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Ayurvedic formularies to enhance growth and development in infants: an updated review

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Abstract

Background: Pediatrics is vitally concerned with all aspects of growth and development in children enabling them to achieve their full potential. A handful of formularies are referred in Ayurveda classics which can enhance proper growth and development in infants.

Materials and Methods: The Extensive literary research inclusive of Ayurveda classics / literature and various electronic databases such as Pubmed, Pubmed central, Index medicus and indexing services like Elsevier, Scopus, Embase etc.

Discussion and Conclusion: The formularies referred in Ayurveda literature in the context of growth and development can undoubtedly be administered in infants. The paper will be making an updated review on all such Ayurveda formularies which aid in proper growth and development in infants.

Keywords: growth and development, infants, ayurvedic formularies, Ayurveda

1. Introduction

Growth and development are the typical biological phenomenon of all living beings ^[1]. The process of growth starts from the time of conception and continues until child grows into a fully mature adult ^[2]. Growth is defined as an increase in the size of an individual due to increase in number and size of the cells, resulting in an overall increase can be seen, appreciated and measured accurately ^[3]. Development is a continuous process from birth to maturity referring to qualitative and quantitative changes and acquisition of a variety of competencies for functioning optimally in a social milieu ^[4]. Childs health and pediatrics focus on the well-being of children right from conception ^[5]. Pediatrics is vitally concerned with all aspects of growth and development in children enabling them to achieve their full potential. In developing countries, due to poverty, poor health, nutrition, and deficit care, more than 200 million children under five years fail to reach their potential in cognitive and social development ^[6]. The paper showcases a comprehensive review on various Ayurvedic formularies which can be the possible interventions to enhance growth as well as development in infants.

2. Uramarunnu

Ura-marunnu is a traditional baby care practice in southern part of India especially in states of Kerala, Karnataka, Tamil Nadu and Goa.⁷ It is the practice of preparing paste of herbal drugs and administering to child from day one of life ^[8].

2.1 Ingredients of Ura-marunnu: Vacha (*Acorus calamus* Linn.), Vidanga (*Embelia ribes* Burm), Rudraksha (*Elaeocarpus ganitrus* Roxb.), Harithaki (*Terminalia chebula* Retz.), Parnayavani (*Coleus aromaticus* Benth), Avartaki (*Cassia auriculata* L.), Hingu (*Ferula asafoetida* L.), Jyotishmati (*Celastrus paniculatus* Willd), Kutaja (*Holarrhena antidysenterica* Linn.), Lashuna (*Allium sativum* L.), Maricha (*Piper nigrum* L.), Mayaphala (*Quercus infectoria* Olivier), Bakuchi (*Psoralea corylifolia* Linn.), Chandana (*Santalum album* Linn.), Ela (*Elettaria cardamomum* Maton.), Jatiphala (*Myristica fragrans* Houtt.), Haridra (*Curcuma longa*), Pippali (*Piper longum* L.), Sunti (*Zingiber officinale* Roscoe) and Yastimadhu (*Glycyrrhiza glabra* Linn.).

2.2 Preparation and administration: The different ingredient drugs are triturated with Breast milk / Honey / Cow's milk / Butter in a mortar and administered to children once in a week till the age of 2 years. Even though many Anupanas are in use, breast milk is considered as the best, as it is Janmasatmya as well as Dhatuposhana. Swadupaakarasa and Vatapittahara

property of breast milk will provide a smoothening effect to the highly Tikshna and Ruksha property of the drugs. Also, milk can complement the transmission of active ingredients through the lipid vehicle form^[9]. Dosage is the drug obtained with a single rub on an abrasive material. There is no proper standardization on its dosage. Sticking to the concept of Oushadamatra mentioned in Sharnagadhara Samhita, dosage can be restricted to 1-2 ratti.

2.3 Benefits of this procedure are: It is a curative and preventive assist for digestive disorders especially in infants. It helps to relieve stomach discomfort, flatulence and colic. Added to these it is also Deepana (increases appetite), Pachana (kindles digestive fire), Balya (increases strength), Bhootaghna (destroys evil spirits), Krimiroga (worm infestation), Vyadhikshamatva karaka (increases immunity), Swasakasahara (respiratory disorders), Roghaghna (destroys diseases), Nidrakaraka (induces sleep), Grahi (absorbs the excess moisture), Soolaghna (removes pain), Medhya (increases intellect) and in proper development of milestones.

3. Kumarabharana Prasha^[10]

Kumarabharana Prasha is a compound drug comprising of Choorana of Yastimadhu (*Glycyrrhiza glabra* Linn.), Amalaki (*Emblca officinalis* Linn.), Ashwagandha (*Withania somnifera* Linn.), Shunti (*Zingiber officinale* Roxb.), Pippali (*Piper longum* Linn.), Harithaki (*Terminalia chebula* Retz.), Vacha (*Acorus calamus* Linn.) and Bhasmas (calx) of Swarna (Gold), Rajata (Silver), Pravala (Coral). All these drugs were given one Bhavana with Swarasa (extract juice) of Brahmi (*Bacopa monnieri* Linn.), Guduchi (*Tinospora cordifolia* Willd.) and Tulsi (*Ocimum tenuiflorum* Linn.) separately, later mixed with honey and ghee. The drugs mentioned above are made into fine powder. Then it is mixed with madhu and ghrta to a semi-solid consistency. Later packed in air tight plastic bottles, each containing 5g Kumarabharana Prasha. This can be readily administered to child in requisite dose. Kumarabharana prasha by virtue of ingredients which are Deepaniya, Brumhana, Balya, Rasayana, Medhya, improves taste, reduces thirst, removes Kleda (unwanted metabolic waste) and promotes Shadindriya Prasadana (nourishing and augmenting all sensory perceptions).

4. Swarnamritaprasha leha^[11]

Swarna Amrita Prashana is an indigenous multi drug, formulated considering principles of Svarna prashana explained in various texts of Ayurveda.

4.1 Method of preparation

Amrita Ghrta is it to be prepared in Madhayama Paka by Snehpaka Vidhi with reference to Sharangadhara Samhita using 90ml of Ghrta and 400ml Amrita kashaya. This is later mixed with 90ml of Madhu. Later fine powder of Brahmi, Vacha, Jatamamsi, Ashwagandha, Shankhapushpi, Yastimadhu, Pippali, Mandukaparni and Amrita is to be mixed with above mixture and triturated thoroughly to attain consistency of leha (linctus). Thus prepared Swarnamritaprasha leha is to be stored in food grade plastic bottles with capacity of 23 gms.

4.1.1 Dose of Swarnamritaprasha leha: Each child will be administered 200mg of Swarnamritaprasha (1mg gold/dose) early morning on empty stomach for period of 3months.

4.1.2 Discussion on probable mode of action of study drug:

The ingredients of Swarnamritaprasha lehana are with Madura, Tikta and Kashaya rasa predominant, Shita Veerya, Madhura Vipaka and Deepaniya, Brumhana, Balya, Rasayana and Medhya actions helping child to attain proper growth and development^[12].

5. Swarnaprashana

Swarnaprashana has been traditionally practiced across India as a formula for growing child to improve growth and development as well as to promote longer and healthy life.¹³ Also it is one of the important practices mentioned under Jatakarma in Ayurveda classics^[14-15]. The oral administration of Swarna along with herbs, ghee and honey in liquid or semi-solid form by neonates and children is referred as Swarnaprashana^[16]. There are several references of the Swarnaprashana in Ayurvedic literatures mentioning its actions Medha vardhana (promoting intelligence), Agni vardhana (promoting digestive power), Bala Vardhana (increasing physical strength and vigour), Punya (reward), Ayushakaraka (promoting longevity), Varnya (improves complexion), Grahapaha (protection against infections/organisms)^[17]. Further it has been mentioned that by feeding gold for one month, child becomes extremely intelligent and is not attacked by the diseases and by using for six months, is able to retain what-so-ever he/she hears^[18-19]. According to Sushruta, Swarnaprashana helps in escalating Bala (strength) and Buddhi (memory) and thereby aiding in proper development of a child^[20].

6. Swarnamritaprashana drops

In classical method of Swarnaprashana, Swarna is rubbed over a stone along with water and administered with honey and ghee^[21]. Later Swarnaprashana was modified by adopting an adapted procedure with a consideration to get extra beneficial effects by Medhya drugs through enhancing its bioavailability and to maintain uniform drug dosage^[22]. So Swarna was made into Bhasma form and then suspended with Honey and Ghee along with other Medhya drugs. Swarnamritaprashana is been practicing in Sri Dharmasthala Manjunatheshwara college of Ayurveda Hassan since 2009 May, by administering it once in a month on an auspicious day (Pushya nakshatra). Guduchi (*Tinospora cordifolia* (Thunb.) Miers) Kashaya (water extract) was prepared reducing to quarter. In 200ml of Guduchi Kashaya, 50 ml of Ghee was added along with Brahmi (*Bacopa monnieri* (L.) Pennell), Vacha (*Acorus calamus* L.), Jatamamsi (*Nardostachys jatamansi* (D. Don) DC.), Ashwagandha (*Withania somnifera* (L.) Dunal), Shankhapuspi (*Convolvulus pluricaulis* Choisy), Yastimadhu (*Glycyrrhiza glabra* L.), Pippali (*Piper longum* L.) and Maricha (*Piper nigrum* L.) 2 gm powder of each and 50 ml of Murchita Ghrta (processed ghee) and cooked on low flame according to preparation of medicated ghee as referred in Ayurvedic literature. Swarna Bhasma (1.2 gram) and honey (50 ml) are added to this ghrta and triturated on the day of Pushya Nakshatra. The bowl of Swarnamritaprashana is kept in warm water to maintain the consistency. This preparation is administered orally in a dose of 4 drops (containing 2 mg of Swarna Bhasma) to each child. Swarnamritaprashana is observed to be effective in improving the growth velocity and accelerating early attainment of developmental milestones and establishing enhanced development in infants^[23].

7. Kumarabharana Rasa

Kumarabharana Rasa ^[24] is a herbo-mineral compound drug comprising of Bhasmas (calx) of Swarna (Gold), Rajata (Silver), Pravala (Coral) and Choorna of Yastimadhu (*Glycyrrhiza glabra* Linn.), Amalaki (*Emblica officinalis* Linn.), Ashwagandha (*Withania somnifera* Linn.), Shunti (*Zingiber officinale* Roxb.), Pippali (*Piper longum* Linn.), Haritaki (*Terminalia chebula* Retz.), Vacha (*Acorus calamus* Linn.) and all these drugs given one Bhavana with Swarasa (extract juice) of Guduchi (*Tinospora cordifolia* Willd.), Brahmi (*Bacopa monnieri* Linn.) and Tulsi (*Ocimum tenuiflorum* Linn.) separately.

7.1 Method of Preparation of Kumarabharana Rasa

Fine powder of Vacha (10 parts), Pippali (10 parts), Shunthi (20 parts), Ashwagandha (40 parts), Amalaki (50 parts), Haritaki (10 parts) and Yastimadhu (50 parts) along with bhasmas of Swarna (1 part), Rajata (2.5 parts) and Pravala (5 parts) should be taken and one bhavana (impregnation) with each of Guduchi swarasa, Brahmi swarasa and Tulsi swarasa is to be given and tablets of 500mg can be prepared ^[25].

7.2 Mode of action of Kumarabharana Rasa

The ingredients have shown digestive stimulant, anti-inflammatory, antioxidant, immunomodulatory, antibacterial, antipyretic, scraping, carminative, nourishing and rejuvenative properties and aids in escalated growth and development in children ^[26].

8. Samvardhana ghrita

In Kashyapa samhita Lehanadhyaya many preparations are prescribed to enhance body growth, intellect, immunity, understanding etc and also to fulfill the nutritional requirements ^[27]. Samvardhana Ghrita is one among them which is mainly indicated in Pangu (lame), Muka (dumb), Ashruti (deaf) and Jada (mental retardation) ^[28-30]. By using this Ghrita, child grows rapidly, free from diseases, crawls and walk early and children with Pangu, Muka, Ashruti and Jada start developing respective functional activity at the earliest ^[31]. Drugs such as Khadira (*Acacia catechu* Willd.), Prishnaparni (*Uraria picta* (Jacq.)), Arjuna Twak (*Terminalia arjuna* (Roxb.) Wight & Arn.), Saindava (Rock salt), Balamoola (*Sida cardifolia* Linn.), Atibalamoola (*Abutilon indicum* L.), Kebuka Kanda (*Costus speciosus*) (each 2.250kg) taken and pulverised into coarse powder, chaturthavashesha kwatha of the coarse powder was prepared by adding 80 litres of water. The above seven drugs (each 750gms) taken and pulverised into medium fine powder as kalka. Ghrita (20 kg) was taken in a vessel and boiled along with kwatha, kalka and milk (20 kg) till it attains the Ghrita siddha lakshana. Then it was filtered and cooled. After that it was preserved in air tight, properly labelled bottle of 200 ml each. Honey is advised as Anupanana as the drugs of Samvardhana Ghrita are having the taste of katu, tikta ^[32]. the dose starts from 1 Ratti for one-month old child and was gradually increased to 12 Ratti for 12-month old child. Thereafter, the dose is increased by one Masa (~750 mg) every year, till 16 years of age ^[33].

9. Amritaprasha ghrita

Amritaprasha Ghrita³⁴ comprises of fifty drugs such as Jivaka (*Pueraria tuberosa* (Willd.) DC), Rishabhaka (*Puerariatuberosa* (Willd.) DC), Veera (*Nardostachys jatamansi* (D.Don) DC.), Jivanti (*Leptadenia reticulata*

(Retz.) Wight & Arn), Shunti (*Zingiber officinale* Roscoe), Shati (*Hedychium spicatum* Sm. in A.Rees), Shalaparni (*Desmodium gangeticum* (L.) DC.), Prishniparni (*Uraria picta* (Jacq.)DC.), Mudgaparni (*Phaseolus trilobus* Ait.), Mashaparni (*Teramnus labialis* (L. f.) Spreng.), Meda (*Asparagus racemosus* Willd.), Mahameda (*Asparagus racemosus* Willd.), Kakoli (*Withania somnifera* (L.) Dunal), Ksheerakakoli (*Withania somnifera* (L.) Dunal), Brihati (*Solanum indicum*.) Kantakari (*Solanum xanthocarpum* Schrad. & H.Wendl.), Sweta Punarnava (*Boerhavia diffusa* L.), Rakta Punarnava (*Trianthema portulacastrum* L.), Madhuka (*Glycyrrhiza glabra* L.), Kapikachu (*Mucuna pruriens* (L.) DC.), Shatavari (*Asparagus racemosus* Willd.), Riddhi (*Dioscorea bulbifera* L.), Vriddhi (*Dioscorea bulbifera* L.), Parushaka (*Grewia asiatica* L.), Bharangi (*Clerodendrum serratum*. (L)), Mrudvika (*Vitis vinifera* L.), Bruhati (*Solanum indicum*), Shringhataka (*Trapa bispinosa* Roxb.), Tamalaki (*Phyllanthus niruri* L.), Vidarikanda (*Pueraria tuberosa* (Willd.) DC), Pippali (*Piper longum* L.), Bala (*Sida cordifolia* L.), Badara (*Ziziphus jujube* Mill.), Akshotaka (*Juglans regia* L.), Kharjura (*Phoenix dactylifera* L.), Vatama (*Prunus amygdalus* Batsch), Abhishuka (*Pistacia vera* L.), Dhatri (*Phyllanthus emblica* L), Ikshu (*Saccharum officinarum* L.), Chaaga Mamsarasa, Go ksheera, Go ghrita, Madhu, Sarkara, Maricha (*Piper nigrum* L.), Twak (*Cinnamomum zeylanicum* Blume), Ela (*Elettaria cardamomum* (L.) Maton), Patra (*Cinnamomum zeylanicum* Blume), Nagakesara (*Mesua ferrea* L.). Amritaprasha Ghrita is made use in the management of Karshya (Grade 1 & 2 under nutrition) in children. The dosage detailed for Samvardhana ghrita can be resorted here too.

9.2 Drug preparation

The dried raw drugs for kashaya like Vidari and Amalaki were pounded and made into coarse powder (kashaya churna) using the mortar and pestle. The dried raw drugs for kalka was pounded and made into coarse powder using the mortar and pestle and again pounded into fine powder using the mixer. 5 kilogram each of Vidari and Amalaki powder was weighed and soaked in 80 liters of water in a container which was then boiled and reduced to 20 litres (by 8hrs). This decoction was then filtered and kept aside in a new container. Next day, 8 litres of ghee was added to the filtered kashaya and was boiled for 3hrs. Later 8 litres of ikshu rasa, Go Ksheera and mamsa rasa was added to the decoction and boiled (6hrs). 3700 grams of kalka dravyas was added into the decoction and boiled in low flame for the next 2 hours and the heating was discontinued and left to cool overnight. The heating was resumed next day morning and occasional stirring of the mixture was done. During the process of heating, it was observed that a frothy layer appeared on the surface of the ghee and the milk began curdling. Later, due to continuous boiling for 8 hrs, a cohesive mud like paste was formed at the bottom of the container and continuous stirring was done so as to avoid charring of the paste. Slowly by the 10th hour of stirring, the frothy layer started disappearing. The heating was continued till all the water evaporated from the ghee and the ghee started separating from the paste and turned into clear, transparent fluid devoid of any froth. As the preparation was nearing the end point a small quantity of the paste was burned in fire as to confirm that the entire water particle has evaporated by assessing for the crackling sound when the kalka was subjected to fire. After obtaining this sign, the heating was stopped and the mixture was kept to cool

overnight. Next day, the ghee was separated from the paste by squeezing and filtering through two fold muslin cloth. The filtrate was collected in a clean autoclaved vessel and was measured. 9 liters of ghee was obtained to which prakshepaka dravya was added. 100 ml of ghee was measured, bottled in airtight containers and labeled.

10. Ashwagandha ghrita

Ashwagandha ghrita is a formulation specifically indicated for nourishment and increasing vitality in children [35]. Ashwagandha Ghrita contains Ashwagandha which has Madhura, Kashaya and Tiktarasa, Snigdha Guna, Ushna Veerya and Madhura Vipaka [36]. It is Vata Pitta shamaka and is thus Agni deepaka helps in Srotoshodhana [37-38]. Ashwagnadha also contains many alkaloids and steroids [39]. Ghrita possesses Yogavahi as well as Samsaka ranu varthana properties, and these are all responsible for increasing body mass [40]. Ghrita is rich in proteins which are believed to interact with the liver protein synthesis activity and thus influence many modular proteins and also phospholipids and fatty acids, which promotes increased protein synthesis [41]. The dosage detailed for Samvardhana ghrita can be resorted here too.

11. Karshyahara Yoga

Karshyahara Yoga (KY) [42] is an Ayurvedic polyherbal nutritive drug comprising of Vidarikanda (*Pueraria tuberosa* (Willd.) DC.) – 1 part, Godhuma (*Triticum sativum* L.) – 1 part, Yava (*Hordeum vulgare* L.) – 1 part, Sita (sugar) – 2 parts and Pippali (*Piper longum* L.) – 1/20th part. The pharmacodynamic properties of KY comprises of Madhura rasa (taste), Sheetaveerya (potency), Guru guna (qualities) and Madhura vipaka (taste after digestion) which pacifies the Vata dosha which is one of the main causative factor for karshya. Added to this, KY will also do the bhrumhana (nourishing) action. Anupana (adjuvant) mentioned for KY is ksheera (milk), ghrita (ghee), madhu (honey) and sharkara (sugar), which has brumhana (nourishing) and deepana (appetizer) action [43].

12. Prakara Yoga

Prakara Yoga is the 35th chapter of “Arogyakalpadruma”, Ayurvedic pediatric classic text book authored by Vaidya Kaikkulangara Rama Varrier [44]. The book details the indigenous practices for enhancing body immunity and to prevent diseases in children [45]. Prakara Yogas help to prevent the occurrence of diseases just like a fort prevents the attack of enemies [46]. In whole regimen of Prakara Yoga, good numbers of drugs are used at various developmental stages as per the age of the child and few drugs were found to be repeated at almost every level. 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. Most of the combinations in Prakara Yoga are in the form of powder or ghee. In 10-12 years age group, drugs in Prakara yoga are administered in the form of Gritha kalpana, which substantiate the fact that, the children of that age group are more prone to diseases due to vitiated Pitta and Vata and ghee is the ideal form of medication since it is going to pacify pitta and vata doshas. The various drugs have properties like Deepana (increases appetite), Pachana (kindles digestive fire), Kushtaghna (anti-microbial), Kapha nissaraka (expectorant), Mutrala (diuretic), Ayushya (provides long life), Laghu

(light), Srotoshodhana (clears the body channels), Rasyana (rejuvenative), Anulomana (mild laxative), Vyadhihara (disease curing), Grahi (absorption), Tridosahara (alleviates the three body humours), Shulahara (analgesic), Balya (improves strength), Medhya (nootropic drugs), Krimighna (antihelmintic) and Vyadhikshamatva karaka (increases immunity). Hence, proper and scientific use of these formulations increases immunity and thereby protecting the child from various diseases [47]. the combinations of drugs are administered for seven consecutive days and the dose will be varying with age and suitable adjuvant.

13. Conclusion

The Ayurvedic drugs formulations detailed in the paper can be made use to attain proper growth and development in infants. However much extended research works has to be carried out in order to re-establish the effectiveness and safety of various Ayurvedic formulations for documentation and evidence creation.

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