

## REVIEW OF PHYSIOLOGICAL CONCEPT OF IMMUNOMODULATION IN AYURVEDA AND ROLE OF RASAYANA AS IMMUNOMODULATOR

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Article Received on  
16 February 2020,  
Revised on 06 March 2020,  
Accepted on 27 March 2020  
DOI: 10.20959/wjpr20204-17186

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### ABSTRACT

Immunomodulators can be define as substance which can influence any function of the immune system including both innate and adaptive immunity. In ayurvedic text immunity had been explain by *chakrapani* in terms of *vyadhikshamatva* and it is described as a state of equilibrium of *oja*, *bala*, *prakrit kapha*. *Chakrapanidatta* has interpreted term *vyadhikshamatva* as *vyadhibalavirodhitwa* i.e. antagonistic to strength and virulence of the disease and *vyadhiutpada pratibandhaktwa* i.e. capacity to inhibit to bind causes and factors of the disease. The ayurvedic system of medicine details the concept of immunomodulation by the term *rasayana*. *Rasayana* acts in the body at three level i.e. *ras*, *agni*, *strotas*. So that nutrition will be distributed

to whole body at microcellular level. This paper is a review on physiological concept of immunity and immunomodulation in Ayurvedic as well as modern point of view, and role and action of *rasayana* as immunomodulator.

**KEYWORDS:** immunomodulators, *vyadhikshamatva*, *rasayana*, *oja*, *bala*, immunity.

### INTRODUCTION

Immunity is defined as body's ability to identify and resist large number of infections and potentially harmful microorganism, enabling the body to prevent and resist diseases and inhibit organ and tissue damage.<sup>[1]</sup> The modulation of immune response by using ayurvedic herbal medication as a possible therapeutic measure has now become a subject of scientific investigation.<sup>[2]</sup> In modern science the concept of immunomodulation would mean

enhancement of immune response of organism against a pathogen non specifically activating the immune system using immunomodulatory agent of plant origin.<sup>[2]</sup> It is now being recognized that modulation of immunological response could provide an alternative to various therapies for a variety of diseases of impaired immune response or when a selective immunosuppression has to be induced in a situation like autoimmune disorder and organ transplantation.<sup>[2]</sup>

An immunomodulator can be defined as substance which can influence any constituent or function of the immune system in a specific or nonspecific manner including either innate or acquired immune response.<sup>[3]</sup> They can be natural or synthetic preparation, often cytokines. Some of these substances such as granulocytes colony stimulating factors, interferons, imiquimods and cellular membranes functions from bacteria are already licensed for the use in the patient.<sup>[4]</sup> Other including IL-2, IL-7, IL-12, various chemokines, synthetic cytosine phosphate-guanosine, oligodeoxynucleotides and glucans are currently being investigated extensively in clinical and preclinical studies.<sup>[4]</sup> Various hypothesis has been proved scientifically by various authors which are discuss below.

## MATERIALS AND METHODS

All the classical text of Ayurveda (Samhitas along with their commentaries) were referred for the conceptual study. Different journals, research articles, textbooks on *vyadhikshamatva* (immunity) were also referred. Different recent research updates in the contemporary sciences have also been seen for evidence-based researches to scientifically justify the Ayurvedic fundamental facts regarding health and immunity.

## DISCUSSION

### Component of immune system<sup>[5]</sup>

1. Lymphocyte
2. Cellular immunity
3. Humoral immunity
4. Lymph nodes
5. Immunoglobulins
6. Spleen
7. Thymus
8. Complement synthesis and antibody formation

**Mechanism of Immunomodulation<sup>[5]</sup>**

Drugs may modulate immune mechanism by either suppressing or stimulating one or more of the following steps:

- Antigen recognition and phagocytosis
- Lymphocyte proliferation
- Antibody synthesis
- Antigen-antibody interaction
- Release of mediators due to immune response
- Modification of target tissue response

**Classification of immunomodulators**

1. Immunoadjuvants
2. Immunostimulants
3. Immunosuppressants

**Immunoadjuvants:** immunoadjuvants are used to enhance the efficacy of vaccines and considered as specific immune stimulants. It has been proposed that they exploited as selector between cellular and humoral helper cell T (Th1) and helper T (Th2), immunoprotective, immunodestructive and reagenic [immunoglobulin E (Ig E)] verses Ig G type immune responses- posing a real challenge to vaccine designer.<sup>[6]</sup>

**Immunostimulants:** They can act through innate as well as acquired immune responses. In healthy person it serves as a prophylactic and promoter agent i.e. immunopotentiator, by enhancing the basic level of immune response. In individual with impairment of immune response it acts as immunotherapeutic agents.<sup>[7]</sup>

e.g. levamisole, thalidomide, recombinant cytokines etc.<sup>[7]</sup>

**Immunosuppressants:** It structurally and functionally heterogenous group of drugs which are often administered in combination regimen to treat various types of organ transplant rejection and autoimmune diseases.<sup>[8]</sup>

e.g. glucocorticoids, antiproliferative, antimetabolites etc.<sup>[8]</sup>

### Concept of immunomodulation in ayurveda

Ayurveda has propounded the concept of immunomodulation as Vyadhikshamatva.

**Vyadhi** – means disease, non equilibrium state of physiological entities.<sup>[9]</sup>

**Kshamatva** – means tolerance or to resist.<sup>[9]</sup>

### Types of vyadhikshamatva

Chakarapani has quoted two types of vyadhikshamatva

1. **Vyadhi bala Virodhi kshamatva**: which means destroys the diseases which has already occurred i.e. improving the strength against a specific disease, which can be achieved by *naimittika rasayana*. It can be correlated with *yuktikrita bala* or acquired immunity.<sup>[2]</sup>
2. **Vyadhi utpada pratibandhaktva**: it means that it doesn't let the vyadhi to evolve. It can be correlated with *Sahaj bala* or innate immunity.<sup>[2]</sup>

### Main Reason for Vyadhikshamatva

Disease is the only factor responsible for disturbing the normal physiological state of the body. acharya chakrapani has mentioned in the *prameha adhyay* of *nidan sthan* as, disease originates from *paraspar anubandha* of *nidan*, *dosha*, *dushya* and absence of *vikarvighatkar bhava*.<sup>[10]</sup>

Vyadhikshamatva is process which acts as result of presence of *vikarvighatkar bhava* even after *paraspar anubandha* of *nidan*, *dosha*, *dushya*.<sup>[10]</sup> *vikar vighatkar bhava* means when the resistance power of the body is sufficiently strong enough to destroy the cause, there will be no manifestation of the disease. The bhavas that creates the defensive mechanism against disease are called *vikar vighatkar bhava*.<sup>[10]</sup>

Hence, **VIKAR VIGHATKAR BHAVA** is the main reason for vyadhikshamatva.<sup>[10]</sup>

### Characteristics of vikar vighatkar bhava<sup>[11]</sup>

1. *Vikar ajananam*: no occurrence of disease.
2. *Chiren cha ajananam*: occurrence of disease after some time
3. *Anuvikar jananam*: occurrence of disease in small qualities
4. *Asarvalinga vikar janana*: not showing all the symptoms.

Acharya charak has also described *bala* as the factor that destroys the *doshas* or disease-

causing factor.

**BALA:** *Bala* is used as synonyms to *prana* and *oja*. They have underlying meaning of biostrength and vitality with natural resistance against ageing and disease.<sup>[11]</sup>

**OJA:** In Ayurveda, *ojas* has been considered vital in the defense mechanism of the body. It resides in the heart (*hridaya*), but also circulates all over the body and maintains the healthy status of the person.<sup>[12]</sup>

Types of *ojas*

1. *Ardhanjali or shleshmik oja or apar oja.*<sup>[12]</sup>
2. *Asthta bindu or par oja.*<sup>[12]</sup>

They are important and significant in the context of *vyadhikshamatva*. The two kinds of *ojas* have direct influence on the body's defense mechanism.<sup>[12]</sup>

The *ojas* prevents, resists and overcomes such factors which are produced during vital activities of the organism. A few examples of such events are *prameha* (diabetes mellitus), *rajyakshma* (pulmonary tuberculosis), *pandu* (anemia), *arbudas* (malignant and other tumours), natural degenerative changes that take place in old age.<sup>[12]</sup>

The second important group of functions performed by *oja* is to provide the body with appropriate substances, inhibit, neutralize and destroy the virulent factors of the disease.<sup>[12]</sup>

Thus, the concept of immunity is familiar at that time and has been analyzed in detail in the form of *vyadhikshamatva* in various Ayurvedic texts.

### **Role of Rasayana As Immunomodulators**

*Rasayanatantra* is one of the eight clinical specialties of Ayurveda. It refers to nutrition, natural resistance and geriatrics. Apparently *rasayana* means an improved state of nourishment which in turn upholds, increases immunity and youthfulness.<sup>[2]</sup>

The term *rasayana* in Ayurveda denotes a specific meaning. It consists of two words viz. *RAS* and *AYAN*. The word *rasa* represents seven dhatus because they are all nourished by *rasa* or yield of *rasa* and *AYAN* represents path to follow. So, the means of obtaining optimum standards of *rasa* is known as *rasayan*.<sup>[13]</sup> Acharya *Charaka* has described *rasayana* as the means of obtaining best qualities of *rasadi dhatus* (tissue elements). Best qualities of *rasa*

lead to formation of best qualities of other dhatus. Thus, *rasayana* is that process by which all the body tissues are nourished.<sup>[12]</sup>

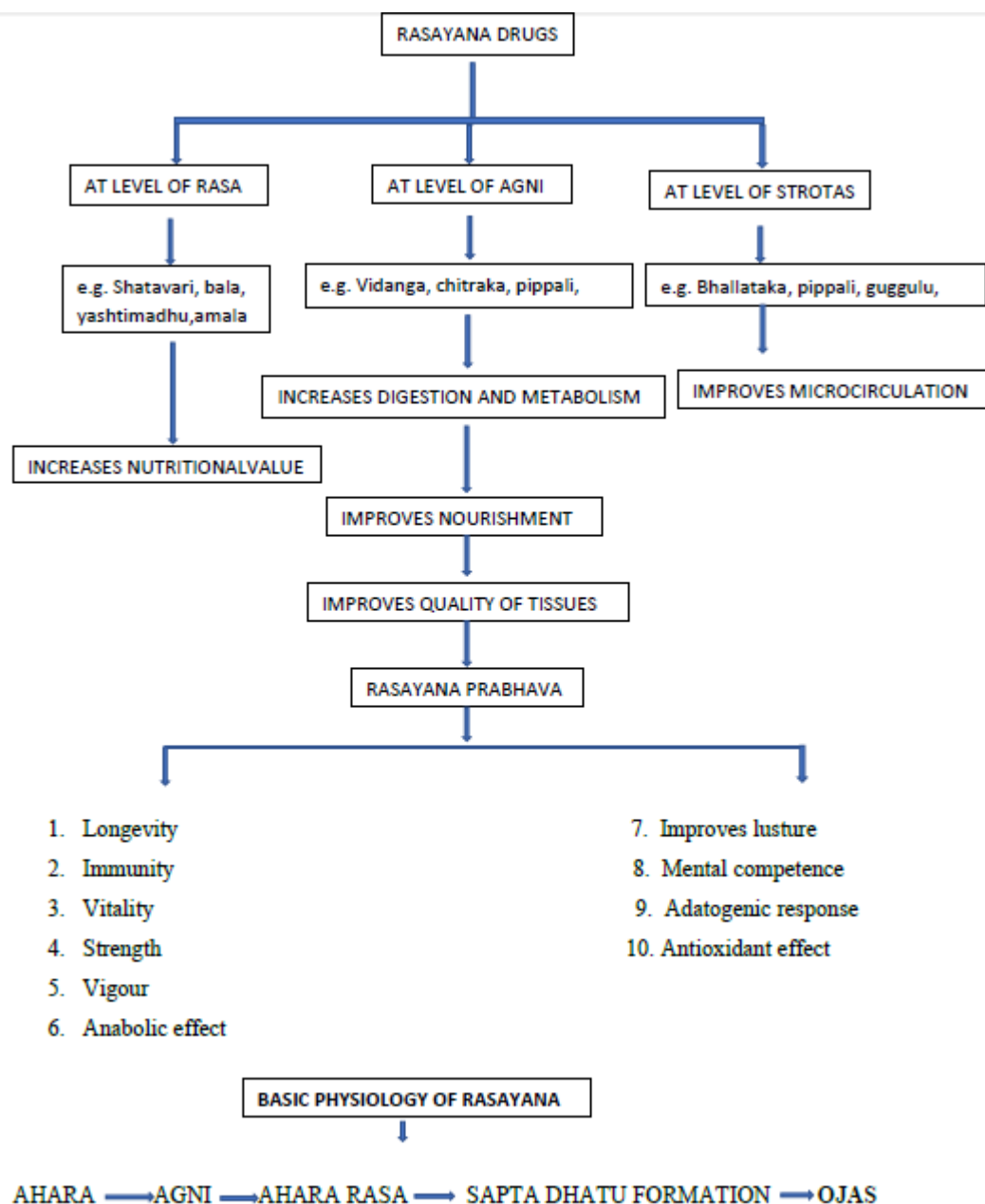
The *rasayanas* are supposed to strengthen *oja* and *bala* i.e. vitality and bio strength with natural resistance against ageing and disease.<sup>[2]</sup>

*Rasayana* is believed to promote *dhatuposhan* by acting on *dhatwagni* and enriched *ojas*. It contributes to the integrity of the body tissue and thus increase longevity. The other benefits of this therapy are the promotion of memory and intelligence, the preservation of youth, luster, complexion, and voice. The various measures comprehended by this therapy are termed as *rasayana*.

### Action of Rasayana

By three ways (M. Paul and Singh R.H. 1979)<sup>[2]</sup>

- 1. Acting at the level of RASA:** *Rasayana* may act at the level of *rasa* by improving the nutritional status of *rasa* and turn by improving tissue nourishment. Probably *rasayana* drugs having *madhura*, *guru*, *sheeta*, *snigdha* *guna* may act at this level by promoting nutritional value of *poshaka* *rasa* which in turn helps in obtaining the best qualities of dhatus. E.g. *shatavari*, milk, *ghrita*, *amalaka*, *yashtimadhu*.<sup>[14]</sup>
- 2. Acting at the level of AGNI:** i.e. by improving digestion and metabolism of the body and thereby affording better nutrition.<sup>[2]</sup> *rasayana* drugs possessing the *ushna*, *laghu*, *ruksha*, *guna* and *katu*, *tikta* *Kashaya* *rasa* may be acting at the level of *agni* (digestion and metabolism) by improving the digestive capacity and by vitalizing the metabolic activities (improving *jatharagni* and *dhatwagni*) of the body. e.g. *pippali*(*piper nigrum*), *haritaki* (*terminalia chebula*), *chitraka* (*plumbago zeylanica*).<sup>[14]</sup>
- 3. Acting at the level of STROTAS:** i.e. by improving the microcirculation, it ensures proper perfusion and nourishment of the tissue. The integrity of the channel is equally important for the distribution of *ojas* to the dhatus.<sup>[2]</sup> similarly, the drugs with *katu*, *tikta*, *Kashaya* *rasa* *vishada* *ruksha* and *laghu* *gunas* and *ushna* *virya*, *katu* *vipaka* may produced the classical *rasayana* effect at the level of *strotas* by improving *shukshma samvahn* and the quality of *deepan* and *pachan*. This drugs cause *strotoshodhana* and thus allow efficient blood circulation and improved tissue nourishment and there by maintains the structural integrity and functional capacity e.g. *guggulu*(*commiphora mukul*), *rasana* (*allium sativum*), *bhallatak* (*semicarpus anacardium*).<sup>[14]</sup>



**Fig. 1: Schematic representation of basic pharmacodynamic of *rasayana* drugs.**

The immunomodulators action of *rasayana* brings alteration in the status of immune system i.e. equally related with the immunotherapy. *Rasayana* is believed to promote *dhatuposhan* and enriched *ojas* leading to *vyadhikshamatva*. The defence mechanism present in the body allows us to survive in the potentially hostile environment of various infectious diseases.

It has been previously stated that *rasayana* are worked at various level including *dhatu*, *agni*, *strotas*. Consequently, *vyadhikshamatva* of the body is being improved and thus internal environment is also improved and maintained. This condition is totally unfavourable to growth and cultivation of microbes, results in healthy people and healthy society.



## CONCLUSION

*Vyadhikshamatva* which can be compared with immunity is of prime importance to maintain homeostasis of the body. the concept of *vyadhikshamatva* properly understand with prior knowledge of concept like *bala*, *oja*, *vikarvighatakar bhava*, *rasayana* which in turn are helpful for the better management of various diseases. This all factors are considered as very important for regulation of *vyadhikshamatva*. *Bala* is also associated with *vyadhikshamatva*, more the *bala* more the *vyadhikshamatva*. *Oja* is pure extract of dhatus. *Vikar vighatakar bhava* are bhavas that creates defensive mechanism against diseases. *Rasayanas* are rejuvenators. *Rasayana* drugs have not only immunomodulatory activity, but also have other effect such as immune stimulation, anti-stress, antioxidants, enhancing cellular detoxification mechanisms etc. also *rasayana* therapy is meant for maintaining good health as well as curing various diseases. *Rasayana* works at various levels in the body and overall result is absolute state of *vyadhikshamatva*.

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