home remedies for prevention and protection from COVID-19 in their routine diet.

The participants were briefed regarding the objectives of the study and assured anonymity of their responses. During the survey, participants could leave at any stage before submission and their responses were only recorded when they clicked “submit.”

**Inclusion criteria**

Participants that give an informed consent and were willing to comply with the protocol of the study.

**Exclusion criteria**

1. Participants that were diagnosed with diseases that require lifestyle modification (like Diabetes and Hypertension) during the pandemic.
2. Duplicates and incomplete entries were excluded during data analysis.

**Result**

**Table 1: Social demographics of the study population**

Age	N	%
18-30	435	87
30-40	25	5
>40	40	8
<b>Gender</b>		
Male	200	40
Female	300	60
<b>Religion</b>		
Hindu	175	35
Muslim	325	65
<b>Educational status</b>		
Undergraduate	430	86
Postgraduate or above	70	14
<b>Type of residence</b>		
Metropolitan cities	225	45
Mid-level cities	175	35
Small cities	100	20

Majority of the respondents belonged to the age group of 18-30 years. A large number of participants were females and undergraduate students. Metropolitan cities were observed to have highest number of respondents in our study.

**Table 2: Change in consumption of pattern of various food groups**

	Higher % 35	N 175	About the same % 48	N 240	% 17	N 85
<b>Poultry</b>						
Meat	30	150	45	225	25	15
Fish and seafood	12	60	40	200	48	240
Eggs	38	190	40	200	22	110
Frozen proteins	12	60	40	200	48	240
<b>Dairy products</b>						
Milk	45	225	43	215	12	60
Curd	40	200	43	215	17	85
Cottage cheese	28	140	45	225	27	135
<b>Carbohydrates</b>						
Breads and Buns	40	200	40	200	20	100
Rice	48	240	43	215	9	45
Wheat	40	200	52	260	8	40
Other cereals	22	110	52	260	26	130
<b>Fruits and vegetables</b>						
Green leafy vegetables	50	250	40	200	10	50
Roots and tubers	40	200	50	250	10	50
Flowers	30	150	52	260	18	90
Seeds	30	150	52	260	18	90
Fruits	60	300	30	150	10	50
Frozen vegetables	18	90	52	260	30	150
<b>Fats and oils</b>						
Oil	25	125	64	320	11	55
Butter	30	150	52	260	18	90
Ghee	35	175	50	250	15	75
Nuts	40	200	40	200	20	100

It was observed that majority participants had no change in consumption and almost 30% had raised their consumption of poultry. On the other hand, 17% reduced their intake during the pandemic. It was observed that a large number of respondents increased and less than half of respondents had no change in consumption of milk, whereas 12% decreased drinking it during the lockdown. A large number of participants turned up their consumption and 40% participants had no change in the consumption of breads and buns. In contrast, only 18% turned down their consumption during the pandemic. Change in consumption of fruits and vegetables. It was observed that majorly respondents developed practice of ate more of fruits and vegetables, while on the other hand 40%

and 10% ate the same amount and less leafy vegetables, respectively, during the pandemic. Change in consumption of fats, oils, and nuts: It was recorded that a lot respondents did not change their oil consumption, while almost a third reported to have increased their consumption. Along with this, a remarkable change was observed in the frequency of intake of traditional remedies. The participants had varied responses to change in consumption of processed carbohydrates, of which a major change was observed in the intake of saturated carbohydrates like chocolates and candies. Similar pattern was found in case of junk food intake where more than half participants had lowered the intake of junk foods

**Table 3: Consumption pattern of traditional home remedies**

Home remedies	Always N(%)	Sometimes N(%)	Rarely N(%)	Never N(%)
Turmeric	35 (175)	35 (175)	90 (18)	60 (12)
Neem	6 (30)	24 (120)	35 (175)	35 (175)
Tulsi	70 (14)	140 (28)	140 (28)	150 (30)
Ginger	200 (40)	180 (36)	50 (10)	70 (14)
Triphala	30 (6)	75 (15)	150 (30)	245 (49)
Giloy	25 (5)	100 (20)	150 (30)	225 (45)
Amla	50 (10)	125 (25)	150 (30)	175 (35)
Kadha	75 (15)	190 (38)	125 (25)	110 (22)
Ashwagandha	40 (8)	150 (30)	140 (28)	170 (34)

It was observed that almost two thirds of participants turned up their fluids consumption. In contrast, one third participants had no change and only a few participants turned down their consumption of water during the pandemic. Maximum difference was observed in case of intake of carbonated beverages where intake was lowered.

### Discussion

At the end of 2019, WHO recommended certain changes in diet which were supposed to be considered across cultures by everyone. After the COVID-19 outbreak, we observed a lot of changes in people's lifestyle, dietary pattern, and exercise in the entire population. The lockdown has thrown different types of challenges at the Indian population. [13] Many have lost jobs while many families have lost their primary source of income due to COVID-19 leading to financial constraints and switching to cheaper sources of food. The major challenge being decreased availability of fresh foods like fruits, vegetables, etc., and a switch to processed foods that led to a change in emotional responses of an individual. [13,14] There has been constant news regarding the increase in cases which has led to stress eating. [15,16] This tense situation has promoted packaged foods rich in carbohydrates that enhance the release of serotonin, the so-called happy hormone. [17] There was added pressure on the homemaker to provide food which encouraged the use of ready to eat foods and frozen foods. [18]

Majority of the respondents belonged to the age group of 18-30 years. A large number of participants were females and undergraduate students. Metropolitan cities were observed to have highest number of respondents in our study. It was observed that majority participants had no change in consumption and almost 30% had raised their consumption of poultry. On the other hand, 17% reduced their intake during the pandemic. It was observed that a large number of respondents increased and less than half of respondents had no change in consumption of milk, whereas 12% decreased drinking it during the lockdown. A large number of participants turned up their consumption and 40% participants had no change in the consumption of breads and buns. In contrast, only 18% turned down their consumption during the pandemic. Change in consumption of fruits and vegetables. It was observed that majorly respondents developed practice of ate more of fruits and vegetables, while on the other hand 40% and 10% ate the same amount and less leafy vegetables, respectively, during the pandemic. Change in consumption of fats, oils, and nuts: It was recorded that a lot respondents did not change their oil consumption, while almost a third reported

to have increased their consumption. Along with this, a remarkable change was observed in the frequency of intake of traditional remedies.

The participants had varied responses to change in consumption of processed carbohydrates, of which a major change was observed in the intake of saturated carbohydrates like chocolates and candies. Similar pattern was found in case of junk food intake where more than half participants had lowered the intake of junk foods. It was observed that almost two thirds of participants turned up their fluids consumption. In contrast, one third participants had no change and only a few participants turned down their consumption of water during the pandemic. Maximum difference was observed in case of intake of carbonated beverages where intake was lowered. A study done by Kumar RR in India showed that the maximum number of participants lost weight during the pandemic. The intake of bread/buns has decreased while cereals have increased as this could be easily stocked at their homes. The study also showed that foods containing sugar were consumed less by the participants to maintain fitness. Many participants decreased takeaway food consumption because of the restrictions due to the lockdown. [19] In contrast to this study, the participants of our study have increased the consumption of breads and buns as well as sweets. Another study conducted by R Bracale showed that there was an increase in the intake of pasta, flour, eggs, long-life milk, and frozen foods, in comparison with a reduction of fresh food goods. The sales of snacks have dropped relative to the production of homemade bread, pizza, and cakes. [20] A study done in Poland demonstrated overweight and obese individuals showed less frequent consumption of vegetables, fruit, and legumes during quarantine, and higher adherence to meat, dairy, and fast-foods, [21] whereas the participants of this study have increased the consumption of fresh fruits and vegetables and reduced the consumption of frozen foods. Although the present study provides generic insights on changed dietary habits among Indian population during COVID-19 pandemic, the outcomes are not free from limitations. First, the study relied on comparatively a small sample. Second, the study only captured the changes in the dietary pattern in terms of additional food items; but failed to provide information on quantity and frequency of consumption.

### Conclusion

There was a paradigm shift in consumption of certain products primarily to boost immunity and fight the COVID-19 pandemic. Majority of the participants have increased consumption of healthy foods like milk, fruits, vegetables, and nuts which is the need of the hour given that immunity has a

big role to play in fighting against COVID-19. Overall, there has been a positive shift in the dietary pattern of the Indian population toward foods that help develop immunity despite its limited availability during the pandemic. Further studies could be conducted in future to assess whether the population has continued with the development of healthy habits since the pandemic.

## References

1. Hu Z, Lin X, Chiwanda Kaminga A, Xu H. Impact of the COVID-19 epidemic on lifestyle behaviors and their association with subjective well-being among the general population in mainland China: cross-sectional study. *Journal of medical Internet research*. 2020 Aug 25;22(8):e21176.
2. Di Renzo L, Gualtieri P, Pivari F, Soldati L, Attinà A, Cinelli G, Leggeri C, Caparello G, Barrea L, Scerbo F, Esposito E. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *Journal of translational medicine*. 2020 Dec;18(1):1-5.
3. Lippi G, Henry BM, Sanchis-Gomar F. Physical inactivity and cardiovascular disease at the time of coronavirus disease 2019 (COVID-19). *European journal of preventive cardiology*. 2020 Jun;27(9):906-8.
4. Benedict C, Brandão LE, Merikanto I, Partinen M, Bjorvatn B, Cedernaes J. Meal and sleep timing before and during the COVID-19 pandemic: a cross-sectional anonymous survey study from Sweden. *Clocks & sleep*. 2021 Apr 22;3(2):251-8.
5. Sinha M, Pande B, Sinha R. Impact of COVID-19 lockdown on sleep-wake schedule and associated lifestyle related behavior: A national survey. *Journal of Public Health Research*. 2020 Jul 28;9(3):jphr-2020.
6. Thomson M, Spence JC, Raine K, Laing L. The association of television viewing with snacking behavior and body weight of young adults. *American Journal of Health Promotion*. 2008 May;22(5):329-35.
7. Boulos R, Vikre EK, Oppenheimer S, Chang H, Kanarek RB. *ObesiTV*: how television is influencing the obesity epidemic. *Physiology & behavior*. 2012 Aug 20;107(1):146-53.
8. Deschasaux-Tanguy M, Druesne-Pecollo N, Esseddik Y, de Edelenyi FS, Allès B, Andreeva VA, Baudry J, Charreire H, Deschamps V, Egnell M, Fezeu LK. Diet and physical activity during the coronavirus disease 2019 (COVID-19) lockdown (March–May 2020): Results from the French NutriNet-Santé cohort study. *The American journal of clinical nutrition*. 2021 Apr;113(4):924-38.
9. Phillipou A, Meyer D, Neill E, Tan EJ, Toh WL, Van Rheenen TE, Rossell SL. Eating and exercise behaviors in eating disorders and the general population during the COVID-19 pandemic in Australia: Initial results from the COLLATE project. *International Journal of eating disorders*. 2020 Jul;53(7):1158-65.
10. Bennett G, Young E, Butler I, Coe S. The impact of lockdown during the COVID-19 outbreak on dietary habits in various population groups: a scoping review. *Frontiers in nutrition*. 2021 Mar 4; 8:626432.
11. Worldometer. COVID-19 Coronavirus Pandemic; 2020.
12. Naja F, Hamadeh R. Nutrition amid the COVID-19 pandemic: a multi-level framework for action. *European journal of clinical nutrition*. 2020 Aug;74(8):1117-21.
13. Nicola M. The emotional impact of COVID-19: From medical staff to common people. *Brain, Behav., Immun*. 2020.
14. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, Ho RC. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International journal of environmental research and public health*. 2020 Mar; 17(5): 1729.
15. Yılmaz C, Gökmen V. Neuroactive compounds in foods: Occurrence, mechanism and potential health effects. *Food Research International*. 2020 Feb 1; 128:108744.
16. Rodríguez-Martín BC, Meule A. Food craving: new contributions on its assessment, moderators, and consequences. *Frontiers in PSYCHOLOGY*. 2015 Jan 22;6:21.
17. Ma Y, Ratnasabapathy R, Gardiner J. Carbohydrate Craving-not everything is sweet. *Current opinion in clinical nutrition and metabolic care*. 2017 Jul;20(4):261.
18. Calder PC, Carr AC, Gombart AF, Eggersdorfer M. Optimal nutritional status for a well-functioning immune system is an important factor to protect against viral infections. *Nutrients*. 2020 Apr 23;12(4):1181.
19. Vaidyanathan S, Kuppili PP, Menon V. Eating disorders: An overview of Indian research. *Indian Journal of Psychological Medicine*. 2019 Jul;41(4):311-7.
20. Bracale R, Vaccaro CM. Changes in food choice following restrictive measures due to Covid-19. *Nutrition, Metabolism and Cardiovascular Diseases*. 2020 Aug 28;30(9): 1423-6.
21. Sidor A, Rzymski P. Dietary choices and habits during COVID-19 lockdown: experience from Poland. *Nutrients*. 2020 Jun 3; 12(6):1657.