

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

Mukesh Kumar Meena\*

\*M.S. Regional Ayurveda Research Institute for Endocrine Disorders (RARIED), Jaipur-302016, Rajasthan, India

### **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 *Oupasargikarogas*. 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*. In spite 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 transmitted<sup>1</sup>. Morbidity due to STH was estimated to be 39 million, or almost 8 % of the disease burden due to infectious diseases<sup>2</sup>. 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 (Ascarislumbricoides), whipworms (Trichuristrichiura), and two hookworms (Ancylostomaduodenale and Necatoramericanus)<sup>3</sup>. Most of these are transmitted through soil, there route of transmission being feacaly contaminated fingers or sometimes migrate through skin to intestine.<sup>4</sup> Intestinal worm infection spread rapidly by poor sanitation, scarcity of potable drinking water and poor personal hygiene<sup>5</sup>. These infections cause morbidity and mortality along with other manifestations

like iron deficiency anaemia, growth retardation in children and other physical and health problems<sup>6</sup>. 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 development<sup>7-10</sup>. This intestinal worm infestation and clinical features can be compared with *Krimirogain* Ayurveda.

**Defination of Krimi:** “*Krinathihimsathiithi Krimi*”<sup>11</sup>, 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*<sup>12-13</sup>, as those are responsible for illness, disease or death. The *Graha Rogas may be compared* to infectious diseases, caused by pathogenic microorganisms. *Krimi* has wide range including all *Apada-Bahupada*, pathogenic – non-pathogenic, movable and alive organisms in it. *Acharya Charka* explained *Krimiroga* based on *Hetvadisaptakagana* (seven specific aspects)<sup>14</sup>. It is said that *Krimi* is itself one of the cause for *Kushtha*, *Pandu*, *Grahani*, *Karshyata* etc<sup>15</sup>. In present and fast forward life people are lacking in awareness about

nutrition & diet, due to this many patients become sufferer of *Krimi* 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 *Krimi*. 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* (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 *Acharya Charaka*, *Kleda* in the body is one of the factors for the production of *Krimi*<sup>16</sup>.

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

#### According to effect on the body -

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

***Sahaja Krimi*:** *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 organisms<sup>18</sup>.

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

- i. *Bahya* or External *Krimi* e.g. - *Yuka*, *Liksha* etc<sup>19-20</sup>.
- ii. *Abhyantara* or Internal - who remain inside the body<sup>21</sup>. These internal *Krimis* also further 3 sub types as:

- i. *Kaphaja*,
- ii. *Raktaja*
- iii. *Pureeshaja*

*Udara Krimi* intestinal worms generally include— *Pureeshaja* and *Kaphaja Krimi*<sup>22</sup>.

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 MalajaKrimi</i> (External)	<i>AbhyantaraKrimi</i> (Internal)			Total No. of <i>Krimi</i>
			<i>Kaphaja</i>	<i>Raktaja</i>	<i>Pureeshaja</i>	
1.	<i>CharakaSamhita</i>	2	7	6	5	20
2.	<i>SushrutaSamhita</i>	-	6	7	6	20
3.	<i>Astangahridya</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>CharakaSamhita</i>	<i>Kesha, Shmasru, Loma, Pakshma, MalinVastra</i>	<i>Rakta-vahiniSira, Rakta-VahiniDhamani</i>	<i>Amashaya</i>	<i>Pakvashaya</i>
2.	<i>SushrutaSamhita</i>	-	-	<i>Amashaya</i>	<i>Pakvashaya</i>
3.	<i>Astangahridya</i>	<i>Kesh, Loma</i>	<i>Rakta-VahiniSira</i>	<i>Amashaya</i>	

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

***SamanyaKrimiNidana***(Common aetiology):

*Nidanarefers* to the causative factors which can be broadly divided into *AharaSambandiNidana*(food-related) and *ViharaSambandiNidana*(activityrelated).

***AharaSambandi***: Milk, jaggery, sesamum, fish, meat or and other products that cause *KaphaUtklesham*, besides, also includes the food which are unctuous, sweet, heavy, cold items etc<sup>23</sup>.

***ViharaSambandi***: *Divaswapna*(day sleep), *Asana* & *Avyayama*(prolonged sitting which indirectly indicates lack of exercise<sup>24</sup>).

**Specific signs of *Krimis***: *AcharyaCharaka* has been described

three *VisheshaRoopas*(cardinal signs) such as *Purishabheda*(unformed stools), *Karshya* (emaciation), *Lomaharsha*(cutis anserina)<sup>25</sup>.

**General signs and symptoms Of *AbhyantaraKrimis***:

*AcharyaSusrutahas* quoted general symptoms are described as: – *Jwara* (fever), *Vivarnata*(discolouration), *Shoola*(pain), *Hridroga*(diseases of the heart), *Bhrama*(giddiness), *Bhaktadwasha*(disinterest towards food), *Atisara*(diarrhoea), *Sadana*(tiredness), *Chardi* (vomitting) and *Swasa*(breathlessness)<sup>26</sup>.

***KrimiSamanyaChikitsa***:(General line of treatment) *AcharyaCharaka* has given three principles for treating the patients of *Krimiroga*. These are *Apakarshana*, *PrakrutiVighata* and *NidanaParivarjana*<sup>27</sup>.

**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. PrakrutiVighata:**

*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*, *UshanaDravyas* 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*<sup>28</sup> (*Snigdha*, *Sheeta*, *Guru*, *Manda*, *Shlakshana*, *Sandra*, *Madhura*, *Picchila*) after producing *Agnimandya*, starts the formation of *Ama* which may favour for the formation of *KaphajaKrimi* and in the same way when *Sara-kitta- vibhajana* take place, *Sarabhaga* performs the function of *Shariraposhana* (nutrition) and *Kittabhaga* 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 *PureeshajaKrimi*. So here *Purisha* will act as its *Prakriti* i.e. causative factor. That's why *acharyaCharak* advises to make use of *dravyas* which possess the opposite properties to the *Kapha* and *Purisha* e.g. *Katu* – *Tikta* – *Kashaya* – *Ushna* – *KsharaDravyas*, 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* (*Amorphophalluscampaunulatus*), *Vidanga* (*Embeliaribes*) etc<sup>29</sup>. Additionally various classical formulations with *Danti* (*Baliospermummontanum*) and *Dravanti* (*Chlorophytumtuberosum*), *Tilvaka* (*Viburnum nervosum*) and *Udallaka* (*Bauhiniavariegata*) *kashaya*etc have also been mentioned<sup>30</sup>.

***Nidanaparivarjana:* (avoiding the causative factors)**

This is the third principle in the treatment of the *Krimi* as avoidance of etiological factors (*Nidanaparivarjana*). Hence, all the factors listed as etiological factors of the *Krimi* and *Apthya* 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 feces<sup>31</sup>. Hand washing with soap appears protective<sup>32</sup>.

## 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 anthelmintic treatment<sup>33</sup>. 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 soil<sup>34</sup>. As previous studies shown the, helminthic infections especially Ascariasis caused by Round worm (*AscarisLumbricoides* –) is a common manifestation. With the knowledge of worms from both the systems of medicine, *PureeshajaKrimi* and its affliction can be co-related to Ascariasis and *Ascarislumbricoides* as they share a lot of similarities. Some of them are explained below:

### General features of *PureeshajaKrimisuch* as:

- I. ***Sthana(Site):****Pakvashaya* which is stated as the *Sthana* for *PureeshajaKrimi*, is considered as a part of intestine between ileocecal junction and sigmoid colon. According to the modern parasitology, organisms like adult *Ascarislumbricoides* (round worms), live in the small intestine and eggs are passed in the
- II. ***Akruty(Shape):****PureeshajaKrimi* has been described as *Sookshma* (minute), *Vritha* (round), *Deergha* (long), *Sthoola* (big), *Prithavapucksa* (flat tail) and *Tanu* (thin)<sup>35</sup>. On the other hand *Ascarislumbricoides* has also been identified to be around, elongated worm measuring 45-70  $\mu\text{m}$  in length and 35-50  $\mu\text{m}$  in breadth<sup>36</sup>.

III. **Varna (color):** *PureeshajaKrimi* is mentioned to possess colours like *Shweta* (white), *Shyava* (pale), *Neela* (blue), *Harita* (green), *Peeta* (yellow)<sup>37</sup>. Nonetheless, *Ascaris* worms are also smooth cream colored surface too<sup>38</sup>. According to *SushrutaGandupada*<sup>39</sup> *Krimis* have been clearly mentioned in *Pureeshaja* type, which can be correlated with „Round Worm“ in modern science. In *HaritaSamhita* accumulation of *Purisha* is the main cause for internal type of *Krimi*, infesting which more like snake in the *Kaphakoshtha* is explained here. *Krimis* name according to their shape, size and habitat. For example *Pruthumunda*, *Sukshma*, *Anavaha* and *Suchimukha* etc<sup>40</sup>.

Hence with the above substantiation it can be assumed that *Ascarislumbricoides* can be considered as a type of *PureeshajaKrimi* in *Ayurveda*.

*Ascarislumbricoides* is responsible for pulmonary disease and obstruction of the intestinal orbiliary tract in children<sup>41</sup>.

**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 eosinophilia<sup>42</sup>, these sign and symptoms

may be correlated to *ShleshmajaKrimi* 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*<sup>43</sup>.

#### **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 small<sup>44</sup>. 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 development<sup>45</sup>. All the above sign and symptoms may be

correlated in *Ayurveda* with signs & symptoms of *Pureeshajakrimis* such as: *Purishabheda*(diarrhoea),

*Karshya*(emaciation), *Parushya* (dryness of skin), *Lomaharsha* (horripilation), *Gudamuhanishkramana* (coming out from anus), *Gudakandu* (pruritisani), *Shula* (acute pain), *Agnimandya* (loss of appetite), *Pandu* (anaemia), *Vishtambha* (constipation & flatulence), *Balakshaya* (weakness), *Praseka* (salivation), *Aruchi* (anorexia), *Hridroga*<sup>46</sup>.

In present era increasing demand of herbal as well *Ayurvedic* medicines, maintaining quality standards is the prime need of hour some *Ayurvedic* medicine have anthelminthic 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 Vermicides<sup>47</sup>.

*AcharyaKashyapa* has quoted the administration of bitter and pungent drugs in *Krimirogas* are well explained. Medicated bath is indicated to destroy the external *Krimis* in *DwivraniyaAdhyaya* and mentioned only the total number of *Krimis* in children<sup>48</sup>.

**Below are listed a few research studies on anthelminthic properties:**

(1.) The aqueous extract of *Sesbaniagrndiflora* the leaves recorded a definite anthelmintic efficacy against *A. galli*<sup>49</sup>.

(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 *Pheretimaposthuma* at all the tested doses when compared to control<sup>50</sup>.

(3.) Methanolic leaf extract of *Tephrosiapurpurea* showed the presence of alkaloids, carbohydrates, flavanoids, tannins and phenolic compounds and the presence of these phytoconstituents were responsible for anthelmintic activity<sup>51</sup>.

(4.) The methanol extract of *Buteamonosperma* seeds, tested in vitro, showed significant anthelmintic activity<sup>52</sup>.

(5.) Clinical management of *PureeshajaKrimi*in children with *PalashaBeejaChoornaby* Dr.Manjunath MP 2004-05.

(7.) Dash Durgaprasad (2001) treatment of *Krimiroga*with the extract of *Hyosyamusniger* Linn- Puri<sup>53</sup>.

Above studies have thus revealed the efficacy of *Ayurvedic* compounds in the

treatment of *PureeshajaKrimi* 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 *PrakrutiVighata*, *NidanaParivarjana*, 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 *ShleshmajaKrimis* are the migrating larvae of nematodes and also parasites present in upper gastro intestinal tract, and *PureeshajaKrimis* are the intestinal parasites in general.

## REFERENCES

1. WHO, Soil-transmitted helminthic infections, (2014) Fact sheet N°366, Available from: <http://www.who.int/mediacentre/factsheets/fs366/en/>
2. Hotez PJ, Molyneux DH, Fenwick A, Molyneux D, Incorporating a rapid-impact package for neglected tropical diseases with programs for HIV/AIDS, tuberculosis and malaria. *PLoS Med*, 2006, (3), e102.
3. Centre for Disease Control and Prevention (2013), Available at <http://www.cdc.gov/parasites/sth/>
4. Blaser MJ, Ravindin JI, Guerrant RL, et al (2008). Gastrointestinal tract infections. In: Richard VG, Hazel MD, Derek W, Mark Z, Peter LC, Ivan MR, *et al.*, editors. *MIMS Medical Microbiology*, 4<sup>th</sup>ed. Europe: Mosby Elsevier; p. 304-11.
5. Celiksöz A, Güler N, Güler G, Oztop AY, Degerli S, Prevalence of intestinal parasites in three socioeconomically-different regions of Sivas, Turkey. *J Health PopulNutr* (2005) (23), 184-91.
6. World Health Organization, Control of Tropical Diseases. Geneva, Switzerland: WHO; 1998.
7. Hotez PJ, Fenwick A, Savioli L, Molyneux DH, Rescuing the bottom billion through control of neglected tropical diseases, *Lancet* 373, (2009), 1570-1575.
8. Grantham-Mc, Gregor SM. Assessments of the effects of nutrition on mental development and behavior in Jamaican studies, *Am J ClinNutr* 57, (1993), 303-309.
9. Hotez P, Hookworm and poverty, *Ann NY AcadSci* 1136, (2008), 38-44.
10. Ault SK, Intersectoral approaches to neglected diseases, *Ann NY AcadSci* 1136, (2008), 64-69.
11. KantadevRadha, Shabdhakalpadruma, 3rd ed., Chaukhambha Sanskrit Series Office, Varanasi, 1967, p. 178.
12. Jakhmola R.K, Micro-organisms in Vedas, Ayurvedic concepts in Vedas, (2013), Serial in the internet, cited 22 oct
13. Devanathan R, GopinathV, Brindha P, Ayurvedic concepts in Vedas, (2013), Serial in the internet. cited 22 oct
14. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi 2009, Viman Sthana, 7/31, p. 735.
15. Danga SK, Bombarde DT, Pinge CD, Gulhane CM, Petkar S, (2014), A Clinical Study of Khadiradikashaya in Purishajkrimi With special reference to Worm Infestation, *International Journal of Ayurvedic Medicine*, 5(4), p. 315-320.

16. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi2009, Sutar Sthana,17/37, p. 337.
17. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi2009, Viman Sthana,7/10, p. 726.
18. Jaisawal V, Intestinal krimi in childrens and its management, World Journal of Pharmaceutical Research, 5(8), p. 524-537.
19. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi2009, VimanSthana,7/10, p. 726.
20. Brahmanandtripathi, Astangahrdayam, reprint, Chaukhambha Sanskrit pratishthan, Delhi 2011, ChikitshiyaSthan, 14/43-45, p. 534.
21. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi 2009, Viman Sthana,7/10, p. 726-727.
22. Jaisawal V, Intestinal krimi in childrens and its management, World Journal of Pharmaceutical Research, 5 (8), p. 524-537.
23. ShastriKavirajaAmbikadutta, SusrutSamhita, reprint, Chaukhambha Sanskrit Sansthan, Varanasi 2010, UttaraTantram , 54/ 3-5, p.506.
24. BhisagacharyaSatyapala, KashyapaSamhita, reprint, ChaukhambhaVisvabharati, Varanasi, 2008, Chikita Sthana,15/1-6, p.200.
25. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi 2009, Viman Sthana,7/13, p. 727.
26. ShastriKavirajaAmbikadutta, SusrutSamhita, reprint, Chaukhambha Sanskrit Sansthan, Varanasi 2010, UttaraTantram, 54/ 3-5, p.506.
27. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi 2009, VimanSthana, 7/13, p. 727.
28. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi 2009, SutarSthana, 1/61, p.37.
29. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi 2009, SutarSthana, 4/15, p.82.
30. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharatiAcademy, Varanasi 2009, VimanSthana, 7/26, p.733.
31. Dold C, Holland, CV, (2011), Ascaris and ascariasis, *Microbes and infection / Institut Pasteur*, 13 (7), p.632-7.
32. Fung IC, Cairncross S. (Mar 2009). Ascariasis and handwashing, *Transactions*

*of the Royal Society of Tropical Medicine and Hygiene*, 103 (3), p.215–22.

33. WHO, Soil-transmitted Helminthiasis. Eliminating Soil-transmitted Helminthiasis as a Public Health Problem in Children: Progress Report 2001e2010 and Strategic Plan 2011e2020. Geneva: World Health Organisation; 2012:3e4.

34. Robert M Kliegman, The E-book, Nelson Test book of Pediatrics, 20<sup>th</sup>ed.,Section 16 Helminthic Diseases, Ascariasis (*Ascarislumbricoides*),p. 2459.

35. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi 2009, VimanSthana 7/13, p.727.

36. Robert M Kliegman, The E-book, Nelson Test book of Pediatrics, 20<sup>th</sup>ed.,Section 16 Helminthic Diseases, Ascariasis (*Ascarislumbricoides*), p. 2459.

37. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharatiAcademy, Varanasi 2009, VimanSthana, 7/26, p.733.

38. Paul V, bagga A, Ghai essential Pediatrics, 8<sup>th</sup> ed., CBS publishers and distributors pvt ltd, new Delhi 2010, p. 274.

39. ShastriKavirajaAmbikadutta, SusrutSamhita, reprint, Chaukhambha

Sanskrit Sansthan, Varanasi 2010, UttaraTantram, 54/ 8, p.509.

40. Tripathiprasdha, Haritsamhita, 2<sup>nd</sup> ed., Chaukhambha Sanskrit Series, Varanasi 2009, 5/9-11, p. 235.

41. Robert M Kliegman, The E-book, Nelson Test book of Pediatrics, 20<sup>th</sup>ed.,Section 16 Helminthic Diseases, Ascariasis (*Ascarislumbricoides*), p. 2460.

42. Robert M Kliegman, The E-book, Nelson Test book of Pediatrics, 20<sup>th</sup>ed.,Section 16 Helminthic Diseases, Ascariasis (*Ascarislumbricoides*), p. 2459.

43. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi 2009, Viman Sthana,7/12, p.727.

44. Dold C, Holland CV, (2011). *Ascaris* and ascariasis, *Microbes and infection/ InstitutPasteur*, 13 (7), 632–7.

45. Robert M Kliegman, The E-book, Nelson Test book of Pediatrics, 20<sup>th</sup>ed.,Section 16 Helminthic Diseases, Ascariasis (*Ascarislumbricoides*), p. 2460.

46. ShastriSatyanarayana, Charakasamhita, reprint, ChaukhambhaBharati Academy, Varanasi 2009, Viman Sthana,7/13, p.727.

47. Prakash V, Mehrotra BN (1987). Anthelmintic plants in traditional remedies in India. *Ind J history*, 22(4), p. 332-40.

48. Bhisagacharya Satyapala, Kashyapa Samhita, reprint, Chaukhambha Visvabharati, Varanasi 2008, Chikita Sthana, 15/1-6, p.200-2001.
49. Jothikarumari R, Sumathi S, Vijayalakshmi K, Balasubramanian E (2014). Anthelmintic Efficacy of Sesbaniagrandiflora Leaves and Solanum torvum Fruits against the Nematode Parasite Ascaridia galli. Am J Ethnomed, 1(5), p. 326-33.
50. Deb Prashanta KR., Ghosh R, Das S, Bhakta T (2013). In-vitro Anthelmintic activity of Acorus Calamus leaves. Asian J Pharmaceut Clin Res, 6(3), p. 135-7.
51. Manjula RR, Spandana U, Anand TJ, Sudheer M (2013). In-vitro anthelmintic activity of aqueous and methanolic leaf extract of tephrosia purpurea Linn. Int J Respharchem, 3(1), p. 12-4.
52. Prashanth D, Asha MK, Amit A and Padmaja R (2001). Anthelmintic activity of Butea monosperma. Fitoterapia, 72(4), p. 421-422.
53. Dash Durgaprasad (2001) treatment of Krimi Roga with the extract of Hyosyamus niger Linn- Puri. Serial in the internet. cited 22 oct 2013.