



A REVIEW ON THE CONCEPT OF *PURISHAJA KRIMI* OF *AYURVEDA* ALONG WITH ITS MODERN CORRELATION

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ABSTRACT

Ayurveda is the oldest medical science and its object is not only to restore the health of a healthy individual but also to get rid of ailing individuals from different ailments. Since the ancient period, worm infestations are still present with worldwide cosmopolitan distribution among different classes. The greater infestations in our country especially among children due to improper unhygienic diet and behaviour due to illiteracy triggered by environmental and socio-economic status (population, pollution, poverty) make the burden of severe nutritional deficiencies, anaemia and death sequentially. According to Ayurveda, worms are discussed under the topic of Krimi and helminthiasis can be correlated with the Purishaja Krimi. The Veda has indicated the existence of Krimi and Ayurvedic classics have already mentioned the existence of Krimi and the classification of Krimi. Purishaja Krimi (faeces-born parasites) are found in Pakwashaya (colon) and when they are excessively grown, move downwards and sometimes when they move towards Amasaya (stomach), then eructation produces faecal odour. During the infestation of Purishaja Krimi, several health hazards appear such as diarrhoea, emaciation, dryness, horripilation, etc. Modern medicines (albendazole, mebendazole etc.) have not been able to completely eradicate the same. Also, these drugs have a lot of adverse effects. Specific management has been mentioned by our classics to arrest and eradicate the genesis as well as multiplication of the helminth, some drugs are ought to be introduced to our people. The management approach in Ayurveda involves three stages namely Apakarshana (elimination therapy), Prakriti Vighata (destruction of the susceptible environment of Krimi) and Nidana Parivarjana (avoiding the daily lifestyle hacks leading to Krimi.)

Keywords: Krimi, worm, Helminthiasis, Purishaja Krimi, Pakwashaya.

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INTRODUCTION

The Concept of *Krimi* is not new, since the ancient period worm infestations are still present with worldwide cosmopolitan distribution among different classes. The description of *Krimi* is found in the *Vedic* period. In modern medical science, there are separate branches for worms (helminthology) and microbes (microbiology), but in *Ayurveda*, the word *Krimi* is used for all worms and microbes. In *Ayurveda*, *Acharyas* described the classification, causes, symptoms and treatment of the *Krimis*, they have described 20 types of *Krimis*. According to Modern science, some microorganisms are beneficial and some are harmful, which can be correlated with *Sahaja* (non-pathogenic) and *Vaikarika* (pathogenic) *Krimis* of *Ayurveda* respectively. Approximately 1.5 billion people, or 24% of the world's population, are infected with soil-transmitted helminths worldwide [1]. India is a widely prevalent Asian country with 60% to 80% of estimated cases found in West Bengal, Bihar, Orissa, Punjab, Tamilnadu (east coast) and Andhra Pradesh [2]. Roundworm or *Ascaris* infections are commonly found reaching the number estimated cases of about 1.3 billion [3]. During the infestation of *Purishaja Krimi*, several health hazards appear such as diarrhoea, emaciation, dryness,

horripilation, etc. Modern medicines (albendazole, mebendazole etc.) have not been able to completely eradicate the same. Also, these drugs have a lot of adverse effects. Proper sanitation, providing pure water, uncontaminated food and maintenance of personal hygiene are the key solutions to Helminthiasis. As *Ayurveda* believes in *Prakriti* (nature of individual), if we can change the internal environment of the intestine (*Kostha*) by enhancing the strength of *Agni*, then affinity towards production and multiplication of parasites may be arrested. The management approach in *Ayurveda* involves three stages namely *Apakarshana* (elimination therapy), *Prakriti Vighata* (destruction of the susceptible environment of *Krimi*) and *Nidana Parivarjana* (avoiding the daily lifestyle hacks leading to *Krimi*.)

LITERARY REVIEW

The etymology of *Krimi* – According to *Vedic* and *Ayurvedic* literature, the word '*KRIMI*' is used to denote 'tiny living beings. The word '*KRIMI*' is derived from the root '*KRAMU*' which means 'to step or to walk'.

On the basis of pathogenesis; *krimis* are divided into *Avaikarika* (*Sahaja*) and *Vaikarika*. *Sahaja* is meant for non-pathogenic organisms, which are present in the gut flora as a symbiotic agent naturally. According to

habitat, *Vaikarikis* are classified in two broad headings i.e. *Bhahya* (external) and *Abhyantar* (internal). *Abhyantar Krimis* are of 3 types. These are *Raktaja*, *Slesmaja* and *Purishaja*. *Purishaja Krimi* is one of the important categories of internal verities. *Purishaja* means that which originates from *Purisha*^[4]. So, *Purishaja Krimi* may be called the *Krimi* which either originates or resides in *Purisha*.

HISTORY OF KRIMI

The history of *Ayurveda* starts from the *Veda* (5000B.C. - 2500B.C.). The word 'KRIMI' is used to denote all the worms and microorganisms in the *Vedas*. A detailed description of *Krimi* is available in *Atharvaveda* including its synonyms, habitat, origin, classification, pathogenicity and treatment^[5]. In *Arthashastra* of *Kautilya*, *Udara Krimis* are described very clearly. *Charaka*(2500/1000 B.C.) has given the classification and nomenclature of *Krimi* in *Sutra Sthana*^[6] and *Krimi Roga* is described in detail in *Vimana Sthana*^[7], chapter 7(*Vyadhitarpuyam Adhyaya*). *Susruta Samhita* (500 B.C.) described *Nidan*, *Rupa*, classification and treatment of *Krimi* in detail in chapter 54 of *Uttar Tantra (Krimiroga Pratishedha)*^[8]. *Bhela Samhita*^[9] (1000 B.C.) described only the no. of *Krimis* (20 types) and their names are mentioned. *Nidan*, classification, *Samprapti*, *Rupa*, *Chikitsa* etc. were described in the 3rd

Sthana, Chapter 5 of *Harita Samhita* (1000 B.C.)^[10]. The no. of *Krimis* is given as 13 in *Kashyapa Samhita* (100-300 A.D.)^[11]. The only treatment portion of the *Krimi Roga* is found in the *Chikitsa Sthana* of *Kashyapa Samhita*. In this chapter administration of bitter and pungent drugs in *Krimi Roga* are well explained. *Astanga Samgraha* and *Astanga Hridaya*^[12] (7th Century A.D.) explained *Nidan*, classification and *Lakshanas* of *Krimi Roga* in *Nidana Sthana* and treatment was given in the *Chikitsa Sthana*. According to *Madhava Nidana* (900 A.D.) 7th chapter (*Krimi Nidanam*), the external and internal types of *Krimis* are classified^[13]. Internal *Krimis* were further classified into three such groups such as *Raktaja Krimi*, *Purishaja Krimi* and *Sleshmaja Krimi*. A total of 20 types of *Krimis* were described according to their origin and habitat. *Bhavaprakasha Samhita*(1600 A.D.) explained the classification, aetiology, and symptomatology of *Krimi* very well in *Madhyama Khanda*, 7th *Adhyaya*^[14]. *Rasaratna Samuchaya* (1300 A.D.) has been explained by *Krimi Chikisa* in the 20th chapter^[15]. Many *Rasaushadhis* were described with *Kasthaushadhi* for the treatment of *Krimi Roga*.

Types of *Krimi*-

A) According to the site in the body-

1. *Bahya*(external) or *Malaja Krimi* and 2. *Abhyantara Krimis* are of 3 types.a) *Raktaja Krimi*,b) *Sleshmaja Krimi* and c) *Purishaja Krimi*.

Table No.1

Showing Sub-classification and Total number of *Krimis* according to their Site as mentioned in different *Ayurvedic* classics

Sl.No.	Ayurvedic Texts	<i>Bahya/MalajaKrimi</i> (External)	<i>AbhyantaraKrimi</i> (Internal)	Total No.
1.	<i>Charaka Samhita</i>	02	18	20
2.	<i>Sushruta Samhita</i>	-	20	20
3.	<i>Ashtanga Samgraha</i>	02	18	20
4.	<i>Bhela Samhita</i>	-	20	20
5.	<i>Sarangdhara</i>	02	19	21
6.	<i>Harita Samhita</i>	07	06	13
7.	<i>Madhava Nidana</i>	02	18	20
8.	<i>Bhava Prakasha</i>	02	18	20
9.	<i>Yoga Ratnakara</i>	02	18	20

B) According to the source of origin-

1. *Malaja*-These *Krimis* originate from *Bahya-malas* like sweat, dirt, clothes etc.
2. *Raktaja*-This originates from *Rakta* or blood.
3. *Sleshmaja*- Those originate from *Sleshma Sthana* i.e *Amashaya*
4. *Purishaja*- Those originate from *Pakwashaya* or *Purisha*.

According to the Modern Medicine, based on their shape and other characteristics, helminths are classified into two groups^[16].

1. Phylum Platyhelminthes (Flatworms): It includes two classes:
 - i. Class: Cestoda (Tapeworms) Ex - T.saginata, T.solium, H.nana
 - ii. Class: Trematoda (Flukes or Digeneans) Ex- F.buski, G.hominis, S.mansoni

2. Phylum Nematelminthes (Cylindrical worms): It includes Class Nematoda. Ex - A.duodenale, E.vermicularis, A.lumbricoides.

Table No.2
Differences between Cestodes, Trematodes and Nematodes ^[17]

Helminth	Cestodes	Trematodes	Nematodes
Shape	Tape-like, segmented	Leaf-like unsegmented	Elongated, cylindrical, unsegmented
Head end	Suckers are present; some have attached hooks.	Suckers are present but no hooks.	Hooks and sucker absent. Well-developed buccal capsule with teeth or cutting plates is seen in some species.
Alimentary canal	Absent	Present but incomplete, no anus	Complete with anus
Body cavity	Absent, but inside is filled with spongy undifferentiated parenchymatous cells, in the midst of which lie the viscera.	Same as cestodes	Present and known as pseudocoel. Viscera remains suspended in the pseudocoel
Sex	Not separate: Hermaphrodite (monoecious)	Not separate: Hermaphrodite except Schistosoma	Separate (diecious)

Life cycle	Requires two hosts except for Hymenolepis(one host) and Diphyllbothrium (three hosts).	Requires three hosts except schistosomes (two host).	Requires one host except filarial worms (two host) and Dracunculus (two host).
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Purishaja Krimi-

Purishaja Krimis have been designated according to their shape and the symptoms they produced. Except for *Susruta*, all others followed *Charaka's* view. These types of *Krimis* remain in *Pakwashaya* or colon. When they are grown in size and number, they circulate downwards and when increase, they move upwards towards the stomach, the patient gets faecal eructation and faecal odour in breath^[18].

Another *Krimis* of this group mentioned by *Susruta* like *Gandupada* and *Churu* have been undertaken by *Charaka* and *Vagbhatta* in the *Sleshmaja* group. *Dvimukha* of *Susruta* indicates those *Krimis* have two mouths moving freely in the intestinal canal. The *Ayurvedic* literature has mentioned *Pakwashaya* as the site for these *Krimis* and from here they move up or down. *Harita* has mentioned *Malashaya* for this. *Malashaya* or *Pakvashaya* are of similar structure.

Table No.3

Showing the Total number of *Purishaja Krimi*

Sl.No.	Ayurvedic texts	<i>Purishaja Krimi</i>
1.	<i>Charaka Samhita</i>	05
2.	<i>Sushruta Samhita</i>	07
3.	<i>Ashtanga Samgraha</i>	05
4.	<i>Bhela Samhita</i>	-
5.	<i>Sarangdhara Samhita</i>	05
6.	<i>Harita Samhita</i>	-
7.	<i>Madhava Nidana</i>	05
8.	<i>Bhava Prakasha</i>	05
9.	<i>Yoga Ratnakara</i>	05

Table No.4

Showing the Specific Nomenclature of *Purishaja Krimis* of different types as described in *Brihatrayee*

Types	Name of the <i>Krimis</i>	<i>Charaka</i> ^[19]	<i>Sushruta</i> ^[20]	<i>Vagbhatta</i> ^[21]
<i>Purishaja Krimi</i>	<i>Kakeruka</i>	+	-	+
	<i>Makeruka</i>	+	-	+
	<i>Leliha</i>	+	-	+
	<i>Sausurada</i>	+	-	+
	<i>Sashula</i>	+	-	+
	<i>Ajava</i>	-	+	-
	<i>Vijava</i>	-	+	-
	<i>Kipyra</i>	-	+	-
	<i>Chipyra</i>	-	+	-
	<i>Gandupada</i>	-	+	-
	<i>Churu</i>	-	+	-
	<i>Dvimukha</i>	-	+	-

Table

No.5

Showing Classification of *Purishaja Krimi*

According to <i>Charaka Samhita</i>	According to <i>Susruta Samhita</i>	According to <i>Madhava Nidana</i>
<i>Kakeruka</i>	<i>Ajava</i>	<i>Kakeruka</i>
<i>Makeruka</i>	<i>Vijava</i>	<i>Makeruka</i>
<i>Leliha</i>	<i>Kipyra</i>	<i>Sausurada</i>
<i>Sasulaka</i>	<i>Cipyra</i>	<i>Sasulaka</i>
<i>Sausurada</i>	<i>Gandupada</i>	<i>Leliha</i>
----	<i>Curava</i>	----
----	<i>Dwimukha</i>	----

Table No.6

Showing the Morphological Character of *Purishaja Krimi*

Sl.No.	Morphology	<i>Charaka</i> ^[22]	<i>Sushruta</i> ^[23]	<i>Vagbhatta</i> ^[24]
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1.	Minute	+	+	-
2.	Thick	+	-	+
3.	Rounded	+	-	+
4.	Wide	-	+	+
5.	Thin	-	-	+
6.	Long	+	-	-
7.	Flat tailed	-	+	-
8.	Wool-like structure	+	-	-
9.	Red	-	+	-
10.	Blue	+	-	-
11.	Green	+	-	-
12.	Black	+	-	+
13.	White	+	+	+

It is not possible to give an exact explanation of various names of *Krimis* mentioned by the different authors, however, based on

etymological derivation or verbal meaning few *Krimi* can be explained in the following way-

Table No.7

Showing explanation of all *Krimis* according to their name

<i>Kakeruka</i>	A detailed description is not available.
<i>Makeruka</i>	(<i>Makara</i> =Crocodile) <i>Krimi</i> has rough ridges like a crocodile on the dorsal surface of the body.
<i>Leliha</i>	<i>Krimi</i> has a snake-like movement of the tongue or It may belong to the shape of the snake.
<i>Gandupada</i>	(<i>Gandu</i> =Knot, <i>Pada</i> =foot) Similar to earthworms.
<i>Dvimukha</i>	<i>Krimi</i> has a double mouth or mouth-like structure on both the ends of the body
<i>Ajava</i>	Without segment
<i>Vijava</i>	With segment
<i>Sashulaka</i>	This <i>Krimi</i> causes pain in the abdomen.
<i>Sausurada</i>	This produces fermentation in the lumen, survives on the same and causes irritation in the large intestine by eroding the lumen.

PROBABLE MODERN CORRELATION OF PURISAJA KRIMI

The various commentators of *Ayurvedic Samhitas* and other scholars have always tried to correlate the various *Krimis* with the modern concept of parasitology, microbiology and bacteriology. The following points should be kept in mind in establishing the correlation of *Krimi* with microbes. These are- a) Mode of entry and aetiology, b) Sites (habitat), c) Morphology, d) Nomenclature & e) Pathogenicity. *Charaka* and other *Acharyas* have given special morphological characters

for *Purishaja Krimi*. They said that they have a wool-like appearance, thick and round-shaped, white, yellow and blackish. *Susruta* has described them as having red colour and long shape and the site of these *Krimi* has been mentioned in the whole large intestine and lower part of the small intestine. According to *Ayurvedic Samhitas*, symptoms of *Purishaja Krimis* are itching in the anal region and a stool-like smell from the mouth. *Susruta* has made a special reference to *Gandupada Krimi* which indicates the Nematodes.

Table No.8.

Showing the correlation of *Purishaja Krimi* of *Ayurveda* with the Intestinal Helminth of Modern Medical Science.

<i>Ayurvedic</i> Nomenclature	Probable Parlance	Mode of Infection	Habitat	Morphology	Pathogenicity
<i>Leliha</i> (<i>Charaka</i>)	Nematodes Threadworms	Contaminated food	Caecum	Small, White	Pruritus Perineal pain in abdomen
	Ascaris lumbricoides	Contaminated food	Small intestine	Same as Gandupda	Same as Gandupda
	Trichuris trichura	Infected water and food	Large intestine Caecum	Thin, hair-like, round, brown	Pain in abdomen
<i>Gandupada</i> (<i>Susruta</i>)	Ascaris lumbricoides	Contaminated food	Small intestine	Large cylindrical worm with tapering ends,	Lowgrade fever, dry cough, asthmatic

				pale pink or flesh coloured	wheezing, urticaria, mal- nutrition
<i>Sasulaka</i>	Sarcodina E. hystolitica E. nana Ankylostoma duodenale Trichuris trichura	Contaminated food	Large intestine	Round blunt pseudopodia	Loose motion Pain in the abdomen, cysts in the liver, lungs and brain.
<i>Sausurada</i>	Cilliatea Balantidium coli Enterobius vermicularis	Infected food	Large intestine	The oval body is covered with cilia.	Do
<i>Kakeruka</i>	Trematodes Gastro-discoid hominins	Infected uncovered vegetables	Caecum and Ascendin g colon	Pyramidal pink coloured	Diarrhoea
<i>Churu</i>	Enterobacteriaceae Shigella	Infected water and food	Large intestine	Short rod- shaped	Fever, Diarrhoea
<i>Makeruka</i>	H. nana Taenia nana Taenia saginata Taenia solium		Small intestine		
<i>Ajava,</i> <i>Vijaba,</i> <i>Kipyra,</i> <i>Chipya,</i> <i>Dwimukha</i>	The descriptions of the nomenclature of these <i>Krimis</i> are not available properly, so no equivalence can be made.				

Samanya Nidana(General Etiology) -

According to *Charaka Samhita* and *Ashtanga Samgraha*, *Nidana Sthana*^[25], the general aetiology of *Krimi Roga* are as follows-

1. Adoption of cold regimens immediately after hot regimens and vice versa.
2. Continuous intake of honey, fish, *Lakucha* (*Artocarpus lakoocha* Boxh.) radish, and *Kakamachi* (*Solanum nigrum* Linn.) in large quantities while suffering from indigestion.
3. Intake of *Chilchima* fish with milk.
4. Intake of food mostly containing *Yavaka* (a type *Hordeum vulgare* Linn.) *Chanaka*, *Uddalaka* and *Kordusha* (*Paspalum scorbulatum* Linn.) along with Milk, Curd, Butter Milk, *Kola* (*Zizyphus jujube* Lam.), *Kulattha* (*Dulichos biflorus* Linn.), *Masha* (*Phaseolus radiates* Linn.), *Atasi* (*Linum ussitassimum* Linn.), *Kusumbha* (*Carthamus tinctorius* Linn.) and unctuous substances.
5. Excessive indulgence in cohabitation, physical exercise and exposure to heat after taking the above-mentioned food to one's satisfaction.
6. Entering into cold water immediately after one is affected with fear, exhaustion and grief.
7. Intake of such food which may cause a burning sensation without vomiting out the undigested food.

8. Suppression for the urge of emesis; and

9. Excessive oleation, etc.

According to *Madhava Nidana*, 7th Chapter^[26], *Samanya nidanas* of *Krimi Roga* are as follows- *Ajir nabhojana*, excessive intake of *Madhura*, *Amla*, *Drava dravya* (dry powder), *Pishtanna*, *Guda* (jaggery), *Vyayama varyi* (avoid physical exercise), *Divasayana* (Day sleep) and *Viruddha bhojana*.

Vishishta Nidana (Specific aetiology) –

It has been previously stated that etiological factors, described for *Kaphaja krimi* have been said to be responsible to cause *Purishaja krimi* by *Charaka*. But *Charaka* has specially mentioned *Masha*, *pishtanna*, *Patra shaka* etc. in the aetiology of *Purishaja Krimi* ^[27]. According to *Madhava Nidana*, excessive use of *Masa* (black gram), *Pishtanna* (Dry food), *Amla dravya*, *Lavana dravya*, *Guda* (jaggery) and *Shaka* (leafy vegetables) give rise to the growth of *Purishaja Krimi* ^[28].

Purvarupa-

All the texts like *Brihatrayee* (*Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*), *Laghutrayee* (*Madhava Nidana*, *Sarangdhara Samhita*, *Bhava Prakasha*) and various other texts that were referred, didn't mention any prodromal symptoms of *Krimi Roga*.

Table No.9

Showing the *Samanya Rupa* (general symptoms) of *Abhyantara Krimi*

Sl. No.	Symptoms	<i>Susruta Samhita</i> ^[29]	<i>Madhava Nidana</i> ^[30]	<i>Bhavaprakash Samhita</i> ^[31]	<i>Harita Samhita</i> ^[32]	<i>Yoga Ratnakara</i> ^[33]
1.	<i>Jwara</i> (fever)	+	+	+	+	+
2.	<i>Vivarnata</i> (depigmentation)	+	+	+	+	+
3.	<i>Shoola</i> (pain)	+	+	+	+	+
4.	<i>Hridroga</i> (heart trouble)	+	+	+	+	+
5.	<i>Bhrama</i> (Vertigo)	+	+	+	+	+
6.	<i>Bhaktadwesa</i> (anorexia)	+	+	+	+	+
7.	<i>Atisara</i> (diarrhoea)	+	+	+	+	+
8.	<i>Sadana</i> (malaise)	+	+	+	-	-
9.	<i>Chhardi</i> (vomiting)	-	-	-	-	+
10.	<i>Swasa</i> (dyspnoea)	-	-	-	-	-
11.	<i>Jatharagarjanam</i> (abdominal sound)	-	-	-	+	-
12.	<i>Mandagni</i> (diminution of Agni),	-	-	-	+	-
13.	<i>Pipasa</i> (thirst),	-	-	-	+	-
14.	<i>Pitanetra</i> (yellowish eyes)	-	-	-	+	-

Table No 10

Showing *Vishesha Rupa* (Pathogenicity) of *Purishaja Krimi*

Sl.N o.	Pathogenicity	<i>Charaka Samhita</i> ^[34]	<i>Susruta Samhita</i> ^[35]	<i>Astanga Samgraha</i> ^[36]	<i>Astanga Hridaya</i> ^[37]	<i>Madhava Nidana</i> ^[38]
1.	<i>Atisara</i> (diarrhoea)	+	+	+	+	+
2.	<i>Shula</i> (cramping pain in the abdomen)	-	+	+	+	+
3.	<i>Agnimandya</i> (loss of appetite)	-	+	+	+	+
4.	<i>Arochaka</i> (anorexia)	-	+	-	-	-

5.	<i>Panduta</i> (anaemia)	-	+	+	+	+
6.	<i>Vishtambha</i>	-	+	+	+	+
7.	<i>Mukhapraseka</i> (water brash)	-	+	-	-	-
8.	<i>Balanash</i> (loss of strength)	-	+	-	-	-
9.	<i>karshya</i> (emaciation)	+	+	+	+	-
10.	<i>Parushya</i> (dryness of the body)	+	-	+	+	-
11.	<i>Roma Harsha</i> (horripilation)	+	-	+	+	+
12.	<i>HridayaRoga</i> (cardiac diseases)	-	+	-	-	-
13.	<i>Kandu</i> (Itching)	+	-	-	-	-
14.	<i>Toda</i> (pricking pain)	+	-	-	-	-
15.	<i>Gudakandu</i> (itching over the anal region)	-	-	+	+	+

Upashaya and *Anupashaya* (Relieving and Aggravating Factors)-

Means *Ausahadha*(Medicine), *Anna* (Diet) and *Vihara* (Physical Habitats) which help in the removal of disease and which is also *Satmya*(good for person) is known as *Upashaya* and just opposite to it is *Anupashaya*. Particularly in the context of *Krimi Roga*, *Acharyas* had not mentioned directly any specific *Upashaya* and *Anupashaya* but according to *Acharya Harita*, *Kashyapa*, *Sushruta* and in *Bhaisajya Ratnavali*, there is a list of dietetic indications (*Pathya*) and contraindications (*Apathya*).

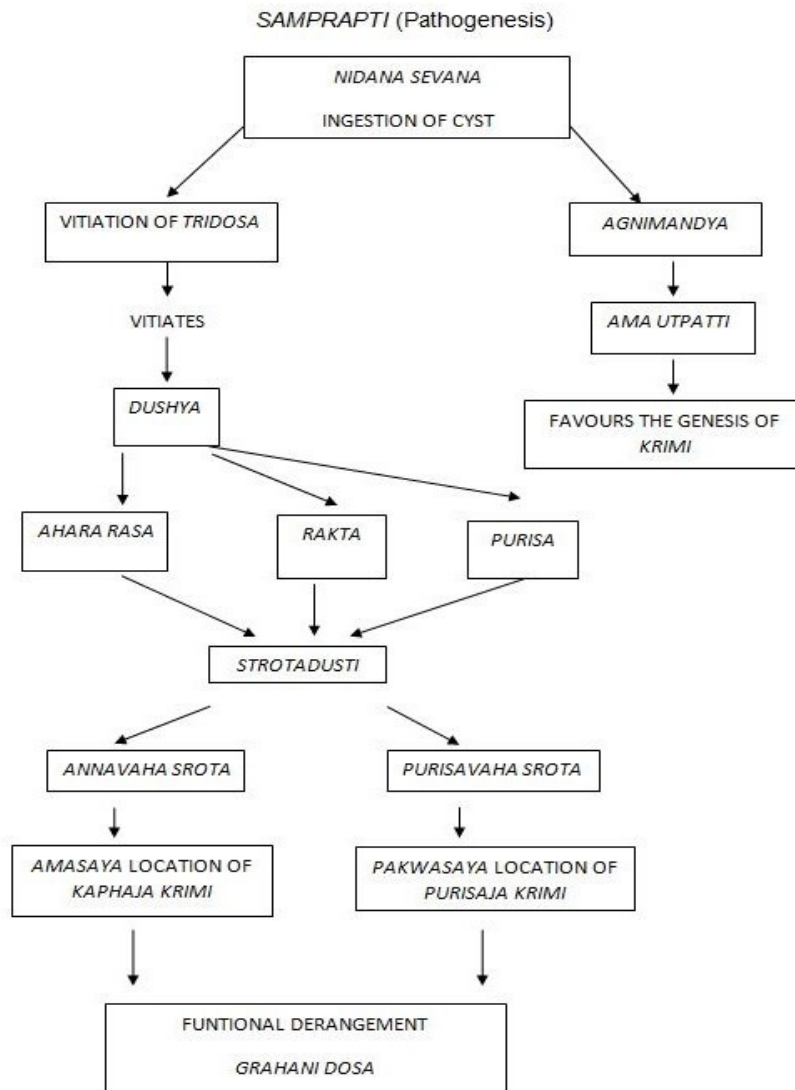
Samprapti-

As millions of *Krimi* exist in the environment, which contaminates the eatables and drinks. So, unhygienic, unhealthy habits and intake of

contaminated food and drinks and intake of other etiological factors like heavy, cold, sweet substances, etc. thereby simultaneously resulting in the entry of *Krimi* into the host. By these Particular *Nidanas* of *Krimi Roga*, the *Dosas* first get vitiated and then affect the *Dushyas* such as *Ahara rasa*, *Purisa*, *Rakta* etc. and ultimately the *Samprapti* is initiated. Vitiated *Dosas* produce "*Jatharagni Mandya*" and also lead to the production of *Ama*. The *Dosas* and *Dushyas* affect the *Annavaha* and *Purishavaha Srotas* and all these make a suitable environment for the *Krimis* to multiply the *Slesmaja Krimis* located in *Amasaya* and the *Purishaja Krimis* in *Pakwasaya* and the diseases become manifested. The functions of *Agni* are impaired and later this condition goes to the stage of *Grahani dosa* which may

ultimately lead to the development of *Grahani Roga*. The presence of *Krimi* in *Grahani Roga* is indicated by *Susruta*, whereas in the treatment of *Grahani Roga*, the *Krimi Cikitsa* is indicated. The multiplication of *Krimi* needs

nutrition which is taken from the host, resulting in emaciation, dehydration, nausea, anaemia, vomiting, etc. As the site of these *Krimis* is in *Purisha Vaha Srota*, it is called *Purishaja Krimi*.



Samprapti Ghataka-

1. Dosa- Tridosha
2. Dushya–Ahara Rasa
3. Srota- Mahasrota, Purishvaha Srota.

4. Adhisthana - Pakwasaya (PurisajaKrimi)
5. Agnidusti-Mandagni(Ama formation)
6. Sanchara- Sarvatarā
7. Rogamarga-Abhyantara & Bahya

8. *Vyakti-* (a) *Krimi Lakshana* (sign & symptoms)

(b) *Krimi Darshana* (in microscopic examination ova or cyst present)

9. *Svabhava -Chirakari* (Chronic) & *Asukari* (Acute)

Purisha Pariksha^[39](Examination of Stool)-

In the ancient period, a simple examination of stool by the naked eye was done based on several characteristics such as-

1. *Matra* (quantity), 2. *Avritti* (frequency of stool), 3. *Samhanana* (consistency), 4. *Varna* (colour), 5. *Gandha* (smell), 6. *Sarakta* (presence of blood), 7. *Sapuya* (presence of pus), 8. *Sakapha* (presence of mucus), 9. *Sama nirama* (presence or absence of toxins) and 10. *Sakrimi* (Presence of worms).

Sapeksha Nidana (Differential Diagnosis)-

Usually, *Krimis* are the causative factors of several diseases like *Pandu* (anaemia), *Karshya* (emaciation), *Ajirna* (indigestion), *Atisara* (diarrhoea), *Krimija Hrid Roga* (cardiac ailments), *Krimija Shiro Roga* (neurological ailments), *Tvak Roga* (skin diseases), etc. as these are *Nidanarthakara Rogas*. So, after history taking, *Rogi Pariksha* (Examination of the patient) and *Roga Pariksha* (examination of the disease) is highly applicable during the confirmation of the diagnosis.

Roga Vinischaya (Diagnosis)-

The diagnosis is confirmed by *Purisha Pariksha* (stool examination). The presence of *Krimi* (helminths), the presence of *Ama* (toxins) in the *Purisha* (stool), etc. are the usual confirmatory features.

Chikitsa Siddhanta^[40] (Line of Management)-

Acharya Charaka described *Samanya Shidhanta* of *Krimi Roga* in a 'three-fold method'. These are-

(1) *Apakarsana*, (2) *Prakriti Vighata* & (3) *Nidana Parivarjana*

(1) *Apakarsana* - *Apakarshana* means removal or expulsion of the *Krimis* (parasite) from the body by mechanical and therapeutic methods. *Apakarsana* of *Abhayantara Krimi* should be done by the elimination method such as (i) *Vamana*, (ii) *Virechana*, (iii) *Shirovirechana* and (iv) *Asthapana Basti*. *Krimis* are eliminated from the *Amasaya* through *Vamana* therapy. *Virechana* is done for eliminating the vitiated *Doshas* through the gastrointestinal tract with the help of *Krimighna Dravyas*. This is the most useful *Karma* in *Purishaja Krimis* (intestinal worm infestation) in which the worm will die or become unconscious and eliminated from the gut. *Charaka* mentioned the surgical measures for the removal or extraction of *Krimis*. According to him, *Krimis* may be extracted by hand with or without the help of instruments. In the case of *Shirovirechana*, *Katu*, *Tikta Rasa* and *Ushna*

Guna yukta Dravyas are administered for the elimination of *Krimis* through the nose. *Asthapana Basti* is also a technique of eliminating *Purishaja Krimi* from the large intestine where the active principles of the medicine will directly reach the site of *Krimi*, affect the organism, and inhibit the growth of *Krimi* and its activities. *Kashaya Dravyas* which have the *Karshan Guna*, are used in *Asthapana Basti*. Most commonly used drugs for the intestinal worms are *Vidanga*(*Embelia Ribes*), *Palash* (*Butea monosperma*), *Ajamoda*(*Carum roxburghianum*), *Yavani*(*Trachyspermum ammi*), *Mustak*(*Cyperus rotundus*), *Kampillaka*(*Malluctus philippinensis*), *Nimba*(*Azadirachta indica*), *Indrayava*(*Holorrhena antidysentrica*), *Pippali*(*Piper longum*), *Paribhadra*(*Hyocymus reticulatus*), Seeds/bark of *Shigru*(*Moringa oleifera*) etc.

(2) *Prakriti Vighata* -*Prakriti Vighata* means the removal of the causative factors which are responsible for the production and development of the *Krimis*. This is an important factor. The *Krimi* which develop in

the *Amashaya* and *Pakvashaya* (Gastrointestinal tract) somehow gets a favourable environment in that place. *Charaka* has described the use of *Katu* (pungent), *Tikta*(bitter), *Kashaya* (astringent), *Ushna*(hot), etc. are antagonistic to *Kapha*. *Sushruta* has also recommended bitter and pungent tastes as counteracting measures in *Krimi Roga*. The drugs or the diets having the said pharmacological properties may change the intestinal environment which ultimately may hamper the growth of the *Krimis*. *Chakrapani* in his commentary on *Charaka Samhita* had stated that *Samshamana* or alleviation therapy stands for the measures for *Prakriti Vighata*. *Charaka* has suggested a fair number of drugs be adopted for counteracting intestinal parasites. *Vidanga* has positive anthelmintic activity against roundworm and tapeworm infestation. According to *Kashyapa Samhita*, *Chikitsa Sthana*, *Krimi Chikitsa*, the administration of bitter and pungent drugs in *Krimi Rogas* is well explained for children.

(3) *Nidana Parivarjana* -Avoidance of the *Nidanas* or the etiological factors of the *Krimi Rogas* are included in the measure.

Table No.11

Showing Therapeutic & Dietetic indication (*Pathya*) in *Krimi Roga*

Sl. No.	<i>Pathya</i>	<i>Harita Samhita</i> ^[41]	<i>Kashyapa Samhita</i> ^[42]	<i>Susruta Samhita</i> ^[43]	<i>Bhaishajya Ratnavali</i> ^[44]
1.	Purification methods--				

	<i>Asthapanavasti</i>	-	-	-	+
	<i>Shirovirechana</i>	-	-	-	+
	<i>Dhumapana</i>	-	-	-	+
	<i>Virechana</i>	-	-	-	+
	<i>Snehana</i>	-	+	-	-
	<i>Swedana</i>	-	+	-	-
	<i>Shariramarjana</i>	-	-	-	+
	Avoidance of worry	+	-	-	+
2.	Vegetables (Use of leaves of the following) -				
	<i>Nimba</i>	-	-	-	+
	<i>Vastukam</i>	+	-	-	+
	<i>Arka (White)</i>	-	-	-	+
	<i>Karela</i>	-	-	-	+
	<i>Koshataki</i>	+	-	-	-
	<i>Paravala</i>	+	-	-	-
	<i>Tanduliyaka</i>	+	-	-	-
3.	Grains-				
	<i>Raktashali</i>	-	-	-	+
	<i>Tila</i>	-	-	-	-
	<i>Sarshapa</i>	-	-	-	-
	<i>Kulaththa</i>	-	-	+	-
	<i>Yava</i>	-	-	+	-
	<i>Mudga</i>	+	-	-	-
4.	Meat-				
	Flesh of Rat	-	-	-	-
	Flesh of <i>Lawa</i>	+	-	-	-
	Flesh of <i>Titara</i>	+	-	-	-
	Flesh of <i>Mriga</i>	+	-	-	-
	Flesh of <i>Chikkar</i>	+	-	-	-
5.	Animal Products-				

	<i>Gomutra</i>	-	-	-	+
	<i>Ushtra Mutra</i>	-	-	-	+
	<i>Ushtra Milk</i>	-	-	-	+
	<i>UshtraGhrita</i>	-	-	-	+
	<i>Madhu</i>	-	-	-	+
6.	Fermented Articles-				
	<i>Sura</i>	-	-	-	+
	<i>Sukta</i>	-	-	-	+
	<i>Sauvira</i>	-	-	-	+
	<i>Tushodaka</i>	-	-	-	+
7.	Diet has the following tastes and qualities-				
	<i>Tikta</i>	-	+	+	+
	<i>Kashaya</i>	-	-	-	+
	<i>Katu</i>	-	+	+	+
	<i>Ruksha</i>	-	+	-	+
	<i>Ushna</i>	-	+	-	-
8.	Certain herbs-				
	<i>Patola</i>	-	-	-	+
	<i>Vetrakra</i>	-	-	-	+
	<i>Rasona</i>	-	-	-	+
	<i>Chitraka</i>	-	-	-	+
	<i>Kantakri</i>	-	-	-	+
	<i>Nadicha</i>	-	-	-	+
	<i>Vidanga</i>	-	-	-	+
	<i>Haritaki</i>	-	-	-	+
	<i>Tada</i>	-	-	-	+
	<i>Bhallatak</i>	-	-	-	+
	<i>Tambula</i>	-	+	-	-
	<i>Hingu</i>	-	-	-	+
	<i>Yavakshara</i>	-	-	-	+

	<i>Ajamoda</i>	-	-	-	+
	<i>Khidara</i>	-	-	-	+
	<i>Jambiya</i>	-	-	-	+
	<i>Ajawayan</i>	-	-	-	+
	<i>Devadaru</i>	-	-	-	+
	<i>Agaru</i>	-	-	-	+
	<i>Sheesham</i>	-	-	-	+
	<i>Shatapushpa</i>	+	-	-	+
	<i>Jeevan</i>	+	-	-	-
	<i>Sunthi</i>	+	-	-	-

Table No.12

Showing Contraindication (*Apathya*) in *Krimi Roga*

Sl.No.	<i>Apathya</i>	<i>Susruta Samhita</i> ^[45]	<i>Astanga Hridaya</i> ^[46]	<i>Bhavaprakash Samhita</i> ^[47]	<i>Yoga Ratnakara</i> ^[48]	<i>Bhaishajya Ratnavali</i> ^[49]
1.	<i>Vamana vegaDharana</i>	-	-	-	-	+
2.	<i>Divaswapna</i>	-	-	-	-	+
3.	<i>Ajirna</i>	-	-	-	-	+
4.	<i>Pistadravya</i>	-	-	-	-	+
5.	<i>Masha</i>	-	-	-	-	+
6.	<i>Amla rasa</i>	+	+	+	+	+
7.	<i>Madhura rasa</i>	+	+	+	+	+
8.	<i>Sitalajala</i>	+	-	-	-	-
9.	<i>Kshara</i>	-	-	-	+	-
10.	<i>Mamsa</i>	+	+	+	+	+
11.	<i>Milk</i>	+	+	+	+	+
12.	<i>Ghrita</i>	+	+	+	+	+
13.	<i>Leafy vegetables</i>	+	+	+	+	+
14.	<i>Viruddhabhojana</i>	-	-	-	-	+

15.	<i>Dadhi</i>	+	+	+	+	+
16.	<i>Jaliyadravyasevena</i>	-	-	-	-	+
17.	<i>Sauvira</i>	-	-	-	+	-
18.	<i>Guda</i>	-	+	-	-	-

SADHYASADHYATWA (Prognosis)-

If *Krimi* persists for a long time and *Poshaka Dhatuhani* (loss of nourishing agents) of *Purusha* (host) persists for a long time, then *Pandutva*, *Karshatva*, *Hridroga*, *Siro Roga*, etc, may cause the condition which is *Krichhrasadhya* (Difficult to cure) and may lead to death even. So, *Alpa Kala* (less duration of illness), *Alpa Roga Bala* (less severity of the disease) and *Adhika Rogi Bala* (more strength of the patient), such a condition is *SukhaSadhya* (easy to cure). Whereas, if the *Rogi Bala* is less, *Rogabala* is more and *Krimi* persists for a long time, it may lead to *Krichhasadhya* or *Asadhya* (incurable) condition.

DISCUSSION

The concept of *Krimi* and *Krimi Roga* are available since the *Vedic* period, but detailed descriptions are found in the *Samhita* period along with the type of *Krimi*, its morphology, pathogenesis, clinical features and three-fold treatment of *Krimi Roga*. *Charaka Samhita* (2500BC), and *Susruta Samhita* (500BC) have discussed in detail *Krimi Roga*. In *Sangraha Kala*, *Vagbhatta* has also described it in detail.

There are two types of *Krimi* – *Drishya* and *Adrishya*. *Adrishya Krimi* was recognized with the help of *Anumana Pramana* by the analysis of signs and symptoms. Now a day, it becomes easy to identify with the help of a microscope. Through the entire literature review, it has been found that *Purishaja Krimi* may co-relate with Intestinal helminthiasis of Modern medical science. *Krimis* which can be visualized may be compared with adult worms and which are never visualized through the naked eye may be considered as microbes and larval stage of the worm. On the basis of pathogenesis, *Krimis* are divided into *Sahaja* or *Avaikarika* and *Vaikarika*. Here *Sahaja* is meant for non-pathogenic organisms", which is present in the gut flora as a symbiotic agent naturally. According to the habitat they are classified in two broad headings i.e., *Bhahya* (external) and *Abhyantara* (internal). Ayurveda described three types of *Abhyantara Krimi* viz. *Raktaja Krimi*, *Kaphaja Krimi* and *Purishaja Krimi*. *Purishaja Krimi* may be called the *Krimi* which either originates or resides in the *Purisha*. As per the main Ayurvedic medicinal text, *Charaka Samhita*, there are 5 members

that belong to the group of *Purishaja Krimi* viz *Kakeruka*, *Makeruka*, *Leliha*, *Sashulaka* & *Sausurada*. *Krimi* word shows all microorganisms such as helminths, protozoa, bacteria and viruses in the Ayurvedic literature. So it is very difficult to understand the correlation between the term *Krimi* and modern science because of the lack of a detailed description of individual *Krimi*. There are several etiological factors which are responsible for the genesis of *Krimis* such as *Adhyashana* (eating before digestion of a previous meal), *Ajirna bhojana* (eating in indigestion), *Asatmya bhojana* (unwholesome food), *Viruddha bhojana*, *Malina bhojana* (contaminated food), *Ati guru* (excessive heavy), *AtiSnigdha* (excessive unctuous), *Ati Drava Dravya*, *Avyayama* (lack of exercise), *Divaswapna* (day steep), etc. The specific aetiological factors of *Purishaja Krimis* are excessive intake of *Masha*, *Guru Dravya*, *Parnashaka* or leafy vegetables, *Amladravya*, *Lavanadravya*, unhygienic, unhealthy habits, intake of contaminated food and drinks and intake of other etiological factors like heavy, cold, sweet substances, etc, simultaneously results in the entry of *Krimi* into the host. By these particular *Nidanas* of *Krimi Roga*, the *Dosas* first get vitiated and then affect the *Dushyas* such as *Ahara rasa*, *Purisa*, *Rakta* etc., – and ultimately the *Samprapti* is initiated.

Vitiated *Dosas* produce “*Jatharagni Mandya*” and also lead to the production of *Ama*. The *Ama Anna* creates a suitable environment for the existence, genesis and multiplication of *Krimi* in the *Purisha Vaha Srota*. These *Krimis* start to move into a different part of *Anna Vaha* and *Purisha Vaha Srotas* and produce several hazards regarding digestion, metabolism and assimilation of the ingested food. The *Dosas* and *Dushyas* affect the *Annavaha* and *Purisavaha Srotas* and all these make a suitable environment for the *Krimis* to multiply the *Purishaja Krimis* in *Pakwasaya* and the diseases become manifest. Helminthiasis is a macro parasitic disease of humans and other animals, where the body part is infected with parasitic worms. We can co-relate *Purishaja Krimi* with intestinal helminthiasis of Modern medical science. The helminths are classified into three phyla- Nematodes, Cestodes and Trematodes. *Ascaris lumbricoides*, *Ankylostoma duodenale* and *Trichuris trichuria* are the example of Nematodes. *Taeniasaginata*, *Hymenolepis nana*, etc. come under Cestodes and *Heterophyes* species come under Trematodes. The specific signs and symptoms of *Krimi Roga* are *Purishabheda* (diarrhoea). *Gudamukha todakandu* (perianal itching), *Loma Harsha* (horripilation), *Karshya* (emaciation), *Parushya*(dryness), etc. are mentioned in

Ayurvedic literature and are more or less similar to the helminthiasis of modern medicine. So, routine examination of stool, OPC (ova, parasite and cyst), and occult blood test. etc. are very essential to confirm the diagnosis.

CONCLUSION

The concept of *Krimi* and *Krimi Roga* are available since the *Vedic* period, but detailed descriptions are found in the *Samhita* period along with a three-fold treatment of *Krimi Roga*. *Purishaja Krimi* is a great health hazard to personal health as well as social health. The *Veda* has indicated the existence of *Krimi*. *Charaka Samhita* described *Krimi* more elaborately than other *Samhitas*. *Purishaja Krimi* may be co-related with intestinal helminthiasis in modern medicine. An unhealthy lifestyle, and unwholesome and contaminated food and drinks are liable to form *Ama*, which leads to the development of *Purishaja Krimi*. For the management of *Krimi Roga*, *Apakarsana*, *Prakriti Vighata* and *Nidana Parivarjna* are essential.

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