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# Prakara Yogas as an Immunomodulator during Infancy - A Critical Evaluation

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## ABSTRACT

Infancy is a crucial phase where the child comes across many mild to life threatening infections. The immunodeficiency of this period is compensated to some extent by the vertically transmitted antibodies from mother, exclusive breast feeding and through proper vaccination. But the protection offered by the maternal antibodies is transient and wanes off within 1 year. Concept of exclusive breastfeeding cannot be met in all circumstances especially in working mothers. Vaccinations provide protection against specific infections. In the present setting of pandemic, where the difficulties faced in tackling the spread of infections are witnessed, vaccinations become chaotic due to the unpredictable mutations of microbes. At this juncture arises the need for a well-built generalized immunity that will protect against a number of infections irrespective of the causative organism. *Prakara Yogas* are various immunomodulatory formulations elaborated in the textbook *Arogyaraksha Kalpadruma* that are scheduled to be administered during childhood in order to prevent diseases. The drug combinations in *Prakara Yogas* counteract the expected *Dosha Vaishamya* at specific ages, stabilize *Agni* and enhances immunity thereby preventing the onset of diseases. For protecting our future generations, usage of these formulations should be promoted for boosting their innate immunity, rather than attaining disease specific immunity against diseases through vaccination. This paper elaborates *Prakara Yogas* advised during infancy and also an attempt is made to critically analyse the formulations in aiding immunomodulation.

**Key words:** *Prakara Yoga, Immunity, Agni, Balam.*

## INTRODUCTION

The word Immunity is derived from the Latin word 'Immunis' meaning 'exempt'<sup>[1]</sup> and the term is concerned with the state of being resistant or immune to foreign substances such as bacteria and other pathologic agents. There are two interconnected

systems of immunity - innate immunity and adaptive immunity. These two systems work together in protecting the body against foreign invaders. Innate immunity comprises of built-in molecular and cellular mechanisms. These are encoded in the germ line and are evolutionarily more primitive. The innate immunity is aimed at preventing infection and in quickly eliminating common invaders. The recognition elements of the innate immune system are quick and some occurring even within seconds of a barrier breach. But the small differences between foreign antigens are not differentiated due to the absence of specificity in innate immunity. A second form of immunity, known as adaptive immunity, is much more attuned to even minute molecular differences. This part of immune system, which depends on B and T lymphocytes is much more antigen specific, but takes longer to get engaged in the immune activity.

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Typically, there is an adaptive immune response against a pathogen within 5 or 6 days after the initial exposure and barrier breach, and this is followed by a gradual resolution of the infection.<sup>[2]</sup>

In Ayurveda, the concept of Immunity is explained under *Vyadhikshamatwa*. It is defined as the ability of the body to counteract the strength of disease and prevent the body from falling ill. This concept having a broader perspective depends on various factors as follows.

**Agni** - The role of *Agni* (digestive fire) in preventing diseases can be understood from the *Sloka* “*Roga Sarve Api Mande Agnou*”. *Agni Mandya* (mildness of *Agni*) is the sole cause of all diseases. *Agni* in *Sama* (normal) state bestows good health. *Agni* becomes *Vishama* (unstable), *Teekshna* (aggravated) and *Manda* (mild) when vitiated by *Vata*, *Pitta* and *Kapha* respectively.<sup>[3]</sup> These vitiated *Agni* results in ill health. *Agni* can be kept in equilibrium by appropriate observance of *Dinacharya* (daily regimes), *Ritucharya* (seasonal regimes), timely *Sodhana* (purificatory) therapies etc.

**Ojas** - It is the collective essence of *Sapta Dhatus*.<sup>[4]</sup> It is considered as the seat of *Prana* (life) and its *Abhava* (absence) leads to deterioration of health.<sup>[5]</sup> The quality of is determined by the quality of *Ahara* (food) ingested, strength of *Agni* and mental health. The quality of *Ojas* is affected by trauma, emaciation, and emotional disturbances, excessive thinking, over exertion and fasting.<sup>[6]</sup>

**Balam** - *Balam* (Strength to fight against diseases) is the end result of *Ojas*.<sup>[7]</sup> “*Baladhishtanam Arogyam*”. There are three types of *Bala*, *Sahaja* (Innate immunity), *Kalaja* (Immunity acquired as age advances, attained during different phases of day and seasons. *Yuktikrita* (acquired through *Ahara Oushadha Seva*).<sup>[8]</sup> Status of *Bala* is determined by the *Balavrudhikara Bhavas*,<sup>[9]</sup> which are as follows;

- Birth to parents whose immunity is strong
- Birth in a place where people are strong by birth
- Birth in a time when people naturally gain strength

- Favourable disposition of time
- Excellent qualities of *Sukra* and *Sonita* (male and female gametes)
- Excellent qualities of ingested food

*Vyapat*, *Visramsa* and *Kshaya* denote the deranged states of *Ojas* and *Bala*<sup>[10]</sup> and it can be understood from the specific features as explained by *Sushruta*.

### Immunity in infancy

While the foetus is in utero, it is very much essential that the foetal immune system remains tolerant to the maternal alloantigens. Even at birth, their native immune system remains immature, i.e., neonates have physiological immunodeficiency. Newborn serums concentrations of almost all circulating components are 10-80% lower than in adults with diminished biological activity.<sup>[11]</sup> After birth, the infant is suddenly exposed to enormous environmental antigens which call for a rapid change to make distinct immune responses appropriate for early life.<sup>[12]</sup> The neonate is almost completely dependent on the passively acquired maternal IgG and IgA antibodies. Particularly during the last trimester of pregnancy, the maternal antibody IgG are transported actively across the placenta to the foetus and IgA is passed on to the baby via breast milk. However, these passively acquired antibodies are not capable of mounting a cell mediated response rendering the neonate susceptible to various pathogens. The effect of transplacentally acquired immunity starts to wane when the baby nears 1 year of age. Exclusive breast feeding up to 6 months contributes much to the innate immunity of the baby which helps to nullify the developmental immune deficiencies. But still, the protection provided through breastfeeding is limited to some diseases like respiratory infections, diarrhoea, ear infections etc. Ayurveda explains *Balya Avastha* (childhood period) as the first phase of life where the body is immature in terms of physical, psychological strength and sexual development.

- *Aparipakwadhatu* (immaturity of tissues)
- *Ajatavyanjanam* (secondary sexual characters are not developed)

- *Akleshasaham* (intolerant to harsh situations)
- *Sukumaram* (highly vulnerable)
- *Asampurna Balam* (incomplete strength)
- *Anavasthita Satwam* (instability of psychological factors)<sup>[13]</sup>

Due to immaturity of body tissues, reduced immunity, elevated number of inflammatory mediators and vulnerability to extraneous factors like environmental changes, the child is more prone to infectious diseases. The risks are however reduced by immunomodulatory drugs and through vaccination. Immunomodulators are biological or synthetic substances that stimulate or suppress the components of immune system including both innate and adaptive immune responses in a beneficial way.<sup>[14]</sup> Improving the generalised immunity against wide range of infections and disease conditions is the need of the hour in protecting infants especially as the world is witnessing surge of newer infections due to mutagenicity of microbes. It has been studied that the ability of the body to defend from microbes varies throughout lifespan. Ill health always results from *Agnimandya*.

Children are physiologically immunodeficient due to this *Manda Agnitwa*. Immune system gradually deteriorates in old age resulting in a state called Immunosenescence.<sup>[15]</sup> *Agni* is weak in old age group. The mature immune system seen in young adults is as a result of their powerful *Agni* resulting from the physiological *Pitta* predominance. Despite having strong immunity, if the person indulges in inappropriate diet and activities, and if he does not follow proper *Dinacharya* and *Ritucharya*, his *Agni* gets vitiated. The vitiated *Agni* breaks the equilibrium of *Dosha*, *Dhatu* and *Mala* whose balance determines *Swasthya*. At this point, *Vyadhikshamatwa* of an individual compromise. So, it becomes obvious that one has to preserve the normalcy of *Agni* or modify the *Agni* through *Hitaaharavihara* (suitable diet and activities) and *Oushadha Upayoga* (use of suitable drugs) accordingly for maintaining *Swasthya*.

### *Prakarayogas* - a unique contribution from *Arogyaraksha Kalpadruma*

*Prakara Yogas* are age specific immunomodulatory formulations mentioned in *Arogyaraksha Kalpadruma*. *Arogyaraksha Kalpadruma*, a renowned book of *Ayurvedic* clinical paediatrics, written by *Vaidya Kaikkulangara Rama Varrier* in simple Sanskrit is widely followed in South India and is unique in many aspects. It is a practically oriented textbook and explains many simple and easy to use *Yogas* and *Kalpanas*. The book contains incomparable information regarding various diseases, their pathogenesis and management with reference to paediatric age group. The unique formulations of *Prakarayoga* are explained systematically in 35<sup>th</sup> chapter of *Arogyakalpadruma*. These 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*.<sup>[16]</sup> Most important of them are selected & explained as a schedule in a separate chapter in *Arogyakalpadruma*.

“*Prakara Iva Satrubhyo Ye Rakshanti Vapuh Sisoh*

*Prakarayoga Taanaahu Taan Braveemi Prithagvidhaan*”<sup>[17]</sup>

It is explained that just like a wall or fence that protects the house from adversities; *Prakarayogas* keep the child away from various ailments. These formulations provide generalized immunity to the child and compensate the physiological immaturity of immune system in paediatric age. They should be given as a schedule at different age groups from *Jatamatra* (just after birth) up to *Dvadasabdha* (completed 12 years of age). Most of the combinations are in the form of *Churna* (powder)/*Ghrita* (medicated ghee). Constituents of each formulation vary with corresponding age & must be used along with appropriate adjuvant. The prescribed use of *Prakara Yogas* correct *Agni* and alleviate *Dosha Dushti* (vitiating of body humors) as they are collectively having pharmacological actions such as *Deepana* (carminative) and *Pachana* (detoxifying).<sup>[18]</sup> There are different modes of

administration of drugs in different age groups like local application over *Murdhni* (anterior fontanelle) and oral intake in prescribed dosage. Following of appropriate dietary, daily and seasonal regimes are advised along with the *Prakara* schedule.<sup>[19]</sup> These *Yogas* have been chosen to counter the *Dosha Vaishamya* expected at specific ages.<sup>[20]</sup>

**Table 1: Drug formulations scheduled at specific period during infancy**

| Age group   | Drug formulation                              | Mode of administration                          | Anupana              | Duration | Time    |
|---|---|---|----------------------|----------|---------|
| <i>Jatamatra</i> <sup>[21]</sup><br>(Newborn)             | <i>Vacha</i> mixed with <i>Tripadika Rasa</i> | External application as <i>Thalam</i> - 3 drops | -                    | 7 days   | Morning |
| <i>Pakshateeta</i> <sup>[22]</sup><br>(Completed 15 days) | <i>Vilwa Panchanga Churna</i>                 | Oral  | <i>Dhatriswarasa</i> | 7 days   | Morning |

|   |                                     |      |  |                       |        |         |
|---|-------------------------------------|------|--|-----------------------|--------|---------|
| <i>Masajata</i> <sup>[23]</sup><br>(Completed 1 month)    | <i>Musta, Hingu, Vidanga Churna</i> | Oral |  | <i>Trayanti Sarpi</i> | 7 days | Morning |
| <i>Trimasika</i> <sup>[24]</sup><br>(Completed 3 months)  | <i>Vyosha, Sariba Churna</i>        | Oral |  | <i>Navaneta</i>       | 7 days | Morning |
| <i>Shanmasika</i> <sup>[25]</sup><br>(Completed 6 months) | <i>Musali Kanda, Vyosha Churna</i>  | Oral |  | <i>Madhu</i>          | 7 days | Morning |

For fixing the dosage of drugs, *Sarngadhara's* opinion<sup>[26]</sup> can be taken into account. 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).

**Table 2: Pharmacological properties of drugs mentioned in *Prakara Yogas* upto Infancy**

| Name of the drug   | Botanical Name                     | Rasa                                       | Guna                  | Veerya        | Vipaka         | Karma  |
|--|------------------------------------|--|-----------------------|---------------|----------------|--|
| <i>Tripadika</i> <sup>[27]</sup><br>( <i>Hamsapadi</i> ) | <i>Adiantum lunulatum</i> Burm.    | <i>Tikta Kashaya</i>                       | <i>Guru</i>           | <i>Sheeta</i> | <i>Katu</i>    | <i>Vishaghna, Raktavikara Harana</i>   |
| <i>Vacha</i> <sup>[28]</sup>                             | <i>Acorus calamus</i> Linn.        | <i>Katu Tikta</i>                          | <i>Laghu Teekshna</i> | <i>Ushna</i>  | <i>Katu</i>    | <i>Deepana, Krimihara, Kantya, Kaphahara, Medhya, Vatahara, Vamaka, Mala Mutra Visodhini</i>   |
| <i>Dhatris</i> <sup>[29]</sup>                           | <i>Emblica officinalis</i> Gaertn. | <i>Madhura, Amla, Katu, Tikta, Kashaya</i> | <i>Laghu Ruksha</i>   | <i>Sheeta</i> | <i>Madhura</i> | <i>Vrishya, Rasayana, Chakshushya, Tridoshajit</i>   |
| <i>Vilwa</i> <sup>[30]</sup>                             | <i>Aegle marmelos</i> Carr.        | <i>Katu, Tikta, Kashaya</i>                | <i>Laghu Ruksha</i>   | <i>Ushna</i>  | <i>Katu</i>    | <i>Balya, Deepana, Pachana, Grahi, Pittakrit, Vatakaphahara</i>  |
| <i>Musta</i> <sup>[31]</sup>                             | <i>Cyperus rotundus</i> Linn.      | <i>Katu, Tikta, Kashaya</i>                | <i>Laghu Ruksha</i>   | <i>Sheeta</i> | <i>Katu</i>    | <i>Sothahara, Deepana, Grahi, Krimighna, Amapachana, Visaghna, Pittakaphahara, Sthoulyahara, Trishnanigrahana, Twakdosshara, Jwaraghna</i> |
| <i>Hingu</i> <sup>[32]</sup>                             | <i>Ferula foetida</i>              | <i>Katu</i>                                | <i>Teekshna</i>       | <i>Ushna</i>  | <i>Katu</i>    | <i>Anulomana, Deepana, Hridya, Krimighna,</i>  |

|                                 |  |  |  |                |                |   |
|---------------------------------|--|--|--|----------------|----------------|---|
|                                 | <i>Regel.</i>  |  |  |                |                | <i>Pachana, Ruchya, Vatakapha Prasamana</i>   |
| <i>Vidanga</i> <sup>[33]</sup>  | <i>Embelia ribes</i><br><i>Burm.</i>                   | <i>Katu Tikta</i>                        | <i>Laghu,</i><br><i>Ruksha,</i><br><i>Teekshna</i> | <i>Ushna</i>   | <i>Katu</i>    | <i>Anulomana, Deepana, Kriminashana,</i><br><i>Vatakaphapaha</i>  |
| <i>Trayanti</i> <sup>[34]</sup> | <i>Bacopa monnieri</i><br><i>Linn.</i>                 | <i>Madhura,</i><br><i>Tikta, Kashaya</i> | <i>Laghu, Sara</i>                                 | <i>Sheeta</i>  | <i>Madhura</i> | <i>Kaphahara, Medhya, Rasayana, Swarya,</i><br><i>Vatahara, Vishahara, Ayushya, Matiprada,</i><br><i>Prajasthapana, Mohahara</i>                                  |
| <i>Sunti</i> <sup>[35]</sup>    | <i>Zingiber</i><br><i>officinalis Roxb.</i>            | <i>Katu</i>                              | <i>Laghu,</i><br><i>Snigdha</i>                    | <i>Ushna</i>   | <i>Madhura</i> | <i>Anulomana, Deepana, Hridya, Pachana,</i><br><i>Vatakapha Samana, Asmadoshahara</i>   |
| <i>Maricha</i> <sup>[36]</sup>  | <i>Piper nigrum</i><br><i>Linn.</i>                    | <i>Katu Tikta</i>                        | <i>Laghu,</i><br><i>Ruksha,</i><br><i>Teekshna</i> | <i>Ushna</i>   | <i>Katu</i>    | <i>Sleshmahara, Deepana, Medohara,</i><br><i>Pittakara, Ruchya, Kapaha Vatajit,</i><br><i>Vatahara, Chedana, Jantunasana, Chedi,</i><br><i>Hridroga, Vataroga</i> |
| <i>Pippali</i> <sup>[37]</sup>  | <i>Piper longum</i><br><i>Linn.</i>                    | <i>Madhura,</i><br><i>Katu, Tikta</i>    | <i>Laghu,</i><br><i>Snigdha</i>                    | <i>Anushna</i> | <i>Madhura</i> | <i>Deepana, Hridya, Kaphahara, Ruchya,</i><br><i>Tridoshshara, Vatahara, Vrishya, Rasayana,</i><br><i>Rechana.</i>  |
| <i>Sariba</i> <sup>[38]</sup>   | <i>Hemidesmus</i><br><i>indicus Linn.</i>              | <i>Madhura</i>                           | <i>Guru,</i><br><i>Snigdha</i>                     | <i>Sheeta</i>  | <i>Madhura</i> | <i>Raktasodhaka, Visaghna, Tridoshanasana,</i><br><i>Deepana, Amanashana, Jwarahara</i>   |
| <i>Musali</i> <sup>[39]</sup>   | <i>Curculigo</i><br><i>orchoides</i><br><i>Gaertn.</i> | <i>Madhura, Tikta</i>                    | <i>Guru,</i><br><i>Pichila</i>                     | <i>Ushna</i>   | <i>Madhura</i> | <i>Sramahara, Dahahara, Pittahara, Vrishya,</i><br><i>Brimhana, Rasayana, Pushtiprada,</i><br><i>Balaprada</i>  |

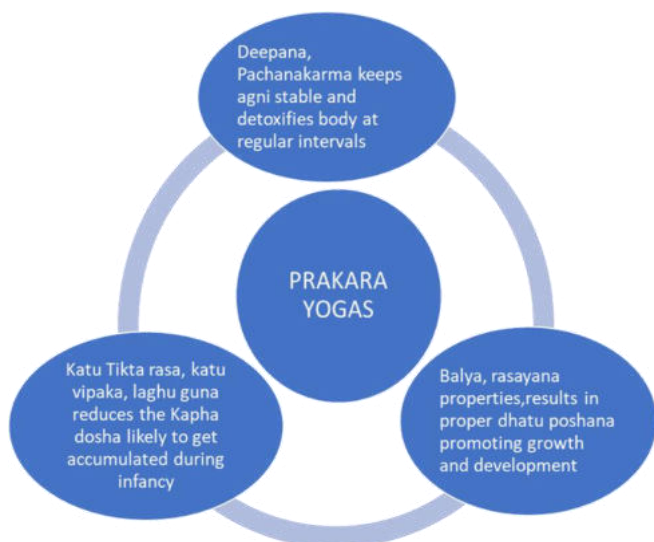
## DISCUSSION

Early phase of *Balya* is *Kapha* predominant with unstable *Agni*. Due to peculiarity of dietary habits with excessive consumption of *Ghrita* and *Ksheera*, the chances of *Kapha* vitiation is more during this period. Stability of *Agni* is vital for the balanced state of *Tridosha*, *Dhatu* and *Mala*, the equilibrium of which represents *Swasthya*. Moreover, the immature immune system, *Aparipakwata* of *Dhatu* and *Asampoorna Bala* of *Balya* makes the infant prone to diseases mainly of *Kapha* origin. *Sutikagara* and *Kumaragara* where the baby is confined in the initial period is constructed in such a way as to provide maximum protection where it is advised to adopt *Rakshakarma* (protective measures) frequently. During this period, the *Yuktikritha Bala* of the infant enhanced by various immunomodulatory formulations may have a sustained effect throughout the life. *Swarnaprasa*, *Prakarayoga*, *Uramarunnu* etc. are few *Oushadha Yogas* (immunomodulatory drug

formulations) which can help a great deal in compensating the immaturity of Infant immunity. As per Ayurvedic principles, the pharmacological action of a drug is determined by its *Rasa* (taste), *Guna* (properties), *Veerya* (active principles), *Vipaka* (bio transformation) and *Prabhava* (specific action). During labour, the *Prasuti Klesha* (stress during labour) may affect the baby by vitiating *Vata* and *Rakta*. Application of *Vacha Churna* with *Tripadika Rasa* as *Thala* (usage of drug over anterior fontanelle) in *Jatamatra* aids in balancing the *Doshas* and prevents *Rakta Kopa*. Many drugs used in *Prakara Yoga* comprises of are predominantly having *Katu Tikta* (pungent and bitter) *Rasa*, *Katu Vipaka* and *Laghu* (easy to digest) *Guna* which help in alleviating *Kapha Dosh* and also promotes metabolism by its *Deepana* and *Pachana Karma*. The formulations, by virtue of its *Srotho Sodhana* (channel cleansing) property helps in proper assimilation of nutrients and thus ensures optimum growth and development. Drugs with

*Rasayana* property included in the formulations helps in the formation of superior quality *Dhathus*.

Several pharmacological studies have been conducted in many of the ingredient drugs like *Pippali*,<sup>[40]</sup> *Sunti*,<sup>[41]</sup> *Sariba*,<sup>[42]</sup> *Musali*,<sup>[43]</sup> etc. and are proven to have immunomodulatory action. Many of the ingredient drugs have actions like *Krimighna* (antimicrobial, antihelminthic), *Jwaraghna* (antipyretic), *Hridya* (cardioprotective), *Ruchya* (taste stimulant), *Anulomana* (laxative), *Vishaghna* (anti-toxic) etc. which helps in preventing various childhood ailments. Antibacterial, antifungal, antioxidant, anti-cancerous, anti-inflammatory etc. actions of the drugs enhance the preventive action. So far, several clinical trials have been conducted on *Prakarayoga* in children of different age groups and their efficacy have been proved beyond doubt.<sup>[44],[45]</sup> These *Yogas* given at specified intervals for a specified duration helps in maintaining the wellbeing of child by supporting metabolism, growth and development without giving a chance to vitiate *Agni*.



## CONCLUSION

Preventive aspect of health care system has been receiving great importance due to threat of new disease outbreaks and unpredictable spontaneous mutations of various pathogens. Ayurveda classics explains various drug formulations which helps in enhancing natural immunity and in improving the general health of the individual. *Prakara Yoga* is a sole concept in Ayurveda in which immunomodulatory

drug combinations are given in an age wise schedule, right from birth. Though, immunomodulatory effect of many of the ingredient drugs have been proven by various researchers, further investigations on its safety and efficacy is essential to instigate a wide acceptance for this traditional paediatric practice.

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