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Management of Krumiroga in Paediatrics by Ayurveda: A Review

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Abstract: Krumiroga, commonly known as worm infestation, is a prevalent health issue addressed in Ayurveda. This condition refers to the invasion of the human body by various types of parasites, leading to a spectrum of health disturbances. The Ayurvedic system offers a holistic approach to managing Krumiroga, emphasizing dietary regulations, herbal medications, and lifestyle modifications. Krumiroga is (worm infestation) is one of the most common disease encountered in day to day Paediatric practice. Helminthes are quite common and comprise a very large group of infestations and disease producing in children. Helminthiasis is prevalent globally (33% of world's population harbours them), but is more common in developing countries with poorer personal and environmental hygiene. In Ayurvedic literatures, the word krumi is vague term used to denote tiny living being. Many Acharyas described krumis in various Samhitas in detail and they also believed that krimi also act as an etiological factor in various disease e.g. krumija shiroroga, hridroga etc. Because of the negligible side effects, the importance of ayurveda drugs has tremendously increased in the recent practice. A wide variety of ayurveda drugs possess anthelminthic activities which are naturally available in abundance.

Keywords: Krumiroga, krumi, krumija shiroroga, hridroga.

Introduction:

Diseases caused by helminthes are very common and comprise a huge group of infestations and infections in children worldwide. It would not any hyperbole to say that almost every child suffers 2-3 attacks of worm infestation in a year and this affects the growth and development of the child. India is a developing country where thousands of children suffer from epidemics due to atmosphere, social and economic problems. Since years ago Plant parts or extracts have been used to combat worm infections, and in many parts of the world natural products are still in use as herbal remedies. Plants are always a rich source of drugs; in fact many of the currently available drugs were derived either directly or indirectly from them. Helminthic infections continue to be a major health hazard of people. Helminthes not only harm the host by depriving him of food causing blood loss, but injury to organs, intestinal or lymphatic obstruction and by secreting toxins also.

Nirukti and definition : In Ayurvedic literatures, the word *krumi* is vague term used to denote tiny living being. The word *Krumi* is derived from the root "*Kramu"* which means to step or to walk. Different meaning of *krumi* are those which move with the legs, one capable to break or injure the surroundings, the living being which are born from the vapour of faecal material in the intestinal tract or such environment else were.

Types of *krumi*:

In Ayurveda, parasitic infection and helminthic infections are included under *Krumi roga.* Different varieties of *Krumi*'s are described in various Ayurvedic literatures. Anthelminthic treatments are described and these were widely tried. Acharya Charaka in *Vimanasthana* 7/9)[1] classified *krumis* into two broad groups

a) ***Sahaja*** (means congenital i.e. which live in human body right from birth until death and the name indicate that they are not harmful to human body) and

b) ***Vaikarika*** (are harmful or cause disease or deformity in body i.e. pathogenic in nature.

Acharya Charaka also further classified *vaikarika krumi* into two sub groups as

a-1) *bahyakrumi* (external) and

b-1) *abhyantara krumi* (internal).

Acharya Sushruta describes twenty types of internal *krumis* in detail with their causative factors, clinical features, pathogenesis and treatment in *Sushrut samhita Uttaratantra 54*).[2] Further Acharyas also had clear vision about visibilities or non-visibilities of worms as Acharya Sushruta describes that some *krumis* were visible to naked eyes and some were non-visible to naked eyes (*Sushruta Samhita Uttaratantra* 54/20).[2]

Helminthiasis is infestation with one or more intestinal parasitic worms, roundworms (*Ascaris lumbricoides*), whipworms (*Trichuris trichiura*), or hookworms (*Necator americanus* and *Ancylostoma duodenale*).

Causative Factors :

According to Ayurveda, *Krumiroga* is caused by:

- ✓ **Improper dietary habits**: Consumption of contaminated food and water.
- ✓ **Poor hygiene**: Lack of cleanliness leading to infestation.
- ✓ **Weak digestive fire (*Agni)*:** Leads to incomplete digestion and creation of *Ama* (toxins), which provide a favorable environment for worms.
- ✓ **Imbalance of *doshas***: Particularly *Kapha and Pitta doshas*.

Along with worm transmission is enhanced by many factors like poor socio-economic conditions, improper disposal of human faeces, deficiencies in sanitary facilities, insufficient supplies of clean water, poor individual hygiene, inadequate housing and lack of education.

Generalised Symptoms of Krumiroga :

Symptoms vary depending on the type and location of the worm infestation:

- ✓ **Gastrointestinal symptoms**: Abdominal pain, bloating, diarrhoea, constipation, nausea, vomiting, and anal itching.
- ✓ **Systemic symptoms**: Weakness, fatigue, weight loss, anemia, and allergic reactions.
- ✓ **Skin symptoms**: Itching, rashes, and eczema.

According to Acharya Sushruta, general symptoms which mark the presence of worms in the system are fever, paleness of complexion, *shula*, cardiac troubles (hridroga), lassitude, vertigo,

aversion to food and diarrhoea *(atisara)* are the complaints (*Sushruta Samhita Uttaratantra* 54/19).[2]

Adverse Effects :

This disease when untreated gradually leads to mild to severe malnutrition, which in turn adversely affects the physical and mental growth of children. Soil transmitted helminthes infection has been increasingly recognized as an important public health concern, predominantly in developing countries. Typically the helminthes involved include *Ascaris lumbricoides*, *Ancylostoma duodenale*,*Trichuris trichiura* and *Strongyloides stercoralis* etc

Primary Objective : The aim of present work is to review such anti-helminthic ayurvedic herbs having properties as stated above in various Ayurvedic texts. On the contrary, a general approach nowadays towards intestinal helminth control is school deworming programs. Anthelminthic drugs used are Mebendazole, Albendazole, Pyrantel pamoate, Levamisole, Praziquantel etc. but these drugs are having different adverse effects during their uses such as diarrhoea, nausea, abdominal pain, allergic reactions, loss of hairs etc. Likewise albendazole has exhibited embryo-toxicity in animals. That is why in this article , it is pertinent to explore the details of Ayurvedic anti-helminthic i.e *krumighna* treatment.

Ayurvedic General Management of Krumiroga

The management of *Krumiroga* in Ayurveda is multifaceted, involving detoxification, herbal therapy, and lifestyle modifications.

1. **Detoxification *(Shodhana*)**

- ***Panchakarma***: Specific procedures such as *Vamana* (therapeutic vomiting), *Virechana* (purgation), and *Basti* (medicated enema) are employed to eliminate toxins and parasites from the body. But since *kumars* i.e children are not prone to *shodhana kriya*, medicinal treatment has been emphasized on wide scale.

2. **Herbal Therapy (*Aushadhi)*** Ayurveda prescribes various herbs and formulations for their anthelmintic (worm-expelling) properties:

- ***Vidanga* (Embelia ribes)**: Known for its potent anthelmintic activity.
- ***Palasha* (Butea monosperma)**: Effective against intestinal worms.
- ***Krimighna dravyas***: Herbal formulations like *Krimimudgara Rasa, Kriminashaka Churna, and Ajamodadi Churna* are specifically used to treat *Krumiroga.*
- ***Neem* (Azadirachta indica)**: Its leaves and bark have strong antimicrobial properties.

3. **Dietary Regulations (*Pathya-Apathya*)**

- ***Pathya* (Wholesome foods)**: Light, easily digestible, and warm foods. Includes barley, rice, buttermilk, and vegetables like bitter gourd.
- ***Apathya* (Unwholesome foods)**: Avoidance of heavy, oily, sweet, and processed foods. Restriction on the consumption of meat and fermented foods.

4. **Lifestyle Modifications (Dinacharya and Ritucharya)**

- Emphasis on maintaining personal hygiene and cleanliness.
- Regular physical activity to enhance digestive fire and prevent the accumulation of *Ama.*
- Following seasonal regimens to balance the doshas and strengthen the body's immunity.

Preventive Measures

Preventing *Krumiroga* involves both individual and community measures:

- **Personal hygiene**: Regular hand washing, proper sanitation, and avoiding consumption of contaminated food and water.
- **Environmental hygiene**: Proper disposal of waste, avoiding stagnation of water, and maintaining clean surroundings to prevent the breeding of parasites.
- **Dietary precautions**: Ensuring food is properly cooked, and water is boiled or purified before consumption.

Treatment according to Charak Samhita:

Acharya Charaka in *Vimansthana* 7/14- 15)[1] has given certain principle for treating the patient of *krumis*. These are *krumis apakarashna* (extraction of worms with the help of *sanshodhana* therapy [*Sanshodhana* refers to the cleansing methods which includes: *Vaman* (therapeutic vomiting or emesis), *Virechan* (purgation), *Basti* (medicated enema), *Nasya* (elimination of toxins through the nose)], *prakriti vighata* (means utilising anti- helminthic drugs having toxic effect on helminthes along with dietary regimen non-congenial to proliferation of helminthes) and *nidan-parivarjana* (means avoidance of all etiological factors of helminthiasis).

Treatment according to Sushrut Samhita:

Acharya Sushruta first of all ascertain the nature of the worms and with a view to destroy their colony in the body. one should treat the patient with a *sneha* (clarified butter or oil), emetic formulations, drugs of the *Sursadi* group, strong purgative and treat him with an *asthapana basti and anuvasana basti (Sushruta Samhita Uttaratantra* 54/21-24).[2]

Uses of Ayurvedic *Krumighna* drug's :

So, Anthelminthic from the natural sources may play a key role in the treatment of these parasitic infections. Plants had been used generations after generations for its medicinal purposes long before ancient time. In the last few decades, there has been an exponential growth in the field of herbal medicine. Owing to its natural origin and fewer side effects, it is getting popularized in developing and developed countries. Ayurveda and traditional medicine system uses herbal medicines to treat patients. Researches are being carried out now days on a large scale to discover the herbal alternatives for various allopathic medicines. Anthelmintic drugs are one such example for which herbal alternatives are being searched. Because of the fewer side effects, the importance of herbal drugs as a remedy has tremendously increased in the recent years. Consequently, the need for the herbal formulation has been felt in routine life. This paper reviews the use of some traditional medicinal plants in curing worm infestations:-

1) The anthelminthic activity of ***Acacia oxyphylla*** stem bark extract was tested against *Ascaridia galli* (Nematoda), the intestinal roundworm of domestic fowl and it showed concentration-dependent efficacy of the plant extract.[3]
2) Combination of rhizomes of ***Acorus calamus*** and root part of ***Vitex negundo*** were screened for anthelmintic activity using Indian earthworm, *Pheritima postuma* and reported potent anthelmentic activity.[4]
3) The anticestodal efficacy of ***Adhatoda vasica*** leaf aqueous and ethanolic extracts was evaluated and exhibited ovicidal and larvicidal activity against gastrointestinal nematodes.[5] Another study also describes the *in vitro* and *in vivo* anthelminthic activity of *Adhatoda vesica.*[6]
4) The methanol and aqueous extracts of ***Aerva lanata*** were assessed for anthelminthic activity against Indian earthworm, *Pheritima postuma* and possessed good anthelminthic activity.[7]
5) The extract effect of ***Allium sativum*** showed anthelminthic activity in *Haemonchus contortus*.[8]
6) The aqueous and ethanolic bark extracts of ***Alstonia boonei*** and leaf extract of ***Vernonia amygdalina*** showed anthelminthics activity when evaluated using earthworms (*Lumbricus*

terretris).[9]

7) Methanol extracts of the three plants (*Amaranthus spinosus*, *Amaranthus caudatus* and *Amaranthus viridis* L.) at different concentrations showed vermicidal activities against (*Pheretima posthuma*).[10] The aqueous extract of *Amaranthus spinosus* showed anthelmintic activity for both the worms - *Pheritima posthuma* and *Tubifex tubifex*.[11]

8) Methanolic extracts of the tuber of ***Amorphophallus paeoniifolius*** showed vermicidal activity against *Pheretima posthuma* and *Tubifex tubifex*.[12]

9) Extracts of the root of ***Anthocephalus cadamba*** (Roxb.) Miq. was evaluated and the results indicated that the chloroform and methanolic extracts were more potent as antihelminthin.[13]

10) The essential oil of ***Artemisia pallens*** [14]

11) Chloroform extracts of stem and root of Artrmisia siversiana and Punica granatum were investigated for activity against *Syphacia obvelata*, *Nippostrongylus brasiliense* and *Hymenolepis nana in vivo* and results showed that both extracts were able to eliminate *Hymenolepis nana* from mice.[15]

12) Alcohol and aqueous extracts from the roots of *Baliospermum montanum* Muell. Arg were investigated for their anthelminthic activity against *Pheretima posthuma* and *Ascardia galli* and both the extracts exhibited significant anthelminthic activity.[16]

13) The ethanolic extract of ***Benincasa hispida*** seeds was studied for its anthelmintic activity using earthworms (*Pheretima posthuma*) and anticonvulsant activity in Swiss albino mice. The anthelmintic activity increased with increasing concentrations.[17]

14) The anthelminthic activity of alcohol and ethyl acetate extracts of leaves of ***Butea monosperma*** were noticed against earthworms (*Pheretima posthuma*), roundworms (*Ascardia galli*.) and tapeworms (*Raillietina spiralis*).[18]

15) Various extracts of pod of ***Caesalpinia pulcherrima*** **(Linn.)** (e.g. petroleum and choloroform extracts) reported anthelminthic potency while using Indian earthworms (*Pheretima posthuma*).[19]

16) The antihelminthic activity of methanolic, aqueous and chloroform extracts of root of *Carissa spinarum* on *Pheretima posthuma* was carried out and results show anthelminthics property.[20]

17) ***Carum copticum*** seeds possess anthelminthic activity against nematodes when evaluated in sheep naturally infected with mixed species of gastrointestinal nematodes.[21]

18) The anthelminthic activity of alcohol and aqueous extracts of ***Cassia tora*** has been demonstrated when used against *Pheretima posthuma* and *Ascardia galli*.[22]

19) The ethanolic and aqueous extracts of leaves and roots of ***Clerodendrum viscosum*** were tested against *Pheretima posthuma* and *Ascardia galli* to ascertain their anthelminthic potential and the extracts showed significant anthelminthic activity in dose dependent manner.[23]

20) The anthelminthic activity of aqueous and ethanolic extracts of leaves of ***Clitoria ternatea*** using *Eisenia foetida* were tested and the results confirmed their anthelminthics activity.[24]

21) The anthelminthic activity of all six fractions of ***Cocculus hirsutus*** **and** ***R. dentatus*** was noticed wormicidal activity which suggests that it could be effective against parasitic infections of humans.[25]

22) The ethanol extract of the roots of ***Crataeva nurvala*** was investigated for anthelminthic activity using earthworms (*Pheretima posthuma*), tapeworms (*Raillietina spiralis*) and roundworms (*Ascaridia galli*) and extract exhibited significant antibacterial and anthelminthic activity.[26]

23) The hydroalcoholic extracts of *Curcuma longa* and *Zingiber officinale* were evaluated for anthelminthic activity using *Pheretima posthuma* model and results showed that rhizomes extracts bearing a potential anthelminthic property.[27]

24) The aqueous extract of rhizomes of the plant ***Cyperus tegetum*** reported anthelminthic activity as compare to piperazine citrate when assessed on adult Indian earthworms, *Pheretima posthuma*.[28]

25) The alcoholic and aqueous extract of ***Emblica officinalis*** show potent anthelminthic activity in experimental adult earthworm's *Pheritima posthuma*.[29]

26) ***Garcinia indica*** reported anthelminthic activity against earthworm infections.[30]

27) The ethanol and water extract of whole plant of ***Gloriosa superba*** Linn. (Liliaceae) were investigated against Indian earthworms, *Pheretima posthuma* and both extract (aqueous and ethanol) at the[31]

28) ***Lawsonia inermis*****:** *In-vitro* anthelminthic potency of the petroleum ether extract of *Lawsonia inermis* leaves using Indian earthworms (*Pheretima posthuma*) was evaluated and found to have anthelminthics property.[32]

29) The crude extract extract of ***M. elengiroots*** **and** ***D. sepiaria*** leaves exhibited significant anthelminthic activity with respect to standard and control by using adult Indian earthworms, *Pheretima posthuma*.[33]

30) Anthelmintic activity of leaves of ***Mimosa pudica*** evaluated using *Pheretima posthuma* as a test worm to the different concentrations. The results indicated that the crude alcoholic extract and aqueous extracts significantly demonstrated paralysis and also caused death of worms in dose dependent manner as compared to standard reference albendazole.[34]

31) Oil of ***Moringa oleifera*** was investigated for its anthelminthic activity on adult Indian earthworms, *Pheretima posthuma* and shows anthelminthics activity.[35]

32) The present study reports anthelminthic activity of various extracts obtained from the leaves of ***Saraca indiaca*** Linn (Leguminosae) against adult earth worms *Pheretima posthuma*.[36]

33) The alcoholic and aqueous extract of the fruits ***Terminalia chebula*** showed significant anthelminthic activity and further it was noticed that the alcoholic extract activity is higher than aqueous extract and the standard drug of albendazole.[37]

34) The anthelminthic property of ***T. cordifolia*** extracts was evaluated using *Pherithema posthuma* as an experimental model and the ethanol extract showed significant results.[38]

35) The extracts of ***Tribulus terrestris*** fruit shown exerting significant and much better anti microbial and anthelminthic activities.[39]

36) The alcoholic extract of ***Trikatu churna*** and its ingredients were screened for preliminary phytochemical studies and also tested for anthelminthic activity against *Pheritima posthuma* and exhibited potent anthelminthic activity.[40,41]

CONCLUSION:

Ayurveda offers a comprehensive approach to managing *Krumiroga*, focusing on eliminating the parasites and preventing their recurrence through detoxification, herbal remedies, dietary modifications, and lifestyle changes. This holistic management not only addresses the symptoms but also strengthens the body's natural defenses, ensuring long-term health and well-being. Integrating Ayurvedic principles with modern practices can provide an effective strategy for managing worm infestations and promoting overall health. Nature has provided a abundant source of remedies to cure all ailments. In this light, a wide variety of anthelminthic activities has been explored amongst plants which possess such narrow or broad spectrum activity innately to be a viable option. Hence, more extensive studies are needed to be directed towards

experimental validation of plants, their molecular studies, active constituents, clinical evaluation and ascertaining of their specific mode of action so as to establish an effective alternative treatment against various helminthins. Herbs have remained vital source of drugs since the ancient times. The above review is an attempt to highlight the anthelminthics property of certain credible herbs as described in the most ancient of medical sciences i,e. Ayurveda - the Indian system of medicine.

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