

Exploring the possibilities and challenges in *immunomodulatory* strategies in *kaumarabhritya* with special reference to *yuktikrita bala*

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ABSTRACT

Immunization has been one of the biggest success stories of modern medicine. The WHO estimates that by vaccination, we could avoid nearly 10 million deaths between 2010 and 2015. *Ayurveda* upholds the unique principles of strengthening innate resistance of an individual in prevention and cure of diseases which is inculcated since the time of conception. The *Bala* or *Vyadhikshamatva* is the functional aspect of *Ojus*. *Vyadhi utpadak pratibandhakatva* and *Vyadhibala virodhitva* which are the two aspects of *Vyadhikshamatva* are determined and controlled by the state of *Ojus*. The immunomodulation is done through the medium of medicines at proper age, dose and state of body along with proper diet, regimen and state of mind. The study explores the immuno modulation strategies in children through a literature survey through the *Brhat trayee* and *Kaumarabhritya* classics like *Kashyapa samhitha*, *Arogya kalpadruma* along with

relevant online articles. An experience survey among *Ayurveda* experts for the use of methodologies for use and practicality of these strategies also is included.

Keywords: *immunomodulation, Vyadhikshamatva, Ayurveda, Prakara yoga.*

INTRODUCTION

The Contribution of Vaccination to Global Health has been ginormous. Despite the advancements, many diseases still remain for which researchers have been unable to find effective vaccines (HIV/AIDS, malaria etc.).¹ So there is an ongoing need for new vaccines, improved *immunotherapies* for highly *immunocompromised* conditions like cancer, and address the concerns of increasing reports of cases of allergic diseases, flare up of autoimmune diseases and primary *immunodeficiencies*. This has led to quest for agents to enhance immunological and nonspecific host defenses and thus to modify the defence

favourably. The present study explores the possibilities of *Ayurveda* to contribute and reduce these concerns with scientific strategies. The study also addresses the challenges to implement the strategies in the system. *Ayurveda* with its rich treasure of versatile drug combinations with well planned treatment protocol is a promising tool for a wholesome health achievement. *Kaumarabhritya*, the paediatric branch of *Ayurveda* has outlined age wise protective care for the physical and mental development. This is an underexplored, but promising area for the immunomodulatory interventional strategies in the health care system.

AIM & OBJECTIVE:

To explore the possibilities and challenges in immunomodulation strategies in *Kaumarabhritya*

STUDY DESIGN : EXPLORATORY RESEARCH MODEL.

Conducted by 1. LITERARY STUDY.

2. EXPERIENCE

SURVEY.

LITERARY STUDY:

1. Relevant portions of *Brhat trayee*, *Kashyapa samhitha*, *Arogya Kalpadruma*.

2. Relevant online articles, research papers

EXPERIENCE SURVEY

An online SURVEY conducted with a prepared questionnaire among *Ayurvedic* practitioners.

Their feedback converted to data showing an insight into the current practices of immune interventions.

IMMUNITY IN MODERN VIEW:

Immune system identifies and distinguishes harmful pathogens from the healthy tissue of organisms. The immune system comprises the lymph nodes, spleen, bone marrow, lymphocytes (T&B), thymus

and leukocytes. An immune system consists of innate and adaptive components.² The innate system is composed of primitive bone marrow cells that are programmed to recognise foreign substances and to react. The adaptive system is composed of more advanced lymphatic cells that are programmed to recognise self-substances and not to react. These two components of the immune system create a dynamic biological environment where “foreign” is eliminated from the system and “self” is kept safe. The equilibrium is lost in diseased state.

ALTERED IMMUNITY/AUTOIMMUNE DISORDERS.

Autoimmune disorders are on the rise globally and affect 8.5% of the population worldwide. The prevalence can be higher since these follow a familial history as a result of shared environmental as well as genetic factors or the combined influence of both these factors. Three factors are at play in the pathogenesis of autoimmune diseases.³

1. **Genes:** Autoimmune diseases tend to occur in the same family ("familial aggregation)" and are considered polygenic (multifactorial) diseases.

2. **Immune system :** The subjects have multiple defects in regulatory mechanisms that normally prevent autoreactive lymphocytes to develop or control them if they do appear in the periphery. This leads to harm of “self” along with “foreign” challenges. Autoantibodies are the main clinical indicators of an immunological dysfunction in patients with autoimmune diseases, both in terms of their diagnostic and predictive value. These can be predictors of upcoming disease way before manifestation, due to their chronic

presence. Evidences have been published in conditions like Diabetes, SLE, Hashimoto thyroiditis etc.⁴

3.Environment: Infections (usually viral), dietary components (feeding infants with cow's milk instead of mother's milk, gluten, lack of vitamin D, increased ingestion of iodine), pollutants (chemicals like polychlorinated biphenyls), drugs (such as streptozotocin, a form of chemotherapy) and stress form the factors that trigger altered immune system. (*John Hopkins' autoimmunology basics*).

Immunity as per Ayurveda : *Ayurveda* propagate and decipher the principle of prevention and management of any circumstances of insult to the dynamic functional equilibrium of tridoshas or the structural integrity of dhatus. *Ojus* is the concentrate of nourishment formed out of good metabolic power and clear *Srotas*. The functional aspect of *Ojus* is '*Bala*'. *Bala* (*Vyadhikshamatva*) is the combined action of *Udana* and *Agni*. The functionality of *Vyadhikshamatva* is in two broad categories ie, *Vyadhi utpadaka pradhibandakatva* (resistance of the body- innate and acquired) and *Vyadhi bala virodhitva* (humoral and cell mediated) based on source of attainment.⁵

Bala is classified as three. ie, *Sahaja*, *Kalaja* and *Yuktikrutha*.⁶

1. *Sahaja Bala* refers to the innate immune attributes of an individual present since birth; formed from the time of formation of *Garbha* based on excellence of *Shukra* and *Arthava*. The Understanding of *Sahaja Bala* resembles the innate immunity.⁷

2. *Kalaja Bala* refers to the strength attained by the individual by the development of *Bala* against seasonal variation and ageing phenomenon, which is temporary. In modern science, it resembles the acquired or adaptive

immunity. ie, the immunity developed by an individual after any infection in the due course of the subject's life.

3. *Yuktikrutha Bala*. It is gained by the planned implementation of a combination of diet, medication and other regimen by the patient as planned by the physician. In modern medical literature it is the acquired immunity where in it includes active immunity induced by vaccination and passive immunity due to administration of antibody

IMMUNOMODULATORS These are biological or synthetic substances that can stimulate, suppress or modulate any aspect of the immune system including both adaptive and innate arms of the immune system. Clinically, immunomodulators can be classified into the following three categories.⁸

1. **Immune Adjuvants:** used to improve the efficacy of the immune system.

2. **Immunistimulants:** Nonspecific. They can act through innate as well as adaptive immune responses.

3. **Immunosuppressants;** Structurally and functionally heterogeneous group of drugs, which are often concomitantly administered in combination regimens.⁹

Side Effects of Immunomodulator Drugs: There are various side effects are associated with the use of these drugs as Pulmonary toxicity, *Myelosuppression*, Alopecia, Increased risk of infection, Hepatic fibrosis, Lymphoma (Epstein-Barr virus associated), *Nephrotoxicity*, neurotoxicity (tremor, headache, motor disturbances and seizures), GI complaints, hypertension, hyperkalemia, hyperglycemia, Renal dysfunction, tremor, hirsutism, etc.¹⁰

ALTERED IMMUNITY AS PER AYURVEDA

Self tolerance is the normal state in which no immune response against self antigen is present. State of *Ojus* (*upadhatu*) is determined by *Shukrasara* and *Shukra dhatu*. ie, *Beeja dushti* (genetic predisposition), Since *Bala* reflects the *Ojus* in normalcy, any pathological state of *Ojus* can hamper the immune system through *Avara samhanana* (*Vyadhi bala virodhitva*) that paves way for *Khavaigunya*. The *Nidana* can be the habit of *Virudha*, *Sankeerna*, *Adhiashana* etc or in the form of *midhya upachara of roga or karma* causing *Agni dushti* which if persistent lead to *Dhatu leena saama dosha* presented as *Dushi visha* causing *Vyapat of ashtama dhatu ie, Ojus*. With involvement of cellular ill programming and genetic predisposition, the *Ojovyapat* goes from mild treatable condition to severe untreatable condition. Hypersensitivities (allergy & autoimmune diseases) and *neoplasms* are altered immune responses or *Ojo vyapat*.¹¹The treatment should aim at *Dhatu leena saama dosha harana by Deepana and Visha hara chikitsa*. The *Yuktikruta bala* strategy should aim on improving metabolism, (*deepana*) persistent cleansing of accumulated vitiated constituents (*dushi visha hara*) and preventive equipment of substrata. (*ojasya / balya*).

LITERARY SURVEY THROUGH CLASSICS.

Acharyas described many useful *dravya*, formulations (*yogas*), mode of conduct for adults to enhance immunity (*Bala or Vyadhikshmatva*), similarly for healthy *Ksheerapa* (infantile period), *Ksheerannada* (1-2years age period) and *Annada* (age period from 2-16 years). *Acharya Sushruta, Vagbhata, Kasyapa* describe a special formulation by the name

of "*Lehana*", for this purpose which enhances immunity and thus minimises infection episodes.

SUSHRUTA SAMHITA¹²

Lehana Prayoga which enhance *bala* that incorporate use of *Suvarna* as

1. *Suvarna, kushta, vacha with madhu, ghrita.*
2. *Suvarna, brahmi, shankhpushpi with madhu, ghrita.*
3. *Suvarna, vacha, arkapushpi with madhu, ghrita.*
4. *Suvarna, kaidarya, aparajita, durva with madhu, ghrita.*

VAGBHATA¹³

1. *Suvarna with same combination as of Sushruta Samhita*
2. *Ashtanga ghrita, Vachadi ghrita, Saraswata ghrita.*

ACHARYA KASHYAPA-

Panchagavya ghrita, Brahmi ghrita, Abhaya ghrita, Samvardhana ghrita (effective in children with delayed milestones (*Kashyapa Samhita Sutrasthana, Lehaadhyaya*) are mentioned. The unique formula *Suvarna prashana* has been explained where in gold should be triturated along with honey, and ghee on a clean stone facing eastern direction and made the *Shishu* (infant] lick the same.¹⁴ The specific benefits ascribed to *Swarnaprashana* are as follows- *vardhana of medha, agni and bala, ayushya* that improve longevity, or *mangala, varnyam and grahapaham*. If administered for 1 month, the baby will become *Parama Medhavi* (highly intelligent) and *Vyadhibhir Na Cha Drusyate* (will not be affected by any disease). If administered for 6 months, the baby will become *Srutadhara* (will be able to remember the

things, which are just heard). These are some of the studies done on Suvarna Prashan -

- *The Swarna-Vacha* combination shows a significant effect of humoral antibody formation and a rise in the total proteins and serum IgG levels.¹⁵
- Specific and Nonspecific immune responses, modified in a positive manner with a stimulatory effect on peritoneal macrophages.¹⁶
- Colloidal gold uptake in gastrointestinal tract is dependent on particle size.¹⁷

AROGYA KALPADRUMA : PRAKARA YOGA:

Prakara Yoga is mentioned in the thirty fifth chapter of *Arogya Kalpadruma* authored by *Vaidya Kaikulangara Rama Warriar*. The author, at the end of the chapter points out that the content of *Prakara Yoga* is advised by *Acharya Bhela*.¹⁸ The core content of the chapter are the indigenous practices for enhancing body immunity and to prevent diseases in children. *Prakara* means fort or wall. Like the fort prevents the attack of enemies, *Prakara Yogas* help to prevent the occurrence of disease. In the whole regimen of *Prakara Yoga*, good numbers of drugs are used at various developmental stages. Most of the combinations in *Prakara Yoga* are in the form of *churna or ghrita*.

The one special feature regarding *Prakara Yoga* is that all the drug combinations / recipes detailed are as per the age of the child. Here, the drug schedule starts with birth and continues to the age of 12 years for the purpose of enhancing non-specific immunity of the body and thereby

preventing diseases of childhood. Thus, the preventive measures mentioned in *Prakara Yoga* can be studied as an *Ayurvedic* approach or way of immunization as the modern tool of immunization/vaccination is also age specific.¹⁹The detailed description of the various immunomodulatory measures explained in *Prakara Yoga* is:

- ***Jaatamatra/one day old child:*** - *Vacha* is grinded in the juice of *Tripadika* and three drops of this mixture is instilled over the centre of the head. This procedure will maintain the digestive power correctly, the *doshas* will maintain correct balance, and the affliction with *Balagraha* will be prevented.
- ***Pakshateeta /15 days :*** - The *panchanga* of *Bilva* are taken together and powdered well. This powder is added with the juice of *Dhatri* and given internally for 7 days.
- ***Athipakshateeta / completed 1 month:*** - *Musta, Hingu and Vidanga* are powdered and added with ghee medicated with juice of *Trayanti / Brahmi* is given internally for 7 days.
- ***Thraimasika/completed 3 months:*** *Vyosha and Sariba* are added with *navneeta*, given for 7 days..
- ***Shanmasika / completed 6 months:*** - The powder of *Musalikanda and Trikatu* are mixed together and added with honey for 7 days.
- ***Ekabdha / 1 year old child:*** - The child of one year old should be administered with different preparations in each month for 7 days

- **Thryabdha / 3 year old child:** - The child of three year old should be administered with different preparations in each month 7days with sarpi and sarkara.
- **Panchayana / 5 year old child:** - The child of five year old is given with medicaments said for *Thryabdha* /3 year old child with *Pushkaramula* instead of *Vacha*.
- **Ashtabdha / 8 year old child:** - The child of eight year old is given with medicaments said for *Thryabdha* / 3 year old child, added with root of *Shankha Pushpa* instead of *Vacha* and the medium for mixing the compound is ghee and honey instead of sugar and ghee.
- **Dashabdha / 10 year old child:-** After the tenth year, the child is given with proper medicated ghee monthly for seven days.
- **Dwasasabdha / 12 year old child:** At 12 year 1 month, the drugs such as *Ananta* and *Vacha* along with sugar and honey is administered internally while from 12 year 2 month onwards, Instead of *Ananta*, the drugs such as *Brahmi*, *Munda*, *Shami valka*, *Bhrunga*, *Amalaka*, *Magadhi*, *Vishala*, *Vajra valli*, *Indurekha*, *Bhunimba* are administered.²⁰

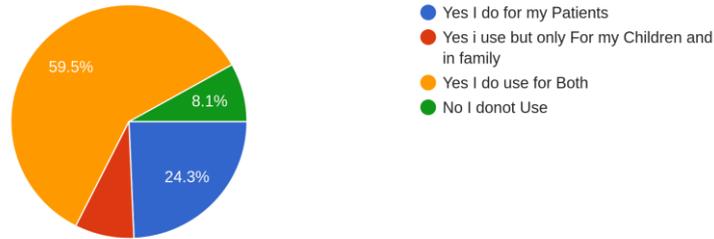
EXPERIENCE SURVEY

An online survey was conducted among 49 ayurveda practitioners. Following Questionnaire with Objective as well as subjective questions were given to share their views on various *Bala vardhaka* yogas in practice.

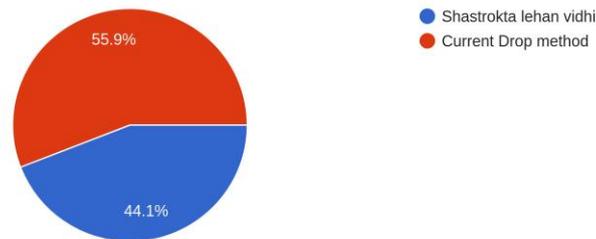
1. Do you use any of the *Bala vardhaka yogas* or single medicine as immunity booster
 - Yes I do for my Patients
 - Yes i use but only For my Children and in family
 - Yes I do use for Both
 - No I don't Use
2. Can you specify which Medicine you choose?
3. Can you specify a) *Kalpana* b)*Maatra* c)*Anupana* d)Age group. Here?
4. If you use *Suvarnaprashan*, do you prefer shastrokta lehan vidhi / current drop method.
 - *Shastrokta lehan vidhi*
 - Current drop method
5. Do you know about *Praakara yoga* ?
 - Yes
 - No
6. Do you use *Prakara yoga* as such or any modified way yes/no. If yes, kindly specify detail.
7. Do you use the Ayurvedic way of immune boosting or the National immunization program?
 - Only *Ayurveda*
 - Both *Ayurveda* and National Immunization Programme
 - Only National Immunization Programme.
8. Since how many years you have been practicing immune-boosting through *Ayurveda*?
9. How do you validate the results observed?
10. Can you suggest how can the Ayurveda principles and practice of immunity enhancers be used in a larger sect of people for a greater benefit?

RESULT:

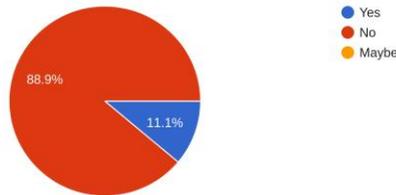
1. Do you use any of the bala vardhaka yogas or single medicine as immunity booster
49 responses



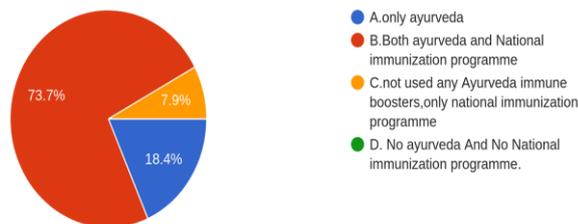
4. If you use swarnaprashan, do you prefer shastrokta lehan vidhi / current drop method.
48 responses



5. Do you know about praakara yoga ?
48 responses



6. Do you use Ayurvedic way of immune boosting or National immunization program
47 responses



The Subjective responses were carefully studied and classified into themes for better understanding.

DISCUSSION:

60% of the participants use some balavardhaka dravya for family and patients. 8% answered no to any immune

boosting medicines. *Bala, guduchi, amalaki, ashwagandha* are the most preferred single dravyas. *Chyavanaprasha, Vasanthakalpa, Indukanta ghritam and Rajanyadi churna* are the most preferred combinations used. 56% prefer the *Shastrokta lehan method*, while 44% prefer

the current drop method. *Praakaara yoga* is not used as a method of immunomodulation. 74% use both ayurvedic and National immunization programmes, while an impressive 18% use only ayurvedic method. Results are validated satisfactory with improvement of *Agni Bala*, overall immunity. Public education and awareness has been the choice for mass implementation.

POSSIBILITIES

1. The spectrum of hypersensitivity and autoimmune diseases are a challenge which can be tackled by the immunomodulatory intervention in Ayurveda. The genetic predisposition, confused immune system and stress (environmental) factors can be modified by identification through medical screening. This is primary prevention. The latent period can be defended and corrected by agni correction through proper *Pathya Ahara, Vihara and Oushadha*.
2. The age wise distribution of the *Prakara yoga* makes it a proper tool to combat the immune deficient conditions that can lead to mortality and morbidity.
3. After a proper, large population study, the *Praakara yoga* can be implemented as a primary health care schedule from birth to 12 years of age.
4. An interdisciplinary approach of principles of Biotechnology, Ethnopharmacology, Ayurvedic Drug Discovery, Pharmacoepidemiology, Reverse Pharmacology can project the results in acceptable, validated form.

4. The main challenge of implementation of ayurvedic drugs on a mass is overcome, since praakara yoga is age specific and no need for *dosha, dushya, prakriti, desha* determination. This makes it the best choice to be properly studied and implemented at mass level.

CHALLENGES

1. There are not enough studies to assess the immunomodulatory effects of the dravyas as the crude form.
2. The standardization of dravyas, with proper Identification, Sampling, Collection and preparation as prescribed on a large scale especially jeevaniya gana is a possible difficulty.
3. The course of medicine should be followed with *Proper Pathya* for the proper absorption of nutrients, and clearing of channels ie, *Dhatu Pushti, Srotoshudhi and Agni deepiti*. The new age children are difficult to be managed with *Pathya* awareness on a mass level and for a long time.
4. The palatability of *Yogas* can be a possible reason for many children to step back when implemented.
5. Drug interaction is the most challenging issue, since when used with immunization schedules, the possible interaction and impacts are not known.
5. The cost of gold, Standardization and lack of proper studies of long term impact makes Shastrokta Suvarnaprashan method a difficult method for a large sect of the population.

CONCLUSION

Ayurveda promise a comprehensive, wholesome resistance of the body that can address the issues and clinical conditions of immunodeficiency, altered immunity like autoimmune, hypersensitivity and neoplasms. The fundamental correction and preservation of dhatu and agni is possible through proper use of principles and procedures. The possibilities of implementation have to be studied with challenges to be addressed.

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