



IMPORTANT ROLE OF FOOD AND NUTRITIONAL SECURITY DURING COVID-19: A SURVEY

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Abstract

The Covid-19 epidemic is now the most pressing issue on a global scale. To combat viruses, a healthy nutritional state must be attained and maintained. A person's nutritional status is influenced by a number of variables, including age, sex, health condition, way of life, and medicines. During this COVID-19 pandemic, the nutritional state of people has been exploited as a resistance against instability. Strengthening the immune system is the only sustainable approach to live in the present environment since optimal nutrition and dietary nutrient intake have an influence on it. Except for vitamin C, which is one of the greatest ways to boost immunity, there is no proof that supplements help heal the immune system. A healthy diet can guarantee that the body is prepared to fight the infection. However, proper food practices and food safety management are required in addition to the dietary management standards. The present article explored about the survey of immunity boosters and vitamin C supplements for better recovery from COVID-19.

Keywords: COVID-19, Vitamin C, Immunity Boosters, Market Survey.

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DOI: 10.48047/ecb/2023.12.si5a.013

Introduction

Food and nutrition play an important role in this pandemic situation. There are several fruits used during treatment of COVID-19. In this review, we have to study the role of food and nutrition to boost the immune system. Indian fruits, vegetables and other horticultural commodity increased in March 2020. Fruits in the citrus family grow on evergreen trees or shrubs [1]. Citrus fruits (*Rosaceae* family) are rich sources of vitamin c, anthocyanins, and flavanones, with hesperidin and naringin as the most abundant components, which have various properties, including antioxidant and anti-inflammatory activity [2]. Nutritional deficiencies of energy, protein, and specific micronutrients are associated with depressed immune function and increased susceptibility to infection [3]. Among the benefits of the Mediterranean diet for the protection from many diseases, there is also the high consumption of foods rich in bioactive substances such as polyphenols and vitamins, including vitamins A, C, D, E. Food polyphenols constitute a large family of substances, with beneficial effects in a large group of communicable and non-communicable diseases. These compounds support and improve the body's defenses against oxidative stress and in the prevention of cardiovascular diseases, atherosclerosis and cancer [4, 5].

Food supply chains have needed to adjust rapidly to demand-side shocks, including panic buying and changes in food purchasing patterns [6]. Any changes to the food supply will inevitably impact food, nutrition, and health policies, particularly pertaining to food production, agricultural practices, dietary patterns, nutrition, and health guidance and management [7]. Vitamin C is usually considered the major antioxidant in citrus fruits. In oranges the concentration of ascorbic acid in peel is higher than in the center of the fruit. The vitamin C is found in higher concentration in lemon peel and lower in the pulp and juice [9-11]. On the basis of clinical trials, it is proposed that the oral administration of vitamin C in combination with Quercetin gives antiviral and antioxidant effect. Studies also revealed that the oral administration of 250-500 mg Quercetin + 500 mg vitamin C for high risk and mild symptoms twice a day for 7 days improves the overall recovery of SARS CoV-2 patients [12].

Vitamin D supplementation may reduce the hazard for viral infections, including respiratory tract diseases, by reducing creation of pro-inflammatory compounds in the body. Increased

vitamin D in the blood has been connected in prevention of other chronic disease like tuberculosis, hepatitis, and cardiovascular ailment. Food sources of vitamin D include fortified cereals and plant-based diet, milks and supplements [13]. Apparently, supplementation with vitamin D brings down the probability of creating intense respiratory tract infections to varying degrees among the individuals who were infected, influenza manifestations experienced were less with recovery sooner if higher dosages of Vitamin D more prominent than 1000 IU were managed [14-16].

Traditional medicine system such as Ayurveda, have a holistic approach of consideration mind body physiology to deal with disease condition [17]. Extract from plant have also been documented to display anti-SAR-CoV-2 effect from a screening analysis using hundreds of Chinese medicinal herbs [18]. The COVID-19 Pandemic has increased the demand for Immunity booster under Ayurveda and homoeopathy at different Covid-19 dedicated facilities. Because the Ayurvedic immunity booster build immunity against infection and can help you to make your immunity system stronger [19].

The companies such as Dabur, Baidyanath, Patanjali and Himalaya wellness said that they have seen an increase in demand for Ayurvedic products across portfolio. Metabolomics is an important tool for standardization and quality control in ayurvedic [20]. Dabur said it was, witnessing a strong growth the interrogation for main products, particularly the immunity booster range that includes kadha, tea, powder, paste, syrup etc. The demand for ayurvedic products with health care benefits has gone up [21].

Immunity booster Ayurvedic products contain Turmeric, Giloy, Black Pepper, Cinnamon, Tulsi, Ginger, Dalchini, and more [22]. Turmeric has an anti-inflammatory, antimicrobial, antioxidant properties, Giloy has a cardio protective, anti-arthritis properties, Tulsi has an antibacterial, antipyretic properties, Ginger is loaded with antioxidant, compound that prevents stress and damage to your body's DNA [23]. It is great for your immune system. All the ayurvedic products offer the umbrella of wellness and immunity have witnessed considerable increase in demand [24-28-29].

Present article focused on the use of fruits for enhancing the immunity of all aged groups against COVID-19, to analyze the fruits which has good nutritional value, to council the patients about

food and nutrition security at community level, to assess the impact of food to boost our immune system, to assess various types of citrus fruits used in COVID-19.

Hypothesis of the study was as follows:

H0: Patients not satisfied with citrus fruit to boost immunity;

H1: Patient satisfied with citrus fruit to boost immunity;

H2: Another is Patients who used herbal drugs to recover from Covid-19 infection;

H3: Fruit Market Survey in Nagpur from COVID-19 Pandemic.

Research methodology

Research is systematic and creative effort done to add our understanding of people, culture, and society and to apply that information to develop new applications. The systematic, theoretical examination of a technique used in an area of research is called methodology. It usually relies on both qualitative and quantitative methods.

Sampling Techniques

Sample Size: 4 Types

The word "sample size" in marketing research refers to the whole population of the study. Based on factors such as age, gender, and geographic area, researchers choose their sample. Accurately calculating and determining sample size may offer an advantage over rivals.

Step 1 - Normal people who consumed fruits on daily basis.

Step 2 - Recovered COVID-19 patients.

Step 3 - Food Market survey for daily sale of fruits.

Step 4 - Doctors who prescribed vitamin C.

Step 5 -Market popular products, home remedy used conventional sample to collect data.

Step 6 - Market survey on the basis of sale of fruits in March to August 2021 in Nagpur.

Sampling Method: Convenient sampling or interview.

In this sampling method, the sample respondents were chosen purely on their proximity to the survey desk and their willingness to participate in the research.

Tools for Data Collection and Analysis

Data Collection: Interview method was used in structured questionnaire.

Data Analysis: All the data collected were presented in MS-Excel.

Questionnaire - I

1. Are u recovered from COVID-19 infection?

A. Yes B. No

2. Have you consumed fruits to recover from Covid-19?

A. Yes B. No

3. Which type of fruits you eat during treatment of Covid-19?

A. Fibrous fruit (contains fibers)
B. Citrus fruits (Vitamin C)
C. Iron rich fruits
D. None of these

4. Did u eat citrus fruits to boost immunity?

A. Yes B. No

5. Among the following which citrus fruit you eat most?

A. Oranges and limes B. Kiwi
C. Papaya D. All of these

6. How many times it takes to recover from a COVID-19 infection?

A. More than 15 day's B. At least 20 days
C.1 Month D. Other

7. Do you agree that citrus fruits can be used to boost the immunity and cure the infection?

A. Yes B. No

8) Do u eat fruits in yours daily routine?

A. Yes B. No

9) How is the sale of fruits during COVID-19 pandemic?

A. Increased B. Average
C. Decreased D. None of these

10) Is the sale of citrus fruits increased?

A. Yes B. No

11) Which fruit is more offer by peoples?

A. Apple B. Papaya
C. Orange D. Banana

12) Have your doctors prescribe you a Vitamin C supplement?

A. Yes B. No

13) Which Doctor prescribe you Vitamin C?

14) Is Vitamin C being essential for Covid-19 infection recovery?

A. Yes B. No

15) Will you recommended to other people to eat citrus fruits?

- A. Yes B. No

16) Which food boosts the immune system?

- A. Citrus fruits B. Chocolates
C. Blueberries D. All of the Above

17) Can Pandemic Hit the Cultivation of Crop During Lockdown?

- A. Yes B. No

18) How Good Nutritional Therapy Helps in Coved Situation

- A. Getting Strong Immunity
B. Prevent From Opportunistic Disease
C. None
D. Both A and B

19) In Current Condition Demand of Fruits and Veggies in Maharashtra will be?

- A. Increase B. Decrease
C. Stable D. None

20) Currently Supply Of vegetables in Mandy?

- A. Lower B. Higher
C. Stable D. None

21) Which Factor Play and Important Role in Covid-19 situation?

- A. Exercise
B. B. Eat Healthy Foods
C. Strong Immune system
D. All of the Above

22) Vitamin C helps your body to fight disease by maintaining a strong immune system. Which food has more vitamin C?

- A. Oranges B. Lemon
C. Avocados D. Both A and C

23) Which Vitamin helps your body to fight disease by maintaining a strong immune system?

- A. Vitamin A B. Vitamin D
C. Vitamin B D. Vitamin C

24) Can Pandemic Hit the Cultivation of Crop During Lockdown?

- A) Yes B) No

25) Can You Get the Coronavirus through Food?

- A) Yes B) No

Questionnaire II: For the people

1) Did you use any Immunity boosters

- A) Yes B) No

2) Did you change any product?

- A) Yes B) No

3) Which form of immunity booster you used?

- A. Syrup. B. Powder C. Paste. D. Extract

4) That you had any side effects after taking this product?

- A) Yes B) No

5) Is Kadha really work in COVID-19

- A) Yes B) No

6) When did you started to use Immunity booster?

- A. Before COVID-19
B. After COVID-19

7) What benefit did you get from Immunity booster?

8) You use it daily?

- A) Yes B) No

9) I think it is very effective against to tackle disease

- A. Agree B. Not sure C. Disagree

Questionnaires III: For the pharmacy and wholesalers

1. How many immunities booster is available in market?

_____.

2. Which brand of products is most sale?

_____.

3. How many products are sold in a day after the arrival of COVID-19?

_____.

4. Which form of products sells the most?

_____.

5. Which immunity booster is best?

_____.

6. How many forms of product are available in the market?

_____.

7. Since when is the immunity booster selling more

- a. Before COVID-19 pandemic
b. After COVID-19 pandemic

8. Are poor people can afford the products available in the market?
_____.

9. What questions asked by people before buying it?
_____.

10. Is any complaints come from the people for any brand of immunity booster?
_____.

Findings of the study

Data collection showed that individuals eat fruits on a daily basis in 2020 (Figure 1). Citrus fruits were shown to be the most popular choice among both individuals and COVID-19 patients (Figure 2). 85% of respondents were aware of foods that strengthen immunity, and the majority of people ate citrus fruits (Figure 3). Oranges and limes were the most often utilized citrus fruits (Figure 4). The graph showed that whereas 99% and 92% of individuals consumed citrus fruits and vitamin C as immune boosters, respectively, 76% of physicians prescribed vitamin C tablets (Figure 5).

According to the survey, after eating fruits in the year 2020, 58% of females and 42% of men recovered from COVID-19, respectively (Figure 6). Patients made a full recovery. Data from the COVID-19 survey showed that 98% of respondents eat citrus fruits, whereas 2% did not. According to data, Limcee and Zincovit were the supplements most often taken to recover from COVID-19 (Figure 7). According to surveys conducted by several fruit providers, fruit sales were less than 40% before COVID-19 but surged starting in April 2020. Oranges sold more than any other fruit (Table 1).

According to a survey of the most popularly promoted goods to enhance immunity, individuals used traditional treatments like kadha as well as commercial medicines like chyawanprash, herbal tea, etc (Table 2). Data showed that the three months of January, June, and July in 2020 had the highest demand for fruits (Figure 8).

56% of the 100 participants in this poll are men, and 44% are women. The survey found that the majority of respondents (46% of participants) were between the ages of 18 and 45, while 26% of participants were under the age of 18 and 28% were above the age of 45. In our research, 85% of participants had a COVID-19-related contact with emergency medical services, whereas 15% did not. Under 5% of individuals during the COVID-19 Pandemic crisis did not utilize any immunity-boosting products, whereas 95% of people used

them. 67% of participants utilized ayurvedic products, while 11% used homoeopathic ones. Participants who utilized allopathic medicine made up 9%, while 13% used something else. We may infer that the majority of individuals utilized ayurvedic medications to maintain a healthy immune system. In the current research, 46% of participants took an immune booster made by the Ayush Ministry, while 51% of them used Dabur brand products. Around 18% of participants chose Patanjali as their second favorite brand of immunity-boosting product, while 12% enjoyed Himalaya goods, 13% selected Baidyanath, and just over 6% chose any other brand other than these top four. After conducting a study in the Medical Square Wholesale area, it was discovered that during the COVID-19 Pandemic condition, the majority of individuals use herbal Kadha. Chywanprash has the second-highest demand for the commodity. The third-highest demand for tea and powder. And at the very least, folks buy syrup. According to a one-year wholesale market study, the sale of these Ayurvedic items peaked in June 2020. since the virus at this time had spread widely in the neighbourhood. From September through December, less Ayurvedic products were sold. The demand for Ayurvedic products returned in January 2021 as the threat posed by the Corona virus started to resurface. The Ayurvedic preparation is the most popular since it uses natural components, according to an offline study from the Medical Square Wholesale area. There are no adverse effects with natural products. Therefore, the majority of individuals are drawn to Ayurvedic medicine. This study shows that Kadha is most effective and in great demand during COVID-19 (Table 3). 90% of individuals were immunized, according to our survey.

Suggestions and action live

Food and nutrition play a crucial role in immune development, and sound nutrition is the cornerstone of good health. Our bodies need herbal products to sustain immunity and wellness. The general people are strongly encouraged to utilize herbal remedies to treat illnesses and combat infections. Our study revealed that the majority of those who utilized herbal kadha as a preventative during COVID 19 did so. Fighting viruses has a lot of advantages. There are either plant parts, additional plant material, or a mix of both as the active components in the herbal product or herbal preparation. Herbal medicine's appeal has declined. As individuals increasingly choose herbal medicine over other synthetic drugs, it has recently regained some of its prior prominence. Going natural is the greatest way to

cure any ailment or condition since it is no surprise that our environment is full with pollutants and diseases nowadays. Patients with heart, lung, and diabetes are particularly at risk during the COVID-19 pandemic. The herbal remedy may improve the immune system, heal arthritis, minimize the symptoms of infection, lower blood sugar and cholesterol levels, and alleviate bad breath. Potential COVID-19 treatments using herbal preparations After performing study, we learned that the kadha is more efficient during this epidemic. The majority of participants—nearly half—agreed that the greatest virus prevention today is Dabur brand kadha. However, avoid taking kadha every day since it may create intestinal issues. Nearly 45% of those who regularly use kadha report having stomach problems. Although the AYUSH Ministry Formula has refuted assertions that "prolonged consumption" may result in liver problems, to prevent adverse effects, one should take a two-week vacation after taking kadha on a regular basis for three weeks before returning, or use kadha on alternate days. They took about 74% of persons, showing their dedication to prevention. Nearly 89 percent of participants reported no fevers or other issues. Although the drug was difficult to swallow, individuals were prepared to consume it if the predicted benefit was larger; taste did not matter. The intake of kadha was marginally higher than the consumption of pills. The optimum time to consume ayurvedic kadha is when you have a cold, a cough, or allergies. With the goodness of ginger, tulsi, black pepper, and dalchini, which have several health advantages, Dabur Ayush kwath mixes the rich experience of Dabur with these ingredients. Exploiting these natural chemicals' antiviral actions might reveal more about how they interact with the many stages of the viral life cycle, including invasion, penetration, replication, assembly, and release. The biggest Ayurvedic and healthcare corporation in the world, Dabur, has been around for more than 135 years and is the most well-known and trusted brand in India. A hot beverage known as Dabur kadha is created by combining a variety of Ayurvedic herbs and other natural components with a variety of recognized health benefits. Following this study, we suggest Dabur products as being more advantageous and effective for building immunity. You may use them throughout the COVID-19 pandemic to fend off illness and maintain a better immune system.

Ginger- Ginger is a wonder spice that has been scientifically demonstrated to have a number of health advantages. By consuming kadha, which includes ginger, toxins may be quickly eliminated

from the body. As a result of its anti-inflammatory and antioxidant characteristics, it helps to reduce blood sugar, ward off colds, and battle infection.

Tulsi- Tulsi is one of the greatest therapeutic plants and contains antibacterial and antipyretic qualities. The immune system is strengthened by tulsi, which boosts T helper cells and natural killer cells.

Black pepper- Black pepper contains antimicrobial and antioxidant properties. It supports general well-being. It functions well as an antibiotic. It also contains vitamin C, which improves immunity naturally.

Cinnamon- It contains antibacterial, antiviral, anti-inflammatory, and antioxidant properties. Blood pressure is decreased. lowered risk of type 2 diabetes and blood sugar levels. and strengthen immunity.

- Consume fresh leafy vegetables (broccoli, green chilli peppers, kale, lime, green bell peppers, garlic, ginger, and dried coriander). 5 servings from 2.5 cups of veggies and legumes (beans and lentils).
- Make use of nuts like pistachio, coconut, and almonds.
- Consume food derived from animals (e.g., fish, eggs, and milk)
- Opt for raw vegetables and fresh fruits as snacks rather to items that are heavy in sugar, salt, or fat. Prevent sporadic munching.
- Avoid overcooking veggies since it destroys vital components like vitamins and minerals.
- Keep your daily salt consumption to no more than 5 g.
- Eat unprocessed fats (found in avocado, fish, nuts, soy, olive oil, canola, corn oil, and sunflower)
- Every day, consume 8 to 10 glasses of water. It controls body temperature, eliminates waste, and aids in the blood's transfer of nutrients.
- Steer clear of any fizzy junk food
- Adhere to a healthy lifestyle that includes frequent exercise, meditation, and sleep. The immune system will work better with enough sleep.
- To limit social interaction and lessen the danger of contracting COVID-19, eat at home.
- Eating a lot of vitamin C-rich foods, such broccoli, kale, and kiwifruit, might influence how your cells are made.

Conclusion

In the investigation that was done, it was discovered that our theory was correct. Fruits other than citrus are less efficient in preventing COVID-19 infection. The fruit that humans eat the

most is oranges. Almost all of the medical professionals have advised vitamin C intake as part of COVID-19 infection therapy. Additionally, it has been shown that a lot of patients or individuals prefer citrus fruits to other types. Fruit sales have surged as a result of the COVID-19 outbreak. This study's primary goal is to determine customer satisfaction with Ayurvedic goods. According to the study's findings, those who were at risk tended to favour preventative actions more. Immune system enhancers from Ayurveda were in high demand. Immune system enhancers are often bought by consumers. We used four different kinds of immune boosters in our research. After interviewing 100 individuals over the course of a year, we discovered that the first product (Dabur kadha) is very well-liked and in demand. The people also believe that it will be the most significant, advantageous, and practical during COVID-19. It strengthens our immunity. Those who use Ayurvedic Ministry-approved medication like it. kadha is a safe and efficient natural remedy for enhancing digestion, treating colds and coughs, and boosting resistance to sickness, disease, and infection. For our health and immunity, it is always a good idea to rely on natural components or a natural product since these substances have the fewest health risks and may strengthen your immune system. Dabur kadha is preferred by many people. In our research, 74% of participants preferred kadha as an immune booster. And 80% of those who participated felt it was extremely helpful and efficient. Both younger and older youngsters may drink kadha, and virtually everyone can savour a hot sip.

References

1. Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *J Transl Med.* 2020;18(1):229. doi: 10.1186/s12967-020-02399-5
2. Martinez-de-Quel O, Suarez-Iglesias D, Lopez-Flores M, Perez CA. Physical activity, dietary habits and sleep quality before and during COVID-19 lockdown: A longitudinal study. *Appetite.* 2021;158:105019. doi: 10.1016/j.appet.2020.105019
3. Sidor A, Rzymiski P. Dietary Choices and Habits during COVID-19 Lockdown: Experience from Poland. *Nutrients.* 2020; 12(6):1657. doi:10.3390/nu12061657
4. Skotnicka M, Karwowska K, Kłobukowski F, Wasilewska E, Małgorzewicz S. Dietary Habits before and during the COVID-19 Epidemic in Selected European Countries. *Nutrients.* 2021;13(5):1690. doi: 10.3390/nu13051690
5. Ruiz-Roso MB, Knott-Torcal C, Matilla-Escalante DC, et al. COVID-19 Lockdown and Changes of the Dietary Pattern and Physical Activity Habits in a Cohort of Patients with Type 2 Diabetes Mellitus. *Nutrients.* 2020;12(8):2327. doi:10.3390/nu12082327
6. Soares MJ, Müller MJ. Editorial: Nutrition and COVID-19. *Eur J Clin Nutr.* 2020; 74(6):849. doi:10.1038/s41430-020-0647-y
7. Teixeira MT, Vitorino RS, da Silva JH, Raposo LM, Aquino LA, Ribas SA. Eating habits of children and adolescents during the COVID-19 pandemic: The impact of social isolation. *J Hum Nutr Diet.* 2021;34(4):670-678. doi:10.1111/jhn.12901
8. Celorio-Sardà R, Comas-Basté O, Latorre-Moratalla ML, et al. Effect of COVID-19 Lockdown on Dietary Habits and Lifestyle of Food Science Students and Professionals from Spain. *Nutrients.* 2021;13(5):1494. doi:10.3390/nu13051494
9. Souza TC, Oliveira LA, Daniel MM, et al. Lifestyle and eating habits before and during COVID-19 quarantine in Brazil. *Public Health Nutr.* 2022;25(1):65-75. doi:10.1017/S136898002100255X
10. Wdowiak-Szymanik A, Wdowiak A, Szymanik P, Grocholewicz K. Pandemic COVID-19 Influence on Adult's Oral Hygiene, Dietary Habits and Caries Disease-Literature Review. *Int J Environ Res Public Health.* 2022;19(19):12744. doi: 10.3390/ijerph191912744
11. Veljković M, Pavlović DR, Stojanović NM, Džopalić T, Popović Dragonjić L. Behavioral and Dietary Habits That Could Influence Both COVID-19 and Non-Communicable Civilization Disease Prevention-What Have We Learned Up to Now? *Medicina (Kaunas).* 2022;58(11):1686. doi:10.3390/medicina58111686
12. Bohn T. COVID-19: relation to dietary habits, food items and nutrients. *Int J Vitam Nutr Res.* 2022;92(1):1-2. doi:10.1024/0300-9831/a000741
13. Kamarli Altun H, Karacil Erumcu MS, Seremet Kurklu N. Evaluation of dietary supplement, functional food and herbal medicine use by dietitians during the COVID-19 pandemic. *Public Health Nutr.* 2021;24(5):861-869. doi:10.1017/S1368980020005297
14. Rodgers RF, Lombardo C, Cerolini S, et al. The impact of the COVID-19 pandemic on

- eating disorder risk and symptoms. *Int J Eat Disord.* 2020;53(7):1166-1170. doi:10.1002/eat.23318
15. Husain W, Ashkanani F. Does COVID-19 change dietary habits and lifestyle behaviours in Kuwait: a community-based cross-sectional study. *Environ Health Prev Med.* 2020;25(1):61. doi:10.1186/s12199-020-00901-5
 16. Di Renzo L, Gualtieri P, Cinelli G, et al. Psychological Aspects and Eating Habits during COVID-19 Home Confinement: Results of EHLC-COVID-19 Italian Online Survey. *Nutrients.* 2020;12(7):2152. doi:10.3390/nu12072152
 17. Pujia R, Ferro Y, Maurotti S, et al. The Effects of COVID-19 on the Eating Habits of Children and Adolescents in Italy: A Pilot Survey Study. *Nutrients.* 2021;13(8):2641. doi:10.3390/nu13082641
 18. Cheikh Ismail L, Osaili TM, Mohamad MN, et al. Eating Habits and Lifestyle during COVID-19 Lockdown in the United Arab Emirates: A Cross-Sectional Study. *Nutrients.* 2020;12(11):3314. doi:10.3390/nu12113314
 19. Trujillo-Mayol I, Guerra-Valle M, Casas-Forero N, et al. Western Dietary Pattern Antioxidant Intakes and Oxidative Stress: Importance During the SARS-CoV-2/COVID-19 Pandemic. *Adv Nutr.* 2021;12(3):670-681. doi:10.1093/advances/nmaa171
 20. Boukrim M, Obtel M, Kasouati J, Achbani A, Razine R. Covid-19 and Confinement: Effect on Weight Load, Physical Activity and Eating Behavior of Higher Education Students in Southern Morocco. *Ann Glob Health.* 2021;87(1):7. doi:10.5334/aogh.3144
 21. Vu TT, Rydland KJ, Achenbach CJ, Van Horn L, Cornelis MC. Dietary Behaviors and Incident COVID-19 in the UK Biobank. *Nutrients.* 2021;13(6):2114. doi:10.3390/nu13062114
 22. Casas R, Raidó-Quintana B, Ruiz-León AM, et al. Changes in Spanish lifestyle and dietary habits during the COVID-19 lockdown. *Eur J Nutr.* 2022;61(5):2417-2434. doi: 10.1007/s00394-022-02814-1
 23. Clemente-Suárez VJ, Ramos-Campo DJ, Mielgo-Ayuso J, et al. Nutrition in the Actual COVID-19 Pandemic. A Narrative Review. *Nutrients.* 2021;13(6):1924. doi:10.3390/nu13061924
 24. Grabia M, Markiewicz-Żukowska R, Puścion-Jakubik A, et al. The Nutritional and Health Effects of the COVID-19 Pandemic on Patients with Diabetes Mellitus. *Nutrients.* 2020;12(10):3013. doi:10.3390/nu12103013
 25. López-Moreno M, López MTI, Miguel M, Garcés-Rimón M. Physical and Psychological Effects Related to Food Habits and Lifestyle Changes Derived from Covid-19 Home Confinement in the Spanish Population. *Nutrients.* 2020;12(11):3445. doi:10.3390/nu12113445
 26. Lalchand D. Devhare and Niharika Gokhale, A brief review on: Phytochemical and antiulcer properties of plants (fabaceae family) used by tribal people of Gadchiroli Maharashtra. *Int. J. of Pharm. Sci. and Res..* 2023, 14(4), 1000-1022.
 27. Lalchand D. Devhare and Niharika Gokhale, Antioxidant and Antiulcer property of different solvent extracts of Cassia tora Linn. *Res. J. of Pharmacy and Technology.* 2022, 15(3), 1109-1113.
 28. Prete M, Luzzetti A, Augustin LSA, et al. Changes in Lifestyle and Dietary Habits during COVID-19 Lockdown in Italy: Results of an Online Survey. *Nutrients.* 2021;13(6):1923. doi:10.3390/nu13061923
 29. Lalchand D. Devhare and Niharika Gokhale, Acid Neutralizing Capacity And Antimicrobial Potential Of Selected Solvent Extract From Various Indigenous Plants, *Journal of Advanced Scientific Research,* 2021, 12 (04), 175-179

Table 1. Food market survey for sale of fruits.

Sale Per Month Shopkeeper Name	Product	Oct-Dec 2019	Jan- March 2020	April- June 2020	July-Sept 2020	Oct-Dec 2020	Jan-March 2021	April-June 2021
Mr. Asif Sheikh Medical Squire Nagpur	Kiwi	22%	35%	80%	57%	49%	55%	84%
	Oranges	19%	42%	85%	78%	65%	81%	92%
	Apple	30%	49%	72%	68%	57%	72%	76%
Mr. Puroshattam Yeole Sadar Bazar, Nagpur	Papaya	34%	43%	86%	49%	40%	75%	83%
	Apple	26%	38%	76%	59%	36%	69%	77%
	Oranges	19%	51%	95%	63%	55%	83%	94%
	Banana	28%	40%	69%	52%	34%	59%	63%
Mr. Shalu Waghmare	Oranges	22%	38%	94%	78%	59%	79%	90%

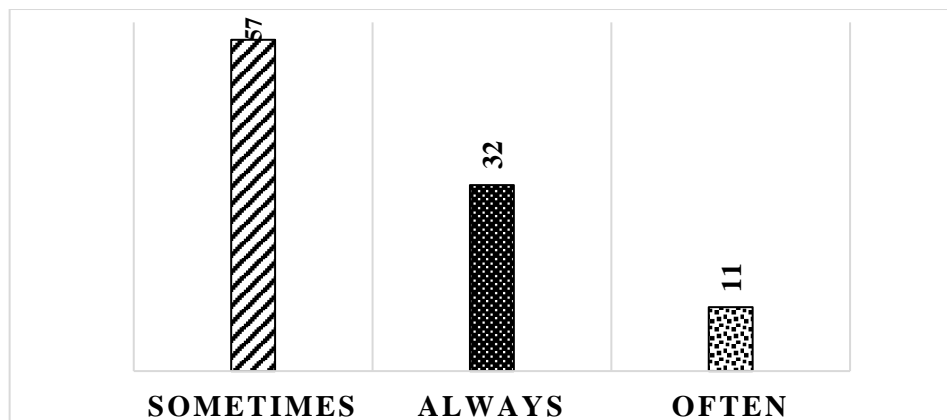
Zhasi Rani sq. Nagpur	Chikoo	15%	19%	27%	25%	21%	27%	25%
	Apple	31%	32%	65%	71%	48%	76%	64%
	Kiwi	28%	40%	83%	68%	51%	81%	79%
	Banana	33%	36%	70%	55%	33%	64%	67%
Mr. Deepak Kakde Lokmat Squear Nagpur	Oranges	20%	40%	89%	78%	54%	80%	96%
	Apple	34%	35%	78%	67%	49%	74%	87%
	Grapes	12%	25%	64%	32%	19%	40%	35%
Mr. Ramesh Ramteke Ambazari, Nagpur	Papaya	18%	42%	72%	69%	53%	81%	83%
	Kiwi	22%	34%	83%	76%	58%	76%	78%
	Banana	27%	37%	67%	65%	44%	61%	72%

Table 2. Popular Marketed brands of Chyawanprash, Kadha, Powder and Herbal Tea

Brand Names	Ingredients
Chyawanprash	
Dhootpapeshwar Swamala Chywanprash.	Gold bhasma, Silver Bhasma, Makardhwaj, Abhrak Bhasma, Pravale Bhasm.
Dabur Chywanprash	Amla, yashtimadhu, Bilya, Pippali, Guduchi etc
Himalaya Chywanprash	Amalaki, Shatavari, Ashwangandha, Guduchi, Bala, etc
Zandu Chywanprash	Amla, Giloy, Ashwangandha, Shatavari.
Kadha	
Ayush Kwath Kadha	Ginger, Tulsi, Blackpepper, and Dalchini etc
Baidhyanat Maharasnadi Kadha	Rasna, Amaltas, Bala, Erand, Javasa, and more.
Saffola Immuniveda Kadha	Blackpepper, Ginger, Cinnamon, Giloy, Amla, and more
Immunity Booster Amrit Kadha	Giloy, Tulsi, Yashtimadhu, Ashwangandha and more.
Powder	
Ayush Herbal Ayurvedic Giloy Powder	Giloy, Tulsi, Dry Ginger, Cinnamon, Ashwangandha and more.
Natural Immune Booster Powder.	Green Amla, Giloy, Turmeric, Moringa Leave and more
Aimil Ayush Kwarh Powder	Tulsi, Sunthi, kalimirch, and Dalchini and more
Patanjali Amrutha Balli	Amla, Giloy, Neem and more
Herbal Tea	
Dabur Vedic Suraksha Green Tea	Tulsi, Kali Mitch, daalchini, Shunthi, kishmish and more
Baidhyanath Ayush Kwarh Tea	Tulsi, cinnamon, Ginger, and Blackpepper
Patanjali Divya Peya	Ela Laughu, Ela Badi, Dalchini, Javitri, Sonth, Chandan Lal and more
Himalaya Herbal Tea	Organic Chamomile, Rosehips, Tulsi, Lemongrass, Nettles and Hops

Table 3. Medical store survey for sale of immunity booster products.

Name of shop Products	Shree Medical store	Maven Ayurvedic Aushadhala ya	Panchsee l Medical	Insta Dawa	Janmat Generic Medicine store	Prap ti Phar ma	Satyam Remedie s	Apic Biotec h LID	Sorbis Medic Distrib utor	Susan super specialty medical
Herbal Kadha	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No
Herb Powder	No	No	Yes	No	No	No	Yes	No	Yes	Yes
Chyawanprash	Yes	Yes	No	Yes	Yes	No	No	Yes	No	Yes
Ayur Syrup	Yes	No	No	No	No	Yes	No	Yes	No	Yes
Herbal Tea	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	No

**Figure 1.** Graph showing fruits consumption in 2020 by people in daily life.

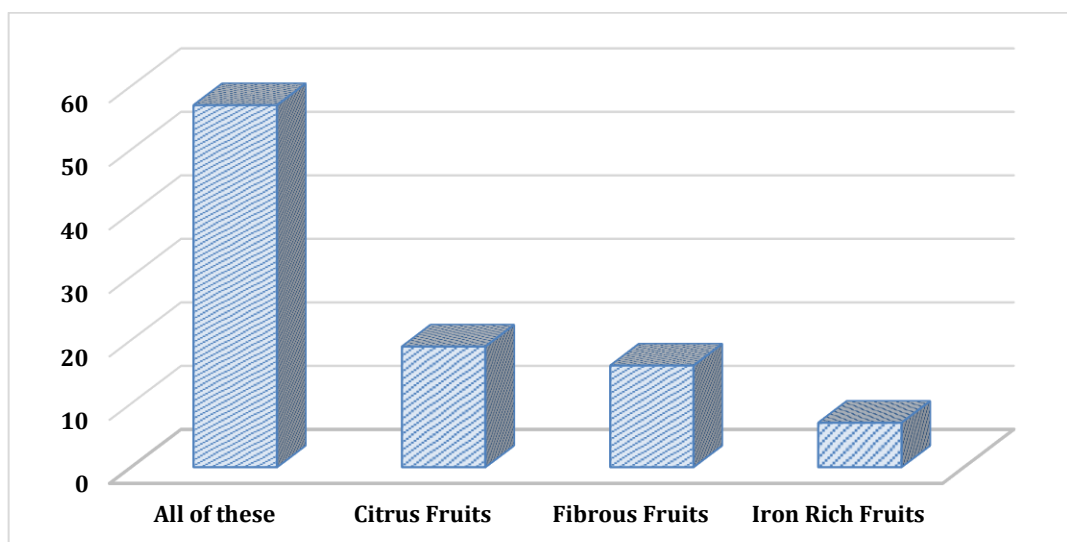


Figure 2. Type of fruits people consume

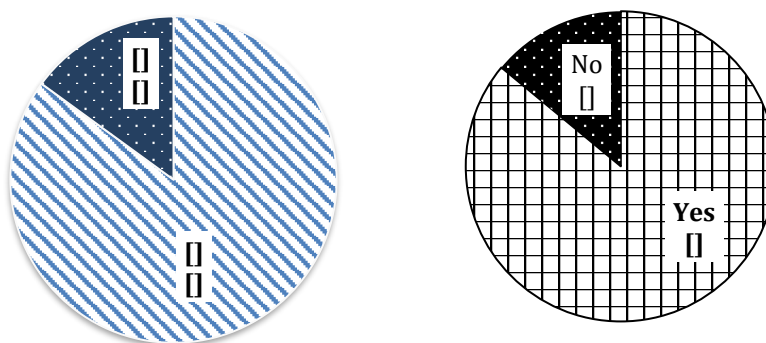


Figure 3. Graph showing awareness about (a) immunity booster; (b) use of citrus fruit as

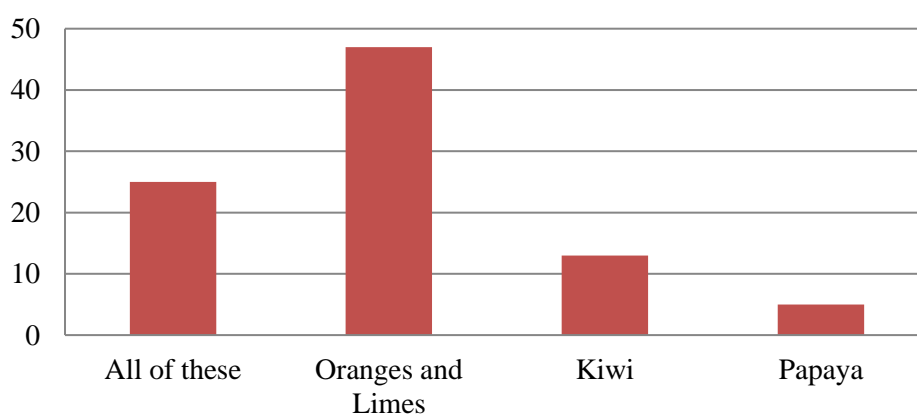


Figure 4. Graph showing type of citrus fruit mostly consumed during COVID-19

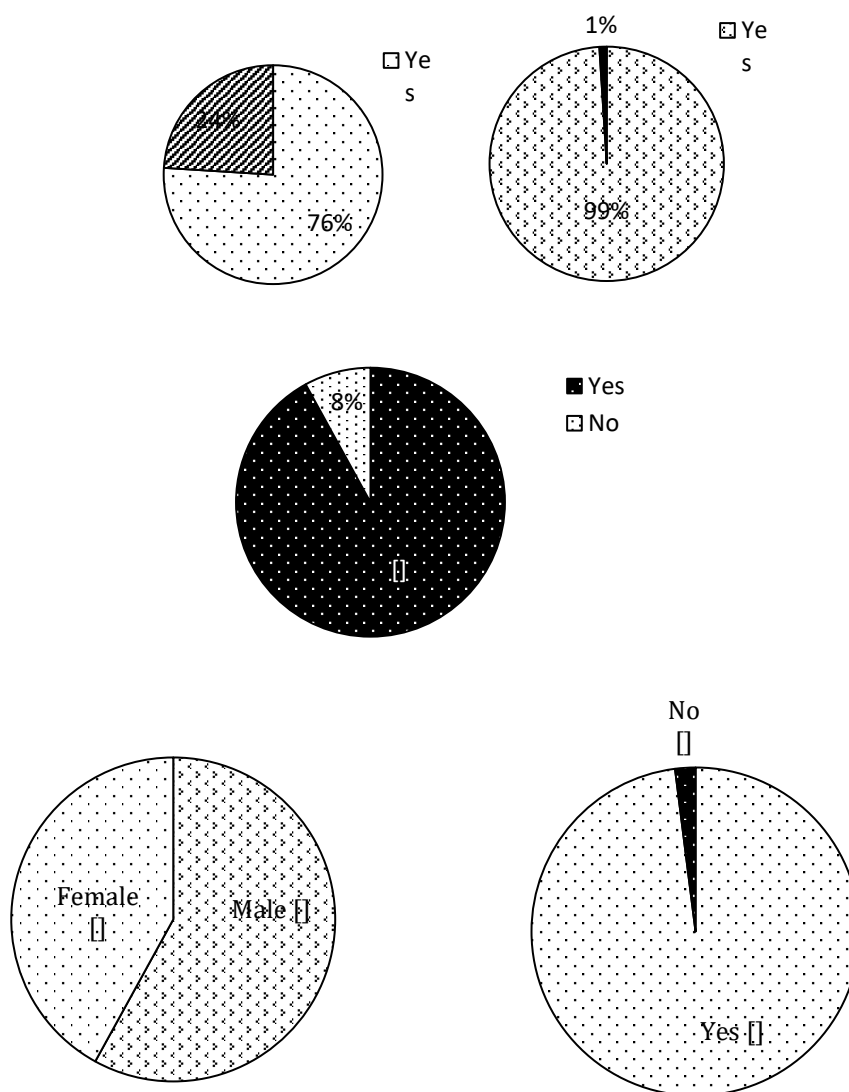


Figure 6. Ratio of (a) male and female recovered from COVID-19 infection; (b) use of citrus fruits to recover from COVID -19.

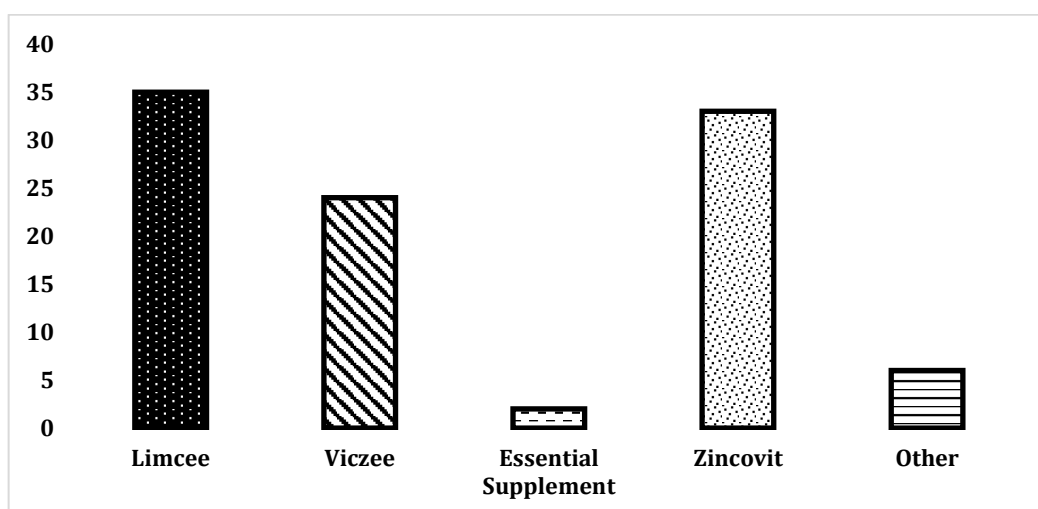


Figure 7. Use of supplements consumed by covid-19 patients.

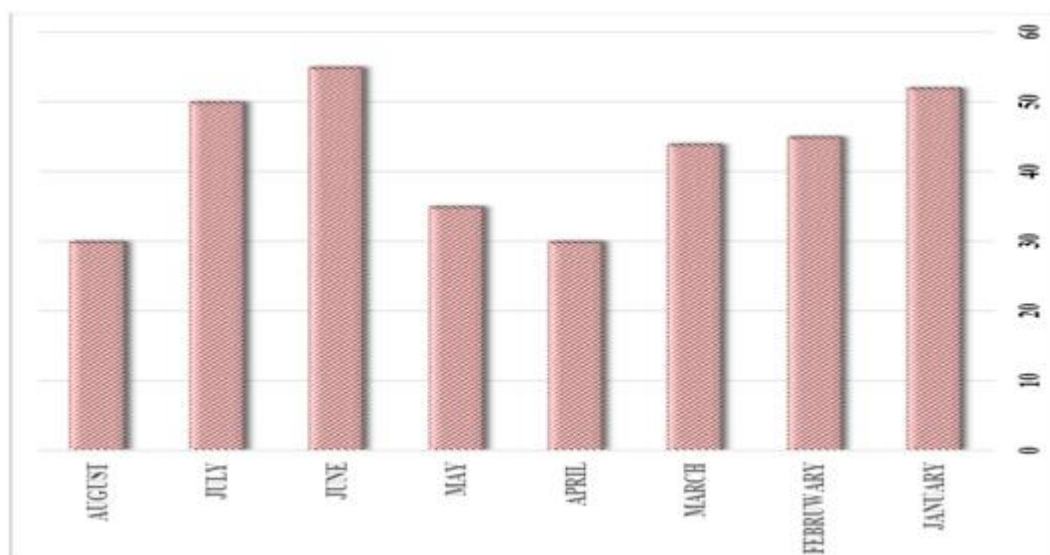


Figure 8. Demand of Fruits per month in 2020