The Concept and Practice of Immunomodulation in Ayurveda and the Role of Rasayanas as Immunomodulators

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The modulation of immune response by using Ayurvedic herbal medications as a possible therapeutic measure has now become a subject of scientific investigation. The concept in modern scientific understanding would mean enhancement of immune responsiveness of an organism against a pathogen by nonspecifically activating the immune system using immunomodulatory agents of plant origin. It is now being recognized that modulation of immunological response could provide an alternative to conventional chemotherapy for a variety of diseased conditions of impaired immune responsiveness or when a selective immunosuppression has to be induced in situations like autoimmune disorders and organ transplantations.

Immunomodulators are considered now as one of the most potent tools in the management of health and disease by modern medicine. In fact the role of immunomodulators in modern medicine is yet to be fully appreciated or perceived as our understanding of immune system is changing at a rapid pace. The more recent understanding of neuro – endocrine – immune axis or the influence of exercise, circadian rhythms, seasonal variations, different psychological states on immune system are unfolding many such issues which are brining the modern concept closer to Ayurvedic principles of Vyadhi-ksamatva, Ojas and Bala.

The basic concept of immunomodulation not only existed in Ayurveda but is being really practiced by the Ayurvedists for centuries. In fact, one of the therapeutic strategies in Ayurvedic medicines is to enhance the body's overall natural resistance to the disease causing agent rather than directly neutralizing the agent itself. Here lies the difference between the fundamental therapeutic approach of Ayurveda and modern medicine, which emphasize on direct attack on the disease causing agents using chemotherapeutic drugs. In Ayurvedic practice, the objective of immune enhancement is achieved through the use of the Rasayana and Vajikarana therapy, following Acar Rasayana measures and also by use of Ojovardhaka remedies.

Vyadhi-ksamatwa, as it is understood in Ayurveda has much wider implications than the term "Immunity" used in modern medicine. Chakrapanidatta has interpreted the term Vyadhi-ksamatwa as Vyadhi bala Virodhitwa i.e., antagonistic to the strength and virulence of the disease and Vyadhyutpada Pratibandhakatwa i.e., the capacity to inhibit and bind the causes and factors of the disease. Charaka has also described Bala as the factor, that destroys the Dosas or disease causing factors viz.,

"Balam hyalam dosaharam Nigrahaya dosanam" (Ch.Chi. 3/16).

The Bala is used as synonym to Prana and Ojas. They have underlying meaning of biostrength and vitally with natural resistance against ageing and disease. Ojas has the property similar to 'Slesma but in the Ayurvedic texts it is stated to stand not only for Sleshma (Tavadeva Slaismika syaujasah – Ch.Sh. 7/15) but also for Rasa (Rasacaujah Samkhyatah-Ch.Ni.4/7) and Rakta (Jiva sonitam api Ojah- Dalhana on Su.Su. 15/91). Reference has been made of the two kinds of Ojas viz., Ardhanjali or Slaismik Ojas and Para or Asta Bindu Ojas. They are important and significant in the context of Vyadhi-ksamatwa. The two kinds of Ojas have direct influence on the body's defense against decay, degeneration and infections.

The Ojas prevents, resists and overcomes such factors which are produced in the course of the vital activities of the organism and may lead to decay and degeneration of the tissues (Dhatus) of the bdoy. A few examples of such events are Prameha (Diabets mellitus), Rajyaksma (Pulmonary tuberculosis), Pandu (Anaemias), Arbudas (Malignant and other tumours), premature senility, natural degenerative changes, that take place in old age, impaired nutritional states, Starvation and such psychosomatic stress conditions as Bhaya (fear), Krodha (anger), Kama (libidinal impulse), Soka (grief) etc., This action of Ojas relates to its capacity of providing the substances (which resemble Slaismika in qualities), the presence of which in the Rasa and Rakta confers adequate protection to the Dhatus against decay and degeneration.

The second important group of functions performed by Ojas is to provide the body with an appropriate substance, which inhabits, neutralizes and destroys the virulent factors of the disease. These obviously relate to immunological factors both cellular and humoral, that destroy or neutralizes the disease causing agencies which invade the body.

As regards the functions and transport of the Ojas, Chakrapanidatta observes that Ojas which is the Sara of all the Dhatus in virtually not different than them, comparable to Ghee of the milk, honey of flowers and fruits, being located in Hrdaya, mixes with Rasa and circulates through the blood vessels and capillaries and perform Tarpana of the entire body. It represents the strength of all the tissues and is present in the organism from time of fertilization of the sperm and ova, due to its natural powder (Chakrapani on Su. Su. 15/99). The ten larger blood vessels (Mahamula Dhamanis) are the channels of transport of Ojas to entire body and the heart and circulation plays an important role in the distribution of Slaismika Ojas to all the body tissues and bestows them protection against degeneration and diseases.

There are the three clinical conditions viz., Ojo Visramsa, Ojo-Vyapat and Ojoksaya, which result due to mild, moderate and severe impairment in the availability of Ojas to the tissues. These conditions arise out of injury to or diseases of the channels of distribution of this vital substance, its altered composition and deficiency respectively. The aetiological factors which bring about these conditions or the causes for reduced immune capability, according to Ayurveda, range from trauma (both physical and microbial), severe degenerative and wasting diseases, malnutrition, starvation to psychological stresses – anger, anxiety and grief etc. These factors depending upon their extent, degree and intensity of operation may result in the production of one of the above mentioned conditions (Su.Su. 15/23).

It is pertinent to emphasize here that the role of the emotional and psychological factors over the proper functioning of immune

system has been very clearly appreciated by Ayurveda, which is now being increasingly recognized by the modern science based on the evidences of the various experimental and clinical studies.

In fact, a new branch of medical sciences known as – *"Phychoneuroimmunology"* is fastly developing, which studies the interrelationship of psychological factors, nervous system and immune system.

Vyadhi-ksamatwa (natural resistance) is not of the same order constitutions i.e., it varies with individuals. It also depends upon nutritional, environmental and individual factors – both physical and mental. The Vyadhiksamatwa or Bala is stated to be of three types:

(1) ***Sahaja Bala*** – It is genetic and inborn resistance to disease, which exists since birth. It is said to increase with the growth of tissues and does not depend upon any other cause (Chakrapani Ca.Su. 11/36).

(2) ***Kalaja Bala*** - This type of immunity is said to be influenced by seasonal traits and the age of the person.

(3) ***Yuktikrit Bala*** – This type of Sarira Bala refers to modulation of body's resistance against diseases by resort to appropriate Ojovardhak diet, physical exercise, rest, restorative and Rasayana, therapies in keeping with seasonal needs.

Rasayana Tantra, is one of the eight clinical specialties of Ayurveda. It refers to nutrition, natural resistance and geriatrics. Apparently, Rasayana means and improved state of nourishment, which in turn upholds increased immunity and youthfulness. Rasayana can be a drug, diet or even a life style and conduct i.e., Acar, which may be helpful in achieving the above goal. The Rasayanas are supposed to strengthen Oja and Bala i.e., vitality and biostrength with natural resistance against aging and disease. It is stated to contribute to the integrity of body tissues and thus increases longevity. The other benefits of this therapy are the promotion of memory and intelligence, the preservation of youth, luster and complexion and voice. The various measures comprehended by this therapy are termed as **Rasayana**, because they conduce to the replenishment of Rasa and other body tissues.

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Rasayana measures act by one of the following three ways – (M. Paul & Singh R.H., 1979):

(1) ***Acting at the level of Rasa:*** Thus directly improving the quality of nutrition.

(2) ***Acting at the level of Agni:*** i.e., by improving the digestion and

metabolism of the body and thereby affording better nutrition.

(3) ***Acting at the level of srotas:*** i.e., by improving the micro-circulation, it ensures proper perfusion and nourishment of the tissues. The integrity of channels is equally important for the distribution of Ojas to the Dhatus, as discussed earlier, which provides body immunity against degeneration and diseases.

Ayurveda describes a number of drugs as Rasayana and Ojovardhak remedies, which are claimed to posses' immunomodulatory effect. Some of the Rasayans which have been subjected to scientific studies and found to possess immunomodulatory effect are Aswagandha *(Withania somnifera),* Shilajatu, Amalaki *(Emblica officinalis),* Tulasi *(Ocimun sanctum),* Guduci *(Tinospora cordifolia),* Pippali *(Piper longum)* and Punarnava *(Boerhaavia diffusa)*, of which Guduci and Tulasi have been extensively studied.

The recent trend in evaluation of the herbal immunodulators is towards assessing the activity profile of the isolated principles in a battery of experiments with a view to identify the components responsible for the activity profile of the isolated principles in a battery of experiments with a view to identify the components responsible for the activity as also to understand the mechanism of their action. Amongst diverse class of compounds, it was observed the flavonol series possess the most potent anticomplementary activity. The potent antiphlogistic and antiallergic activity of the flavonoid wedelolactone from Rasayana drug Bhringraj (Eclipta alba and wedelia calandulacea) was found to be due to its 5-lipoxygenase inhibitory activity, suggesting that it act by free oxygen radical scavenger mechanism (Wagner H. et al, 1986).

The active principles of Guduci (Tinospora cordifolia), an important Rasayana drug, have been found to possess anticomplementary and immunostimulating activities. Previous studies on the extracts of Guduci reported antidiabetic, anti-inflammatory and hepatoprotective activities. Syringin (TC-4) inhibited the invitro immunohaemolysis of antibody coated erythrocytes. The reduced immunohaemolysis was found to be due to inhibition of the C3-convertase of the classical complement pathway. The commounds gave rise to significant increase in IgG antibodies in the serum. Humoral and cell mediated immunity were also dose dependently enhanced. Macrophase activation was reported for cordioside (TC-2), cardiofolioside – A (TC-5) and Cordiol (TC-7). These compounds induced significant increase in phagocytic activity by activation of the peritoneal macrophases (Kapil A. and Sharma S., 1997). It is important recall here that macrophases play an important role in nonspecific and specific immune responses. In innate immunity, the phagocytosis of foreign bodies by macrophases and other phygocytes contributes to regulation of both humoral and cellular immune responses. Macrophases serve as effector cells to provide immune surveillance against tumour cells.

Yastimadhu (Glycirrhiza glabra), another important Rasayana drug has been found to be immunostimulative, which accelerates lymphocytic transformation activation of macrophage and increases the leucocyte count. It also have antiallergic, anti-inflammatory and antioxidant activity (Yamamoto M., 1975). A controlled clinical study with combination of the Rasayana drugs – Amalaki, Vidang and Atibala (Amalaki compound) have shown an increase in immunoglobulin levels in infants which is

significantly greater than that of multivitamin used cases (Tuteja V., 1993).

A combination of four important Rasayana drugs viz. Guduci (T.Cordifolia), Ashwagandha (W.Somnifera), Amalaki (Emblica officinalis) and Tulasi (Ocimum sanctum) in equal amounts was found to potenciate both the cellular and humoral components of immunity (Chatterjee S. & Das S.N., 1996). It is significantly increased the microbicidal activity of the neutrophils and circulating levels of globulins and other components. It also significantly elevated the number of lymphocytes along with improvement in T-cell memory. The macrophage function study showed a significant increases in cell size, number of cells and phagocytic activity of macrophages with the administration of this combination. Chemotactic assay for phagocytic cell indicated positive chemotaxix for leucocytes (Gomes A., 1966). The combination was found to potentiate the immune status and helped in faster recovery when used as an adjunct to specific therapy in cancer, chronic wasting diseases, multidrug resistant tuberculosis and other immunocompromised conditions (Chatterjee S., 1994; Rao A.T. et al, 1996).

Attempts may be made to develop newer methodologies for such a research focusing on the nutritional dynamics as the basis of the immunomodulatory effect of a Rasayana drug. These herbal Rasayana drugs, which are widely available in our country, have wide scope for application in the normal population for the enhancement of their immune status i.e., Yuktikrita Bala and prevention of various communicable and infectious diseases, and also as an adjunct in the therapy in the immunocompromised disease states.

Ayurveda's emphasis on the role of Dosas and their imbalance as the main causative factor of the diseases assumes importance in the light of the fact that mere presence of causative organisms in the environment does not necessarily results in the manifestation of the disease. The concepts of Ojas and Bala, of the inherent immunological capabilities including innate immunity and acquired immunity in terms of Sahajabala and Yuktikritabala etc., playing key role in the health and disease have to be understood and appreciated by the modern immunolgists.

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