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## DIET AND COVID-19

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### ABSTRACT

**Introduction:** A balanced diet is an important factor that needs to be emphasized to cope with the COVID-19 challenge. Several other factors, such as age, sex, health, lifestyle, influence the course and outcome of the disease. The key role of nutrition is the ability of a variety of foods to boost immunity and help the body fight the virus. **Purpose:** The present study aimed to investigate the factors and mechanisms that determine adequate nutrition with COVID-19. **Methods:** Scientific researches related to the problems of nutrition for coronavirus infection have been studied. An analysis and evaluation of official documents of the World Health Organization related to balanced nutrition in the pandemic have been made. **Results and discussion:** There is evidence in the world literature for the recommended inclusion of certain food groups such as fresh fruits and vegetables, whole grains, nuts, soy. The recommendations also include limiting the intake of foods high in sugar, salt, or fat. Consumption of unsaturated fats of vegetable origin is preferred to those of animal fats. Unsaturated ones are contraindicated because they do not have a stimulating effect on the immune system. In addition to these data, it is reported in the literature that diets high in saturated fat, sugars, and refined carbohydrates lead to obesity and type 2 diabetes, which are among the main risk factors for the severe course and higher COVID-19 mortality rate. **Conclusion:** In conclusion, we can say that a healthy diet and lifestyle are factors with a key role in preventing and combating this infectious disease, as well as against the complications it can lead to. A balanced diet can become an effective "tool" in the fight against COVID-19 in a pandemic if properly prepared.

**Key words:** balanced diet, nutritional status, COVID-19

### INTRODUCTION

Proper nutrition and a balanced diet are vital factors that have always been associated with a stronger immune system and a lower risk of chronic diseases and infectious diseases (1, 2).

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According to the World Health Organization (WHO), in the context of the COVID-19 pandemic, it is necessary to include a variety of fresh and unprocessed foods in the diet to supply the body with the necessary vitamins, minerals, fibers, proteins, and antioxidants. The consumption of sufficient water is also important to the recommendations, as hydration is also vital to deal with this infectious disease. It is advisable to avoid sugar, fat, and salt to significantly reduce the risk of overweight, obesity, and the

occurrence or worsening of many chronic diseases (3).

All this suggests that the nutritional status plays a key role in maintaining a strong immune system in the "fight" against the virus (4). There are currently no data on one type of food or food supplement that is sufficient to make the immune system strong enough to fight the virus. There is some evidence for a possible beneficial effect of vitamin C (5, 6). This leads to the need to develop combined diets that are rich in nutrients and various. This would help keep the immune system in a state where it is "ready" to fight the virus and has the "tools" it needs. Our task is to study some food groups, how to combine them in a diet to facilitate the fight against COVID-19.

The present study aimed to examine the factors that determine proper nutrition in COVID-19 for a more effective response of the body in the fight against this infectious disease.

## METHODS

An analysis and a summary of the data from scientific publications related to the problems of nutrition in coronavirus infection were made. The recommendations of the WHO and other official organizations on nutrition and dietetics for a balanced diet during the pandemic of COVID-19 are summarized.

## RESULTS AND DISCUSSION

According to the American Society for Parenteral and Enteral Nutrition, nutrition and hydration are key "weapons" in the fight against COVID-19 (7). As such, they should be used properly during the pandemic.

According to the WHO, the emphasis should be on consuming more fresh and unprocessed foods, consuming enough water, avoiding sugar, fat, and salt. Adherence to these recommendations will provide the body with enough vitamins, minerals, dietary fiber, protein, and antioxidants that would help fight COVID-19 and have a protective effect (8, 9).

A review of the literature shows that there is no hesitation in opinions regarding the consumption of fruits and vegetables. This is the opinion of

*HRISTOVA P., et al.*

Canadian nutritionists (10, 11). The Spanish Academy of Nutrition

and the General Council of Official Colleges of Nutritionists recommend a daily intake of at least 5 servings of fruits and vegetables. It is also healthy to include in the diet whole grains and legumes, moderate consumption of foods of animal origin, and low-fat dairy products. The consumption of nuts, seeds, and olive oil is recommended. These recommendations are explained by the large amounts of vitamins and minerals that fruits and vegetables contain. They are rich in vitamins A, C, D, E, and B complex, zinc, and selenium. These substances are important modulators of the immune system (12-14). Scientists from the European Food Information Council also agree with this view (15).

According to the Brazilian Clinical Nutrition Association, the most important vitamins and minerals that need to be provided to the body are vitamin A, vitamin C, vitamin D, zinc, selenium (16). The American Nutrition Society also supports the recommendations already presented for the consumption of whole grains, vegetables, and fruits. Meat products should be restricted to reduce the intake of saturated fats. It is recommended to limit the consumption of ready-to-make food and frozen foods (17).

The opinion of Australian nutritionists and the United Nations Children's Fund (UNICEF) is that fresh fruits and vegetables should be the first choice. According to them, frozen or dried and canned products could also be an option of choice. Canned fish, legumes, nuts and rice seeds, pasta, quinoa, couscous, and other cereals can be used as sources of protein. The use of herbs and spices is recommended to reduce salt (18, 19).

Despite these recommendations, the fact that there are no foods or dietary supplements to prevent COVID-19 infection should be taken into account. This opinion was issued by the Italian Society of Neonatology.

Despite all the recommendations of official organizations involved in public nutrition, the pandemic has both negative and positive effects on changing people's eating habits worldwide.

Bad eating habits lead to poor quality of life, weight gain, decreased physical activity, and mental and physical health problems (20-23). In addition, Brazilian scientists have found that people's eating habits change, and they eat less during the day. The frequency of late dinners and the consumption of harmful foods from fast-food restaurants is increasing. All this, in combination with low physical activity, leads to weight gain and an increased risk of disease (24-26).

There is evidence in the world literature that social isolation can seriously affect the eating habits of children and adolescents. Non-isolated families are reported to have lower levels of healthy food consumption than isolated families. Physical activity in teenagers is significantly reduced and there is a long stay in front of the screen. This leads to poor sleep, and all factors taken together are a prerequisite for worse health during the pandemic (27, 28).

Some studies warn of an increased risk of cardiovascular disease in the pandemic associated with changes in lifestyle, diet, and physical activity of the population. It is considered to have long-term effects on cardiovascular disease and it is necessary to take global measures to encourage the return to healthy habits (29, 30). Italian researchers add that women are less likely to do regular physical activity and are more likely to gain weight (31). Strategies are needed to deal with this problem, such as a healthy diet with a richer intake of fruits and vegetables, increased physical activity. According to some authors, the intake of vitamin D may also have some protective effects against the virus. The most serious benefit was observed in people who had lower levels of vitamin D (32, 33).

## CONCLUSIONS

In conclusion, we can say that healthy eating is a key factor in the prevention and control of this infectious disease. The main recommendations are aimed at increased consumption of fruits, vegetables, and whole grains. Adequate water intake and good hydration are also important factors. It is necessary to limit sugars, saturated fats, and meat.

A balanced diet can become an effective "tool" in the fight against COVID-19 during the pandemic if consequently followed.

## REFERENCES

1. Aman, F., and Masood, S., How Nutrition can help to fight against COVID-19 Pandemic. *Pakistan journal of medical sciences*, 36(COVID19-S4):S121–S123, 2020.
2. Wypych, T., Marsland, B., Ubags, N., The impact of diet on immunity and respiratory diseases. *Ann Am Thorac Soc*, 14:339–347, 2017.
3. World Health Organization, Nutrition advice for adults during the COVID-19 outbreak, 2020.
4. Aslam, M., Majeed, S., Aslam, S., Irfan, J., Vitamins:Key role players in boosting up immune response, A mini review *Vitam. Miner*, 6:153, 2017.
5. Anton, S., Miller, P., Do negative emotions predict alcohol consumption, saturated fat intake, and physical activity in older adults? *Behav Modif*, 29:677–688, 2005.
6. Haug, A., Brand-Miller, J., Christophersen, O., McArthur, J., Fayet, F., Truswell, S. A food “lifeboat”:food and nutrition considerations in the event of a pandemic or other catastrophe. *Med J Aust*; 187:674, 2007.
7. American Society of Parenteral and Enteral Nutrition. Nutrition and Hydration: Key Weapons in the Fight Against Covid-19, 2020.
8. Nutrition advice for adults during the COVID-19 outbreak. World Health Organization Regional Office for the Eastern Mediterranean website, 2020. <http://www.emro.who.int/nutrition/nutrition-infocus/nutrition-advice-for-adults-during-the-covid-19-outbreak.html>. World Health Organization website. <https://www.who.int/news-room/q-a-detail/q-a-on-covid-19-pregnancy-childbirth-and-breastfeeding>.
9. de Faria Coelho-Ravagnani, C., Corgosinho, F. C., Sanches, F., Prado, C., Laviano, A., Mota, J. F. Dietary recommendations during the COVID-19 pandemic. *Nutrition reviews*, 79(4): 382–393, 2021.

10. Advice for the general public about COVID-19. Dietitians of Canada website, 2020. <https://www.dietitians.ca/News/2020/Advice-for-the-general-public-about-COVID-19>.
11. Academia Española de Nutrición y Dietética (la Academia) y el Consejo General de Colegios Oficiales de Dietistas-Nutricionistas. Recomendaciones de alimentación y nutrición para la población española ante la crisis sanitaria del COVID-19 [in Spanish], 2020.
12. Società Italiana Di Nutrizione Umana. Alimentazione e coronavirus, 2020 [in Italian]. <https://sinu.it/wp-content/uploads/2020/03/Alimentazione-e-coronavirus-FINALE-per-FISM.pdf>.
13. Maggini, S., Pierre, A., Calder, P. C., Immune Function and Micronutrient Requirements Change over the Life Course. *Nutrients*, 10(10):531, 2018.
14. Food and coronavirus (COVID-19): what you need to know. European Food Information Council website, 2020. <https://www.eufic.org/en/food-safety/article/foodand-coronavirus-covid-19-what-you-need-to-know>.
15. Associação Brasileira de Nutrologia [Brazilian Association of Clinical Nutrition]. Position of the Brazilian Association of Clinical Nutrition (ABRAN) regarding micronutrients and probiotics in COVID-19 infection [in Portuguese], 2020. <https://abran.org.br/2020/05/01/posicionamento-da-associao-brasileira-de-nutrologia-abran-arespeito-de-micronutrientes-e-probioticos-na-infeccao-por-covid-19/>.
16. Byrd-Bredbenner, C., Eck, K., Abbot, J.M. Making health and nutrition a priority during the coronavirus (COVID-19) pandemic. American Society for Nutrition website, 2020. <https://nutrition.org/making-health-and-nutrition-a-priority-during-the-coronavirus-covid-19-pandemic/>.
17. COVID-19 tips and resources. Dietitians Australia website, 2020. <https://daa.asn.au/smart-eating-for-you/planning-your-pantry-during-the-covid-19-pandemic/>.
18. United Nations Children's Fund (UNICEF). Easy, affordable and healthy eating tips during the coronavirus disease (COVID19) outbreak, 2020. <https://www.unicef.org/coronavirus/easy-affordable-and-healthy-eating-tips-during-coronavirusdisease-covid-19-outbreak>.
19. Davanzo, R., Moro, G., Sandri, F., et al., Breastfeeding and coronavirus disease–2019. Ad interim indications of the Italian Society of Neonatology endorsed by the Union of European Neonatal & Perinatal Societies. *Matern Child Nutr*, 16:e13010, 2020.
20. 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*, 8:626432, 2021.
21. Enriquez-Martinez, O. G., Martins, M., Pereira, T., Pacheco, S., Pacheco, F. J., Lopez, K. V., Huancahuire-Vega, S., Silva, D.A., Mora-Urda, A.I., Rodriguez-Vásquez, M., Montero López, M. P., Molina, M., Diet and Lifestyle Changes During the COVID-19 Pandemic in Ibero-American Countries: Argentina, Brazil, Mexico, Peru, and Spain. *Frontiers in nutrition*, 8:671004, 2021.
22. Mascherini, G., Catelan, D., Pellegrini-Giampietro, D. E., Petri, C., Scaletti, C., Gulisano, M., Changes in physical activity levels, eating habits and psychological well-being during the Italian COVID-19 pandemic lockdown: Impact of socio-demographic factors on the Florentine academic population. *PloS one*, 16(5): e0252395, 2021.
23. Souza, T. C., Oliveira, L. A., Daniel, M. M., Ferreira, L. G., Della Lucia, C. M., Liboredo, J. C., Anastácio, L.R., Lifestyle and eating habits before and during COVID-19 quarantine in Brazil. *Public health nutrition*, 1–11, 2021.
24. Scarmozzino, F., Visioli, F., Covid-19 and the subsequent lockdown modified dietary habits of almost half the population in an Italian sample. *Foods*, 9:675, 2020.
25. Sidor, A., Rzymiski, P., Dietary choices and habits during COVID-19 lockdown: experience from Poland. *Nutrients*, 12:1–13, 2020.

- HRISTOVA P., et al.*
26. Teixeira, M.T., Vitorino, R.S., da Silva, J.H., Raposo, L.M., Aquino, L.A., Ribas, S.A., Eating habits of children and adolescents during the COVID-19 pandemic: The impact of social isolation. *Journal of human nutrition and dietetics : the official journal of the British Dietetic Association*, 34(4):670–678, 2021.
  27. Moreno, L. A., Gottrand, F., Huybrechts, I., Ruiz, J. R., González-Gross, M., DeHenauw, S., HELENA Study Group, Nutrition and lifestyle in european adolescents: the HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) study. *Advances in nutrition (Bethesda, Md.)*, 5(5):615S–623S, 2014.
  28. Mattioli, A. V., Sciomer, S., Cocchi, C., Maffei, S., Gallina, S., Quarantine during COVID-19 outbreak: Changes in diet and physical activity increase the risk of cardiovascular disease. *Nutrition, metabolism, and cardiovascular diseases: NMCD*, 30(9):1409–1417, 2020.
  29. Pina, A., Castelletti, S., COVID-19 and Cardiovascular Disease: a Global Perspective. *Current cardiology reports*, 23(10):135, 2021.
  30. Mattioli, A.V., Toni, S., Coppi, F., Farinetti, A., Practical tips for prevention of cardiovascular disease in women after quarantine for COVID-19 disease. *Acta bio-medica : Atenei Parmensis*, 91(4):e2020127, 2020.
  31. Zemb, P., Bergman, P., Camargo, C. A., Jr, Cavalier, E., Cormier, C., Courbebaisse, M., Hollis, B., Joulia, F., Minisola, S., Pilz, S., Pludowski, P., Schmitt, F., Zdrengeha, M., Souberbielle, J. C., Vitamin D deficiency and the COVID-19 pandemic. *Journal of global antimicrobial resistance*, 22:133–134, 2020.
  32. Martineau, A.R., Jolliffe D.A., Hooper, R.L., Greenberg, L., Aloia J.F., Bergman, P., Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data. *BMJ*, 356:i6583, 2017.
  33. Cashman, K.D., Dowling, K.G., Škrabáková, Z., Gonzalez-Gross, M., Valtueña J., De Henauw, S., Vitamin D deficiency in Europe: pandemic? *Am J Clin Nutr*, 103:1033–1044, 2016.