

**THE PARADIGMATIC ROLE OF RIGHT DIET & NUTRITION FOR AN  
AMELIORATED IMMUNE SYSTEM****J. C. Balachandar<sup>1\*</sup>, M. Jayachandran<sup>1,2</sup> and Irshad Ahamed<sup>3</sup>**<sup>1,2</sup>Dr.Bala's School of Fitness & Preventive Medicine, Faridabad, Delhi-NCR, India.<sup>2</sup>Department of Physics, Sethu Institute of Technology, Kariyapatti, India.<sup>3</sup>Consultant Surgeon, Department of General and Minimal Access Surgery, Gunam Superspeciality Hospital, Hosur, Tamil Nadu, India.**\*Corresponding Author: Dr. J. C. Balachandar**

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**ABSTRACT**

The immune system is the body's way of protecting itself from infection and disease; it fights everything from cold and flu viruses to serious conditions such as cancer. Eating enough nutrients as part of a varied diet is required for the health and function of all cells, including immune cells. Certain dietary patterns may better prepare the body for microbial attacks and excess inflammation, but it is unlikely that individual foods offer special protection. Each stage of the body's immune response relies on the presence of many micronutrients. Examples of nutrients that have been identified as critical for the growth and function of immune cells include vitamin C, vitamin D, zinc, selenium, iron, and protein (including the amino acid glutamine). They are found in a variety of plant and animal foods. The microbiome is an internal metropolis of trillions of microorganisms or microbes that live in our bodies, mostly in the intestines. It is an area of intense and active research, as scientists are finding that the microbiome plays a key role in immune function. The gut is a major site of immune activity and the production of antimicrobial proteins. The diet plays a large role in determining what kinds of microbes live in our intestines. A high-fiber plant-rich diet with plenty of fruits, vegetables, whole grains, and legumes appear to support the growth and maintenance of beneficial microbes.

**KEYWORDS:** nutrition, immune function, infection, diseases, dietary patterns and flu viruses.**1. INTRODUCTION**

Newborn babies have an immature immune system. After birth, immunological competence is gained partly as a result of maturation factors present in breast milk and partly as a result of exposure to antigens from food and from environmental micro-organisms, the latter starting during the birth process itself.<sup>[1]</sup> A well functioning immune system is key to providing good defense against pathogenic organisms and to providing tolerance to non-threatening organisms, to food components and to self. The immune system works by providing an exclusion barrier, by identifying and eliminating pathogens and by identifying and tolerating non-threatening sources of antigens and by maintaining a memory of immunological encounters.<sup>[2]</sup>

An important component of the immune response is oxidative burst, during which superoxide anion radicals are produced from oxygen in a reaction linked to the oxidation of glucose. The reactive oxygen species produced can be damaging to host tissues and thus antioxidant protective mechanisms are necessary. Among these are the classic antioxidant vitamins

(vitamins E and C), glutathione, the antioxidant enzymes superoxide dismutase and catalase, and the glutathione recycling enzyme glutathione peroxidase. The antioxidant enzymes all have metal ions at their active site (Mn, Cu, Zn, Fe and Se).<sup>[3]</sup>

The effects of individual micronutrients on immune function have been identified from studies of deficiency in animals and human subjects and from controlled animal studies in which the nutrient under investigation is included at known levels in the diet. These studies provide good evidence that a number of nutrients are required for an efficient immune response and that deficiency in one or more of them will impair immune function and provide a window of opportunity for pathogens.<sup>[4]</sup> It seems that under physiological conditions vitamin D probably aids immune responses, but that it may also play an active role in prevention of autoimmunity and that there may even be a therapeutic role for vitamin D in some immune-mediated diseases. Vitamin D acts by binding to its receptor and regulating gene expression in target cells. Its effects include promotion of phagocytosis, superoxide synthesis and

bacterial killing, but it is also reported to inhibit T-cell proliferation and production of Th1-type cytokines highlighting the paradoxical nature of its effects.<sup>[5]</sup>

The effective deployment of the immune system against pathogens or harmful signals and the swift resolution of the immune response is required for survival. The fighting of infection is only one piece of the puzzle. A fulminating immune response is costly in terms of energy expended and results in damage to the host tissues; thus, rapid and complete resolution of an immune response is also key.<sup>[6]</sup> Undernutrition is well understood to impair immune function, whether as a result of food shortages or famines in developing countries, or as a result of malnutrition arising from periods of hospitalization in developed countries. The extent of impairment that results will depend upon the severity of the deficiency, whether there are nutrient interactions to consider, the presence of infection, and the age of the subject.<sup>[7]</sup> The Mediterranean diet is rich in vegetables, fruit, nuts, legumes, fish, and 'healthy' dietary fats. The Mediterranean diet is associated with a reduced risk of chronic disease such as cardiovascular disease, cancer, and more recently Alzheimer's disease.<sup>[8]</sup> This age-related decline in acquired immunity is termed immunosenescence. An additional consequence of immunosenescence is an impaired response to vaccination. Innate immunity appears to be less affected by ageing than acquired immunity.<sup>[9]</sup> A poor nutritional state impairs immunity and predisposes to infections, the immune response to an infection can itself impair nutritional status and alter body composition.<sup>[10]</sup> While immature, the foetal immune system can produce antibodies, and allergens can reach the developing foetus, and allergen-specific IgE can be detected in cord blood samples.<sup>[11]</sup> The development of the immune system in early life will be influenced by both feeding practices and environmental exposures. Breastfeeding provides further passive immunity to the infant, for example via transfer of antibodies and cytokines. Breast milk components can also stimulate maturation of the gut-associated lymphoid tissue, with breast milk known to be rich in bifidogenic oligosaccharides and to contain its own unique microbiota.<sup>[12]</sup>

## 2. DISCUSSION

Numerous vitamins are crucial for the normal functions of the immune response. The dietary supplementation of vitamin D may have positive effects on individuals who are either insufficient or deficient. Evidence supporting the role of vitamin D in reducing the risk of COVID -19 includes the fact the outbreak occurred in winter.<sup>[13]</sup> It is believed that Vitamin E protects the integrity of cell membranes from damage caused by free radicals and has the potential to influence both innate and adaptive immunity. Foods which can improve your immune systems are,

### a. Berries

We can't go wrong adding these little nutrient packed sweet treats to your regular diet. From local blueberries and blackberries to imported goji or açai, these tiny little morsels are packed with vitamins and nutrients to give you a boost you need. Enjoy them in your yogurt or smoothie, or as a less sugary but still sweet option for dessert.<sup>[14]</sup>

### b. Fish oil

Fish that have high levels of Omega 3 fatty acids such as salmon, tuna or mackerel are known to increase activity among white blood cells, which fight infection. These healthy fats help your immune system and are also good for your heart and brain too.<sup>[15]</sup>

### c. Leafy greens

Dark vegetables such as spinach, kale and collard greens are known to have high levels of vitamin C along with antioxidants and beta carotene, all of which help fight infection. They are also good for your heart, brain, and gut.<sup>[16]</sup>

### d. Nuts and seeds

Nuts such as almonds and walnuts as well as seeds such as sunflower contain several vitamins and minerals (B-6, magnesium, phosphorous or selenium) that help regulate and maintain your immune system. Add them to your salads or enjoy a handful for an energy-boosting healthy snack.<sup>[17]</sup>

### e. Spices

In addition to giving your foods some zing, garlic, ginger and turmeric are ancient spices that have long been considered to have immune-boosting properties to fight infection. So don't be shy when it comes to spicing up your dishes.<sup>[18]</sup>

### f. Citrus fruits

Most citrus fruits such as oranges, grapefruits, tangerines, lemons, and limes contain high levels of vitamin C, which is thought to help fight infection by increasing your white blood cells. Whether you eat them whole, or squeeze the juice onto your food, don't forget to add these tangy fruits to your regular diet.<sup>[19]</sup>

### g. Poultry

Chicken soup is good for more than the soul. Poultry is high in vitamin B-6, which can reduce inflammation and is needed in the creation of new red blood cells, and zinc, which increases production of white blood cells. So don't wait until you have a cold to enjoy a warm bowl of comforting goodness.<sup>[20]</sup>

### h. Brightly colored vegetables

We often think of citrus fruits as our source of vitamin C, brightly colored vegetables such as red peppers have even higher levels! The beta carotene in carrots is also good for your immune system, along with your eyes and skin too.<sup>[21]</sup>

**i. Yogurt**

This fermented food with its “live and active cultures” and vitamin D may stimulate your immune system to help fight disease. Look for brands without added sugar and sweeten them naturally with honey or fruit (like berries, for an additional boost).<sup>[22]</sup>

**j. Olive oil**

A staple in the Mediterranean diet, olive oil is a healthy fat that is good for your heart and brain. It also gives your immune system a boost through its ability to reduce inflammation in your body.<sup>[23]</sup>

**3. CONCLUSION**

Immunity is more important now than ever before - with the pandemic raging and several other infections cropping up as a result of it, it's important to stay healthy and safe. It's no secret that you are what you eat. Research over the years has shown that a well-balanced diet filled with nutritious food is your strongest defense against chronic and dangerous conditions such as heart disease, obesity and diabetes and the same food what you eat can also help you fight illnesses such as the flu which are known as immune system boosters. That means they help your body fight disease effectively by enhancing the immune system. Making sure you are eating a diet high in immune-boosting nutrients is one way you can take an active role in maintaining your health and wellness. Immunity cannot be built in a day. It is a continuous process that requires an immune boosting diet plan based on a healthy & nutritious diet and this will play a key role in reducing inflammation and oxidative stress, thereby strengthening the immune system. Immunity is your body's defense against foreign organisms, so by taking care of yourself with a right nutritious diet you will facilitate your immune system to take care of you.

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