



ROLE OF HERBAL IMMUNOMODULATORS IN THE MANAGEMENT OF INFANTILE DISORDERS

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ABSTRACT

In recent few years India has attained manifold achievements in child survival. A fast decline in Infant mortality rate (IMR) of country has been observed. The IMR has dropped by an average rate of 4.56% per year over last five years. Despite of high advances in immunisation to boost up the defence mechanism, the medical science is yet to reach a full proof mechanism against the virulent organism and sometimes we lose out in battle of survival. However, an immune system is a system of biological structures and processes within an organism that protect against diseases by identifying and killing pathogens. The process of rendering a subject immune or becoming immune is called immunization. At the current pace, the country will miss the target to achieve the fourth Millennium Development Goal (MDG-4), which aims to reduce under-five mortality rate and IMR by two thirds between 1990 and 2015. So, there is need of improvement in current immunization schedule. In Ayurvedic texts immunity has been explained in term of *Vyadhikshamatva* Ayurveda bears therapeutic strategy such as *Lehana Karma*, *Suvarna Prashana*, *Rasayana*, etc. That enhances the body's overall natural defence to the disease-causing agents rather than directly neutralising the agent itself. In this to elaborate the management of such common diseases which are prevalent in this era like LBW, Mental retardation, Malnourishment etc which would help to tackle such problems without inculcating their long-term side effects on the infants.

KEYWORDS: Immunization, Immunity *Vyadhikshamatva*, *lehana karma*, *Suvarna Prashana Rasayana*.

INTRODUCTION

Children are one third of our population and all our future. 6.9 million Children under five years of age died in 2011, nearly 19,000/day and 800 every hour. Almost 75% of all child deaths are attributable to just six conditions: neonatal causes, pneumonia, diarrhoea, malaria, measles, and HIV/AIDS. Respiratory infections and diarrhoeal diseases together contribute to 36 per cent of all deaths in children under five years of age (Report on Causes of Death in India 2001-2003: Office of the RGI). 80% of these deaths occurs in the first 2 year of life, main causes being dehydration, complication associated with dysentery, malnutrition, and serious infection such as pneumonia. These statistics show that children are more vulnerable to infection because their immune system is less or under developed. Recurrent respiratory infection and diarrhoea are the most common causes of morbidity in immune compromised children. Majority of children below the age of 5 years do get 7-8 episodes of cold per year and more than 2 million deaths are estimated to result each year the world over because of diarrhoeal disease in children of under five years. Diarrhoea is a killer disease in children under five and recurrent diarrhoea affect almost 20% of the population

(park 2000). Immune system continues to develop as the infant grows. In this period attempt should be done for prevention of disease and to enhance physical, mental and social wellbeing of children so that each child may achieve the genetic potential with which she/he born. At this time if a method is developed or reintroduce from the treasure of Ayurveda, it will be a boon in the field of preventive paediatrics. In Ayurvedic texts immunity has been explained by Acharya Chakrapani in term of *Vyadhikshamatva*^[1] According to Ayurveda Ojas is considered as Bala or Prakrita Kapha attributed to immunity.^[2]

Immunity depends upon the maintenance of the equilibrium of Doshas and the healthiness of tissues and channels. Similarly, the strength of the body is related to immunity and it also depends upon the healthiness of tissues.

Different therapies like Rasayana, Lehana, Orjaskara, Jeevniya, Balya, Sanskaras etc. are focused to modulate the immunity or increase the *Vyadhikshamatva*.

Specific drugs like Rasayana and lehana in Ayurveda acts to prevention of disease and promotion of health by improving immunity or Kshamatva. Ojas play an important role in maintaining the resistance power of the body and it is extract of all the Dhatus. So, the drug Rasayana and Lehana are responsible to potentiate Ojas or intermediate Dhatus directly or by enhancing Dhatwagnies or by Srotoshodhanam.

MATERIALS AND METHODS

All the literature have been collected from Ayurveda Samhitas, modern medical books, articles, journals and internet.

Methods to Boost up Vyadhikshamatva

In Ayurveda texts, various codes of conducts are described for each persons of any age (from conception to old age) to follow in different seasons, during healthy and diseased conditions in terms of dietetic (Ahara) and mode of life (Vihar). These are:

1. For outcome of healthy fetus –follow Garbhini Masanumasika Paricharya, Punsavana karma,
2. To promote health of infant- Lehana Karma, various Medhya Rasayana (memory enhancing drugs).
3. Following Swasthavritta Paripalana (Dinacharya, Ritucharya).
4. Proper nutritious diet (Satymya Ahara).
5. Regular proper sleep, exercise, Yogic Asanas,
6. Adopting Sodhana (Panchkarma) according to Ritu in Swasth Purusha (healthy person).
7. Following Achara Rasayana: for promoting mental and spiritual strength.
8. Meditation for spiritual growth.
9. Use of various drugs: Vajikaraka dravya, Jeevaniya, Brihighana – Balya - Prazasthapana Vayasthapna Mahakashaya as in Charaka Samhita.
10. Rasayana therapy - It promotes and rejuvenate the physiology of body, produce resistance against disease both physically and mentally.

In case of childhood age group Lehana Karma and Rasayana therapy are very beneficial for boost up the immune system.

LEHANA KARMA

In Ayurvedic texts, various Acharyas described countless useful Dravya, formulations (Yogas), mode of conducts for adults to enhance immunity (Bala or Vyadhikshamatva), similarly for healthy Ksheerapa (infantile period), Ksheerannada (1-2years age period) and Annada-Awastha (age period from 2-16 years). Acharya Sushruta, Acharya Vaghbata & Acharya Kashyapa describe a special formulation by the name of “Lehana”, for this purpose which enhances immunity and thus minimises infection episodes. The term Lehana means the act of licking or lapping up with the tongue. Children are very susceptible to the infections. There are so many traditional measures available to combat it and protect from the hostile environment in which drug is mixed with honey or Ghrita are given. The process is called Lehana. So, it is the ideal way of administrating

drugs in children because it increases the palatability of the drug taken with it and can be easily taken up. This is the most accepted mode of the drug administration to child.

Facts about Lehana

Different Acharyas described various Lehana formulations (Balawardhan yogas or strength promoting formulation) for use in Balyaawastha (or during childhood period).

Lehana karma's purposes

1. To enhances growth & development by providing sufficient nutrition.
2. Promote health, complexion and strength (immunity).
3. Protect from various infections along with improving intellect and speech (delayed milestone).

Indication of Lehana

children receiving inadequate amount of breast milk due to pregnancy of mother, children having increased demand of food, children passing less amount of urine and stool, children: very lean & thin without any organic problems.^[3]

Contraindications of Lehana

children having improper digestion, lethargic, passing excessive amounts of urine & stool, suffering from various disorders like eye, ENT disorders (Shiroroga), fever, diarrhoea, oedema, jaundice, anaemia, cardiac problems, rectal disorder, excessive vomiting & nausea, abdominal discomforts, Amaroga (disorders due to toxic residue that is left behind as a by-product of poor digestion).^[4]

Various Lehana formulations mentioned by acharyas

1. Acharya Charaka - Panchgavya ghrita^[5] (Ghrita means clarified butter made from cow's milk), Brahmi ghrita^[6] etc.

2. Acharya Sushruta - has described 4 recipes (containing gold) which provide general immunity, body resistance, helpful in enhancing the growth & development and enhancing the intellectual power. These are: 1) Svaran bhasm with Kustha (Saussurea lappa), Vacha (Acorus calamus), Madhu (honey) & Ghrita. 2) Svaran bhasm with paste of Brahmi (Bacopa monnieri) Sankhpuspi (Convolvulus pluricaulis), with, honey & ghrita. 3) Svaran bhasm, Arkpushpi, Vacha, honey & ghrita. 4) Svaran bhasm, Khaidarya, Sweta Durva, ghrita.^[7]

3. Acharya Vaghbata - Sarshvata ghrita^[8], combination of Vacha and Suvarna Bhasma with honey and ghrita,^[9] etc.

4. Acharya Kashyapa - Suvarna Prashana - Pure gold (in small quantity) is rubbed in water on a clean stone & given with honey and ghrita, to the new-born result in promote health, growth, complexion & strength (immunity), Panchgavya ghrita, Brahmi ghrita, Abhaya

ghrita, Samvardhana ghrita^[10] Effective in children with delayed milestones.

BENEFITS OF LEHANA KARMA

1. The likeable are usually in the leha form. Usually the lehas are palatable and easy for consumption. The smaller kids will always have difficulties and reluctant in taking the medicine in the tablet, Chorna, or Kwatha form. Incomparable to this Lehana form with added Madura drugs easy to administer.
2. Further the Lehana may be Routine procedure or the method by which the body supplements are introduced. As we know that growing child require the extra caloric food as it is busy with playing other activities throughout. In the meantime, the rate of growth and development is very faster in the first few years of life. To meet the demands of the body in toddler there is need of some extra amount of the fats, amino acids and the carbohydrates which is supplied by Lehana Dravya
3. In other sense Lehana will have the long-standing effect. It will have its own effects in physical, mental and the emotional development of the child in future. Classics also explain if it is used for one month or six months the better effects will be seen.
4. The Medhaya Rasayans are explained with special reference in Lehana, may be because growth of the brain and the nervous system is very rapid in the first few years of the life which slows down afterwards as evidences by the Head circumference. As per modern science Brain development occurs shortly after conception and progresses at a very rapid pace in the first few years of life, where neurons form new connections at the astounding rate of 700-1000 per second.^[11]
5. As we know that nutritious disorders are quite common in the child hood period due to many reasons like poorly found of food, lack of the breast milk, vitiated breast milk etc. There may be vitamin, micro and macro elemental deficiencies which may be corrected by the daily usage of the Lehana
6. Most of the drugs which are mentioned in the context of the Lehana are also the Rasayana drugs. The Rasayana drugs increase all the Dhatus and maintain the body.
7. Acharya Kashyapa told that the Lehana is responsible for the happiness and sorrow ness in the future of the baby. By keeping this verse in mind, we can say Lehana is essential in once life time.^[12]

Suvarnaprashana

In Ayurvedic system of medicine Suvarnaprashana is one of the sixteen Samskara (rituals) described in ancient Indian scriptures. 'Suvarnaprashana' is a mixture of micro fine particles of Gold and calcined gold particles (Suvarna bhasma), Ayurvedic herbs, cow ghee and honey administered at a specific time i.e., Pushya-Nakshatra. Suvarna has the properties like that of Medha vardhanam, Agni vardhanam, Bala vardhanam, Vrushya,

Ayushyakara, Grahapaham, etc. these properties of Suvarna can be made use to strengthen an individual. Gold enhances memory power and immunity too. Oxide form of Swarna i.e. Suvarna Bhasma is easily absorbable. Ghrita increase mental ability and it enhance the function of drug added with it. Adding Madhu in Suvarna Prashana is that when Madhu is administered in low dose to new-born, child grows gradually itself develop resistance for allergens and it remains unaffected by allergic disorders.^[13] In a pharmaco-clinical study on neonates Madhu-Ghrita-Swarna combination showed a significant effect of humoral anti-body formation and it acted on immunological system, which was evident by triggering the response of immunological system by a rise in the total proteins and serum IgG levels.^[14]

Rasayana therapy

Rasayana therapy - It promotes and rejuvenate the physiology of body, produce resistance against disease both physically and mentally. Rasayana is made up of two words: Rasa and Ayana. Rasa primarily means essential seven vital tissues (Saptdhatu e.g. Rasa, Rakta, Mansa, Meda, Asthi, Majja and Shukra). Ayana means the path or channel. So, Rasayanas are those that bring about proper uptake, growth and improvement of essential Saptadhatus (seven vital tissues). According to Acharya Charaka, use of Rasayanas results in Dirghamaayu (disease-free long life), Smiriti (recapitulating power), Medha, Aarogyam (healthy wellbeing), Tarun vaya (youthfulness), Prabha, Varna (complexion), voice, strength etc.^[15] According to Acharya Sarangdhar, various drugs, diet and regimens which promote longevity by delaying aging (Jaranashanam) and preventing diseases (Vyadhinashnum) are called Rasayana.^[16] Rasayana is a specialised treatment influencing the fundamental aspects of the organs i.e. Dhatus, Agni and Srotamsi, leading to overall improvement in the organism, which affords prevention of ageing, resistance against diseases, bodily strength and improvement in mental faculties. The mode of action of Rasayana Dravyas can be considered through the following three ways:

- By improving the nutritional value of the Rasa Dhatus (Asthayee), in turn by improving the Dhatus Poshana (Dhatuvardhak)
- By improving the Agni Vyapara (Agnivardhak) in the body, thereby responsible for proper Dhatus Nirmana in the body.
- By Shrota Shodhana in the body, this improves Dhatus Poshana Kriya.

Role of some Drugs as Immunomodulators in the present era.

Piper longum

produce significant activation of macro phages, as shown by an increased MMI (macrophage migration index) and phagocytic activity. Alcoholic extract of the fruits of the plant *Piper longum* and its component piperine was studied for their immunomodulatory and antitumor activity. Bone marrow cellularity and alpha-esterase

positive cells were also increased by the administration of *Piper longum* extract and piperine.^[17] Immunomodulatory activity of *Piper longum*, Piperine may be due to the combined action of humoral and cell mediated immune responses. One of the major objective of the immunotherapy is to modulate immune responses for selected objectives. It includes augmentation of cell mediated immunity and cytotoxic effect. *Piper longum* and piperine also stimulate the stem cell proliferation and differentiation.^[18] In vitro studies have shown the role of piperine in relieving oxidative stress by quenching free radicals and reactive oxygen species. While it is known to act as an anti-mutagenic and anti-tumour agent, anti-diarrheic and anti-dysenteric properties of this spice enhance its medicinal value. The pharmacological properties of this plant also include anti-oxidant, anti-inflammatory, hepatoprotective, immunomodulatory, anti-microbial, anti-platelet, anti-hyperlipidaemic, analgesic, anti-depressant, anti-amoebic, anti-obesity, radioprotective, cardioprotective and anti-fungal effect.^[19] Clinical studies have revealed the efficacy of this plant in the treatment of bronchial asthma in children.^[20]

Glycrrhiza glabra

Increases phagocytic activity of macrophages. Stimulating macrophage to secrete IL-1. Enhances both NK cell & ADCC activity. Potential uses of *Glycrrhiza glabra* for antitumor, antimicrobial, antiviral, anti-inflammatory, immunoregulatory and several other activities that contribute to the recovery and protection of the nervous, alimentary, respiratory, endocrine, and cardiovascular systems.^[21] Glycyrrhizin, a triterpene glycoside from root of *Glycrrhiza glabra*, has positive effects on inhibition of hepatic apoptosis and necrosis by suppression of TNF- α and caspase-3, an important cytokine.^[22] Recently, researchers have demonstrated the anti-bacterial activity of root and leaf extract of *Glycrrhiza glabra* against *E. coli*, *Pseudomonas aeruginosa*, *Entereobacter cloacae* and *Klebsiella* sp. using well and disc method showing that both extracts were ineffective against *Entereobacter cloacae* and *Klebsiella* sp. while strong anti-bacterial activity against *E. coli* and *Pseudomonas aeruginosa*. Therefore, *Glycrrhiza glabra* might be useful in the treatment of diarrhoea caused by rotavirus infection.^[23] High phenolic content compounds present in *Glycrrhiza glabra* Linn. is responsible for its strong antioxidant activity due to free radical scavenging.^[24]

Emblia officinalis

Emblia officinalis fruit contain tannoid principles that have been reported to exhibit antioxidant activity. Ellagic acid, as a powerful antioxidant present in *Emblia officinalis* has the ability to inhibit mutation in gene and repair the chromosomal abnormality.^[25] It has potent free radical-scavenging agents, immunomodulating and cytoprotective effect. Immunomodulatory activity by humoral antibody formation and establishment of cell-mediated immunity. Different biological activities of

Emblia officinalis include antioxidant, immunomodulatory, anticancer, cytoprotective, analgesic, antimicrobial, antipyretic, antitussive and hepatoprotective effect. Majorities of the diseases are chiefly due to the imbalance between pro-oxidant and anti-oxidant homeostatic phenomenon in the body, and the *Emblia officinalis* balances this because of its antioxidant activity. *Emblia officinalis* inhibits the growth and spread of many cancers, including breast, uterus, pancreas, stomach and liver cancers. It also reduces the side effects of chemotherapy and radiotherapy.^[26]

Curcuma longa

Inhibit tumor formation & increases survival rate. Dietary curcumin enhances IgG levels. Curcuminoids (mixture of curcumin, desmethoxycurcumin, and bisdemethoxycurcumin) are considered as key active constituents of *Curcuma longa* and are reported to possess several biological activities. Numerous lines of evidence suggested, that curcuminoids are potent anti-inflammatory agents working through multiple mechanisms viz., suppression of the activation of nuclear factor (NF)-kappa B, inhibition of cyclooxygenase (COX)-2, down-regulation of the expression of cell proliferation, anti-apoptotic, and metastatic gene products.^[27] Curcuminoids have also been demonstrated to modulate the proliferation and cellular response of various immune cell types, such as T cells, B cells, macrophages, neutrophils, natural killer NK cells and dendritic cells.^[28]

Asparagus racemosus

Shatavari is one of the well-known drugs in Ayurveda, effective in treating and having *Madhur Rasa*, *Madhur Vipakam*, *Seet-Veeryam*. *Asparagus racemosus* is a well-known Ayurvedic Rasayana which prevent ageing, increase longevity, impart immunity, improve mental function, Vigour and add vitality to the body and it is also used in nervous disorders, dyspepsia, tumours, inflammation, neuropathy, hepatopathy. Reports indicate that the pharmacological activities of *Asparagus racemosus* root extract include antiulcer, antioxidant, and antidiarrheal, antidiabetic and immunomodulatory activities. Root of *A. racemosus* has been referred as bitter-sweet, emollient, cooling, nervine tonic, constipating, galactagogue, and aphrodisiac, diuretic, rejuvenating, carminative, stomachic, antiseptic and as tonic. Beneficial effects of the root of *Asparagus racemosus* are suggested in nervous disorders, dyspepsia, diarrhoea, dysentery, tumours, inflammations, neuropathy, hepatopathy, cough, bronchitis, hyperacidity and certain infectious diseases.^[29] The major active constituents of *Asparagus racemosus* are steroidal saponins (*Shatavarins I-IV*) that are present in the roots. *Shatavarin IV* has been reported to display significant activity as an inhibitor of core Golgi enzymes transferase in cell free assays and recently to exhibit immunomodulation activity against specific T-dependent antigens in immune compromised.^[30]

DISCUSSION

Though National Immunization Schedule is implemented mortality rate in India is still high. From the first day of life vaccination schedule is started but all these vaccines are not able to protect the child from the diseases like major bacterial infections, viral infections and primary-secondary immunodeficiency syndromes etc. The vaccine takes almost, few months for activation of immune system and to produce the specific immunoglobulins against that specific antigen. Recent immunization data shows that vaccinations and immunization schedules are not sufficient to control the diseases. So, these are some of the major lacunas in the management given by contemporary sciences, hence it is the need of the society for an immunomodulatory agent which boost up the immune mechanism of the body. Theory of vaccination resembles to the concepts of Vyadhikshamta. The Rasayana, lehana and Swarnaprashana drugs are supposed to increase all the Sharira Dhatus, both qualitatively and quantitatively. These drugs also improve the quality of Rasadhatus and by this the entire status of the body. It is an approach towards positive health care programme for children by increasing the Vyadhikshamta (immunomodulation). As Acharya describes Vyadhikshamta as "The individual's resistance to disease which includes both the capacity of attenuation of the manifested disease as well as the prevention of the un-manifested one.

CONCLUSION

Children are more vulnerable to infection because their immune system is less or under developed. Immune system continues to develop as the infant grows. In this period attempt should be done for prevention of disease and to enhance physical, mental and social wellbeing of children so that each child may achieve the maximum genetic potential with which she/he is born. Ayurveda can augment the recovery of children suffering from high morbidity features with its Rasayana therapy, lehana karma and Suvarna prashan. We can say that the children should be supported externally to prevent the infections and at the same time measures should be taken for the proper development of immune system. The defence mechanism of child must be developed to be free from disease.

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