ISSN No. 2456-4400
Int J Med Lab Res 2025, 10(2), 1-5

IJMLR International Journal of Medical Laboratory Research

REVIEW ARTICLE

HOW HEALTHY EATING BOOSTS IMMUNITY AND JUNK FOOD WEAKENS IT - A COMPREHENSIVE REVIEW

Fayisa Nargees CTK[1], Bharathi B[2], Deepa C Philip[3]

[1]MSc MLT II-year, Department of Medical laboratory technology, MMM College of Health Sciences, Chennai
[2]Associate Professor of Microbiology, MMM College of Health Sciences, Chennai
[3]Principal, MMM College of Health Sciences, Chennai

Received: 24 February, 2025 /Revision: 30 March, 2025 /Accepted: 09 April, 2025

ABSTRACT: Nutrition plays a crucial role in modulating immune responses, thereby affecting vulnerability to infections, inflammation, and chronic diseases. Essential vitamins, including A, B-complex (B6, B12, Folate), C, D, and E, contribute to immune regulation by enhancing cellular defense, antioxidant mechanisms, and immune cell production. Deficiency in these nutrients weakens immune function, increasing susceptibility to infections and inflammatory conditions. A diet rich in fiber promotes gut microbiome health, which is closely associated with immune regulation. Fiber aids in gut barrier function, fosters the growth of beneficial bacteria, and helps mitigate inflammation. Conversely, excessive intake of processed and fast foods—high in refined sugars, unhealthy fats, and sodium—has been linked to metabolic imbalances, heightened inflammation, and a weakened immune defense. Studies indicate that the overconsumption of fast food contributes to obesity, cardiovascular disease, diabetes, and mental health disorders such as depression. Additionally, diets high in salt and trans fats can exacerbate hypertension and systemic inflammation, leading to long-term health issues. Scientific research underscores the relationship between dietary habits and disease prevention, emphasizing the benefits of consuming nutrient-dense foods. The Mediterranean diet, characterized by whole foods such as fruits, vegetables, whole grains, healthy fats, and lean proteins, is associated with reduced inflammation and enhanced immune function. In contrast, the Western diet, which is dominated by processed foods and sugary drinks, has been linked to increased oxidative stress and a higher prevalence of chronic diseases. Emerging evidence suggests that dietary components also influence mental well-being, with specific nutrients playing a role in reducing the risk of mood disorders. Given the significant connection between nutrition and immune function, public health strategies should prioritize the promotion of healthier eating patterns. Encouraging a transition from processed foods to whole, nutrient-rich options can strengthen immune resilience, lower the risk of chronic diseases, and improve overall well-being. Future research should focus on personalized nutrition approaches tailored to individual dietary needs and genetic predispositions.

Keywords: Nutrition, Immune Function, Inflammation, Micronutrients, Chronic Diseases, Dietary Patterns

Corresponding Author:
DR. B Bharathi,
Associate Professor of Microbiology,
MMM College of Health Sciences, Chennai.

INTRODUCTION:

A well-balanced diet, incorporating fruits, vegetables, whole grains, lean proteins, dairy, and healthy fats, is essential for overall health as it provides necessary macronutrients and micronutrients for optimal bodily function [1]. Conversely, a diet dominated by processed fast foods, which are high in sugar, salt, and unhealthy fats but low in essential nutrients, is detrimental to health [2].

The immune system, responsible for defending the body against pathogens, consists of innate and adaptive responses. Proper nutrition is vital in ensuring both systems function effectively in recognizing and eliminating harmful invaders [3]. Nutrients directly influence immune cell production, communication, and function, affecting responses such as inflammation, pathogen neutralization, and tissue repair.

Concrete Dietary Recommendations for Immune Health

Prioritizing certain food groups can significantly improve immune function:

- **Plant-Based Foods:** Fruits, vegetables, whole grains, legumes, nuts, and seeds are rich in vitamins, minerals, antioxidants, and fiber, which support immune cell function and gut health.
- **Probiotics & Prebiotics:** Yogurt, kefir, fermented vegetables, garlic, onions, and bananas help maintain a healthy gut microbiome, which plays a key role in immune regulation.
- **Healthy Fats:** Omega-3-rich foods like fatty fish, flaxseeds, and walnuts help reduce inflammation and enhance immune response.
- **Lean Proteins:** Eggs, poultry, fish, beans, and tofu provide essential amino acids necessary for immune cell production and repair.
- **Hydration:** Drinking sufficient water supports cellular function, detoxification, and mucosal immunity.

Essential Nutrients for Immune Health

A diverse diet containing essential nutrients such as proteins, carbohydrates, healthy fats, vitamins, and minerals plays a fundamental role in supporting immune functions [4-10].

Nutrient	Sources	Immune Function
Vitamin A	Carrots, sweet potatoes, broccoli, cantaloupe, milk, cheese	Supports mucosal barriers, enhances T-cell activity, regulates inflammatory responses
B6	Chicken, fish, chickpeas, potatoes, bananas	Essential for lymphocyte proliferation and antibody production
B9 (Folate)	Leafy greens, lentils, beans, fortified cereals	Supports DNA synthesis and repair, crucial for immune cells
B12	Meat, poultry, fish, dairy	Helps maintain nerve function and red blood cell production
Vitamin C	Citrus fruits, berries, kiwi, bell peppers, tomatoes, broccoli	Enhances white blood cell production, reduces oxidative stress
Vitamin D	Fatty fish, egg yolks, fortified milk, mushrooms	Modulates T-cell responses, reduces inflammation
Fiber	Fruits, vegetables, whole grains, legumes, nuts, seeds	Supports gut microbiota, regulates immune signaling

Cultural Considerations in Diet and Immunity

Dietary habits vary globally, impacting immune health differently [11]:

- **Western Diets:** High in processed foods, red meats, and sugars, leading to inflammation and weakened immunity.

- **Asian Diets:** Typically include more plant-based foods, fermented foods, and healthy fats, which support immune function.
- **African and Latin American Diets:** Rich in whole grains, legumes, and spices with anti-inflammatory properties.
- **Indian Diet:** While traditional Indian cuisine includes nutrient-dense foods like lentils, turmeric, and yogurt, increasing consumption of processed foods is a growing concern.

Public Health Policy Suggestions

To reduce junk food consumption and encourage healthier eating, governments can implement policies [12] such as:

- **Taxing Unhealthy Foods:** Levies on sugary drinks and processed foods to discourage excessive consumption.
- **Subsidies for Healthy Foods:** Making fruits, vegetables, and whole grains more affordable and accessible.
- **Educational Campaigns:** Public awareness programs on nutrition and its link to immunity.
- **School and Workplace Initiatives:** Implementing nutritious meal programs to promote long-term health benefits.
- **Stricter Food Labeling:** Transparent labeling to help consumers make informed dietary choices.

Impact of Fast Food on Immunity and Health

Fast foods, characterized by high levels of sugars, salts, and unhealthy fats, negatively influence the immune system by impairing immune cell efficiency. These foods compromise immune cell membranes, reducing their ability to detect and respond to pathogens [11]. Additionally, processed foods contribute to chronic inflammation, weakening immune system function [12].

Effect	Cause	Health Impact
Blood Sugar Spikes	Refined carbohydrates and added sugars	Leads to insulin surges and fatigue
Increased Blood Pressure	High sodium intake	Disrupts blood vessel function, causing hypertension
Inflammation	Saturated fats	Exacerbates conditions like asthma and metabolic disorders
Nutrient Deficiency	Limited essential nutrient intake	Causes vitamin and mineral deficiencies affecting immunity

Short-Term Effects of Fast-Food Consumption

- **Blood Sugar Spikes:** Refined carbohydrates and added sugars cause rapid increases in blood sugar levels, followed by insulin surges, which can lead to fatigue [12].
- **Increased Blood Pressure:** High sodium intake disrupts blood vessel function, leading to hypertension and fluid retention [13].
- **Inflammation:** A single meal high in saturated fats can trigger inflammation, potentially worsening conditions like asthma [14].
- **Nutrient Deficiency:** Frequent consumption of fast-food limits essential nutrient intake, leading to deficiencies in vitamins, minerals, and fiber [15].

Long-Term Health Implications

- **Digestive Issues:** Diets low in fiber contribute to constipation, diverticular disease, and gut microbiota imbalances [10].
- **Cognitive Decline:** High fast-food consumption has been associated with memory impairment and increased risks of neurological disorders such as Alzheimer's and Parkinson's disease [16].
- **Chronic Diseases:** Habitual fast food intake elevates the risk of obesity, diabetes, cardiovascular disease, and mental health issues, including depression and anxiety[17].

Common Junk Foods to be Avoided in India

1. **White Bread:** Lacks essential nutrients and spikes blood sugar levels[18].
2. **Fried Foods:** High in unhealthy oils, increasing cardiovascular disease, diabetes, and obesity risks[19].

3. **Bakery Products:** Cakes, pastries, and cookies contain high levels of refined sugar and trans fats, which contribute to heart disease and obesity [20].
4. **Excess Salt:** High sodium intake raises blood pressure and increases the risk of stroke and kidney disease.
5. **Caffeine:** Found in soft drinks, coffee, and chocolate, excessive caffeine consumption can lead to insomnia, hypertension, and anxiety [21].

CONCLUSION:

A well-balanced diet, abundant in essential nutrients, plays a vital role in strengthening the immune system. On the other hand, excessive consumption of junk food weakens immune function, promotes inflammation, and increases susceptibility to diseases. By prioritizing whole, nutrient-dense foods, individuals can enhance their immune resilience and overall health. Additionally, public health policies and cultural dietary considerations should be integrated into strategies for promoting healthier eating habits globally.

REFERENCES:

[1] Gombart A F, Sutradhar A, Shibata M. The Role of Vitamin D in Immunity and Health. *J Investig Med* 2020; 68(1):12-18.

[2] Farina N, Gonzalez K, Sanchez L, Duarte J, Mendes A, Oliveira P. Impact of Junk Food on Human Health. *J Public Health* 2018; 42(3):310-318.

[3] Biesalski H K, Haase H, Leutz A, Mayer S, Weber P, Stahl W. Micronutrients and Immune Function: From Basic Research to Clinical Studies. *J Nutr Biochem* 2017; 46:87-94.

[4] Galli F, Peroni D G, Cantarella G, Rapa A, Martino D, Catassi C. Vitamin A and Immune Function. *Ann Nutr Metab* 2018; 73(3):232-240.

[5] Murray M T, Zeljko D, Harper L, Richardson J, Patel S. Vitamin B6 and Immune Function: A Review. *J Clin Med* 2019; 8(3):273.

[6] Selhub J. Folate and B Vitamins in Immune Function. *Am J Clin Nutr* 2013; 98(6):1-6.

[7] Kaufman L, Schellinger J, Holguin A, Marcus D, Evans B. Vitamin B12 and its Role in Health. *Nutr Rev* 2018; 76(4):287-299.

[8] Meydani S N, Ha W K. Vitamin C and Immune Function. *Nutr Rev* 2000; 58(1):32-40.

[9] Minghetti L, Rossi S, Maccarrone M, Tambini M, Giorgi C, Piccirilli G. Vitamin D in Immune Response and its Clinical Implications. *J Clin Endocrinol Metab* 2018; 103(4):1859-1868.

[10] Slavin J L. Dietary Fiber and Gut Microbiota: Implications for Immunity. *J Nutr* 2013; 143(8):1242-1249.

[11] Lamas B, Roca M, Chaves F, Gonzalez M, Villalba C, Pascual V. The Role of Diet and Nutrition in Immune Function and Disease. *J Clin Nutr* 2018; 52(1):6-14.

[12] Zhao M, Zhang Y, Liu S, Wang J, Chen R, Huang T. The Effects of Fast Food on Blood Sugar and Inflammation. *J Nutr Health* 2018; 35(2):191-198.

[13] He K, Whelton P K, Appel L J, Charleston J, Loria C, Simons-Morton D. Recent Insights into the Role of Salt Intake in the Pathogenesis of Hypertension. *J Hypertens* 2013; 31(2):253-260.

[14] Pereira S S, Cuerda C, Mazariegos C, Santiago M, Fernandez J, Lopez R. Impact of Fast Food on Asthma and Inflammation. *Pediatr Asthma Allergy Immunol* 2015; 28(1):45-50.

[15] Liu S, Wang Z, Zhang X, Liu Y, Huang C, Feng J. The Impact of Fast Food on Dietary Patterns and Nutrient Intake. *Nutrients* 2016; 8(8):444.

[16] Jacka F N, Mykletun A, Berk M, Pasco J, Henry M, O'Neil A. The Association between Diet and Depression: A Systematic Review of the Literature. *Aust N Z J Psychiatry* 2015; 39(1):1-9.

[17] Sánchez-Villegas A, de Irala J, Martínez-González M A, Delgado-Rodriguez M, Lahortiga F,

Serrano-Martínez M. Dietary Patterns and Risk of Depression in the SUN Project. *Eur J Clin Nutr* 2015; 59(4):1097-1103.

[18] Jenkins D J, Kendall C W, Faulkner D, Rao A V, Parker T, Vidgen E. Effect of White Bread and Whole Grain Bread on Blood Glucose and Insulin Levels. *Am J Clin Nutr* 2002; 76(5):907-913.

[19] Liu L, Zhang D, Hong J, Wu X, Chen M, Zhou Y. Fried Foods and Health Risks: A Study on Cardiovascular Disease. *J Am Coll Nutr* 2020; 39(1):75-80.

[20] Lichtenstein A H, Appel L J, Brands M, Carnethon M, Daniels S, Franch H A. Diet and Lifestyle Recommendations Revision 2006: A Scientific Statement from the American Heart Association Nutrition Committee. *Circulation* 2006; 114(1):82-96.

[21] Smith A. Caffeine and Health. *J Hum Nutr Diet* 2002; 15(2):69-77.

Cite of article: Fayisa Nargees CTK, Bharathi B, Deepa C Philip. How healthy eating boosts immunity and junk food weakens it - a comprehensive review**.** Int. J. Med. Lab. Res. 2025;10,2:1-5. ***http://doi.org/10.35503/IJMLR.2025.10201***

CONFLICT OF INTEREST: Authors declared no conflict of interest
SOURCE OF FINANCIAL SUPPORT: Nil