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Review Article

Harnessing The Plant Kingdom: A Review Of Herbal Immunostimulants

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ABSTRACT

In The Current Developing World, People Are More Prone To Immunological Diseases Such As AIDS, Cancer, Covid-19 Etc,4 People Are Changing There Treatment From Western Medicine To Traditional System Of Medicine4. In The Human Body Immune System Plays A Key Role In Protecting The Human From Different Viruses, Bacteria5.Many Indian Herbal Plants Have The Immunostimulatory Properties5. Immunostimulant Activity Increases The Level Of Neutrophils, Phagocytic Cells, Which Increases The Cytotoxic Cells. Which Increases The Defense Mechanism10.

INTRODUCTION

In India, the Ayurvedic system of medicine is the most widely used traditional. According to the traditional system of medicine, there is a chapter called Rasayana which means plant drug, which is obtained from the plant source and is used to increase the body resistance, it is called an immunity enhancing plant.7 Therapy that uses herbs is called herbal therapy.8 Herbal formulations are used as medicine in the current world.in the present world herbal remedies are used to cure many diseases, and boost the immune

system.1 People believe that herbal remedies do not have any side effects.1 India is called the botanical garden of the world, and it is a large producer of medicinal plants.8 WHO listed 21000 medicinal plants, and 2500 were from India.8

It is reported that medicinal herbs show their immunomodulatory effect by cytokinin release, histamine release, immunoglobulin secretion, phagocytosis, and lymphocyte expression.8

Medicines synthesized from herbs are complex forms of mixtures.6

Discussion:

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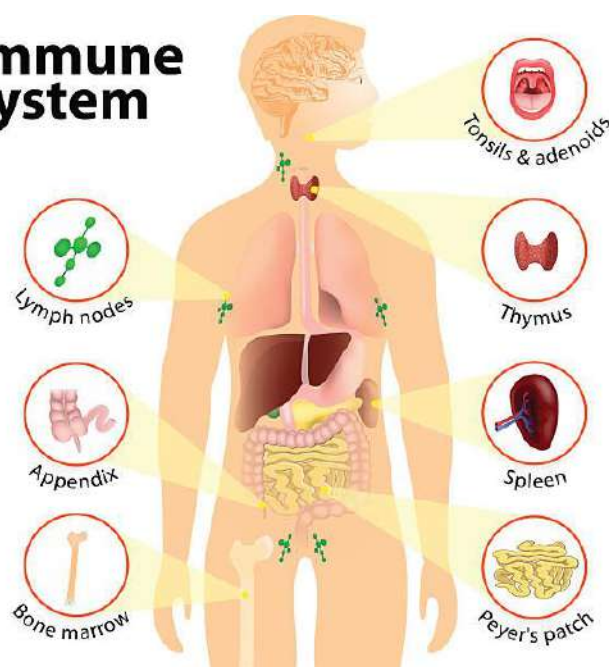
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Immunological diseases are greatly increasing in the present world. Different immunological diseases are rheumatoid arthritis, hematological malignancies, infectious diseases, asthma, and allergic diseases. Immunomodulators are generally defined as the natural and synthetic substances that regulate the immune system. 4 The immune system is classified into two types such as adaptive immunity and innate immunity. 9 Different organs involved in the immune system are the bone marrow, lymphoids, and thymus. Immunomodulators are classified into different types such as immunostimulants and immunosuppressants. Immunostimulants will enhance the body's resistance against different infections. 4 Innate immunity is the first line of defense in which fight against pathogens. 9 When immune cells and normal cells are combined and release chemical cytokines. Adaptive immunity is activated by these cytokines and adaptive immunity releases the antibodies. 9 Innate immunity includes phagocyte cells such as macrophages, dendrite cells, neutrophils, eosinophils, mast cells, and natural killer cells. 9 Adaptive immunity includes t cells and b cells. 9 Oxidative activity of the neutrophils increases the immune stimulant activity. These agents could increase the oxidative activity of neutrophils, augment the engulfment activity of phagocytic cells, and stimulate cytotoxic cells as necessary Défense mechanisms. 4

Immune system



Immunity-enhancing herbal plants:

The natural plant-based ingredients will promote health and boost immunity. The phytoconstituents present in the herbs will increase the bacteria in the gut and maintain immunity. 5 Taramites versicolor (fungi) is a mushroom that is grown on tree trunks, which has glucose-containing glycolytic linkage which has an immunostimulatory effect. 8 Echinacea purpurea commonly known as purple coneflower. it has immuno-stimulatory activity. polyphenols, terpenoids, and alkaloids are responsible for immunostimulant activity. 9 Neem oil which shows immune response by lymphocytes and macrophages. 8 The neem plant extract has phagocytic activity and antigen-presenting ability of macrophages. 8 it stimulates the TNF-alpha, INF γ , and IL-1 which increase the immunostimulatory activity. 8 Research articles have shown that administration of neem oil intraperitoneally in mice, has increased the phagocytic activity, and major histocompatibility complex class-II antigen is also elevated. 11 The studies were continued with the treatment of spleen cells with neem oil as a nonspecific immunostimulant with the ability to activate cell-

mediated immunity.¹¹ Mongolian milkvetch which is having immunomodulatory, anti-inflammatory, and stress-relieving properties. it stimulates the stem cells in bone marrow and lymph tissue.⁸ Turmeric is traditionally used in cooking and has a bioactive compound called curcumin²⁰. It is used as an anti-inflammatory, antioxidant, anxiety, and metabolic syndrome. it increases the serum activities of antioxidants²⁰. Saffron, a spice which is obtained from *crocus sativas*, which is more in carotenoids. Carotenoids which contain lipophilic compartments. Carotin and carotins are natural colorants of carotenoids.¹⁰the saffron carotenoids affect the immune response by increasing the NK-cell mediated activity.¹² Moringa leaves have active constituents such as cryptochlorogenic acid, astragaloside, and isoquercetin which show antioxidant, anti-hypertension, and anti-inflammatory properties¹⁶.

Licorice or *glycyrrhiza glabra* extract has glycyrrhizin, and licochalcone as active constituents responsible for the immunostimulant activity.¹⁷. A study conducted on mice has increased phagocytic activity and there is an increase in the IgG, IgM, and IgA level in the blood.¹⁷ Alovera by oral administration which increase lysozyme activity, serum bactericidal activity, and total protein and IGM levels.¹⁰ Ginger is an antibiotic that is most commonly used as an immunostimulant. It is effective in fish and animals as an immunomodulatory agent. And prevent the disease in aquaculture¹³. In rainbow trout the ginger powder has increased the non-specific immune response.¹³ it is high in antioxidant activity, and it increases the rate of neutrophils, macrophages, and lymphocytes.¹⁰ The rainbow trout was given powdered ginger for 84 days. The results have shown that there is increased haemoglobin, erythrocyte count, MCH, and WBC values. The percentage of neutrophils has increased when compared with the control

group.¹³ Compound such as gingerol, shogaols, and 6-paradol are responsible for the pharmacological activity in the ginger.¹⁴ The immune response of the organism depends on the leukocyte differentials, The changes observed in the fish have shown that there is no toxic effect or oxidative stress in fish.¹³ Ginseng is a commonly known immune modulator. The extracts are used to maintain immune homeostasis and prevent the microbial attack by acting on the immune system. Ginseng which contains steroidal saponins has an immunostimulatory activity that increases the production of cytokines production and lymphocyte activity and macrophage activation saponins¹⁸. stimulate the activity of the cell-mediated immune system and enhance antibody production.⁸ modulation of cytokines shows the immune response, altering cytokine production to control the TH1 or TH2. It stimulates innate immunity by the TLR expression. it also possesses anti-inflammatory activity by TLR signaling. Garlic is a widely used vegetable in most countries, which has an immunomodulatory effect. garlic shows immunomodulatory action by leukocyte production, it stimulates the macrophages lymphocytes and natural killer cells, eosinophils by phagocytosis, and macrophage activation¹⁵. Cytokine secretion and immunoglobulin production also play an important role in maintaining the immune system. The studies conducted have shown that the presence of garlic compounds has reduced the production of inflammatory cytokines in the Th1 cells¹⁵. The homeostasis of the immune system is also well balanced by the use of garlic.¹⁵ Black pepper commonly used Indian spice, which is identified for its antiviral and immunomodulatory activity, a trial conducted on fish for 3 months using black pepper leaf extract has increased antibacterial activity, increased immune responses, and increased growth.¹⁹

CONCLUSION:



Herbal medicine has shown promising potential as an immunostimulant, with various plant-based compounds demonstrating the ability to enhance the immune system. While more research is needed to understand the mechanisms and ensure safety fully, the evidence suggests that incorporating certain herbs into a balanced lifestyle may contribute to improved immune function. The diverse range of plant compounds identified in various herbs highlights their multifaceted impact on the immune system. Further, research and clinical trials are essential to establish the efficacy, safety, and optimal usage of herbal immunostimulants.

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