Worm infestation in Ayurveda and modern science: Approach and management

Srivastava Niraj, Pandey Nitin and Saxena Varsha

Abstract
The worm infection or helmintisis is one of the most common problems in pediatrics practice especially in developing countries due to the poor hygiene. The common parasitic infection in children is Ascaris Lumbricoïdes (Round worm), Enterobiasis vermicularis (Pin worm), Ancylostoma duodenale (Hook worm), Echinococcus granulosus (Hydatid diseases) and Cystercosis. Most common worm infestation in children is Ascaris Lumbricoïdes. Helmintisis has been found to result in poor birth outcome, poor cognitive development, poor school and work performance, poor socioeconomic development, and poverty. Chronic illness, malnutrition, and anemia are further examples of secondary effects of helmintisis.

The Ayurveda described worm infestation as Krimi Roga. In Ayurveda term Krimi can be correlated with helmintisis in modern sciences. Excessive intake of madhura, amla, eating during indigestion, avoid exercise and resorting to day sleep is main etiology in Ayurveda. Main symptom of Krimiroga is Jwara (fever) Vivarnata (discoloration of skin) Sula (Pain) Hridaroga (Heart trouble) Sadanam (lassitude) Bhukadvseo (Anorexia) Atisara (Diarhhea) Vamana (Vomiting).

Ayurveda puts three basic approaches for the treatment of Helmintisis disease such as Apakarsana (Removal of visible worm from the body), Prakriti Vighata (to create unfavorable environment by means of diet and medicine) and Nilana Parivarjana (Avoid etiological factor). According to Kashyap samhita Krimi chikitsa, Vidanga Ghrita kills krimis. This review article explores approach and treatment of worm infestation (Krimi roga) in children.

Keywords: Worm infestation, Helminthes, Krimi Roga, Vidanga ghrita, Katu taila

Introduction
Helminthes or worm infestations refer to worms that live as parasites in the human body and are a fundamental cause of disease associated with health and nutrition problems beyond gastrointestinal tract disturbances [1]. Worm infestation constitutes an important limitation on growth and development of children. Infections with helminthes e.g. Ascaris lumbricoïdes, hookworm, Hymenolepis nana and Trichuristrichiura are closely linked with conditions of poverty, unsafe water, sanitation and hygiene [2]. At highest risk of morbidity are pre-school and school-aged children [3]. Negative effects of helminthes infections include diminished physical fitness and growth retardation, and delayed intellectual development and cognition. Indeed, helminthes have been linked with an increased risk for nutritional anemia, protein-energy malnutrition [4]. There are numerous species of these parasites, which are broadly classified into tapeworms, flukes, and roundworms. They often live in the gastrointestinal tract of their hosts, but they may also burrow into other organs, where they induce physiological damage. Soil-transmitted helminthes are responsible for parasitic infections in as much as a quarter of the human population worldwide. One well-known example of soil-transmitted helmintiasiies is ascarisis.

Signs and symptoms of worm infestation: Young children have a high infection rate and suffer with a heavy worm burden of A. lumbricoïdes, Trichuris trichiura and/or schistosomes [5].
1. The signs and symptoms of worm infestations depend on a number of factors including:
   a. the site of the infestation within the body; the type of worm involved; the number of worms and their volume; the type of damage the infesting worms cause; and, the immunological response of the body [6].
2. Certain worms may cause particular symptoms as taeniasis can lead to seizures due to neurocysticercosis.
3. Signs of the body's immune response may include eosinophilia, edema, and arthritis.
4. Migration of Ascaris larvae through the bronchi of the lungs can cause asthma in children.
5. Helminthiasis may cause chronic illness through malnutrition including vitamin deficiencies, stunted growth, anemia, and protein-energy malnutrition.
7. These parasitic infections manifest themselves as reduced growth rates through impaired nutrient utilization. Consequently the children are not able to achieve their full potential in physical performance and education [6,8].
8. Heavy hookworm burden is the major etiology for iron deficiency anemia in children [9-11].

Classification of Helminthes: Helminthiasis are classified as follows - They are mainly 2 types

1. **Roundworm infection (Nematodes)**
   - Soil-transmitted Helminthiasis – This includes Ascariasis (Ascaris lumbricoides), Trichuriasis and hookworm (Ancylostoma duodenale) infection
   - Filariasis (Wuchereria bancrofti) infection
   - Enterobiasis
   - Strongyloidosis (Trichostrongylus spp.) infection
   - Trichuriasis etc.

2. **Tapeworm infection (Cestodes)**
   - Echinococcosis (Echinococcus infection)
   - Taeniasis/cysticercosis (Taenia solium) infection.

**Clinical features, Diagnosis and treatment of specific worm**

**Ascaris lumbricoides**

**Enterobius Vermicularis (Pin Worm)**

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Diagnosis</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Peri-anal itching</td>
<td>Stool microscopy: not useful Eggs can be demonstrated in perianal swabs collected early morning.</td>
<td>Albendazole 400 mg Once (Taken with food)</td>
</tr>
<tr>
<td>2. More at night</td>
<td></td>
<td>Other options is Mebendazole, Ivermectin and Nitazoxanide</td>
</tr>
<tr>
<td>3. Reduced appetite</td>
<td></td>
<td>Treat entire family</td>
</tr>
</tbody>
</table>

**Ancylostoma duodenale (Hook worm)**

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Diagnosis</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Itching</td>
<td>Stool microscopy</td>
<td>Albendazole 400 mg Once</td>
</tr>
<tr>
<td>2. Abdominal pain</td>
<td>Peripheral smear</td>
<td>Oral iron therapy</td>
</tr>
<tr>
<td>3. Anorexia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Iron deficiency anemia</td>
<td>1. Identified in thick blood film</td>
<td>1. Diethyl-Carbamazine (DEC) 6mg/kg /day q8hr for 12 days</td>
</tr>
<tr>
<td>5. Hypoproteinemia</td>
<td>2. Nocturnal periodicity</td>
<td>2. Other options is Ivermectin + Albendazole</td>
</tr>
<tr>
<td>6. Reducing appetite</td>
<td>3. Adult worm in LN biopsy</td>
<td></td>
</tr>
</tbody>
</table>

**Wuchereria bancrofti (Filariasis)**

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Diagnosis</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Most remain asymptomatic</td>
<td>1. Identified in Thick blood film</td>
<td>1. Diethyl-Carbamazaine (DEC) 6mg/kg /day q8hr for 12 days</td>
</tr>
<tr>
<td>2. Episodes of Fever, lymphangitis, lymphadenitis</td>
<td>2. Nocturnal periodicity</td>
<td>2. Other option is Ivermectin + Albendazole</td>
</tr>
<tr>
<td>3. Tropical Pulmonary Eosinophilia</td>
<td>3. Adult worm in LN biopsy</td>
<td></td>
</tr>
<tr>
<td>4. Chronic stage: Lymphatic obstruction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Taeniasis**

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Diagnosis</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mild epigastric discomfort,</td>
<td>Microscopic identification of eggs in feces</td>
<td>Albendazole 400 mg OD for 3 days</td>
</tr>
<tr>
<td>2. Nausea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Flatulence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Diarrhea</td>
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</tr>
</tbody>
</table>

**Worm infestation in Ayurveda**

The Ayurveda described worm infection as *Krimi Roga*. The *Krimi* may be various types on the basis of their origin; *Kaphaj Krimi, Rakta krimi & Pureeshaj Krimi*. In Ayurveda term *Pureeshaja Krimi* can be correlated to the helminthiasis.

**Pureeshaja Krimi:** They dwell in *Pakwasaya* and usually emerge out through anus precipitating anal itching. They result in general debility, diarrhea and brittle hair. Foetid smell and belching occur in case of upwards movement of the worms. According to Charak samhita [12] Pureeshaja Krimi are five in number and according to Sushruta Samhita [13], seven in number.

**Sign and Symptoms of Worm infestation in Ayurveda:**

1. **Pureeshaja Krimi infection:** Sign and symptoms of Pureeshaja Krimi infection are described in *Astag hridya nidana* [14].
### Possible Co-relation of Pureesha Jaya Krimi with Modern Parasites

<table>
<thead>
<tr>
<th>Ayurvedic Nomenclatures</th>
<th>Ayurvedic Morphology or, Pathogenicity</th>
<th>Modern Morphology or, Pathogenicity</th>
<th>Habitat</th>
<th>Probable co-relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Kakeruka</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Makeruka</td>
<td>Rough ridges all over the body</td>
<td>White, small spindle shaped</td>
<td>Caecum, Appendix</td>
<td>Thread worm</td>
</tr>
<tr>
<td>3. Leliha</td>
<td>Shape of snake</td>
<td></td>
<td></td>
<td>- E. histolytica - Whip worm</td>
</tr>
<tr>
<td>4. Sasulaka</td>
<td>Pain in abdomen</td>
<td>Produces pain in abdomen</td>
<td>Large intestine</td>
<td>- E. histolytica - Whip worm</td>
</tr>
<tr>
<td>5. Sasurada</td>
<td>Irritation in large intestine</td>
<td>Irritate the intestine by eroding the lumen</td>
<td>Large intestine</td>
<td>- E. histolytica - E. Coli</td>
</tr>
</tbody>
</table>

### 2. Mud eating and worm infestation

Consumption of mud or such other inappropriate, non-nutritional substance increases the risk of worm infestation. This lead to Pandu (Anemia) which may be due to different worms.

#### Treatment of Intestinal Worms (Krimi Roga) in Ayurveda

Charaka Samhita \(^{16}\) gives three methods for the treatment of Krimi roga (Worm infestation)

1. **Apakarshana** (Removed by Vamanani Panchakarma procedures)-

2. **Prakriti-vighata** (Breaking the pathogenesis) –
   - It can be done by giving Katu, Tikta, Kshaya, Kshara and Ushana Dravyas.
   - Kapha vardhaka ahara with alkaline pH inside, the gut produce a favorable environment for growth of worm so avoid it.

3. **Nidana Parivarjana** (Absence from cause) -
   - It means to avoid all those causes which are responsible for producing diseases like Mithya-ahara (eg. Kaphavardhaka Aahara, Dugdha, Dahi, Guda etc.), Mithya-vihara (eg. Divashayana).

### 3. Explanation of Harita regarding worm infestation:

According to Harita \(^{15}\) Krimis are basically 2 types as external and internal. External are 7 types and internal are 6 types. Internal krimis are having its shelter in Kapha Kostha, Maladharu etc. It moves within gastro-intestinal tract just like snake. He describes shape of Krimi also.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Sanskrit</th>
<th>Shape of Krimi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pritumunda</td>
<td>Broad head, square head (like Tape worm)</td>
</tr>
<tr>
<td>2.</td>
<td>Konchuk</td>
<td>Rounded head (Round worm)</td>
</tr>
<tr>
<td>3.</td>
<td>Dhanyakarnibha</td>
<td>Sprouted pulses with whitish sprout resembling small worm (Pin worm)</td>
</tr>
<tr>
<td>4.</td>
<td>Sukshma</td>
<td>Invisible</td>
</tr>
<tr>
<td>5.</td>
<td>Anu</td>
<td>Minute</td>
</tr>
<tr>
<td>6.</td>
<td>Suchimukhi</td>
<td>Tapered mouth (Hook worm)</td>
</tr>
</tbody>
</table>

**S No** | **Type of Krimi** | **Shodhana chikitsa** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pureesha jaya</td>
<td>Asthapana Vasti</td>
</tr>
<tr>
<td>2.</td>
<td>Kaphaja Krimi</td>
<td>Vaman and Sirowirechana</td>
</tr>
<tr>
<td>3.</td>
<td>Raktaja Krimi</td>
<td>Treatment of Kastha</td>
</tr>
<tr>
<td>4.</td>
<td>Babyakrimi</td>
<td>Lepa, Abhyanga and Pralepa</td>
</tr>
</tbody>
</table>

### Treatment of Worm infestation in Kashyap Samhita

1. **Vidanga Ghrita** \(^{17}\): Saindava lavana is used in this ghrita. Vidanga ghrita when licked with sugar kills the worms just like Vajra ayudha kills the Rakshasas.

2. **Bahya Krimi**: Bathing, should be done followed by treatment of Vrana chikitsa. While in case of infants all the above treatments should be done to the wet-nurse.

3. **Katu taila Prayoga**: After applying juice worm mustard oil mixed with salt to the anal area, mild sudation should be given by digits (fingers). This gives quick relief beneficial in pinworm which causes intense itching of the anal region at night.

4. **Certain medication for worm in Bal roga**-
   - Palash beeja
   - Karpillika churna
   - Nag keshara is good for tapeworm
   - Kusmand beeja swarasra}

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\(^{15}\) Harita

\(^{16}\) Charaka

\(^{17}\) Aswini Datta
5. List of Kalpa used in Krimi Roga

<table>
<thead>
<tr>
<th>S. No</th>
<th>Type of Preparation</th>
<th>Name of Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Asava/Arishta</td>
<td>Khadiradi arishta, Vidanga arishta, Vidangasav</td>
</tr>
<tr>
<td>2.</td>
<td>Bhasma</td>
<td>Lohga Bhasma, Vanga Bhasma</td>
</tr>
<tr>
<td>3.</td>
<td>Churna</td>
<td>Vidangaqadi Churna</td>
</tr>
<tr>
<td>4.</td>
<td>Ghrita</td>
<td>Bimbighrita, Vidangadighrita</td>
</tr>
<tr>
<td>5.</td>
<td>Rasa</td>
<td>Krimimudgarasa</td>
</tr>
</tbody>
</table>

Summary and Conclusion: - Worm infestations are present in people of all ages but children are much more prone to it as they are at the stage of beginners to learn how to cope with these parasitic enemies. Bowel complaints are common in child suffering from worm infestation. Anthelmintic from natural sources may play key role in treatment of these parasitic infections. In last few years use of herbal medicine in treatment was increasing because of side effects associated with modern medication. Researches are being carried out now a day on large scale to discover herbal alternatives for various allopathic medications. Because modern medication use to treat worms are having side effects like hallucinations, fever, chills, confusion, nausea, vomiting, skin rashes, dark urine, blurred vision, seizures and jaundice. In Ayurvedic textbook various Acharyas has described several effective remedies for solving all kinds of worm infestations. Apakarsana, Prakriti Vishhatu and Nidana Parivaraguna is main line of treatment in Ayurveda for Krimi roga. Kashyap Samhita describes various remedies for treatment of Krimi roga in children as Vidanga Ghrita, Katu taila Prayoga etc.

References