

## REVIEW ARTICLE

# A Review to Illustrate the Concept of Krimi in Ayurveda

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### ABSTRACT

**Background:** Knowledge of *Krimi* and its description in Vedas and Ayurvedic Samhitas is very unique and different from the concept of worm in modern medical science. *Krimi* is a broad terminology in ancient Indian science which encompasses various types of helminths, microorganisms such as bacteria, viruses, fungi, and protozoa causing a large variety of diseases.

**Materials and Methods:** A narrative review was conducted and result was presented under the result.

**Result and Discussion:** *Krimi Roga* is one among the various diseases which must be paid prime attention in terms of Ayurveda management. Drugs and formulations from herbal sources play key role in management of these helminthic and parasitic infections. A majority of patients being from pediatric age segment, the knowledge of *Krimi Roga* management may bring a boon to pediatric ailments.

**Conclusion:** Ayurveda believes in Prakriti (specific body constitution of the individual), if we can change the internal environment of the intestine (Kostha) through Apkarshana, Prakriti Vighata and Nidana parivarjana using appropriate drugs as well as enhancing the strength of Agni; then, affinity towards production and multiplication of *Krimi* may be arrested and hence, the ailments can be treated.

## 1. INTRODUCTION

*Krimi* is a condition, affecting all age groups, but children have always been at risk due to their playful activities and lack of maintenance of adequate personal hygiene. Once infected, the entire family may eventually get affected from the infected children.<sup>[1]</sup> If we consider *Drishya Krimi* as worm infestation, In India, more than 200 million children are infected on an average with roundworm, hookworm, etc. In Ayurveda, several causes (*nidanas*) have been mentioned for development of *Krimi* (microbes/worms) in human body like *Ajirna* (indigestion in GIT), *Adhyashana* (eating even when the previous meal has not been digested), *Asatmyaahara*, *Virudhasana*, *Malinasana* (incompatible foods or unhygienic meal habit), *Avyayam* (sedentary lifestyle), *Diwaswapna* (sleeping during the daytime), *Guru* (heavy), *Atisnidgha* (excessively fatty diet), *Atisheet Ahara-Vihara* (cold

food) and, excessive use of *Masha*, *Pishthanna* (pasted food), *Dal* (legumes), *Mrinaal Kand* (stalk and root of lotus), *Sura* (excessive intake of wine), *Dhadhi* (yoghurt), *Dugdha* (milk), *Guda* (jaggery), etc lead to the excitation of kapha and pitta which in turn produce worm of various type and sizes at different sites in the body.<sup>[2]</sup> *Krimi* have been told to be of two types majorly i.e *Bahya* (external) and *Abhyantara* (internal). These are further of four types mentioned arising from external dirt, *Kapha*, *Asrika* (blood) and mala and twenty types by their respective names.<sup>[3]</sup>

### 1.1. Epidemiology and Prevalence

Recent global survey reports indicate that more than a quarter of the world's population have been infected with one or more of the parasitic or helminth infection.<sup>[4]</sup> Most of the developing countries show high prevalence of worm infestation due to poor personal and environmental hygiene. In the year 2008, the WHO has reported 1100 million people who were exposed to the risk of worm infestations.<sup>[5]</sup> It is one of the most common diseases found in pediatric patients. Despite of medical advancement, still it exists a class of population who are victims of

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parasitic infestations that is ruining their health. The actual prevalence rate however cannot be figured out as they either remain undiagnosed or may not be reported at all. Overall prevalence of intestinal worm infection was found to be 49.38%. *Ascaris* was the most common among the parasites (46.88%), followed by *Taenia* (2.1%) and then *Hymenolepis nana* (0.21%). Cure rate was found out to be 66% for *Ascaris* and 100% in other cases of worm infestation.<sup>[6]</sup> More than 1.5 billion people worldwide, or 24% of the world's population, have been found to be infected with soil-transmitted helminth infections. Infections have been widely distributed as per tropical and subtropical areas, with the highest numbers occurring in sub-Saharan Africa, the Americas, China, and East Asia.<sup>[7]</sup> Over 270 million preschool-age children and over 600 million school-age children have been found to be living in the areas where these parasites are intensively transmitted, and are in need of therapeutic and preventive medical interventions.<sup>[7]</sup> Developing countries in South-east Asian region spent 3.76% of total annual budget for health in year 2010.<sup>[8]</sup> As worm infestation appears as one of the major economic burden to the country. However, according to the WHO, 1100 million people were defecating in the open space resulting in high levels of environmental contamination and exposure to the risk of worm infestations.<sup>[5]</sup> The prevalence data reveal the need of understanding the concepts of *Krimi* (parasites/microbes) as per the basic principles of Ayurveda and hence, the aim of the present article is to review on basic concepts of *Krimiroga* as per the principles of Ayurveda.

## 2. MATERIALS AND METHODS

The classical texts of Ayurveda, lexicons, and text books were explored and internet sources were also explored. A detailed review was carried out and all the collected data were presented in an organized manner under the result.

## 3. RESULTS OF LITERATURE REVIEW

### 3.1. Etymology of *Krimi*

In Vedic and Ayurvedic literature, the word “*KRIMI*” is used to denote “tiny living beings”. The word “*KRIMP*” is derived from the root “*KRAMU*” which means “to step” or “to walk.” Those who are capable to break or injure the surroundings are termed *Krimi* or *Keeta*.

### 3.2. History of *Krimi*

Vedic period (5000B.C. - 2500B.C.)-In *Rigveda*, the word *Adrishta* (invisible to the naked eye) denotes the *Krimi*. In *Yajurveda*, *Krimi* is mentioned in context to *Nilangu* which is said to be a species of worm (Tapeworm). A detailed description of *Krimi* is available in *Atharvaveda* which includes description about its synonyms, habitat, origin, classification, pathogenicity (*Samprapti*), and treatment. *Krimighna* medicines such as *Ajashringi*, *Guggulu*, *Naladi*, *Mahavriksha* have been mentioned to be used in *Atharvaveda*. In *Atharvaveda*, some synonyms are used for *Krimi* such as *Rakshasa*, *Pishacha*, *Yatudhana*, *Kimidin*, *Asura*, *Gandharva*, and *Apsara*.

### 3.3. Samhita Period (2500 B.C.-600 A.D.)

- Charaka Samhita (2500/1000 B.C.)-Charaka has mentioned about the classification and nomenclature of various types of *Krimi* in Sutra Sthana and *Krimi Roga* has been described in detail in *Vimana Sthana* of Charaka samhita.
- Sushruta Samhita (500 B.C.)-*Nidana* (Causative factors), *Rupa* (signs and symptoms), classification, and treatment of *Krimi* were described in detail in chapter 54 of Uttara Tantra. The description of Bahya *Krimi* is not available in Susruta Samhita. Detail

description of *Gandupada Krimi* has also been mentioned which is peculiar to this author.

- Bhela Samhita (1000 B.C.)-Here the count of *Krimi* described is 20 types and their names have been mentioned.
- Harita Samhita (1000 B.C.)-In the 3<sup>rd</sup> *Sthana* of Harita Samhita, *Nidana* (causes), classification, Pathogenesis (*Samprapti*), *Rupa* (signs and symptoms), treatment modalities *Chikitsa*, etc. have been detailed. The count of *Krimi* has been mentioned as 13 here.
- Kashyapa Samhita (100-300 A.D.)-The treatment modalities of the *Krimi Roga* have been mentioned in the *chikitsa sthana* of Kashyapa Samhita and no *Rupa/Nidana* has been mentioned. In this chapter administration of bitter (*Tikta*) and pungent (*Kashaya*) drugs in *Krimi Roga* have been elaborately explained.

### 3.4. Medieval Period (Sangraha Kala) (600 A.D.-1300 A.D.)

- Astanga Sangraha and Astanga Hridaya (7<sup>th</sup> Century A.D.) -These texts have elaborately explained *Nidana* (causative factors), classification and *Lakshana* (signs and symptoms) of *Krimi Roga* in *Nidana Sthana* and treatment protocol has been given in *Chikitsa Sthana* of the text.
- Madhava Nidana (900 A.D.)-In the 7<sup>th</sup> chapter, the external and internal types of *Krimi* have been classified and described. Twenty types of *Krimi* have been mentioned and described according to their respective origins and habitats.

### 3.5. Modern Period (After 1300 A.D.-Till date)

- Sharangdhara Samhita (1300-1400 A.D.) -The number of *Krimi*, that is, 21 (unlike the previous texts), etiology (*Nidana*), classification, and (*Rupa*) symptomatology have been mentioned.
- Rasaratna Samuchaya (1300 A.D.) - In the 20<sup>th</sup> chapter, *Krimi Chikitsa* (treatment modalities of *Krimi*) has been described. Many *Rasaushadhis* have been mentioned with *Kasthaushadhi* (herbal drugs) for the Ayurveda management of *Krimi Roga*.
- Bhavaprakasha Samhita (1600 A.D.) A detailed description about the classification, aetiology (*Hetu*), and symptomatology (*samprapti*) of *Krimi* is found in Madhyama Khanda, 7<sup>th</sup> Adhyaya.

### 3.6. Types of *Krimi*

- According to the basis of pathogenesis: *Krimi* has been divided into *Avaikarika* (*Sahaja*) and *Vaikarika*. *Sahaja* (non-pathogenic organisms) *Krimi* are naturally present in the gut flora as a symbiotic agent.<sup>[9]</sup> *Vaikarika* (pathogenic organisms) *Krimi* are of majorly two types-*Bahya* (external) and *Abhyantara* (internal).
- Krimi* Types *Raktaja*, *Kaphaja* or *Shlesmaja*, and *Purisaja* are the three subgroups of *Abhyantara* (internal) *Krimi*. *Bahya Krimi* has been mentioned in the Charaka Samhita in reference to hair, eyelashes or any other belonging of the patient like clothing, etc. *Brihatrayi* authors mentioned *Abhayantara Krimi* and their location seats in the body where internal *Krimi* are located.
- Symptoms of *Krimi* - Almost all Ayurvedic books (except Charaka Samhita) have listed the common signs and symptoms of all *Krimi*, including fever, cramping discomfort, skin pallor, heart problems, vertigo, decreased appetite, lassitude, diarrhea, and vomiting.

### 3.7. Samprapti Ghataka

- Dosha-Tridosha* (*Kapha pradhana*)
- Dushya*-(*Dhatu*) *Rasa*, *Rakta*, *Mamsa*, *Meda*, *Asthi*, *Majja*.
- Srota*- *Annavaha*, *Mamsavaha*, *Swedavaha* *Purishavaha*,

- *Raktavaha*,
- *Adhithana - Pakwasaya (Purisaja Krimi); Raktavahi Dhamani (Raktaja Krimi); Amasaya (Kaphaja Krimi) Kesha, Shmashru, Loma, Pakshma, Vasana (Malaja Krimi)*
- *Agnidusti-Mandagni (Ama formation)*
- *Rogamarga-Abhyantara and Bahya*
- *Vyakti- (a) Krimi Lakshana (sign and symptoms) (b) Krimi Darshana (in microscopic examination ova or cyst present)*
- *Svabhava - Chirakari (Chronic) and Asukari (Acute)*

### 3.8. Chikitsa Siddhanta<sup>[10]</sup> (Line of Treatment)

Acharya Charaka described *Samanya Chikitsa Shidhanta* (general treatment modality) of *Krimi Roga* in a three major steps. These are-

1. *Apakarsana-Apakarshana* means removal or expulsion of the *Krimi* from their *sthana* (site and location). The *Krimi* from the intestine have been told to get expelled by the administration of *Sirovirechana*, *Vamana* (vomiting), *Virechana* (purgation), and *Asthapana* (corrective enema). According to Charaka, *Krimi* have been told to be extracted by hand (with or without the help of instruments).
2. *Prakriti Vighata*-It means the removal of the causative factors which are responsible for the production and development of the *Krimi*. *Katu* (pungent taste), *Tikta* (bitter taste), *Kashaya* (astringent taste), *Ushna* (hot potency) *Dravyas*, etc. may change the intestinal environment which ultimately may ultimately hamper the growth of the *krimi*.
3. *Nidana Parivarjana*-Abstinence of the *Nidanas* or the etiological factors of the *Krimi Rogas* have been included in this treatment modality.

*Sadhyasadhya* (prognosis)-*Alpa Kala* (less duration of illness/ chronicity), *Alpa Roga Bala* (lessened severity of the disease), and *Adhika Rogi Bala* (strong parameters of the patient), are the factors for *Sukha Sadhya* (easy cure) of the diseases of *Krimi*. Whereas, if the *Rogi Bala* is lessened in the body, *Roga Bala* is adequate and *Krimi* persists for a long time i.e longer chronicity of the disease, it may lead to *Krichhrasadhya* or *Asadhya* (in curable) condition.

### 4. DISCUSSION

According to Ayurveda, *Krimi* has been mentioned to be majorly of two types-*Drishya* and *Adrishya*, which broadly covers all the parasitic/ microbial infestations. *Adrishya Krimi* has been identified with the application of *Anumana Pramana* through the analysis of signs and symptoms. Based on pathogenicity, *Krimi* has been divided into *Avaikarika* and *Vaikarika*. As per the habitat, *Krimi* has been classified under two broad headings, that is, *Bahya* (external) and *Abhyantara* (internal). Ayurveda distinctively describes three types of *Abhyantara Krimi*, namely, *Raktaja Krimi*, *Kaphaja Krimi* and *Purishaja Krimi*.

Several etiological factors have been told to be responsible for the genesis (origin) of *Krimi* such as *Adhyashana* (eating even when previous meal has not been digested), *Ajirna Bhojana* (eating in spite of persistent indigestion), *Asatmya Bhojana* (non-suitable foods), *Viruddha Bhojana*, *Malina Bhojana* (contaminated food), *Ati Guru* (excessively heavy meals), *Ati Snigdha* (excessive oily foods), *Ati Drava Dravya* (excessive liquid foods), *Avyayama* (lack of exercise and sedentary lifestyle), *Divaswapna* (day sleep). These causative factors the *Dosas* first get vitiated and then get affected the *Dushyas* like *Ahara Rasa*, *Purisha*, *Rakta*, etc. and produce "*Jatharagni Mandya*" which leads to the production of *Ama*. The *Ama Anna* creates a convenient environment for the existence, survival, genesis,

as well as multiplication of *Krimi* in the *Pureesha Vaha Srotas*. The *Krimi* then start to move to different parts of *Anna Vaha Srotas* and *Purisha Vaha Srotas* and produce several ailments in relation to the digestion, metabolism, and assimilation of the ingested food. The specific signs and symptoms of *Krimi Roga* such as *Pureesha Bheda* (diarrhoea), *Gudamukha Todakandu* (perineal itching), *Loma Harsha* (horripilation), *Kashaya* (emaciation), etc. have been mentioned in Ayurvedic scriptures and are found to be similar to the helminthiasis of contemporary science.

### 5. CONCLUSION

Hence, periodic examination of the stool for routine examination; ova, parasite and cyst, occult blood test. etc. proves quite useful for the confirmation of the diagnosis. Proper sanitation, providing pure water, uncontaminated food, and maintenance of personal hygiene are the key factors to decide the treatment modalities of *Krimi*. Ayurveda believes in *Prakriti* (specific body constitution of the individual), if we can change the internal environment of the intestine (*Kostha*) through *Apkarshana*, *Prakriti Vighata* and *Nidana parivarjana* using appropriate drugs as well as enhancing the strength of *Agni*; then, affinity towards production and multiplication of *Krimi* may be arrested and hence, the ailments can be treated.

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### 10. CONFLICTS OF INTEREST

Nil.

### 11. DATA AVAILABILITY

This is an original manuscript and all data are available for only review purposes from principal investigators.

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