

**Review Article****PRAKARA YOGA (AGE WISE SCHEDULE OF IMMUNOMODULATORY DRUG COMBINATIONS) AND ITS EFFECT ON CHILDREN'S IMMUNITY****Asha S**

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KEYWORDS: *Prakarayoga, Arogyarakshakalpadruma, Immunity, Immune modulation, Vyadhikshamatwa, Bala.***ABSTRACT**

The term immunity is concerned with the state of being resistant or immune to foreign substances such as bacteria and other pathologic agents. The inborn resistance that is present even before first entry of a pathogen into the host is termed as innate or natural immunity. Innate immune responses are non specific in nature. *Vyadhikshamatwa* as described in *Ayurveda* has two main arms; preventive and curative. In pediatric age group immune deficiency disorders remain the major sphere of concern. The cause can be either genetic or acquired by malnutrition and poor sanitary conditions. Ayurvedic has got a rich tradition of immune modulatory drugs viz., *Swarnaprasa, Oushadhprasas* like *Uramarunnu* (Traditional Kerala practice), *Prakaarayoga* etc for boosting up innate immunity in children. *Prakara yogas* are formulations mentioned in *Arogyarakshakalpadruma*, an authentic Ayurvedic pediatric textbook, for preventing childhood illness and for boosting general immunity in children. They should be given as a schedule in different age groups periodically from birth up to 12 years of age. Just as a fence that protects the house from various enemies, *Prakara yogas* protect the child from various ailments.

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INTRODUCTION

The term immunity is concerned with the state of being resistant or immune to foreign substances such as bacteria and other pathologic agents. Immune system is divided into two major categories Innate and Acquired. The inborn resistance that is present even before first entry of a pathogen into the host is termed as innate or natural immunity. Innate immune responses are non specific in nature. These are not against any particular microbe or disease. These responses act against any microbe entering into the host. The importance of innate immunity lies in the fact that the innate immunity protects the host during the first few days.^[1] *Ayurveda* has propounded the concept of immunity as *Vyadhikshamatwa*. Various immune enhancing methods have also been described by various *Acharyas*. *Prakarayoga* is an immunomodulatory method explained in *Arogyarakshakalpadruma*, an authentic Ayurvedic pediatric textbook.

Review Literature

The innate immune system and the adaptive immune system each comprise both humoral and cell-mediated components.

Cellular immunity protects the body by:

- T-cell mediated immunity or T-cell immunity : activating antigen-specific cytotoxic T cells that are able to induce apoptosis in body cells displaying epitopes of foreign antigen on their surface
- activating macrophages and natural killer cells
- stimulating cells to secrete a variety of cytokines.

It is most effective in removing virus-infected cells, but also participates in defending against fungi, protozoans, cancers, and intracellular bacteria. It also plays a major role in transplant rejection.^[2]

Humoral immunity is the aspect of immunity that is mediated by macromolecules found in extracellular fluids such as secreted

antibodies, complement proteins, and certain antimicrobial peptides.^[3]

Antibodies are large Y-shaped globular proteins. There are five types of antibodies: IgA, IgD, IgE, IgG, and IgM. By binding their specific antigens, antibodies can cause agglutination and precipitation of antibody-antigen products, prime for phagocytosis by macrophages and other cells, block viral receptors, and stimulate other immune responses, such as the complement pathway.

The complement system is a biochemical cascade of the innate immune system that helps clear pathogens from an organism. It is derived from many small blood plasma proteins that work together to disrupt the target cell's plasma membrane leading to cytolysis of the cell.

Immunomodulation

An immunomodulator can be defined as a substance, which can influence any constituent or function of the immune system in a specific or nonspecific manner including both innate and adaptive arms of the immune response. It can cause immune-stimulation by stimulating effector cells or production of their metabolic inducers or by inhibiting the immunity limiting factors. Food-derived substances can modulate either innate or acquired immunity. For example, probiotics such as lactic acid bacteria and some vitamins enhance phagocytic activity and natural killer (NK) cell activity (innate immunity), while vitamins, minerals, amino acids, fatty acids and oligosaccharides augment T cell responses and antibody production (acquired immunity). A balance of innate and acquired immunity is desirable for good health.^[4]

Peculiarities of infant immune system

Neonates have physiological immunodeficiency, i.e., their native immune system is immature. This is reflected in their increased susceptibility to infections, often with severe consequences. The infant has a gastrointestinal tract (GIT) lacking micro flora, with undeveloped mucosal defences. The innate immunity is mostly lacking in neonates and initially so is the humeral immunity, and the neonate is almost wholly dependent on the passively acquired maternal Ig G and Ig A antibodies. Maternal Ig G is transported actively across the placenta to the foetus particularly in the last trimester, and Ig A is passed on to the baby via breast milk. However, these passively acquired antibodies are incapable of mounting a cell mediated response rendering the neonate susceptible to various pathogens.

The child is more prone to infectious diseases due to immaturity of body tissues, reduced immunity, elevated amount of inflammatory mediators and vulnerability to extraneous factors like environmental changes. To protect the child from these situations immunization has been introduced.

Vyadhikshmatwa

Ayurveda has propounded the concept of immunity as "*Vyadhikshamatwa* which acts as a barrier against all diseases. The main strategy of *Ayurvedic* medicine is to increase body's natural resistance to the disease-causing agent rather than directly neutralizing the agent.^[5] *Vyadhikshamatva* in *Ayurveda* is not merely immunity against a specific infectious agent or disease such as typhoid, measles or rubella for which modern medicine provides "immunizations". Rather, it implies a resistance against the loss of the integrity, proportion and interrelationship amongst the individual's *doshas* (bioenergies) and *Dhatus* (tissues). The concept of *Vyadhikshamatva* (immunity) is of tremendous importance in the daily wellness of human beings; for prevention and recovery from diseases. When etiological factors come in contact with the body they try to produce disease. At the same time the body tries to resist the disease. This power of the body, which prevents the development of diseases or resists a developed disease, is called *Vyadhikshamatwa* or Immunity. Resistance to disease or immunity against disease is of two kinds i.e., the one which attenuate the manifested diseases and other variety prevents the manifestation of diseases. Thus, it is clear that concept of immunity was familiar at that time and has been analyzed in detail in form of *Vyadhikshamatva* in various *Ayurvedic* texts. According to the concept of *Vyadhikshamatva* or *Bala* (immunity), the body's resistance is of tremendous importance in the daily welfare of living beings not only for disease prevention but also for rapid recovery after disease affliction.

Acharya Vagbhata opines that *Bala* is of three varieties.^[6]

Sahaja bala- It is innate immunity. It is formed genetically and transferred from mother to the child. Ideal genetic and intrauterine conditions may influence *Sahaja bala*. This can be correlated to passive immunity which is transferred from mother to child.

Kalaja bala- This *Bala* exactly depends upon age of the person and seasonal variations. *Bala* of an individual is maximum during *Sisira* or winter season and will be minimum during *Greeshma* or

summer and *Varsha* or rainy seasons. It is also considered that an individual in *youth* has the maximum *Bala* during infancy and in childhood it will be comparatively less due to immature body tissues.

Yuktikrita bala- It is the acquired form of *Bala* with the help of proper diet (*Ahara*) other regimens (*Vihara*) and various other measures such as *Rasayana*, *Vajeekarana*, *Lehana*, *Prakara yogas*, etc. It is exactly similar to that of acquired immunity acquired by supplementary immunization techniques.

Prakarayoga- a unique concept from Arogyarakshakalpadruma

Prakara yogas are formulations mentioned in *Arogyakalpadruma* for preventing childhood illness. *Arogyakalpadruma*, a renowned book of Ayurvedic clinical pediatrics, written by Vaidya kaikkulangara Rama varrier in Sanskrit widely followed in South India contains a good number of simple drug combinations which are administered in different age groups to protect children from all types of common illnesses specific for that age. The unique concept of *Prakarayoga* is explained systematically in 35th chapter of *Arogyakalpadruma*. Many of them are found to be useful formulations with excellent efficiency to prevent diseases & for boosting immunity. It is said that various *Prakarayogas* are advised by *Bhelacharya*.^[7]

Most important of them are selected & explained in a chapter as a schedule from neonate to 12yrs in *Arogyakalpadruma*. They are useful for establishing and promoting digestion, health, longevity and immunity. It is explained that a wall that protects the house from various odds, *Prakarayogas* keep the child away from various ailments. Hence the name *prakara* means *wall*. These formulations provide generalized immunity to the child similar to modern immunization. They should be given as a schedule in different age groups periodically from birth as an application of *Murdhataila* up to 12 years of age. Most of the combinations are in the form of a medicated powder/*Ghruta*. Constituents of each formulation vary with corresponding age & must be used along with appropriate adjuvant. *Prakara yogas* are those combinations which are most suitable, particular, and unique and strong which can make the child healthy. Just as a fence that protects the house from various enemies, *Prakara yogas* protect the child from various ailments. The prescribed use of *Prakara yogas* correct *Agni* and alleviate *Dosha* as they are collectively having pharmacological actions such as *Deepana* and *Pachana*.^[8]

Mode of administration of drugs:

New born child

The drug *Vaca* is grinded in the juice of *Tripadika* is prepared and three drop of this mixture is advised to instill over the center of the head, from the first day of birth up to seven day, is beneficial to prevent the occurrence of disease.

15 day old Child

After the fifteenth day of child birth, the root, bark, leaf, flower and fruit of *Vilva* are taken together and powdered well. This powder is added with the juice of *Dhattri* and give internally for seven days, in the morning will prevent the occurrence of disease.

1 month old Child

After one month, the drugs such as *Musta*, *Hingu* and *Vilanga* are powdered well and added with the ghee medicated with the juice of *Trayanti* is given internally in the morning for seven days is beneficial.

3 month old Child

After three months, the drugs such as *Vyosha*, and powder of *Sariba* is added with butter and given internally for seven days is beneficial to prevent the occurrence of diseases.

6 month old Child

After sixth months, the powder of *Musalikanda* and *Trikatu* are mixed together and added with honey is given internally for seven days in the morning prevent the diseases.

1 year old Child

On the first month of one year, the child is given with the powder of the drugs such as *Dhattri*, *Musta*, and *Vyosha* added with honey is given internally in the morning for seven days prevent the diseases. On the second month the same powdered drug added with butter is given for seven days. On the third month it is given with hot water, on fourth month it is given with honey, on fifth month the drug in the group *Pancakola* is powdered and added with ghee is given internally for seven days. On the sixth month, the powder of *Jiraka* and *Krishna* is added with honey and administer internally. On the seventh month, the drugs such as *Dadima*, and *Vyosha* added with *Dadhi mastu* is administered internally, for seven days. On the eighth month, the ghee medicated with the drugs such as *Grandhika mula* and *Kalinga* is administered internally in the morning for seven days. On the ninth month, the drugs such as *Vella* and *Krishna* added with honey is administered internally for seven days prevent diseases. On the tenth month, the drugs such as *Jiraka* and *Vyosha* added with sugar are

administered internally for seven days. On eleventh month, the drugs such as *Jiraka* and *Vyosha* added with cow's milk are administered. On twelfth month, the sugar and *Jiraka* added with cow's milk is given internally for seven days.

3 year old Child

On the first month of third year, the drugs such as *Guluci*, *Pippali* and *Vaca* are powdered well and added with ghee and sugar is given for seven days consecutively. On second month, the drugs such as *Vyosha*, *Yashti*, *Vaca*, *Saidhava*, and *Abhaya* are powdered together and added with sugar and ghee is administered internally for seven days. On third month, the drugs such as *Vella*, *Musta*, *Ela*, *Vaca*, *Nagara*, and *Pippali* are powdered and given with sugar and ghee. On fourth month, the drugs such as *Sariba*, *Vyosha*, *Vaca*, *Jiraka*, and *Kaisiki* are powdered and add with sugar and ghee is given for seven days. On fifth month, the drugs such as *Dadima*, *Ambhoda*, *Vaca*, *Dhanyaka* and *Magadhi* are powdered together and given with sugar and ghee for seven days. On sixth month, the drugs such as *Vrusciva*, *Bhunimba*, *Vaca*, and *Kshira taru twak* are powdered well and given with sugar and ghee for seven days. On seventh month the drugs such as *Supyaparni*, *Abda*, *Vira*, *Rudhi*, *Capala*, and *Vaca* are powdered together and added with sugar and ghee is given. One eighth month, the drugs such as *Drona pushpa*, *Abda*, *Vaca*, and *Dwija taru Twak* are powdered together and added with sugar and ghee is administered for seven days. On ninth month, the drugs such as *Trayamana*, *Abda*, *Vaca*, *Kutaja* and *Magadhi* are powdered together and added with sugar and ghee is administered for seven days. On tenth month, the drugs such as *Malati pushpa*, *Vaca*, *Jiraka*, and *Kaisiki* are powdered together and added with sugar and ghee is given to the child for seven days. On eleventh month, the drugs such as *Samipatra*, *Jiraka*, *Agni*, *Vaca*, and *kana* are powdered and added with sugar and ghee is given for seven days. On twelfth month, the drugs such as *Vella*, *Talisa patra*, *Agni*, *Pasugandha*, *Abhaya* and *vaca* are powdered together and added with sugar and ghee is given for seven days.

5 year old Child

The Child of five year old is given with the medicaments said above with *Pushkaramula* instead of *Vaca*.

6 year old Child

The child of six year old is given with the medicaments said for *Traibda*, added with root of *Sankha pushpa* instead of *Vaca* and the medium for mixing the compound is ghee and honey instead of sugar and ghee.

10 year old Child

- The ghee medicated with the juice of *Brahmi* added with the *Kalka* prepared with the drugs such as *Abhaya*, *Vyosha*, *Saindhava*, *Vaca*, and *Talisa Patra*, is given to the child on the first month of tenth year for seven days.
- The ghee medicated with the *Kalka* prepared with the drugs such as *Vilanga*, *Amalaka*, *Vyosha*, *Patha*, *Dadima*, and *Dipyaka* added with the juice extracted from *Krishna Munda*, is administered on the second month of tenth year, for seven days.
- The ghee medicated with the *Kalka* prepared with the drugs such as *Jiraka*, *Vyosha*, *Saindava*, *Vaca*, *Jalada*, and *Pushkara* along with the juice of *Vetasamla*, is given on the third months of tenth year, for seven days.
- The ghee medicated with the drugs in the group called *Jivaniya Gana*, *Ambhoda*, *Jayanti Ula*, *Citraka*, and *Granthi* with goats milk is given on the fourth month of tenth year, for seven days is beneficial.
- The ghee medicated with the kalka prepared with the drugs such as *Draksha*, *Vrusciva*, *Patha*, *Abda*, *Habusha Mula*, *Katphala*, and *Dadima* along with goat's milk, is given on fifth month of first year for seven days.
- The ghee medicated with *Kalka* prepared with the drugs such as *Sariba*, *Jalada*, *Usira*, *Trikatu*, *Surahwaya* and *Jiraka* added with goat' milk is given on sixth month of tenth year for seven days is beneficial to prevent various diseases.
- The ghee medicated with the *Kalka* prepared with the drugs such as *Nagara*, *Amalaka*, *Anantha*, *Vilanga*, *Indrayava*, *Ambuda*, and the root, bark, leaves flower and fruit of *Vilva* added with water, is given on seventh month of tenth year for seven days is beneficial to prevent diseases.
- Ghee medicated with the *Kalka* prepared with the drugs such as *Pippali*, *Indra Yava*, *Draksha*, *Bruhati*, *Amsumati Dwaya*, *Tikta*, *Vaikund A Pushpa*, *Ambu*, *Nalada*, *Alarka*, *Dipyaka*, *Dadima*, *Ambhoda*, *Patha*, *Ugra*, *Sigr*, *Hingu*, *Punarnava*, *Vilva Mula*, *Sami Valka*, *Malati Mukula*, *Utpala*, *Vilanga*, and *Amalaka* added with the medicinal fluid called *Mastu* is added with sugar and *Jiraka* is given on eighth month of tenth year for seven days is beneficial to prevent diseases.
- Ghee medicated with the decoction prepared with the drugs such as *Vilva*, *Ajamoda*, *Nirgundi*, *Capala Mula*, *Toyada*, and *Dadima* added with the *Kalka* prepared with the drugs such as

Vyosha, Ela, Agni, and Vilanga, along with cow's milk is prepared and administer on the ninth month of tenth year for seven days is beneficial to prevent diseases.

- Ghee medicated with the decoction prepared with the drugs such as *Trayamana, Kalinga, Abda, and Capala mula* added with the *Kalka* prepared with the drugs such as *Ativisha, Musta, Bhoonimba, and Kutaca*, is given on tenth month of tenth year for seven days is beneficial to prevent the diseases.
- Ghee medicated with the *Kalka* of the drugs such as *Dadima, Triphala, Vella, Magadhi Mula, and Citraka* along with the juice of *Jivanti and Mastu*, is advised to administer on eleventh month of first year for seven days is beneficial to cure the disease.
- Ghee medicated with the decoction prepared with the drugs such as *Patha, Kutaca, Bhunimba, Varshabhu, and Dhanyaka* along with *Kalka* prepared with the drugs such as *Vella, Palasa twak, Nisa Dwaya, Punarnava, Vyosha, Dipyaka, Ananta, and Madhuka* is advised to administer added with honey on twelfth of tenth year for seven days is beneficial to prevent diseases.

12 Year old Child

On the first month after completing the twelfth year, the drugs such as *Ananta*, and *Vaca* along with sugar and honey is given for seven days in the morning cure the disease. From the second month onwards, instead of *Ananta*, the drugs such as *Brahmi, Munda, Sami Valka, Bhrunga, Amalaka, Magadhi, Visala, Vajra Valli, Indurekha, Bhunimba, and Gopica* are to be given from second month onwards to twelfth month for seven days in consecutive order.

Dosage: *Acharya Sarngdhara's* opinion is considered while fixing the dose for the *Yogas* (recipes) of *Prakara Yoga*. According to him, the dose at first month is 1 *Ratti* (125mg). this dose is increased by 1 *Ratti* each in successive months, up to twelve months when it reaches 2 *Masha* (1.5gm) (since, 12 *ratti* = 2 *Masha*). Next, the dose is increased by 1 *Masha* every year and hence the dose at 12 year is taken as 13 *Masha* since the recipes are explained only upto 12th year.^[9]

DISCUSSION

As early infancy is a *Kapha* predominant stage, children are more vulnerable for diseases due to vitiation of *Kapha*. When we come across diseases, it is clear that need of *Agni* is the crucial basis of ailments in infancy. As per Ayurvedic principles, the *Rasa* and *Guna* of the drugs in a formulation are the leading factors that determine

its action. The ingredients of the formulations are predominantly having *Katu rasa, Katu vipaka* and *Laghu guna* and alleviates the vitiation of *Kapha*. Thus formulations correct digestion and pacify the vitiation of *Kapha*. Due to the pungent taste, light quality and hot potency they cleared the channels of body and thus improved nutrition. The presence of *Rasayana* drugs in the combinations pacify mild *Vata Kapha* and *Kapha kshaya* that might have been formed during *Deepana pachana* process and leads to the formation of superior quality *Dhatus*. Due to the presence of *Rasayana* drugs the formulation directly increases the "*Yuktikrita bala*". So far, several clinical trials have been conducted on *Prakarayoga* in children of different age groups and their efficacy have been proved beyond doubt.^[10,11] Several pharmacological studies have also been conducted on different ingredients of *Prakara Yoga*.

CONCLUSION

The drugs have effect on 2 arms of *Vyadhikshamatwa*, that is "*Vyadhi utpadaka pratibandakatwa*" by reducing the incidence and "*Vyadhibala virodhitwa*" by reducing the duration and severity of diseases. In short, *Prakarayogas* by virtue of its, digestive, carminative, channel clearing, and *rasayana* properties prevent morbidity during infancy. It is the only age wise immunisation method explained in Ayurveda. Its authenticity has to be strengthened by doing more researches on the ingredient drugs. It is really advisable to practice giving *Prakarayoga* to children right from the time of birth, as it enhances their innate immunity and thereby improving their quality of life. Thus we can pave way for a healthy generation.

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