

A Review on the *Ayurvedic Management of Krimi (Intestinal worms) in Children*

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Abstract

Intestinal worm infestations are widely prevalent in tropical and subtropical countries and occur where there is poverty and poor sanitation. Recent global estimates indicate that more than a quarter of the world's populations are infected with one or more of the parasitic infections, the most common being round worm – *Ascaris Lumbricoides* in children. Even though infection can occur at any age, the highest rate is in preschool or early school-age children. The most common etiological and risk factors are poverty, ignorance, lack of hygiene, poor sanitation and use of uncooked food or improper washing of food materials etc. Transmission is primarily hand to mouth, but may also involve ingestion of contaminated raw fruits and vegetables. In *Ayurveda* the infectious diseases caused by *krimi* are explained under the title of *Oupasargika rogas*. The term *Krimi* is a broad term which includes all types of worms and microbes. That may be pathogenic or non-pathogenic. Among them, pathogenic is harmful to human beings and helminthiasis specifically can be correlated to the *Pureeshaja* type of *Krimi*. Treatment like *Apakarshana* (elimination therapy), *Prakruti Vighata* (to create an unfavourable environment) and *Nidana Parivarjana* (avoiding the etiology) is found to be very effective to treat *Krimi* in *Ayurveda*. Inspite of this it is more economical, painless treatment with no or minimum side effects. The present article reviews the concept of *krimi* and role of *Ayurveda* in the management of *krimi* in children.

Keywords

Krimi, Oupasargika, helminthiasis, Apakarshana



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INTRODUCTION

The prevalence of Intestinal worm infestations more found in tropical and subtropical countries and elevated by poverty and poor sanitation. According to WHO, more than 1.5 billion people or 24 % of the world's population are infected with soil-transmitted helminths (STH), Out of them 270 million preschool-age children and 600 million school-age children live in areas where STH is transmitted¹. Morbidity due to STH was estimated to be 39 million, or almost 8 % of the disease burden due to infectious diseases². Geohelminths (soil-transmitted helminthes, STHs) are a group of intestinal parasites causing human infection through contact with parasite eggs or larvae that thrive in warm and moist soil and belong to the class nematode, which includes roundworms (*Ascaris lumbricoides*), whipworms (*Trichuris trichiura*), and two hookworms (*Ancylostoma duodenale* and *Necator americanus*)³. Most of these are transmitted through soil, there route of transmission being feacaly contaminated fingers or sometimes migrate through skin to intestine.⁴ Intestinal worm infection spread rapidly by poor sanitation, scarcity of potable drinking water and poor personal

hygiene⁵. These infections cause morbidity and mortality along with other manifestations like iron deficiency anaemia, growth retardation in children and other physical and health problems⁶. Helminthic infection is also related to protein energy malnutrition, low pregnancy weight and intra uterine weight gain. In addition to their health effects, an intestinal helminthic infection impairs cognition in children and hinders economic development⁷⁻¹⁰. This intestinal worm infestation and clinical features can be compared with *Krimiroga* in Ayurveda.

Definition of Krimi: “*Krinathi himsathi ithi Krimi*”¹¹, Although the colloquial meaning of *Krimi* refers to worms, by etymology it is defined as the one which causes sufferings. Even from the *Vedas* references have been cited regarding *Krimi*^{12- 13}, as those are responsible for illness, disease or death. The *Graha Rogas may be compared* to infectious diseases, caused by pathogenic micro-organisms. *Krimi* has wide range including all *Apada-Bahupada*, pathogenic – non-pathogenic, movable and alive organisms in it. *Acharya Charka* explained *Krimiroga* based on *Hetvadi saptakagana* (seven specific aspects)¹⁴. It is



said that *Krimi* is itself one of the cause for *Kushtha, Pandu, Grahani, Karshyata* etc¹⁵. In present and fast forward life people are lacking in awareness about nutrition & diet, due to this many patients become sufferer of *Krimiroga* and they remains as it is or without undiagnosed. The intestinal worms are affected children as well as adult, but more common in children. Because at present, today in the community, peoples are mostly favour non veg diet, fast food, milk & butter product, sweet product, faulty prepared food or fermented food and all these factors aggregate in outcome of *Krimiroga*. Since the *Vedic* period the *Krimi* are one of the oldest companions of the human beings. Ancient *Acharyas* were well aware regarding the presence of the *Krimi roga* (microorganism). There are some indirect references in *Vedas* for microbes and infectious diseases in the name of *Krimi* and *Krimi Rogas*.

Origin of Krimi: According to *Achariya Charaka, Kleda* in the body is one of the factors for the production of *Krimi*¹⁶.

Types of Krimi: 20 varieties of *Krimis* that have been illustrated are broadly classified into *Bahya* (external) and *Abhyantara Krimi* (internal)¹⁷.

According to effect on the body -

- i) *Sahaja* or Non Pathogenic
- ii) *Vaikarika* or Pathogenic.

SahajaKrimi: *Sahaja Krimi* is defined as types of *Krimis* which are normally reside in the human body without producing any harmful effect on the body. It appears that by *Sahaja Krimis* are referred to those organisms which are present in the various part of the body like buccal cavity, alimentary tract, as well as in the vaginal canal in females and play a role in maintain normal bacterial flora. In *Charaka* their presence is described not to be harmful to humans (and indeed they help us by producing vitamin B12 in the intestines and by competing with and thus in healthy subjects preventing the growth of pathogenic organisms¹⁸.

Vaikariaka Krimi: It consists of those *Krimis* which are harmful to human body. According to *Charaka* and *Ashatanghardiyam*, these *Vaikarika Krimis* two sub- types as:

- i. *Bahya* or External *Krimi* e.g. - *Yuka, Liksha* etc¹⁹⁻²⁰.
- ii. *Abhyantara* or Internal - who remain inside the body²¹. These internal *Krimies* also further 3 sub types as:

- i. *Kaphaja*,

ii. *Raktaja*

iii. *Pureeshaja*

Udara Krimi intestinal worms generally

include—*Pureeshaja* and *KaphajaKrimi*²².

These types of *Krimis* are mainly described elaborately with their pathogenicity in Ayurvedic classics.

Table 1 Total number of *Krimi* according to their Sites as mentioned in different Ayurvedic text

S.no.	Text	<i>Bahya or Malaja Krimi</i> (External)	<i>Abhyantara Krimi</i> (Internal)			Total No. of <i>Krimi</i>
			<i>Kaphaja</i>	<i>Raktaja</i>	<i>Pureeshaja</i>	
1.	<i>Charaka Samhita</i>	2	7	6	5	20
2.	<i>Sushruta Samhita</i>	-	6	7	6	20
3.	<i>Astangahriddya</i>	2	7	6	5	20

Table 2 Site of *Krimi* as mentioned in *Brihatrayi*

S.no	Text	<i>Malaja</i>	<i>Raktaja</i>	<i>Kaphaja</i>	<i>Pureeshaja</i>
1.	<i>Charaka Samhita</i>	<i>Kesha, Shmasru, Loma, Pakshma, Malin Vastra</i>	<i>Rakta-vahini Sira, Rakta-Vahini Dhamani</i>	<i>Amashaya</i>	<i>Pakvashaya</i>
2.	<i>Sushruta Samhita</i>	-	-	<i>Amashaya</i>	<i>Pakvashaya</i>
3.	<i>Astangahriddya</i>	<i>Kesh, Loma</i>	<i>Rakta-Vahini Sira</i>	<i>Amashaya</i>	

According to above classification *Kaphaja* and *Pureeshaja krimis* may be correlated to intestinal worms (helminthes) as evident table no. 2.

Samanya Krimi Nidana (Common aetiology): *Nidana* refers to the causative factors which can be broadly divided into *Ahara Sambandi Nindana* (food-related) and *Vihara Sambandi Nidana* (activityrelated).

Ahara Sambandi: Milk, jaggery, sesamum, fish, meat or and other products that cause *Kapha Utklesham*, besides, also includes the food which are unctuous, sweet, heavy, cold items etc²³.

Vihara Sambandi: *Divaswapna* (day sleep), *Asana* & *Avyayama* (prolonged sitting which indirectly indicates lack of exercise²⁴.

Specific signs of Krimis: *Acharya Charaka* has been described three *Vishesha Roopas* (cardinal signs) such as *Purishabhedha* (unformed stools), *Karshya* (emaciation), *Lomaharsha* (cutis anserina)²⁵.

General signs and symptoms Of AbhyantaraKrimis:

Acharya Susruta has quoted general symptoms are described as: – *Jwara* (fever), *Vivarnata* (discolouration), *Shoola* (pain),

Hridroga (diseases of the heart), *Bhrama* (giddiness), *Bhaktadwesha* (disinterest towards food), *Atisara* (diarrhoea), *Sadana* (tiredness), *Chardi* (vomiting) and *Swasa* (breathlessness)²⁶.

Krini Samanya Chikitsa: (General line of treatment) Acharya Charaka has given three principles for treating the patients of *Krimiroga*. These are *Apakarshana*, *Prakruti Vighata* and *Nidana Parivarjana*²⁷.

i. Apakarshana: Visible *Krimi* are to be manually extracted by bare hand or by *Yantra* (instruments like *sandamsha* while extraction of internal worms with the help of *Sansodhana* therapy includes: *Vamana* (Therapeutic vomiting or emesis), *Virechan* (Purgation), *Vasti* (medicated enema), *Nasya* (elimination of toxins through the nose).

ii. Prakruti Vighata:

Prakriti = *PrakarotiitiPrakriti*, which can produce is the *Prakriti* i.e. causative factor and *Vighata* = *Vinasha*, means which is to be destroyed, get effected etc., means the *Prakriti* or the producing factor to be destroyed is the *PrakritiVighata*.

With the help of *Katu*, *Tikta*, *Kashaya*, *Kshara*, *Ushana Dravyas* and the *Dravyas* which are opposite to property of *Kapha* and

Purisha, performs the function of *Prakritivighata*.

Kapha and *Purisha* is the main *Prakriti* of *Krimis*. Properties of *Kapha*²⁸(*Snigdha*, *Sheeta*, *Guru*, *Manda*, *Shlakshana*, *Sandra*, *Madhura*, *Picchila*) after producing *Agnimandya*, starts the formation of *Ama* which may favour for the formation of *Kaphaja Krimi* and in the same way when *Sara-kitta-vibhajana* take place, *Sarabhaga* performs the function of *Shariraposhana* (nutrition) and *Kitta bhaga* is excreted out, being it is *Vijatiya*. But if this *Vijatiya* portion (*Kittabhaga*) due to any reason accumulates in *Pakwashaya*, there it starts *Kotha* (putrefaction) leading to the formation of *Pureeshaja Krimi*. So here *Purisha* will act as its *Prakriti* i.e. causative factor. That's why acharya Charak advises to make use of *dravyas* which possess the opposite properties to the *Kapha* and *Purisha* e.g. *Katu* – *Tikta* – *Kashaya* – *Ushna* – *Kshara Dravyas*, because they are exactly opposite to their *Prakriti* and by this action they performs the duty of *Prakritivighata*.

These are advised in all aspects of the patient daily activities i.e. in food, drinks, for washing etc. With regard to the pharmacological action, drugs possessing

krimigna (anti-microbial) properties have been enumerated like *Maricha* (*Piper nigrum*), *Gandira* (*Amorphophallus campanulatus*), *Vidanga* (*Embelia ribes*) etc²⁹. Additionally various classical formulations with *Danti* (*Balio-spermum montanum*) and *Dravanti* (*Chlorophytum tuberosum*), *Tilvaka* (*Viburnum nervosum*) and *Udallaka* (*Bauhinia variegata*) *kashaya* etc have also been mentioned³⁰.

***Nidana parivarjana:* (avoiding the causative factors)**

This is the third principle in the treatment of the *Krimi* as avoidance of etiological factors (*Nidana parivarjana*). Hence, all the factors listed as etiological factors of the *Krimiroga* and *Aphya* should be avoided. It is most useful from three points such as:

- I. It may cut off the necessity of *Aushadhi*.
- II. Extra-contaminated intake is prohibited.
- III. Helps to treat the patient and relieve him early.

Presently in modern medical science prevention is by improved sanitation, which includes improving access to toilets and proper disposal of feces³¹. Hand washing with soap appears protective³².

DISCUSSION

Intestinal worm infestation is a global health problem and is a matter of serious concern for the third world countries. Overcrowding, contamination of water, poor sanitation and migration of people to cities greatly favour transmission of parasitic infection resulting in high endemicity. Most important group of intestinal worms is STH infections, which are responsible for 27% of entire school-age and preschool-age children population in the World, whom required anthelminthic treatment³³. Ascariasis is the most prevalent human helminthiasis and its high rate is found in tropical areas of the world due to environmental conditions which are optimal for maturation of ova in the soil³⁴. As previous studies shown the, helminthic infections especially Ascariasis caused by Round worm (*Ascaris Lumbricoides* –) is a common manifestation. With the knowledge of worms from both the systems of medicine, *Pureeshaja Krimi* and its affliction can be co-related to Ascariasis and *Ascaris lumbricoides* as they share a lot of similarities. Some of them are explained below:

General features of *Pureeshaja Krimi* such as:

- I. ***Sthana* (Site):** *Pakvashaya* which is stated as the *Sthana* for *Pureeshaja Krimi*, is

considered as a part of intestine between Ileocecal junction and sigmoid colon. According to the modern parasitology, organisms like adult *Ascaris lumbricoides* (round worms), live in the small intestine and eggs are passed in the

II. Akruty (Shape): *Pureeshaja Krimi* has been described as *Sookshma* (minute), *Vritha* (round), *Deergha* (long), *Sthoola* (big), *Prithavapucks* (flat tail) and *Tanu* (thin)³⁵. On the other hand *Ascaris lumbricoides* has also been identified to be around, elongated worm measuring 45-70 µm in length and 35-50 µm in breadth³⁶.

III. Varna (color): *Pureeshaja Krimi* is mentioned to possess colours like *Shweta* (white), *Shyava* (pale), *Neela* (blue), *Harita* (green), *Peeta* (yellow)³⁷. Nonetheless, *Ascaris* worms are also smooth cream colored surface too³⁸. According to *Sushruta Gandupada*³⁹ *Krimis* have been clearly mentioned in *Pureeshaja* type, which can be correlated with „Round Worm“ in modern science. In *Harita Samhita* accumulation of *Purisha* is the main cause for internal type of *Krimi*, infesting which more like snake in the *Kapha koshtha* is explained here. *Krimis* name according to their shape, size and habitat. For example

Pruthumunda, *Sukshma*, *Anavaha* and *Suchimukha* etc⁴⁰.

Hence with the above substantiation it can be assumed that *Ascaris lumbricoides* can be considered as a type of *Pureeshaja Krimi* in *Ayurveda*.

Ascaris lumbricoides is responsible for pulmonary disease and obstruction of the intestinal or biliary tract in children⁴¹.

Common sign and Symptoms of Pulmonary Ascariasis: The pulmonary Ascariasis manifestations resemble Loeffler syndrome and include transient respiratory symptoms such as cough and dyspnoea, pulmonary infiltrates, and blood eosinophilia⁴², these sign and symptoms may be correlated to *Shleshmaja Krimi* as mentioned in Ayurvedic text such as: *Hrillasa* (nausea), *Asyasanshrawan* (salivation), *Avipaka* (indigestion), *Jwara* (fever), *Arochaka* (anorexia), *Moorchha* (fainting), *Jrimbha* (yawning), *Kshavathu* (sneeze), *Anaha* (tempenitis), *Angamarda* (body ache), *Chhardi* (vomiting), *Karshya* (emaciation), *Parushya* (dryness of skin), *Kasa* (cough), *Pinasa* (chronic rhinitis), *Shula* (acute pain), *Shwayathu* (oedema), *Hridroga*, *Pratishyaya*, *Shiroroga*⁴³.

Common sign and Symptoms of Intestinal Ascariasis: Intestinal ascariasis has no

symptoms in more than 85% of cases, especially if the number of worms is small⁴⁴, A more serious complication occurs when a large mass of worms leads to acute bowel obstruction. Vomiting, abdominal distension, and cramps are most common complaints of Children suffering from heavy worms infections. In some cases, worms may be passed in the vomitus or stools. *Ascaris* worms occasionally migrate into the biliary and pancreatic ducts, where they cause cholecystitis or pancreatitis. Studies show that chronic infection with *A. lumbricoides* (often coincident with other helminth infections) impairs growth, physical fitness, and cognitive development⁴⁵. All the above sign and symptoms may be correlated in *Ayurveda* with signs & symptoms of *Pureeshajakrimis* such as: *Purishabhedha* (diarrhoea), *Karshya*(emaciation), *Parushya* (dryness of skin), *Lomaharsha* (horripilation), *Gudamuhanishkramana* (coming out from anus), *Gudakandu* (pruritis ani), *Shula* (acute pain), *Agnimandyā* (loss of appetite), *Pandu* (anaemia), *Vishtambha* (constipation & flatulence), *Balakshaya* (weakness), *Praseka* (salivation), *Aruchi* (anorexia), *Hridroga*⁴⁶.

In present era increasing demand of herbal as well *Ayurvedic* medicines, maintaining quality standards is the prime need of hour some *Ayurvedic* medicine have anthelmintic properties. Anthelmintic plants that are used traditionally in expelling the worms that is parasitic in nature from the body either by stunning or killing them. They are also known as Vermifuges or Vermicides⁴⁷.

Achariya Kashyapa has quoted the administration of bitter and pungent drugs in *Krimirogas* are well explained. Medicated bath is indicated to destroy the external *Krimis* in *Dwivraniya Adhyaya* and mentioned only the total number of *Krimis* in children⁴⁸.

Below are listed a few research studies on anthelmintic properties:

- (1.) The aqueous extract of *Sesbania grandiflora* the leaves recorded a definite anthelmintic efficacy against *A. galli*⁴⁹.
- (2.) In-vitro anthelmintic activity of *Acorus-calamus* leaves, preliminary phytochemical screening of crude extract revealed the presence of tannins, steroids, flavonoids, Saponins and terpinoids. The presence of these phyto-constituents showed a significant anthelmintic activity on

Pheretima posthuma at all the tested doses when compared to control⁵⁰.

(3.) Methanolic leaf extract of Tephrosia purpurea showed the presence of alkaloids, carbohydrates, flavonoids, tannins and phenolic compounds and the presence of these phytoconstituents were responsible for anthelmintic activity⁵¹.

(4.) The methanol extract of Butea monosperma seeds, tested in vitro, showed significant anthelmintic activity⁵².

(5.) Clinical management of *Pureeshaja Krimi* in children with *Palasha Beeja Choorna* by Dr. Manjunath MP 2004-05.

(7.) Dash Durgaprasad (2001) treatment of *Krimi roga* with the extract of Hyosyamus niger Linn- Puri⁵³.

Above studies have thus revealed the efficacy of *Ayurvedic* compounds in the treatment of *Pureeshaja Krimi or* intestinal worms infection.

CONCLUSION

High prevalence of intestinal worm infestation is an indicator of poor living conditions and low standards of sanitation in a society. The present review article reveals prevention and *Ayurvedic* management of *PureeshajaKrimiroga* (Intestinal worm infection) in children by *Prakruti Vighata*,

Nidana Parivarjana, through improve their sanitary and living conditions by treatment of infected individuals and provision of potable water. An inference can be drawn from the description of *Shleshamaja* and *PureeshajaKrimi* i.e. perhaps the *Shleshamaja Krimis* are the migrating larvae of nematodes and also parasites present in upper gastro intestinal tract, and *Pureeshaja Krimis* are the intestinal parasites in general.

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