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Indian traditional diet may prevent COVID-19-related mortality: A narrative review

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Abstract

During the COVID-19 pandemic, the mortality rate in densely populated India was reportedly 5 to 8 times lower than in less populous western countries. An international team of scientists from India, Brazil, Jordan, Switzerland, and Saudi Arabia conducted the research suggesting that Indian dietary components suppress cytokine storm and other severity-related pathways of COVID-19 and may play a role in reducing the severity and mortality rates of COVID-19 in India compared to western populations. The findings indicated that the constituents of Indian diets, which ensure high iron and zinc concentrations in blood and ample fibre in foods, played a role in mitigating the severity of COVID-19 caused by carbon dioxide retention and lipopolysaccharide. This narrative review highlights various facets of Indian Traditional Diet which has helped in preventing COVID 19-related mortality.

Key words: COVID-19; diet, traditional; Indian; mortality

Introduction

In India and the South Asian subcontinent, COVID-19 mortality was lower than in the western world. Several explanations for this differential mortality related to COVID-19 were younger population, lower D allele frequencies compared to Europeans, difference in HLA gene variant, mutant strains of SARS CoV 2 virus, temperature variation and humidity, lockdown effect, BCG vaccination, delayed presentation of pandemic, HCQ use etc.(1) During the COVID-19 pandemic, the fatality rate in highly populated India was claimed to be 5-8 times lower than in less densely populated western nations.(2)

Dietary habits of Indians and low death rate from COVID-19

By causing cytokine storm-related pathways, intussusceptive angiogenesis, hypercapnia, and elevated blood glucose levels, high levels of sphingolipids, palmitic acid, and byproducts like carbon dioxide (CO_2) and lipopolysaccharide (LPS) that are linked to increased dietary intake of red meat, dairy products, and processed food items by Western populations could increase the severity and death rate. Palmitic acid is also known to raise the incidence of infection by inducing angiotensin converting enzyme-2 (ACE-2) expression. Coffee and alcohol, which are widely consumed in Western nations, may also worsen the severity and mortality rate of COVID-19 by deregulating blood iron, zinc, and lipid levels. On the contrary, the components of Indian diets keep blood iron and zinc levels high, and the substantial fibre content of their meals may help to reduce CO_2 and LPS-mediated COVID-19 severity. Indians who drink tea on a regular basis maintain high high-density lipoproteins (HDL) and low triglyceride levels in their blood because catechins in tea function as natural HMG-CoA reductase

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inhibitors. Importantly, Indians' constant use of turmeric in daily diet further maintains robust immunity, and curcumin in turmeric may inhibit pathways and processes related with SARS-CoV-2 infection and COVID-19 severity, as well as lessen the mortality rate.(2) Plant-based meals, pescatarian and Mediterranean diets, and limiting red and processed meat intake have all been demonstrated to decrease cholesterol (3) and the proclivity for moderate-to-severe COVID-19 disease.(4) It has been shown that meals (5) enriched with vitamins and zinc may lower the severity of COVID-19. Higher intake of a Western diet, on the other hand, was linked to increased COVID-19 risk and severity.(6) When comparing the nutritional value of half-cooked (or lightly cooked) food commonly consumed in the Western world with thoroughly cooked food typically found in traditional Indian cuisine, several factors come into play. The method and duration of cooking have a significant impact on the nutritional composition of food. For instance, heat-sensitive vitamins such as vitamin C and certain B vitamins may be lost during prolonged cooking. As a result, lightly cooked or raw vegetables often retain higher levels of these nutrients compared to thoroughly cooked ones. In the context of India, there is a growing trend of incorporating fresh fruits into the diet to enhance intake of essential vitamins and minerals, potentially mitigating the aforementioned concerns. Fresh fruits serve as a valuable source of vital nutrients, providing a natural means to address potential nutrient losses resulting from cooking methods. By consuming a diverse range of fresh fruits, individuals can obtain a spectrum of vitamins and minerals crucial for overall health and well-being. Incorporating these nutrient-rich fruits into the diet can contribute to a more balanced nutritional profile, potentially compensating for any potential nutrient loss due to cooking practices. However, it is important to note that cooking can also enhance the availability of certain nutrients. For example, cooking tomatoes increases the bioavailability of the antioxidant lycopene. Additionally, cooking can improve the digestibility of proteins in meat, rendering them more readily absorbable by the body. Thus, the nutritional impact of cooking is complex and dependent on various factors, including the specific food item and cooking technique employed.

In COVID-19, low serum iron and zinc levels are related to greater severity and fatality rates.(7,8) Zinc is employed in the treatment of COVID-19.(8) Dairy products contain less iron, while alcohol intake lowers plasma zinc levels. Notably, Idli (zinc 23.4 mg/g, iron 46.4 mg/g, 3-4% fibre) has more zinc and iron than meat (9), and its zinc concentration is double that of vitamin pills containing zinc, which were regularly ingested (10 mg) during the COVID-19 pandemic. Rice, lentils, wheat, chickpeas, and Rajma, which are staples in the north Indian diet (10), are also high in vitamins, minerals, zinc, and iron. As a result, unlike the Western diet, Indian cuisine can maintain high blood zinc and iron levels, which can reduce COVID-19 severity and fatality rates in India. (7,8)

As shown, reduced plasma HDL-C along with elevated triglyceride levels make COVID-19 outcome more severe.(11) Western countries' high alcohol consumption raises plasma triglyceride levels. Atorvastatin decreases COVID-19 severity, shortens hospitalisation, and lowers COVID-19 mortality.(12) Catechins found in tea are natural HMG CoA Reductase inhibitors. Catechin and Epigallocatechin-3-gallate (EGCG) present in tea inhibit interactions between SARS-CoV-2 Spike RBD and ACE-2, preventing SARSCoV infection. India is the world's greatest tea user, with more than 64% of Indians drinking tea.(13) Furthermore, curcumin, which is often taken in India, increases the permeability and lipid-lowering action of EGCG. Caffeine, on the other hand, diminishes statin action, lowers zinc levels, and inhibits iron absorption.(14) Coffee is the most common source of caffeine and is taken in high quantities per capita in Western nations, but consumption in India is low. Therefore, while coffee drinking contributes to COVID-19 severity in Western nations, increased tea consumption in India may be related with a less severe type of COVID-19 and lower fatality rates. Western cuisine with low zinc and high palmitic acid (PA) content stimulates pro-inflammatory PPAR signalling and accelerates SARS-CoV-2 pathogenesis by activating pro-inflammatory cytokines, chemokines, NF-B, and ACE-2.(15) Sphingolipids, which trigger the SphK1/S1P/S1PR (S1P) hyperinflammatory response pathway and enhance COVID-19 severity (16), are also abundant in Western meals. Research scientists discovered that PA and sphingolipids, two important metabolites in Western diets, were linked to COVID-19 severity pathways activation and higher death rates in Western nations.(7,17)

Hypercapnia and respiratory acidosis are caused by meat, fish, eggs, cheese, and alcohol.(18) Furthermore, diets heavy in animal fat and protein but low in fibre, are known to produce gut microbial dysbiosis, which results in increased CO_2 and hypercapnia, as well as LPS-induced elevated blood glucose levels.(19) COVID-19 severity is linked with

both hypercapnia and elevated blood glucose levels. (2,7,17) CO_2 RGs are substantially enriched in COVID-19 patients in Western nations but not in India. As a result, the western diet may be related with hypercapnia and elevated blood glucose levels, which may contribute to greater severity and fatality during COVID-19 in western cultures. Curcumin, the main ingredient in turmeric, is a preventive agent, and curcumin therapy (20) lowers the severity and mortality from COVID-19.(20) Curcumin increases serum zinc levels (21), inhibits the interaction between Spike RBD and ACE2, lowers cholesterol and triglyceride levels, and hinders hypercapnia, IFN, TNF, chemokine, cytokine, VEGFA-VEGFR2-mediated intussusceptive angiogenesis, and NOD-like receptor signalling pathways, which have all been associated with COVID-19 cytokine storm.(22) All of these pathways were shown to be selectively elevated in western samples but not in Indian samples. Curcumin was also shown to be inversely related to COVID-19 related complications. Curcumin is the active ingredient in turmeric, and turmeric is a popular spice/condiment in India (>2 g/day/capita), but not in Western nations.(2) As a result, everyday turmeric consumption in India maintains a high concentration of body curcumin, which inhibits practically all molecular processes. Mechanisms linked to SARS-CoV-2 infection and COVID-19 severity, result in a less severe illness outcome and lower mortality rates in India as compared to other Western countries.(2)

Finally, findings of Barh, Debmalya et al. revealed that Indian eating practices and food components may be related with lower severity and fatality associated with COVID-19 infections in India. While the western diet and food components appeared to contribute to the severity of COVID-19 disease, Indian dietary patterns and food ingredients may have a role in reducing COVID-19 disease severity. Regular intake of plant-based foods, Idli, whole cereals, legumes, vegetables, tea, and turmeric (curcumin) likely contributed to reduced severity and lower mortality rates from COVID-19 in India, despite the country's significantly higher population density.(2) However, further large-scale and intervention trials are needed to make solid conclusions in this area. A notable limitation of this narrative review is our inability to delve into the study results and clinical research evidence. Consequently, we were unable to present concrete findings to support our hypothesis. However, we hope to inspire future researchers to pursue clinical studies in order to investigate our proposed hypothesis.

Conclusion

Already around 3000 BC, the Sanskrit phrase from the Rig Veda, "Aham Annam" meant "we are what we eat." Professor Franz Halberg transformed the subject of nutrition by demonstrating that what we eat can make the difference between life and death in the laboratory and weight growth or loss in ordinary life.(23) COVID 19 pandemic had taught us the importance of traditional Indian diet and emphasizes the way of right eating in prevention of atrocities.

A few important take home messages:

1. During the COVID-19 pandemic, the mortality rate in densely populated India was reportedly 5 to 8 times lower than in less populous western countries.
2. An international team of scientists from India, Brazil, Jordan, Switzerland, and Saudi Arabia conducted the research suggesting that Indian dietary components suppress cytokine storm and other severity-related pathways of COVID-19 and may play a role in reducing the severity and mortality rates of COVID-19 in India compared to western populations.
3. The findings indicated that the components of Indian diets, which maintain high iron and zinc concentrations in blood and abundant fibre in foods, played a role in preventing COVID-19 severity mediated by CO_2 and LPS.
4. Regular tea consumption by Indians contributed to the maintenance of high HDL, also known as "good" cholesterol. Tea's catechins also acted as natural HMG CoA reductase Inhibitors in lowering triglyceride levels in the blood.
5. Regular consumption of turmeric in Indians' daily diet led to a robust immune system. According to the researchers, the curcumin in turmeric may have prevented pathways and mechanisms associated with SARS-CoV-2 infection and COVID-19 severity and reduced the mortality rate.
6. Conversely, increased consumption of red meat, dairy products, and processed foods led to an increase in COVID severity and mortality in western populations. Due to the high levels of sphingolipids, palmitic acid, and by-products such as CO_2 and LPS, these foods "activate cytokine storm-related pathways, intussusceptive angiogenesis, hypercapnia, and increase blood glucose levels," as stated in the study.
7. Palmitic acid is a saturated lipid that occurs naturally in some animal products, such as meat and dairy, and in palm oil. Furthermore, it raises infection rate and activates ACE2 expression.

8. By deregulating blood iron, zinc, and triglyceride levels, the high consumption of coffee and alcohol in western nations also contributed to an increase in COVID-19's severity and mortality rate.

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Authors' contribution

All authors contributed to the conceptualization and design of the study. SRJ, SSS, SM and SS contributed to the acquisition of data. SSS, SRJ, SM and SS contributed to literature search and writing the manuscript. All authors read and approved the final manuscript.

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Declarations

Conflicts of interest

None

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