

## Impact of Zinc on Immune Response

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### Abstract

Zinc is an essential element for various physiological activities in the body such as cell growth, cell differentiation and development. It shows catalytic activity for various enzymes in both plants and animals. Zinc plays important role in boosting the immune system by keeping immune system strong. Deficiency of zinc may affects the human health and it causes many diseases such as hypogonadism, cognitive impairment, poor immune system, diarrhea, delayed wound healing, oligospermia, neurosensory disorders, decreased body mass. Zinc deficiency mainly affects T helper cells.

**Keywords:** Zinc; Immunity; Deficiency; Physiology; Response

### Introduction

Zinc is one of the most important trace elements on earth's crust which is essential for various cellular and catalytic activities of various enzymes of the body for humans, plants and animals. Zinc is obtained from various foods such as dairy products, poultry, eggs, legumes, nuts, red meat, oysters, seafood, and cereals. It also plays very

important role in gene expression, protein synthesis, cell development, nucleic acid synthesis, cell division, replication, growth and development during pregnancy and from childhood to adolescence and in immune function [1-6]. Zinc also known as immune booster by increasing the body immunity because it functions as antioxidant. It decreases oxidative stress markers and generation of inflammatory cytokines. It also helps in several physiological processes such as digestion and regulation of hormone production in the endocrine glands.

Severe deficiency	Moderate deficiency	Mild deficiency
Hypogonadism in males	Growth retardation	Oligospermia
Neurosensory disorders	Poor appetite	Decreased level of testosterone
Obsessive compulsive disorders	Placental abruption	Migraines
Weight loss	Mental lethargy	Hyperammonemia
Diarrhoea	Male hypogonadism	Decreased activity of thymulin
Psychological disorders	Uterine dystocia	Delayed puberty
Intercurrent infections due to cell-mediated immune dysfunction	Cell-mediated immune dysfunction	Decreased activity of natural killer cells
Alopecia	Neurosensory changes	Decreased production of interleukin-2

**Table 1:** Zinc deficiency and its effect on humans.

### Zinc and Immune System

Many biological structures such as proteins, tissues and organs protect against diseases comprising immune system. Immune system is of two types: Innate immune system and Acquired immune system.

**Innate immune system:** It is a non-specific defence mechanism that acts immediately when an antigen appears in the body.

**Acquired immune system:** Also known as adaptive immunity and it is an antigen-specific immunity.

The most important cell in our body which protect from diseases is white blood cells (WBC) or Leukocytes which destroy disease causing substances. Zinc deficiency may cause impaired immune function which causes several types of infections in body such as gastrointestinal, respiratory, inflammatory diseases, autoimmune disease and pneumonia. All these infections develop in the body because level of inflammatory cytokines (IL-6, IL-2, IL-1 $\beta$ ) decreases in the blood due to zinc deficiency [7-9]. Zinc is essential element for normal functioning of cells such as neutrophils and natural killer cells. Zinc deficiency also affects the normal development of acquired

immunity which is prevented by T lymphocytes and B lymphocytes in our body by the activation of Th 1 cytokine production.

## Conclusion

The purpose of this review is to study the relationship between zinc and immunity. Zinc functions as a signalling molecule which targets on specific molecule. Zinc deficiency in the body alters the normal functioning of immune system by altering the signalling pathways which leads to various immunological disorders by affecting the T-cells and B-cells.

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