

AYURVEDA RASAYANA DRUGS – A REVIEW ON CURRENT RESEARCH**Paramkusha Rao M.***

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INTRODUCTION

Immunity is an important of contemporary developments in the field of medicine. Diseases like AIDS and Cancer are being explored from immunity angle in the current researches. Mechanism of Natural Killer Cells – a special type of lymphocytes is offering a new way to contain the cancer. AIDS itself is a disease complex caused by deficiency of immunity in the body. Further, “Health to all by 2000 A.D.” has become “a sour grape fruit” by the advent of resistant malaria and tuberculosis bacilli. It is less known that what happens with smallpox and other infectious disease if various synthetic substances and styles of living degrade the immunity of human beings further. At this juncture it is a need to probe in to the natural substances, which can promote immunity. Extensive researches are conducted all over the world focusing on natural herbs influencing the immunity.

RASAYANA is a unique branch of Ayurveda. It promotes the inner healing power of an individual and helps him in over taking the pain and disease while promoting the immunity (SVASTASYA ORJASKARAM).

RASAYANA as an entity of pharmaco-therapeutic action holds the same meaning. However it is needed to analyse from a different angle in order to wider the implied meaning. An effort has been made to comprehend the mode of action and to re portray the RASAYANA effect from pharmaco-therapeutic angle with the help of current researches conducted by in and allied disciplines. Updating is the need of the hour.

According to Caraka the RASAYANA procedures / drugs cause the following effects in human body (Agnivesa-3BC)

Table-1: The List of Actions attributed to RASAYANA Drugs and Their translated terms

AROGYA Health Promoting	
DEHA BALAM (PARAM)	Optimum Physical strength and Immunity
DIRGHA AYU	Longevity
INDRIYA BALAM (PARAM)	Greater receptivity of sensory organs
KANTI	Promotes Glow
MEDHA	Intellect
PRABHA	Lustre of skin
PRANATI	Tolerance and adaptation
SMRITI	Retention and recollection capacity
SVARA	Voice
TARUNA VAYAS	Youthfulness
VAKSIDDHI	Stability of speech
VARNA	Complexion

As per these descriptions the plants with RASAYANA effect are also bound induce sharp memory, intellect and longevity, promote skin complexion and glow, enhance adaptation capacity, enhance immunity, along with freedom from illness, also restore youthfulness.

In the recent years enormous research is found conducted on the plants mentioned in Ayurveda. Bioassay methods and current sophisticated isolation techniques preserve the phyto-chemical integrity. Such methods have enhanced the scope of finding the accurate effects of the plants. Though the discussion for the use fractions is incomplete these researches provide us enhanced vision of plant actions. A quick review of current researches on RASAYANA drugs envisages the following types of drug actions.

Table-2: The list of contemporary terminologies used to study RASAYANA drugs

- Adaptogen
- Antioxidant
- Bone marrow proliferation
- Cidal constituents
- Humoral immunity
- Immunocompetent

- Immuno-modulators
- Immuno-potentiating
- Immuno-stimulant
- Mental agility
- Nephro-protection
- Reductants
- Stress
- Tissue protection
- Cardio Tonic effect

Certain times it seems that they had to use newer words to explain the effects of Ayurvedic drugs. A brief report of works done on different actions is presented.

ANTIOXIDANT

Antioxidants expel or dissolve certain free oxidants produced due under metabolic activity in the body. They trigger on certain biochemical action leading to accumulation cholesterol and other disease causing ailments in the body. They also hinder the formation of certain essential elements needed for different tissues of the body. Plants have inbuilt mechanism to dissolve such oxidants. Several Ayurvedic herbs have been identified with antioxidant effect in the current studies.

In a clinical study of 3 months duration GUDUCHI (*Tinospora cordifolia*) and ASVAGANDHA (*Withania somnifera*) were found as antioxidants. GUDUCHI was found to be more effective natural antioxidant over others. [De. R.K. & Tripathi, 1996]

BRAHMI (*Bacopa monniera*) known Ayurvedic drug for memory enhancing and for sedation also exhibited anti-lipid peroxidative property. For the first time the effect of alcohol and hexane fractions of BRAHMI have been studied on lipid peroxidation induced by FeSO₄ and cumene hydroperoxide. Alcohol fraction showed greater protection with both inducers. Results were compared with known antioxidants tris, EDTA and a natural antioxidant vitamin E was also examined on hepatic glutathione content. BRAHMI is found more potent antioxidant on comparison with other antioxidants used in the study. The mechanism of action could be through metal chelating at the initiation level and also as chain breaker. The authors

of the work opined that BRAHMI might serve as a medicine of aging and several nervous disorders because free radicals are involved in these pathologies. [Yamini & Tripathi, 1996.]

Immuno Modulation

Immunity is accepted as DEHA BALAM (VYADHIKSAMATVA SAKKTI). However immunity is complex biochemical and neuro-humoral activity still to understand completely. Several RASAYANA drugs are proved to influencing immunology schedules in the human body.

A compound comprising PUNARNAVA (*Boerhavia diffusa*), GUDUCHI (*Tinospora cordifolia*), DARU HARIDRA (*Berberis aristata*), HARITAKI (*Terminalia chebula*) and ARDRAKA (*Zingiber officinale*) had a maximum cure rate of 73 percent at a dose of 800 mg/kg/day in hepatic amoebiasis reducing the average degree of infection to 1.3 as compared to 4.2 for sham-treated controls. In immuno-modulation studies humoral immunity was enhanced as evidenced by the haemagglutination titer. The T-cell counts remained unaffected in the animals treated with the formulation but cell-mediated immune response was stimulated as observed in the leukocyte migration inhibition (LMI) tests. [Sohni, Y.R. & Bhatt, R.M, 1996]

In an in vitro study on immuno-competent cells, aqueous extracts of the stems of GUDUCHI (*Tinospora cordifolia*) was found enhancing T as well as B cell responses and protected mice against experimental infections. However, it appears that the immuno-modulatory principle of GUDUCHI (*Tinospora cordifolia*) may involve different mechanisms at in vivo and in vitro platforms. [Sainis et.al. 1998]

In another study conducted at Amala Cancer Research institute, Kerala, India it is confirmed that the RASAYANAS as immuno-modulators. Administration of brahma Rasayana, Amrita Prasa Rasayana And Narsimha Rasayana were found to enhance the proliferation of lymphocytes in response to mitogens. Some were found to induce the proliferation of bone marrow cells in culture. Natural killer cell activity was also found enhanced in both normal and tumor bearing animals treated with rasayana. [Pradeep Kumar et. al., 1995]

Improving Immune Status

PIPPALI RASAYANA was tried in 41 patients of Giardiasis. It has significantly reduced the clinical signs and symptoms. Stool became free of parasites and in hematological profile, Hb percentage increased and eosinophil count decreased. No side effects were observed. It is hypothesized that the drug possibly acts through some cidal constituents present in it and also by improving immune status of patient. [Abbas, et.al., 1997.]

It is pointed in an extensive review on cancer treatment by Ayurvedic drugs it is visualized that the Ayurvedic drugs may act anti cancerous by improving immunological status of the recipient and by rendering protection from side effects of radiation and chemotherapy. Turmeric (HARIDRA), Emblica officinalis (AAMALAKI), Phyllanthus amarus (BHUMYAMALAKI) and Picrorhiza kurroa (KATUKI) were found to inhibit skin carcinogenesis and hepato-carcinogenesis induced by NDEA. RASAYANAS were found immuno-stimulants and could produce bone marrow proliferation and differentiation. Rasayana was found useful in the patients undergoing chemotherapy and radiation therapy. Polyphenols from plants are anti-metastatic compounds. [Ramadasan Kuttan, 1998]

A volatile fraction from Neem oil (NIMBA TAILA) named as NIM-76 on i.p. injection caused an increase in polymorpho-nuclear leukocytes with a concomitant decrease in lymphocyte counts. This immuno-modulatory was due to an enhanced macrophage activity and lymphocyte proliferation response, while the humoral component of immunity was unaffected. [Sai Ram et. al. 1997]

Adaptogen Activity

RASAYANA of Ayurveda can be considered as adaptogenic drugs. They increasing endurance and sustaining capacity in individuals by promoting DEHA BALA. A number of medicinal plants have been used in Indian system of Medicine as adaptogens, but due to lack of scientific evaluation, both experimental and clinical, these drugs have not achieved due recognition.

Satavari (Asparagus Racemosus) Root, Haritaki (Terminalia Chebula) And Aamalaki (Emblica officinalis) fruits extract and their fraction was evaluated for positive endurance promoting properties in a new model. Cold-hypoxia-restraint rat model was modified and developed to evaluate improvement in Physical work performance and endurance in adverse

stressful environment, which is an essential characteristic of adaptogen endurance to a stressful condition. . The results were compared with Panax ginseng (50 mg/kg, p.o. x 5 days) as control. Crude extract of all the three plants studied in a dose of 200 mg/kg. p.o. for 5 days showed significant ($p < 0.001$) adaptogen activity (35-80%) in all the parameters. [Shukla, R et. al., 1997]

Encouraging results are found in one experimental model developed with albino rats to study the adaptogenic effect of herbal compound, and ASVAGANDHA. The same drugs are given to 200 soldiers, who had spent one year at higher altitudes (3000 - 6000 M ht.). It is observed that psycho-physiological performance, physical performance and sensitive indices of oxygen availability to the tissues were improved by the intake of these drugs up to a period of three months stay in high mountains (4800 - 6000 mtrs). As these adaptogens intake provided protection from high altitude stress they have been suggested as health food supplements. These studies are also indicated that Ayurvedic herbal preparations Viz. RASAYANA and VAJIKARANA drugs as the preparation of real value. [Srivastava K.K., 1995]

Sitotone, a herbal formulation comprising of the Ayurvedic RASAYANAS - ASVAGANDHA (*Withania somnifera*), SATAVARI (*Asparagus racemosus*), GOKSHURA (*Tribulus terrestris*) and SHILAJIT was administered in the doses of 50 and 100 mg/kg orally throughout the 14 day period of stress induction in experimental rats. The stress-induced paradigms were found to be reversed by test drug and it is found similar to Panax ginseng (100 mg/kg, p.o. for 14 days). The results of the investigation indicate that the preparation exerts significant adaptogenic activity, which is attributable to the constituents of this polyherbal formulation. [Bhattacharya, 1998]

Ageing is very often accompanied by fatigue, debility, and confusion, in co-ordination and general impairment of mental and physical functions. Lenticular opacity is also age related problem-but it is believed that stress plays a significant role in causation and development of senile cataract over and above the ageing process. As such no single drug is available for arresting ageing process but certain drugs and plants are reported to have antistress-adaptogenic property. TULASI (*Ocimum sanctum*) and Geriforte are reported to have adaptogenic activity. Both these agents manifest non-specific type of protection against stress induced biological changes, Geriforte is also having role in delaying pathological changes of senile maculopathies. Therefore it was considered to study *Ocimum sanctum* and Geriforte in

experimental lenticular opacity. These agents were administered orally in two doses for prophylactic and curative role in cataractogenesis. Cataract was induced by naphthalene (1 gm/kg of body wt.) in albino rabbits and by galactose (30%) in albino rats. Both TULASI (*Ocimum sanctum*) and Geriforte delayed the onset of cataract as well as the subsequent maturation of cataract significantly. In addition to delay, in reaching various stages of development of cataract, IV stage did not develop in the higher dose groups till completion of 30th day of experimental period. [Sharma, P; et.al.1997]

The results of another study have suggested that the continued employment of TULASI (*Ocimum sanctum*) can cause the restoration of the humoral response in immunosuppressive state thereby making them protective from infections. [Khajurial, et. al., 1997]

Tissue Protection & Regeneration

Several epidemiological studies have suggested that dairy products (KSIRA VARGA) intake is associated with a decreased incidence of colon cancer. In one extensive study conducted on healthy human volunteers to study the effect of milk products it is concluded that a shift from a dairy product-rich to a dairy product-free diet resulted in a significant effect on an accepted risk marker for colon cancer. The protective mechanism of dairy products is found to beat the level of tumor promotion rather than initiation. [Bjorn Glinghammar et. al., 1997]

The ability of phenolic compounds to protect collagen against hydrolysis by collagenase has revealed on screening of 32 plant substances. Glycyrrhetic acid from YASTIMADHU (*Glycyrrhiza glabra*) proved able to interact with collagen and to bind to and inhibit the action of collagenase, making it a potential candidate for the development of drugs for the treatment of degenerative disorders of the extracellular matrix. [Parellada, & Guinea, 1996]

AAMALAKI (*Embllica officinalis*) has exhibited cell protective effect of against experimentally induced acute narcotizing pancreatitis in dogs. On light microscopic examination, acinar cell damage was less and the total inflammatory score was significantly lower in the AAMALAKI treated groups. Electron microscopy confirmed this and showed an increased amount of smooth endoplasmic reticulum and small-condensed granules embedded in a vacuole. [Thoral, S.P. et. al., 1995]

In Adult male Swiss albino mice garlic oils (LASUNA) prevented rapid increase in hepatic total lipids, triglycerides and phospholipids and decrease in free fatty acids induced by radiocalcium and the values reached normal values earlier in garlic (LASUNA) treated animals than in irradiated animals. Possible mechanism underlying the protective action of garlic oils is reported. [Navneet Kumar Gupta, 1996]

The protective action of ASVAGANDHA (*Withania somnifera*) roots on cadmium-induced toxicity in liver and kidney tissues of mice has been studied. Results based on lipid peroxidation indicate that ASVAGANDHA is capable of reducing toxicity caused by cadmium. It is stated that so far, no plant product has been reported to regulate cadmium-induced toxicity in animals. [Panda, S. et. al., 1997]

GOKSHURA (*Tribulus terrestris*) is a RASAYANA commonly prescribed for various renal diseases offered protection against gentamicin induced acute renal damage in rats. [Palav, A.G, et. al., 1998]

The cyto-protective action of an active fraction, lupeol isolated from VARUNA (*Crataeva nurvala*) stem bark against free radical toxicity has been investigated in experimental urolithiasis. Lupeol administration induced a remarkable decrease in kidney oxalate level and was effective in counteracting the free radical toxicity by bringing about a significant decrease in peroxidative levels and increase in antioxidant status. [Baskar, R. et. al., 1996]

CDRI team at Lucknow has conducted extensive researches on a substance named as Picroliv. It is extracted from KATUKI (*Picrorhiza kurroa*). The extract of KATUKI found to possess hepato-protective as well as antioxidant properties. [Mishra, A. et. al., 1996]. In a recent study picroliv is confirmed as antioxidant and found stimulating liver regeneration. [Dhawan, 1997]

Intellect promotion (MEDHYA) & Stress relieving

Recent research on causes of diseases and aging has increasingly supported the importance of stress. One theory of the relation ship between stress and disease is based on the concept of homeostasis, a term coined by Cannon over 50 years ago to signify those states and mechanisms responsible for the "staying power of the body". Bernard, Cannon, Selye and other leading researchers held that full, normal function of the self-regulating or homeostatic power of the body maintains the balanced, integrated condition we recognize as health.

Failures in this Capacity, such as those produced by frequent stressful experiences, can result in disease or death. [Walton K.G. & Pugh N.D.,1995]. ACARA RASAYANAS envisage the code of conduct to lead stress free life in turn fetches longevity. However the herbs that are proved to reduce the stress are also paramount importance.

In Ayurveda, many drugs have been mentioned to improve the MEDHA, e.g., ASVAGANDHA, BRAHMI, SHANKAPUSHPI, JATAMAMSI, BALA, JYOTISHMATI, and GUDUCHI, etc. These drugs have also been mentioned as RASAYANA (rejuvenative and restorative). The beneficial effects of these drugs for the treatment of psychological and psychosomatic disorders suggest that they might be having sedative and tranquillizing properties. Recent studies and researches done so far also suggests that MEDHYA drugs as mentioned in Ayurvedic texts, keep the mind calm and cool, reduce anxiety and apprehension thus producing sedation and tranquility. [Pandey & Pandey, 1995]

SANKHAPUSHPI (*Convolvulus pluricaulis*) is an age-old remedy for different mental ailments. Caraka said it as the intellect promoter. It is an important ingredient in different formulations like BRAHMA RASAYANA, AGASTYA HARITAKI etc. The whole plant is medicinal and even in fairly high doses, the drug is found to be non-toxic. It is found effective in reducing different types of stress. In one study, 89 school going children kept on this drug for 1 year and proved that it enhanced the mental agility of the children. [Koshi,V. et. al.]

The authentication of the traditional claims of BRAHMI (*Bacopa monnieri* L.) was initiated by investigating the effect of an alcoholic extract of this plant on acquisition, consolidation and retention of three newly acquired behavioral responses in albino rats, viz., a foot-shock motivated brightness discrimination response, active conditioned avoidance response and Sidman's continuous avoidance response. The facilitator effect of the BRAHMI extract (40 mg/kg. p.o x 3d) was manifest in all the three learning responses as it augmented both the cognitive function and mental retention capacity. The chemical constituent responsible for the facilitator effect of BRAHMI on learning schedules was identified as a mixture of two saponins designated as bacosides A and B. [Singh, H.K. & Dhawan, B.N. 1997]

The efficacy of Asvagandha (*Withania somnifera*) (tablets 0.5g, 1-2 tab. b. d) and Satavari Ghritam (*Asparagus racemosus*) (1-2 tsp b.d.) as internal medication and Lakshadi Thailam as external massage are used to enhance the non-specific general immunity of 50 pre school

children. The study indicated that the non-specific immunity of children is greatly enhanced as reflected in increased hemoglobin content, and decreased episodes of pyrexia of unknown origin, infectious disease and eye infections. [Chatur Prabhakar; et. al., 1994.]

Cell Proliferation & Regeneration

A study was performed to assess the immuno-potentiating capabilities of ASVAGANDHA (*Withania somnifera*) to circumvent the immuno-suppression produced during radiation treatment in mice. Administration of a 75% methanolic extract of the plant was found to significantly increase the total WBC count in normal Balbic mice and reduce the leucopenia induced by sub lethal dose of gamma radiation. Treatment with Asvagandha was found to increase the bone marrow cellularity significantly. It had normalized the ratio of normochromatic erythrocytes and polychromatic erythrocytes in mice after the radiation exposure. Major activity of ASVAGANDHA seemed to be in the stimulation of stem cell proliferation. [Girija Kuttan, 1996 & Davis, L, 1996]

Bactericidal & Anti microbial Activity

Several RASAYANA drugs have been found with anti microbial activity. The ultimate purpose of RASAYANA drugs is also achieved by their bactericidal and anti microbial activities. Here the action is to be presumed to indirect. By the virtue of promoting immunity the drugs might have contained microbes.

The study showed that both aqueous and organic extracts of Valli Kantakarika (*Solanum trilobatum*), Asvagandha (*Withania somnifera*), Dugdhika Bh. (*Euphorbia pilulifera*), NIMBA (*Azadirachta indica*), Aamalaki (*Embllica officinalis*), Tulasi (*Ocimum sanctum*), LASUNA (*Allium sativum*) and VASA (*Adhatoda vasica*) have bactericidal activity against Mycobacterial tuberculosis in vitro. [Saroja, S. et. al., 1997]

The study of Anti-bacterial activity of Rasakarpura (Mercuric chloride) a known RASAYANA of mercurial origin revealed the safety margin and efficacy against different bacterial strains. [Choudary, A.K., et. al., 1999]

The anti – diphtherial properties of Bhallatakasava And Suksma Triphala possessing Known rasayana drugs like haritaki, aamalaki and Bhallataka were fond to have bactericidal activity on diphtheria causing microorganism *Corynebacterium diphtheria*. [Dalvi, S.J. et. al., 1999]

Pippali Rasayana Showed 98% And Manduka Parni (*Centella asiatica*) recorded 87% recovery of Giardia infection in mice. Lectin receptor interaction is identified as the potential site for development of anti-giardial drugs. Herbal drugs offer an ideal source of biologically active lectins, which may facilitate expulsion of parasites from the GI tract. [Agarwal, A.K & Tripathi, D.M, 1998]

Alcoholic extract of Bhallataka (*Semecarpus anacardium*) dry nuts showed bactericidal activity in three-gram negative strains e.g. *Escherichia coli*, *Salmonella typhi* and *Proteus vulgaris* and two-gram positive bacteria, namely *Staphylococcus aureus* and *Corynebacterium diphtheriae*. Alcoholic extract of different parts of the plant showed antibacterial property against *Corynebacterium diphtheriae*. Alcoholic leaf extract showed bactericidal activity against all the five tested strains. [Nair, A.& Bhide, 1996]

Cardio Tonic effect

Makaradvaja a popular Ayurvedic Rasayana is given to the rabbits orally for a period of two weeks. It has resulted in increase in ventricular contraction force evident of cardio tonic effect. [Pradeep Kumar et. al., 1997]

Mode of action RASAYNA (Herbo-mineral compounds)

Ghosal has suggested a comparative study and possible mode of action on Ayurvedic herbo - mineral vitalizers (RASAYANAS) is worth mentioning. The herbal (Polyphenolic / humic) ingredients, by complexation with the ions of transitional metals (Fe, Cu, Mn) and those of fixed valency states become thermo stable and water-soluble. These assemblies become readily available to living cells as sources of micronutrients and of energy. The herbal ingredients in the assemblies also act as reductants and backing pumps for regeneration of the metal ions into their lower valency states. The total assembly acts as bio - catalyst, for biological energy conservation and for signal transduction. [Ghosal, S., 1996]

CONCLUSION

The RASAYANA plants, by definition, give sharp memory, intellect and longevity, and along with freedom from illness, also restore youth. Also found in a series of experiments that the RASAYANA plants are immuno-stimulant in nature. [Dahanukar, S.A., 1996/97]. Several newer physio-pharmacological terminologies are used to explain the RASAYANA effect of the drugs. Irrespective of language these studies provide us a greater understanding and clarity

about RASAYANA drugs. It is now we have to understand RASAYANA effect through these terminologies like Antioxidant, Improving Immune Status, Adaptogen activity, Tissue Protection & Regeneration, Intellect promotion, Stress relieving, Cell Proliferation & Regeneration, Bactericidal & Anti microbial Activity and Cardio-tonic effect. Immuno-modulation is another important tool for Ayurveda doctors. One has to promote immunity potentials of an individual in any given condition to obtain better results. It is now evident adding one suitable Rsayana drug along with the treatment provides better results.

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