ROLE OF FOOD TO FIGHT AGAINST COVID-19 AND THE IMMUNE SYSTEM

Dr.V.Bindu* and Dr.R.Bharathi**

*Associate Professor, Department of Home Science, Sri Padmavati Mahila Visvavidyalayam, Tirupati, AP (India)-517501.

**Assistant Professor, Department of Home Science, Sri Padmavati Mahila Visvavidyalayam, Tirupati, AP (India)-517501.

ABSTRACT

The unexpected pandemic condition shaken the whole universe with wide spread contagious disease affected majority of the all kinds of people all over the world irrespective of demographic region, race, and development stage of the country. The countries in the world are being striving towards exploration of all the measures to protect their population with multifactorial intervention approaches. Enhancing immunity levels among the people is the most immediate and effective strategy to fight against the infectious corona virus. Apart from medical treatments, nutrition plays a major and critical role in triggering and build up the strong immune responses and to tackle the dreadful disease. However, the appropriate dietary guidelines and the proper scientific knowledge is still not yet studied and analyzed well. In this context, the present study was focused on understanding the role of food and diet in protecting the immune system and to combat the COVID-19. The review was attempted to evaluate the importance of optimal nutrition, possible phytochemicals and nutrients involved in regulating the immune function in the body and illustrated in a concise and precise manner.

Key words: COVID-19, Immune System, Food, Diet, Nutrients

INTRODUCTION

The body protects against various kinds of disease causation infectious organisms by producing sufficient antibodies against the antigens released from the pathogenic agents. The world faced the problem of coronavirus virus in 2002–2003 as the first time in the form of severe acute respiratory syndrome (SARS), and also as Middle East respiratory syndrome (MERS) in 2011. The research noticed that the causative agents for both cases were newly identified coronaviruses of zoonotic origin in the genus Beta coronavirus. The current coronavirus (SARS-CoV-2) COVID-19 appeared as the first time in Wuhan, China, at the end of 2019. People are being widely affected through human-to-human transmission owing to the close contact and suffered from severe illness as the virus targets the human immune system. The possible means of protecting from this virus should be focused on searching for the most suitable intervention strategies along with dietary guidelines to boost up the immune system [1].

Food also to some extent seemed to be associated with positive beneficial effects in protecting the people by accelerating the immune system. Well balanced diet comprising of whole grains, protein rich foods, plenty of fruits and vegetables allowing surplus intake of water may be advantageous in strengthening the individuals and to cope up the essential nutrients required to restore and promote good health as well as initiation of effective immune functioning.

GOOD NUTRITION AND IMMUNE SYSTEM

Balanced diet and optimal nutrition is the key principle in the maintenance of physiological, biological and metabolic functions in the body. The nutritional requirements vary if any abnormality is noticed in the body such as allergic conditions, infections, metabolic and metabolic changes. The current pandemic COVID-19 majorly affects the respiratory system and declines the immune system which puts the patient at higher risk. Though the research is well established on the influence of food on corona, as per previous scientific data base, optimal nutrition certainly enhances the health and well-being of the individuals to combat the severity and to reduce the onset of comorbidity ailments. Increasing the consumption of fruits and vegetables, whole grains and protein rich foods may be

beneficial. Additionally, the existing guidelines suggested that inclusion of vitamin A, C, D and zinc probably improves immune system as they are well known as effective anti-oxidants [2].

Nutrients in the food strongly influences the immune cells either directly or indirectly by exerting specific targeted bodily mechanisms through appropriate biological pathways. The polyunsaturated omega 3- fatty acids have anti-inflammatory properties and thus consumption of their rich sources have pivotal important role in reducing the inflammatory problem and to minimize the risk of inflammation in COVID affected patients. The dietary phenols on the other hand apart from acting as anti-inflammatory agents found to effective immune-modulators. The minerals, zinc and selenium create both innate and adaptive immune response which find their typical role in minimizing the infections including human immune-deficiency viral infections [3].

The major function of immune system is to protect the host body against the infectious agents such as virus, bacteria, fungi and parasites. The functional foods target the immune system more efficiently and is evidenced by both human and animal experimentations. The essential five food groups possess functional properties and helpful in reducing various health problems. Recently much efforts are being increased gradually to identify specific foods containing more functional benefits which can be categorized as functional foods such as oats, pre and probiotics, certain herbs of medical importance etc. The essential amino acids and essential fatty acids which need to be provided from the diet as the body has inability to synthesize those are involved in the maintenance of body homeostasis. The vitamins containing the immune-protective effect in the body are vitamin A, folic acid, B6, B12, C and E and the minerals are zinc, selenium, copper and iron. Ample evidence is available that their deficiency lead to immune suppression and increase in the rates of infections. The studies well explained that addition of the respective nutrients aided in the restoration of immune capacity and effectively reduced the incidence of infectious diseases [4].

LET FOOD BE THE MEDICINE

Hippocrates, more than 2,500 years back rightly quoted as "Let *food be thy medicine and medicine be thy food*." The dried root extract of liquorice contain saponin called as glycyrrhizin serves as immune-modulator, possess antiviral properties and initiates proper biological activities. The literature showed an improvement of white blood cells, bone marrow cellularity and also α-esterase positive cells. Animal experimental studies demonstrated considerable increments in the production of antibodies. The bio-active sulphur compounds in onion and garlic proven to have good role in immune functioning by acting as immune-stimulators through boosting innate and specific cell mediated immunity and useful in enhancing host resistance. Curcumin interacts with different immune cells like B and T-lymphocytes, macrophages, dendritic cells and cytokines to induce active defence mechanism [5, 6].

Food certainly plays a crucial role in maintain good health and reflects the health status of an individual but adhering to food and dietary modifications alone may not be sufficient when there is an adverse effect on the normal functioning of the regular metabolic bodily processes. Molecular targeted biology, pharmaceutical inventions, exploration of new insights into the medicine and technology innovations witnessed the Hippocrates statement dictating to move towards more effective integrating management strategies emphasising on complex and dynamic therapeutic potential of reappraisal of the complementarity of nutrition and pharmacology. The pharma-nutrition well illustrated the collaborative developments to intensify the various fields of discipline in clinical and scientific modalities for though understanding of underlying mechanism of the disease or abnormal deviation, evaluating the process of prognosis and accordingly plan for the relevant suitable multifactorial approach to meet the challenging demands of the most critical health issues such as corona pandemic [7].

The father of medicine, Hippocrates was the first person to enlighten the importance of diet as a centre core in the prevention and treatment of the disease. He tried to apply the major dietetic principles as the crucial measures to treat the sick people before the concerns about drugs and surgery. But due to wider expansion of the medicine field, the role of food and diet as the nutrition component in the health system is neglected even in the low and middle income countries. Certain healthcare institutions tried to focus on healthy diets as part of the nutrition counselling to address the array of malnutrition spectrum. The food researchers, scientists, policy makers and food system analysts move

their attempts to enhance the health levels through integrating with local bodies related to food, agriculture and health systems.

Hippocrates (fifth century BCE), the father of medicine and namesake of the Oath many medical students swear by to this day, was among the first to recognise the centrality of diet in disease prevention and treatment. In that Oath, the statement, 'I will apply dietetic measures for the benefit of the sick according to my ability and judgement', comes before statements about drugs and surgery. Unfortunately, the importance of diet and nutrition in medicine is lost in most discussions of health system reform today, especially in low-income and middle-income countries (LMICs). Moreover, few food system researchers and policymakers consider the myriad opportunities for improving health through forging partnerships between local food, agriculture and health systems. Universal expansion of health coverage, nutrition interventions and the therapeutic applications in the healthcare institutions as the intervention strategies may have substantial impact [8].

ROLE OF FOODS IN COVID-19

The present pandemic situation is a big challenge throughout the world to fight against the virus. Previous literature provided few evidences on the role of nutrition building immunity whole tackling the infectious agents. The nutrition is affected by various factors such as age, sex, physical activity levels, regional area, health status, lifestyle patterns, and medications. The current threatening issue research become much diverse and research extended even into the optimal nutrition and supplements as the few of the modes to improve the immune system which could be the possible means of minimising the risk of infection. The findings however not provided sufficient evidence about supplements except vitamin C in enhancing immune status. On the outset whatever scientific information, safety and effective dietary guidelines management and appropriate food and dietary practices will be surely benefited even during the COVID-19 pandemic.

The dietary and nutrition recommendations at an individual level found as the main motivating drive not only to provide the effective link between diet and immunity but also to combat the problem of virulent viral infection of COVID. There seems to striking impact highlighting the importance of diet on the individual immune system and curative aspects of any type of the infectious disease. The research showed that specific nutrients or specific nutrient combinations influence the immunity in a stronger way by cell activation, modifying signalling pathway and modulating gene expressions. On the other hand, dietary ingredients are of critical in determining the person's gut microbial composition and subsequently influencing the immune response at an individual level. The unique nutrition principles to be highlighted that the conditions of nutritional deficiencies such as energy, protein, vitamins and minerals adversely depress the immune system and further aggravates the condition of high susceptibility towards various types of infections very easily. Thus sufficient consumption of iron, zinc, and vitamins A, E, B_6, and B_{12} is one of the successful strategy to trigger the immune syatem in the body. Hence, the key for regulation of an efficient immune system is based on the management of nutritional deficiencies as it is of utmost important in immune cell triggering, interaction, differentiation, or functional expression [9].

The pandemic condition severely affected the dietary habits of all kinds of people and in the most instances tend towards extreme changes and the unhealthy dietary modifications eventually resulted in weakening the immune system. The low and middle income groups of are mostly affected due lack of employment, deprived salaries and uncertainty in the finance forced them to reduce the income of spending qualitative healthy foods such as milk, fruits and vegetables. Skipping of meals are also being noticed in undue pathetic regimens by adjusting the family meal requirements and thus still deprived of the essential proximate principles needed for the basic living and missed the adequate dietary requirements. At the other corner confining to homes also lead to development binge eating habit and intermittent snacking patterns. In addition lowered physical activity coupled with unhealthy life style conditions had greater impact on immune system which may towards initiation of chronic disorders. The prevailing changes demanded a challenging task to reduce the undesirable unexpected events and the suitable plans should be executed to streamline the dangerous scenario to enhance the income generation, facilitating quality food and to boost up the immune levels to fight against the novel coronavirus infection [10].

FOODS IN COVID-19

The balanced and appropriate food of good quality following healthy dietary practices certainly ensures better immune system and is an effective tool to fight against the virus. The persons who consume the well balanced diets with less chronic diseases found to be safer as the robust immune system protects against the infectious diseases. The dietary guidelines and fewer tips to fight against COVID-19 are mentioned below [11].

- Whole grains and nuts, of which include 180g of unprocessed grains like oats, maize or roots
- At least four fruit servings with serving size of two cups
- Fresh vegetables of 2.5 cups (five servings) and also legumes
- Red meat-once or twice a week, poultry-twice or thrice a week, foods of animal origin (Fish, eggs, milk)
- Consume fresh fruits and vegetables as snack and avoid irregular snacking
- Follow proper cooking practices to conserve nutrients
- Avoid canned foods preserved with either salt or sugar
- Reduce salt intake about 5g
- Use unsaturated fat sources (avocado, fish, nuts, soy, olive oil, canola, corn oil, and sunflower) rather than saturated fats (butter, fatty meat, coconut and palm oils, cheese, ghee, and cream)
- Plenty of water around 8 to 10 glasses daily for better nutrients transport, waste removal and body temperature regulation
- Avoid carbonated and processed beverages
- Healthy lifestyle with good exercise, sufficient sleep and meditation supports immune function
- Try out breathing exercises to enhance lung capacity and functioning
- Follow COVID precautionary measures

CONCLUSION

The literature reviewed well exploited an immediate need of introducing possible preventive and curative measures among the people all over the world. The complex, practicable and well defined integrated approach connecting the various sectors of agriculture, food, medical, pharmaceutical and scientific inputs is necessary to combat the pandemic COVID-19. The existing research not provided the sufficient data base for the impact of food and supplements in boosting the immunity levels. However, healthy diet is very important as adjacent to the COVID-19 treatment protocols to improve the patients risk levels and enhance the immune functioning to fight against the dreadful virus.

REFERENCES

[1].M.A.Chowdhury,N.Hossain,M. A.Kashem, Md. A.Shahid and A. Alam, "Immune response in COVID-19: A review", Journal of Infection and Public Health.,Vol.13,no.11,(2020), pp. 1619-1629.

[2]. C.F.Coelho-Ravagnani, F.C. Corgosinho, F.F.Z.Sanches, C.M.M.Prado,A. Laviano and J.F.Mota, "Dietary recommendations during the COVID-19 pandemic", Nutr Rev., vol.12,(2020),nuaa067. doi: 10.1093/nutrit/nuaa067.

[3]. C.E.Childs, P.C.Calder and E.A.Miles,E, "Diet and Immune Function", Nutrients., vol.11.no.8, (2019),pp. 1933.

[4]. P.C.Calder and S.Kew, "The immune system: a target for functional foods?", Br J Nutr., vol.88,no.2, (2002),pp.S165-77. doi: 10.1079/BJN2002682.

[5]. Bogoch II, A.Watts, A. Thomas-Bachli,C. Huber, M.U. Kraemer and K.Khan, "Pneumonia of unknown etiology in Wuhan, China:potential for international spread via commercial air travel", J Travel Med., vol.272, (2020), pp.1–3.

[6].F.Yang, Y.Zhang,A. Tariq,X. Jiang,Z.Ahmed,Z.Zhihao,M.Idrees,A.Azizullah,M. Adnan and R.W.Bussmann, "Food as medicine: A possible preventive measure against coronavirus disease (COVID-19)", Phytotherapy Research., (2020),https://doi.org/10.1002/ptr.6770.

[7]. R. F.Witkamp and K. Norren, "Let thy food be thy medicine….when possible", European Journal of Pharmacology., vol.836, (2018), pp. 102-114.

[8]. L. M, Jaacks and A. L. Bellows, "Let food be thy medicine: linking local food and health systems to address the full spectrum of malnutrition in low-income and middle-income countries", BMJ Journals., vol.2, no.4, (2017), http://orcid.org/0000-0002-7791-5167 .

[9]. F. Naja and R. Hamadeh, "Nutrition amid the COVID-19 pandemic: a multi-level framework for action", European Journal of Clinical Nutrition., vol. 74, (2020), pp.1117–1121.

[10]. M. Sutaria, G. Keny, S.A. Pratinidhi, "COVID-19 and its effect on nutrition", International Journal of Community Medicine and Public Health., vol.7, no.10, (2020), pp.4112-4117.

[11]. F.Aman and S.Masood, "How Nutrition can help to fight against COVID-19 Pandemic", Pak J Med Sci., vol.36 (COVID19-S4), (2020), pp. S121–S123.