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# Immunomodulator in Traditional Healthcare System

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## Abstract

In all over world the importance of traditional medicine for the use as treatment against of life threatening diseases is acceptable. Due to heavy potency and availability of the natural sources it's easy to utilize this traditional knowledge for treatment, prevention or mitigation against diseases. In this chapter we discuss about different potent Immuno-modulating drugs which majorly act as immune stimulant. From the ancient time these drugs having potent active constituent which shown prominent effect in treatment of diseases. Considering efficiency with safety plant derived drugs having very global market this review discusses immuno-modulating plant with their active constituent.

**Keywords:** traditional herbs, immunomodulators, medicinal plants

## 1. Introduction

The Indian traditional system of medicine (Ayurveda) had important role in prevention and treatment of disease. Many of the plants showing effect as an immunomodulator. Though conventional immunomodulatory chemotherapy is available but it is costlier and is not usually affordable to ordinary people with low economic status [1]. Therefore, the modulation of immune system by traditional medicinal plant products has become a subject matter for current scientific investigations worldwide. A huge number of medicinal plants have been indicated in Siddha and Ayurveda classical literature towards the management of several diseases that results in immune deficiency. The present study summarized that the Ayurveda, siddha used as Immunomodulator in Health care system.

## 2. Immunity

Immunity is the capability of the Multicellular organism to resist harmful microorganism. these microorganism act as foreign body for living cell, and it try to kill that microorganism. It is also called defense mechanism of the organism to protect from the external factor. Immunity involves both specific and nonspecific components. The nonspecific components act as fighter or barriers to the number of pathogens with various genetic makeup and its nature while specific type of immunity is produce only when specific type of Pathogen produce specific type of Infection and to resist it specific type of immune cell become active and produce resistant to that pathogens [2].

Immunity can be defined as a complex biological system of the body which having capacity to identify whatever belongs to cell or which is beneficial to body and resist to foreign or harmful material with the capacity to recognize and tolerate whatever belongs to the self, and to recognize and reject what is foreign (non-self) [2].

### **3. Immune cells has two distinct**

The basic architecture of the immune system is multi layered, with the Defense on several levels. First barrier is the skin, against the infection. Another is physiological conditions, where conditions like temperature and pH of the body provide in appropriate living condition for foreign organisms. Once pathogens have successfully entered in the body, they are addressed by the innate or acquired or adaptive immune system.

The immune system has two components: innate and adaptive immunity. The innate immunity is present in all metazoans, while the adaptive immunity only occurs in vertebrates.

The innate system after the stimulation of foreign material body produces Inflammation and phagocytosis. On the other side on adaptive system is composed with Lymphatic cell, these cells have ability to distinguish between self cell and non self cell [3].

The inflammation reaction is produce when foreign material enters into body and cells able to find out its foreign material.while The non-reaction to self substances is described as immunity - meaning to exempt.

These two action produce dynamic biological environment and it called health. Disease can occur when foreign material not eliminated or what is self is not spared [3].

### **4. Immuno modulators**

These are natural or synthetic compound or its combination which alter or modify both types of immune system either adaptive or innate of the body.

### **5. Classification of an immunomodulators**

Imunoadjuants are used to enhance the efficiency of vaccines and therefore could be considered a specific immune stimulant. Imunoadjuants hold the promise of being the true modulator of the immune response. It has been proposed that they be exploited as selectors between cellular and humoral helpers [4].

Immunostimulants are inherently non specific as they are envisaged as enhancement to the resistance to the inspection. They act through the intent as well as adaptive immune responses. In healthy individuals, the immunostimulants are play a role as proteolytic or promoter for formation of immune cell. Drugs which impart in production of immune cells are called Immunomodulator [4].

Immunosuppressant is structurally and functionally heterogeneous group of drugs which are often, simultaneously administered in a combination of Regiment to treat the various types of organ transplant rejection and autoimmune disease.

.In clinical practice, both aspects of immunomodulation, i.e. immunostimulation and immunosuppression are equally important. Immunostimulation may require during conventional chemotherapy when the host defense mechanisms are to be activated under conditions of impaired immune responsiveness.

The mechanism of Immunomodulation activity occurs mainly via the stimulation of phagocytes, macrophages, lymphoid cells, increasing circulating total white cell counts and interleukin-2 levels. Immunological defense is a constant interplay between nonspecific and specific, cellular and humoral immune responses, stimulation and suppression of immunocompetent cells, and the influence of endocrine and other mechanisms. The Primary targets of the Immunostimulant are T or B lymphocytes and it plays a central role an immunostimulation. The second most important role in the stimulation of T lymphocytes is Activation of macrophages, which can be achieved either directly or indirectly, via macrophages [5].

## **6. Ayurveda system and immunomodulation**

The primary objective of Ayurveda, the Indian traditional system of medicine is the prevention of the disease. The different health care measures to be adopted by an individual are grouped together under the heading of “Rasayana.” Rasayana meaning in sanskrit that literally implies to the circulation of rassa means Nutrients .and these nutrients reach to the various parts of body, reaches upto tissues and cell. In that nutrients some are micro and macro nutrients which help in proper functioning of the body and resistant to diseases. Sushruta was more specific, describing a Rasayana as one, which is antiaging, increases the life-span, promotes intelligence and memory, and increases resistance to diseases [6].

## **7. Siddha system and immunomodulation**

The great Tamil saint ‘Thiruvalluvar’ has discuss the significance of diet as the cause of disease. According to Siddha system, the Term “Food is medicine and medicine is food” indicated that proper diet and healthy lifestyle containing medicinal herbs has intrinsic elements allowing the body to remain healthy. The ultimate essence of our consumed food acts as an essential component to strengthen the seven UdalkattugalSaaram (Plasma), Seneer(Blood), Oon (Muscles), Kozhuppu, Enbu, Moolai, Sukkilam, Suronitham thereby stimulating immunomodulation [6].

## **8. Indian medicinal plant**

An in India wide range of traditional medicine that is from ancient time use for medicinal purpose. India is heritage for wide range of medicinal plants. These medicinal plants show various pharmacological action like anti-inflammatory, Anti diabetic, Antiulcer, Stimulant, Nervine tonic and many more.

In that some plants contain some micronutrients present in form of secondary metabolite and produce action of immunomodulation [7].

Some of the indigenous plants investigated for immunomodulatory effects.

### **8.1 Garlic (*Allium sativum*)**

*Allium sativum* is also known as Lahsuna. It consists of bulb belonging to family. Liliaceae. It grows 1.5 to 2.5 cm with having Characteristic and Aromatic Odor. Bulb are whit to pink in color. Garlic contain volatile oil, alliin and allicin. Garlic used as Carminative, expectorant, Antibacterial, disinfectant and also used in treatment of pulmonary infection [7].

Immunomodulatory effect

- Inhibit growth of cancer cells.
- Modulates activity of chemical carcinogens.
- Enhances capillary skin perfusion.
- Enhances macrophage (oxidative burst) and T lymphocytes.

### 8.2 Ghriti Kumari (*Aloe vera*)

It consists of dried juice of leaves of *Aloe vera* belonging to family Liliaceae.

Aloe is indigenous to eastern and southern Africa and grown in cape colony, Zanzibar and island of Socotra. In India it is available in almost all the houses. The genus Aloe consists of about 200 species, these plants have rosettes of subulate, succulent large leaves. These leaves are sessile and have a strong spine at apex and also no. of spines in margins. Aloe mainly contains Barbaloin and alosin. Barbaloin is C- glycosides. Aloe used as a purgative, Antiseptic, cooling agent and also in many of the cosmetic preparation [7].

Immunomodulatory effect

- Prevents UV-induced suppression of DTH.
- Polysaccharides from it show adjuvant activity for antibody (Ghrit-kumari) production and DTH.
- Inhibits inflammation.
- Improves wound healing.
- Serves as oxygen radical scavenger, acts synergistically with NO.
- Causes regression of tumor.

### 8.3 Kalmegh (*Andrographis paniculate*)

It consists of dried leaves and tender shoots of plant *Andrographis paniculate* belonging to family Acanthaceae. Kalmegh is an annual herb distributed in Sri Lanka and throughout India, specially in Maharashtra, Karnataka, Uttar Pradesh, Tamilnadu, Andhra Pradesh and Madhyapradesh. It is cultivated in some extent in Assam and West Bengal. Leaves are dark green, white flowers and rose colored. It is odorless and intensely bitter in taste. It is used as Immunostimulant [7].

- Stimulates macrophage migration,
- Phagocytosis of *E. coli*; Induces paniculata stimulation of antibody and DTH response to SRBC in mice.
- Proliferation of splenic lymphocytes.
- Inhibits NO synthase.

#### 8.4 Shatavari (*Asparagus racemosus*)

It is also called as Shatmuli. It consists of dried roots and the leaves of the plant *Asparagus racemosus* belonging to family Liliaceae. The roots are silver white or ash color externally and white internally. Spindle shaped and having slightly bitter followed by sweet taste. Shatavari roots is used as Galactagogue, tonic, diuretic. Shatavari I having ant oxytocic property. Shatavari also used as anti stress, Anticancer, Antiseptic, Antiaging and immunostimulant [8].

Immunomodulatory effect

- Stimulates RE System and PMN cell.
- Induces lag in tumor development.
- Prevents leucopenia induced by cyclophosphamide.
- Inhibits ochratoxin A induced suppression of IL-1, TNF- $\alpha$  – Antiaging and macrophage chemotaxis.

#### 8.5 Neem (*Azadiractaindica*)

It is also known as Margosa. It is non edible fixed oil obtained from fully matured seeds of *Azadiractaindica* belonging to family Meliaceae. Neem plant found throughout India and other tropical countries. It mainly contains Glycerides saturated and unsaturated fatty acids. It having yellow colored oil with specific odor and bitter in taste. It contains Nimbin, nimbidin and other related compound possess antiviral activity. It is also used for making soap and manufacturing of oleic and steric acids. It also acts as pesticides and spermicides.

- Stimulates IL-1, INF- $\gamma$ , TNF- $\alpha$  production, enhances proliferative response of spleen cells to Con A and tetanus toxoid.
- Inhibits both complement pathways as well as activates PMN cells.
- Enhances macrophage phagocytosis and expression of MHC II antigen.
- Enhances anti-ovalbumin antibody response, DTH response, macrophage migration inhibition.
- Attenuation of stress and xenobiotic induced suppression of humoral and cell-mediated immunity.
- Enhances PMN leucocytes and cell-mediated immunity.
- Induces production of interferons.
- Reduces mortality induced by Tacaribe viral encephalitis.
- Inhibits intracellular multiplication of Chlamydia and cytopathic effects of herpes<sup>81</sup>.
- In a clinical study reduced erythema desquamation and infiltration of psoriatic lesions.

### 8.6 Amla (*Embellica officinalis*)

Amla consist of dried and fresh of plant *Embellica officinalis* belonging to family Euphorbiaceae. It is small in size tree found in all deciduous forest in India. It is also found in Shrilanka and Myanmar. The Fruits are Green in color, after maturity it is converted into yellow and brick red. Having sore and astringent taste. It is used as a Antibacterial, Rejuvenate and it improve vitality.

Immunomodulatory effect

- Protects against pancreatitis
- Induce positive nitrofn balance
- Protects against toxic effect of metals
- Enhance NK cell and Antibody dependant cellular toxicity against Dalton lymphoma ascites Tumor [9]

### 8.7 Tulsi (*Ocimum sanctum*)

It is also called as Holy basil. Tulsi consists of fresh and dried leaves of plant *Ocimum sanctum* belonging to family Lamiaceae. It is herbaceous, branched, small herb annual plant found throughout India. The plant considered as sacred by Hindus. It is commonly cultivated in garden and grown in temples. It mainly contains volatile oil and eugenol is the main chemical constituent. Generally, all part of tulsi is used as a medicine.it act as an Anti-inflammatory, antiseptic, Antifungal, antiviral, Antiasthematic [10].

- Increases colony forming unit in spleen and protects mice after irradiation.
- Enhances survival of viral encephalitis patients.
- Enhances humoral immunity; inhibits histamine release from sensitized mast cells and antagonizes tissue responses to histamine [10]

### 8.8 Haldi (*Curcuma longa*)

I also known as Haridra, Indian Saffron, Turmeric, Curcuma.

Turmeric consist of dried and also fresh Rhizomes of plant *Curcuma longa* belonging to family Zingiberaceae. Externally it is having yellowish color with characteristic odor and bitter in taste. Curcumin is the main chemical constituents. It used as a spice, colorings agent, antiseptic, anti-inflammatory [11].

- Increases mitogenic response of lymphocytes
- Inhibits NO production and scavenges reactive oxygen species.
- Enhanced IgG level but did not affect DTH and NK cell activity.
- Helps in rheumatoid arthritis.
- Chemoprotective agent against cancer.

### 8.9 Ginseng (*Panax pseudoginseng*)

It consist of dried roots Of various species of Panax like *P. pseudoginseng*, *P. japonica*, *p. notoginseng*. Belonging to family Araliaceae. It is an important immuno-modulatory drug. It generally used as health tonic and Adaptogen.

Immunomodulatory effect

- Stimulates macrophage migration;
- Enhances circulating antibody and antibody forming cells to SRBC in mice.

It is also called Withania root, Winter cherry. Withania consists of dried roots and stem bases of *Withaniasomnifera* belonging to family Solanaceae. it mainly contain, Withaferin A, Withaferin, Anaferin, Withanolides. It acts as a Immunostimulant, Antirheumatic, Antistress [11].

Immunomodulatory effect

- Stimulates RE system and PMN cells.
- Inhibits tumor development.
- Increases WBC counts in irradiated mice.
- Prevents myelosuppression induced by azathioprine, cyclophosphamide and prednisolone.
- Inhibits Ochratoxin A induced suppression of IL-1, TNF- $\alpha$  and macrophage chemotaxis.
- Enhances spleen colony forming units.
- Enhances Radio sensitization for V97 Chinese hamster cell.

### 8.10 Kutki (*Picrorrhizakurroa*)

It used as Immunostimulant and antioxidant.

Immunomodulatory effect

- Enhances antibody and DTH response to SRBC in mice.
- Inhibits ochratoxin A induced suppression of IL-1, TNF- $\alpha$  and macrophage chemotaxis.
- Protects animals against leishmania and filarial infections.
- Enhances phagocytosis, stimulates PHA, ConA and LPS induced lymphocyte proliferation, macrophage migration, enhances antibody response against SRBC [12].

*Murrayakoenigii* is commonly known as curry leaves, belonging to family Rutaceae. Because of its aromatic value mainly used as spice throughout India. Leaves are green in color. The bark, leaves and root are used as tonic, stomachache, stimulant and carminative Plant identified as Rsayanas in Indian ayurvedic system

of medicine have various pharmacological properties such as immunostimulant, tonic, neurostimulator, antiaging, antibacterial, antiviral, antirheumatic, anticancer, apoptogenic, ant stress.

Methanolic extract of *Murrayakoenigii* leaves gives cellular and humoral immune response [1].

### 8.11 *Tinosporacordifolia*

It is commonly called as Guduchi. It is large, glabrous, perennial, climbing shrub of weak and fleshy stem found throughout India. It is used as an antidiabetic, antipyretic, antimalarial, anti-inflammatory, hepatoprotectives, immunomodulatory, antispasmodic, antineoplastic activity.

### 8.12 *Bauhinia variegata linn*

The plant commonly found in moist waste ground and open plantations. It is cultivated throughout India. Its family is Caesalpiniaceae. The bark powder of plant is ingredients of the herbal tonic Kanchanar guggul, is an Ayurvedic remedy used to increase white blood cells. The plant also used as tonic for liver, in treatment of leprosy, menorrhagia, impurities of blood, wounds, ulcer, asthma. The effect of the ethanolic extract of the stem bark of *Bauhinia variegata* on the primary and secondary antibody responses was evaluated by the humoral antibody response for a specific immune response. Phagocytic cells, such as macrophages and neutrophils, barriers such as skin and a variety of antimicrobial compounds synthesized by the host, all play important roles in innate immunity [13].

### 8.13 *Abutilon indicum linn*

*Abutilon indicum linn* commonly known as Atibala, it is a stronger diuretic and heart tonic. It is also used for the remedy of the jaundice, piles, ulcer, leprosy, raktapittadosha and blood purifier. The ethanolic extract of *Abutilon indicum* leaves beneficial for the treatment of impaired immunity.

### 8.14 *Terminia arjuna Roxb*

It is commonly called as Arjuna bark and Arjun. It consists of dried stem bark of the plant known as *Terminia Arjuna Roxb*. Belonging to family Combretaceae. It is common tree in Indian peninsula. Bark having Astringent taste. Bark is used as a cardiotonic. It also possesses diuretic and tonic properties. Diuretic properties are due to Arjunolic acid. The drug exhibit hypotension action with vasodilation and decrease heart rate [13].

## 9. Conclusion

Besides of allopathic diagnosis system, we can use Traditional system for the treatment of various diseases and which can be affordable to the common communities. Ayurveda and siddha system involved the medicinal plants for the treatment of diagnosis and it is available easily in Indian forest. So, the medicinal plant or Indian traditional system is best way for treatment or Immunomodulator.

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