

CONCEPT OF IMMUNOMODULATION IN AYURVEDA AND SOME IMMUNOMODULATORY HERBS

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ABSTRACT

An immunomodulator is a drug used for its effect on the immune system. It can be defined as a substance, which can influence any component or function of the immune system in a specific or nonspecific method. The concept of immunomodulation is mentioned as *Rasayana* in *Ayurveda*. *Ayurveda* has two aims- first one is prevention and promotion of health and the other one is cure from disease. *Rasayana* are used for both aims. It is one of the eight major divisions of *Ashtang Ayurveda*. *Rasayana* remedies act basically on nutrition dynamics and rejuvenate the body and psyche. They are used for promotion of health, longevity and prevention of diseases. They preserve the *Ojas* status and improve the *Vyadhikshamatva* i.e. immunity. *Rasayana* builds natural resistance against infection. The use of herbs for improving the overall resistance of body against common infections and pathogens has been a guiding principle of *Ayurveda*.

Keywords: Immunomodulator, *Rasayana*, *Vyadhikshamatva*.

INTRODUCTION

The active agents of immunotherapy are collectively called immunomodulators. They are a diverse array of recombinant, synthetic and natural preparations, often cytokines. Some of these substances such as granulocyte colony stimulating factor (G-CSF), interferon, imiquinol and cellular membrane fractions from bacteria are already licensed for use in patients. Others including IL-2, IL-7 and IL-12, various chemokines, synthetic cytosine phosphate guanosine, oligodeoxynucleotides and glucane are currently being investigated extensively in clinical and pre-clinical studies. Immunomodulatory regimens offer an attractive approach as they often have fewer side effects than existing drugs, including less potential for creating resistance in microbial diseases.¹

Ayurveda has mentioned the concept of immunity as “*Vyadhikshamatva*”. *Acharya Chakrapani* has interpreted the term *Vyadhikshamatva* as “*Vyadhi bala virodhitva*” means opposed to the strength and virulence of the disease and “*Vyadhyutpada pratibandhaktwa*” means ability to restrain and bind the causes and factors of the diseases. *Charaka* has described *Bala* as a factor that destroys *Dosha* and disease causing factors. *Vyadhikshamatva* or *Bala* is not of the same, it varies with individuals. It also depends upon nutritional, environmental and individual factors both physical and mental. In our classics *Bala* is stated to be of three types² -

1 *Sahaja bala*- It is innate and natural resistance to disease which exists since birth.

2*Kalaja bala*- It is influenced by seasonal traits and age of the person.

3*Yuktikrit bala*- This refers to modulation of body's resistance against disease by use of proper diet, physical exercise, rest and *Rasayanas*.

Acharya Sushruta has mentioned that *Ojas* and *Bala* is same thing³. There are two types of *Ojas* are mentioned in *Samhitas*- *Apara ojas (ardhanjali pramana)* and *Para ojas (ashta bindu pramana)*. *Ojas* has direct influence on body's defence.

In fact one of the therapeutic strategies in *Ayurvedic* medicines is to advance the body's overall natural resistance to the disease causing agent rather than directly neutralizing the agent itself. The use of herbs for improving the overall resistance of body against common infections and pathogens has been a guiding principle of *Ayurveda*. Such herbs possessing immunomodulatory effects are referred to as *Rasayanas* in *Ayurvedic* classics. They are believed to have the capacity of protecting the body against external factors that induce disease. The implicit resistance against disease may correspond to the modern concept of immunity.

Ayurveda has two aims- prevention and promotion of health and the other one is cure from disease⁴. *Rasayana* may be used for satisfying both aims. *Rasayana Chikitsa* is the branch of *Ayurvedic* science, which deals with different aspects of preventive health care. It is one of the eight major divisions of *Ashtang Ayurveda*⁵. *Sushruta* has defined a healthy man as one whom has⁶:-

- Equilibrium of the Doshas (Sama dosha).
- Normal functioning of Agni (Sama Agni)
- Normal condition of 7 Dhatus (Sama Dhatu)
- Normal Excretion of waste products (Sama Malakriya).

Beside this *Atma* (Soul), the *Indriyas* (sense organs) and *Mana* or mind should be happy and joyful. The modern definition of health by W.H.O. is also same that "Health is a state of complete physical, mental and social well being and not merely absence of disease". This healthy condition of mind and body can be achieved by *Rasayana* therapy or Rejuvenation therapy. *Rasayana* drugs are supposed to slow down the aging process (*jara*) and offer a defence against disease. *Rasayana* improve the host resistance of an individual, helping to prevent aging and diseases. Specific diets and lifestyle changes are also advised in *Rasayana* therapy.

Etymology

Rasayana is made up of *Rasa* and *Ayana*. *Rasa* principally means essential seven vital tissues: *Rasa* (lymphatic), *Rakta* (blood), *Mamsa* (muscle), *Meda* (adipose tissue), *Asthi* (bones), *Majja* (bone marrow) and *Shukra* (reproductive element). *Ayana* means the path or channels for the same. So *Rasayanas* are those that carry about appropriate uptake, growth and improvement of seven essential vital tissues. *Rasayanas* provide long life, good intellect, ability to remain young and general well being.

Rasayana Chikitsa in Samhita

Charaka Samhita:- In *Charaka Samhita* 1st chapter of *Chikitsa sthana* is committed to *Rasayana* therapy. *Charaka* has mentioned *Rasayana* as the means of obtaining the best qualities of *Rasadi dhatus*⁷. Best quality of *Rasa* leads to the creation of best qualities of other *Dhatus*. So it the procedure by which all body tissues are nourished. Here various *Rasayana Yogas* are described as-

- 6 yogas in Ch.Chi 1-1
- 37 yogas in Ch.Chi 1-2,
- 16 yogas in Ch.Chi 1-3,

4 yogas in Ch.Chi.1-4.

Sushruta Samhita:- Sushruta has described four chapters (from 27th to 30th) in Chikitsa sthana for Rasayana. Acharya has mentioned that Rasayana should be used in young or middle age invariably after prior unctio and evacuation⁸. He also mentioned seven types of persons whom should not use Rasayana⁹.

Vagbhatta Samhita:- Acharya Vagbhatta has described Rasayana therapy in last chapters of Uttara tantra (49th chapter of Ashtang Samgraha and 39th of Ashtang hrudaya). The description of Rasayana resembles close to Charaka Samhita.

Various details of Rasayana therapy is available in Sharangadhar Samhita Purva khand 4th chapter, Kalpa sthana of Kashyapa samhita, in Chikitsa kalika written by Testaacharya etc.

Classification of Rasayana

Rasayana is chiefly divided into two types:-

- *Dravyabhuta Rasayana*
- *Adravyabhutas Rasayana* (*Achara Rasayana*)

(A) As per method of use (According to Acharya Charaka)¹⁰:

- *Kuti Praveshika* (in door use) - This type of *Rasayana* is administered in *Trigarbha kuti*.
- *Vatatapika* (outdoor use) - There is no need to live in any *kuti*.

(B) As per Scope of use¹¹:-

- *Kamyas Rasayana*- *Kamya* means desire. The *Rasayana* used for attainment a specific wish is called *Kamya Rasayana*.
- (a) *Prana kamya*: Aiming to complete desires of vitality and longevity.
- (b) *Medhakamya*: Promoter of intellectual power e.g. *Brahmi*, *Shankhpushpi*.
- (c) *Shreekamya*: To enhance the complexion and lusture.

- *Naimittika Rasayana*- *Naimittika Rasayana* is to be used in person suffering from definite disease like *Shilajit* in *prameha*.

- *Ajasrika Rasayana*- It can be used daily as diet like *Dugdha*, *Ghruta*.

(C) According to Prabhava (Effect):-

- *Samshodhana Rasayana*- The *Rasayana* which eradicate the vitiated *Doshas* by expelling from body known as *Samshodhana Rasayana*.
- *Samshamana Rasayana*- The *Rasayana* drugs which have *shaman* effects on *Doshas* are called *Samshamana rasayana*.

(D) As per content of Rasayana:-

- *Ahara rasayana*- It is based on diet.
- *Aushadha rasayana*- It is based on herbs and drugs.
- *Achara rasayana*- It is based on conduct and behaviour.

(E) According to Sapta Dhatus (Body tissues):-

- *Rasa* (Lymphatic)
- *Rakta* (Blood)
- *Mamsa* (Muscles)
- *Meda* (Adipose tissue)
- *Asthi* (Bone)
- *Majja* (Bone marrow)
- *Shukra* (Reproductive element)

(F) According to Satmya:-

- ✓ *Desha Satmya*- There is three types of *Desha* are mentioned in our classics:-
 1. *Anupa Desha*
 2. *Jangala Desha*
 3. *Sadharana Desha*
- ✓ *Ritu Satmya*-
 - *Aadana kala*- *Shishir*, *basant* and *grishma ritu*.
 - *Visarga Kala*- *Varsha*, *sharad* and *hemant ritu*.

(G) According to Modern Medical Science:-

- To enhance Immunity.

- To improve and recover metabolism.
- To improve secretions (Both exocrine and endocrine).

Mode of action of Rasayana

Rasayana fundamentally promotes the health through three modes. They are:

- By directly enriching the nutritional ingestion of the body through increasing the consumption of milk, ghee etc.
- By improving *Agni* i.e. digestion and metabolism through *Bhallataka*, *pip-pali* etc.
- By promoting the potential of *Srotas* or microcirculatory channels in the body, through herbs like *Guggulu*, *tulsi* etc.

Some immunomodulatory herbs

Here is description of some herbs, which are used as *Rasayanas* (immunomodulator) in our classics-

1 *Tinospora cordifolia* (*Guduchi*): It is used in management of jaundice, diabetes, skin diseases, anaemia, emaciation and infections. Plant extracts are recognized to motivate macrophages and enhance their phagocytic activity and intracellular killing activity. It was reported to develop surgical outcome by strengthening host defences¹². *Tinospora cordifolia* has been evaluated as an adjuvant in clinical conditions like obstructive jaundice, TB and cancer chemotherapy and has been found to enhance the efficiency of conventional therapies. It is also revealed to utterly motivate macrophages and improve their phagocytic activity.

2 *Emblica officinalis* (*Amalaki*): It is a rich source of vitamin C. The fruits of *E. Officinalis* have been used in *Ayurveda* as effective *Rasayana* and also for the management of miscellaneous aetiology diseases. Perhaps there is no other drug in any other system of natural medicine with such an immense range of endorsed effects. In an experimental study, it was reported that

E. Officinalis could bring about a noteworthy weight gain in the subjects together with an increase in serum total protein content¹³. It is used as antioxidising, antibacterial, anti-inflammatory agent. The anti oxidant activity of *E. Officinalis* resides in tannoids.

3 *Terminalia chebula* (*Haritaki*): It is an antibacterial, antioxidising, anti-inflammatory and immunomodulatory agent. The topical administration of an alcoholic extract of the leaves of *T. Chebula* was found to heal much faster as indicated by decreasing period of epithelialization. The tensile strength of the tissue was increased by 40%¹⁴. Biochemical studies have shown a noteworthy increase in total protein, DNA and collagen contents in the granulation tissue of treated wound. Reduced lipid peroxide levels in treated wounds recommend anti oxidant activity. The extracts of *T. Chebula* were found to appreciably restrain yields of cytomegalo virus in lungs of mice. Thus *T. Chebula* may be valuable for prophylaxis of CMV in immunocompromised patients¹⁵.

4 *Glycyrrhiza glabra* (*Yashtimadhu*): It is an immunomodulator and antioxidant. Glycyrrhizin, a triterpenoid glycoside obtained from it is found to slow up RNA viruses such as measles, polio viruses' type 1, 2 and 3 and DNA viruses such as herpes virus 1 and 2¹⁶. Polysaccharide fractions obtained from the root of *G. Glabra* persuade nitric oxide production from macrophages¹⁷.

5 *Commiphora mukul* (*Guggul*): It is used as an anti inflammatory, anti-hyperlipidemic and immunomodulatory agent. A randomised control trial of *C. Mukul*, at 50 mg twice daily was conducted on patients with hypercholesterolemia. *C. Mukul*, decreased total cholesterol by 11.7%, low density lipoprotein

(LDL) by 12.5%, triglyceride by 12% and the ratio of total cholesterol/high density lipoprotein (HDL) by 11.1%¹⁸.

6 *Allium sativum* (Lahsuna): It is an antimicrobial, antitumor, hypolipemic, antiarthritic and hypoglycaemic agent. These descriptions have been correlated to their influences on immune functions in different ways¹⁹. The herb has been found to enhance human immune functions by stimulating peripheral blood mononuclear cells. Diallyl sulphide in *A. sativum*, is known to exert anti carcinogenic activity²⁰. Allicin has been found to encourage programmed cell death and seize of proliferation in cancer cell.

7 *Withania somnifera* (Ashwagandha): It is one of the much-admired *Rasayana*. It is an immunomodulatory, anti-inflammatory and antioxidising agent. *W. Somnifera* efficiently inhibits the inflammatory process. It can also bring about a specific decline in alpha-2 macroglobulin synthesis, unlike the conventionally used non-steroidal anti-inflammatory drugs (NSAIDS) and has anti-oxidant activity²¹. The herb is described to act as *Rasayana* and *Medhya*. In a clinical study on patients of anxiety neurosis, it was observed to diminish the symptoms of anxiety. In another study, the herb has been shown to be successful in cases of depression. This plant also produced leucocytosis with predominant neutrophilia and prohibited leucopenia induced by cyclophosphamide²².

8 *Azardicta indica* (Neem) : It is reported to have numerous therapeutic effects, including being anti infective, anxiolytic and having general immunopotentiating capacity²³. It is extensively studied for a range of valuable properties. The aqueous extract of *Neem* leaves improve the phagocytic activity of macrophages. In human volunteers, it stimulates humoral immunity by increasing antibody levels and cell me-

diated immunity by increasing total lymphocyte and T-cell count.

9 *Asparagus racemosus* (Shatavari): It is used as an immunomodulator and antioxidant. The aqueous extract of the whole plant of *A. Racemosus* gives defence from biological, physical and chemical stresses²⁴. Aqueous extract of *A. Racemosus* are also found to suppress the myelosuppressive effects of single and double doses of cyclophosphamide²⁵.

10 *Samecarpus anacardium* (Bhallatak): Extract of nut preparation of *S. Anacardium* is effective against a variety of diseases like arthritis, tumours and infections. An extract of *S. Anacardium* at a dose of 150 mg/kg considerably reduced the lysosomal enzyme activity in arthritic animals²⁶.

11 *Piper longum* (Pippali): *Pippali rasayana*, an *Ayurvedic* herbal medicine prepared from *P. Longum* is prescribed for the treatment of chronic dysentery and worm infestation. *P. Longum* significantly increases macrophage migration inhibition and phagocytic activity²⁷.

12 *Aloe vera* (Ghritkumari) : *Aloe vera* is a plant exclusively used in skin care protection and other health care products. It is also found to posse's anticancer activity. Supplementation of *Aloe vera* gel has been found to suppress the occurrence of hepatocarcinogenesis in male rats²⁸.

13 *Boerhaevia diffusa* (Punarnava): The plant *Boerhaevia diffusa* is used as an antiarthritic, immunomodulatory and antistress agent. It is known to potentiate macrophage phagocytic activity.

14 *Ocimum sanctum* (Tulasi): It is used as an antistress, antioxidising and immunomodulatory agent. The ethanolic extract of *O. Sanctum* inverted the changes in plasma levels of corticosterone induced by exposure to acute and chronic stress²⁹.

15 Shilajit (Asphalt): It is an exudate of selected rocks in Himalaya region. It is a composite mixture of both organic and inorganic matter and is measured to be effective therapy for many diseases. A study showed that *Shilajit* exhibited cytotoxic effects and inhibited the carcinogenic potential of cyclophosphamide. In experimental studies, it also has been observed that *Shilajit* activates macrophages and enhance cytokine release³⁰.

16 Chyawanprash Awaleha :- Rasayana formulation: It is a polyherbal *Ayurvedic rasayana* preparation described in *Charak Samhita*. This preparation is used as a health supplement. It contains the pulp of *Embelica officinalis* as the chief component. In a controlled clinical study using *Chyawanprash awaleha* as an adjuvant in treatment of pulmonary tuberculosis, it was observed that the preparation could enhance the recovery process in addition to an improved nutritional status of subjects.

DISCUSSION AND CONCLUSION

The immune system is an intricate system, linking network of biochemical mechanism. The concept of *Rasayana* as described in *Ayurveda* is a holistic approach. It constitutes an important approach to handle with subjects of immunity. *Rasayana* is a specific type of treatment influencing the basic aspect of body i.e. *Dhatu*, *agni* and *srotas*. Herbs used as *Rasayana* and other *Rasayana* formulas provide amazing potential to be fascinated for immunomodulatory activity.

- Probably *Rasayana* drugs are having *Madhura*, *guru*, *snigdha*, and *sheeta* properties act at level of *Rasa* by promoting the nutritional significance of the *Rasa* which helps in obtaining the best virtues of *Dhatu*s.
- The *Rasayana* having the *Ushna*, *laghu*, *ruksha* and *katu*, *tikta*, *kashaya*

rasa may be acting at level of *Agni*, stimulating the organic metabolism.

- The *Rasayana* drugs with *Katu*, *tikta*, *kashaya rasa*, *vishada*, *ruksha*, *laghu guna*, *ushna veerya* and *Katu vipaka* may cause *Srotoshodhana* and may help in the assessment of the *Rasayana* effect in the body.

Besides immunomodulatory action *Rasayana* drugs acts as antioxidant, anti-stress, anti-inflammatory, anti-microbial, anti-aging, anti-arthritis and anti-bacterial agents.

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