REVIEW ARTICLE

CONCEPT OF KRIMI IN PERSPECTIVE OF MODERN ERA-A REVIEW

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ABSTRACT

Abstract: The existence of Krimi is not a new concept. From the Vedic period to Samhita period description of Krimi is found. Here all visible and invisible Krimi are described. Though there was no microscope at that period but they felt the existence of invisible Krimi also. Their mode of transmission, sign and symptom are almost same as worm and microbes in contemporary science. They had given description of structure, naming of Krimi as far as possible. But worms and microbes are described in contemporary science separately. Acharyas also described epidemic diseases, contagious diseases in the context of Janapadodhwamsa and Upasargika Roga. Keeping these views it is try to describe about concept of Krimi in contemporary science.

Key words- Krimi, Worm, Microbes, Janapadodhwamsa, Upasargika roga

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INTRODUCTION

*Krimi* in *Ayurveda* in broad sense is all worms and microbes. Description of *Krimi* is found since *Vedic* period. The Visible or invisiblesubtle organisms that affect the living & non living things of biosphere are described very scientifically in *Ayurvedic* texts. In *Samhita* period there is an enough description about classification, *Nidana* (causes), *Chikitsha* (treatment) of *KrimijaRogas* are found. It is also found that the Infectious diseases are also mentioned in *Samhita Granthas* as *Sankramaka*, and *Upsargaja roga*. As in contemporary science there is separate branch of helminthology and microbiology but in *Ayurveda* the word *Krimi* is for all worm and microbes either it is visible or invisible. Now-a-days through microscope almost all microbes can be visible but in the Vedic era Germs are considered as *Krimi, Rakshas, Raksha, Pichas, Yatu, Yatudhan, Kimidi, Gandhrava, Apsara* etc. even the human also originated from Golden-germ. Their origin (*Utpatti Sthanas*) are *Parvata* (mountain), *Vana* (forest), *Oushadhi* (plants), *Pashu* (animals), *Apsu* (water)[1] etc. Except these our *Acharya* said very beautifully about the *Krimi* which resides in our body in different site means the organism invading in our body and locate in some particular site and produced various diseases. In contemporary science it is said that there are some beneficial microbes and some are harmful, they described all but in *Samhita* period there is no broad description of beneficial *Krimi*. They limit this portion by using the word *Sahaja* which means avaikarika.[2] In ancient time the existence of *Krimi* was detected by *Anumana*, by watching sign and symptoms or by the super-human power of the sages. They felt about the contagious and epidemic diseases sodescribed about *Janapadodhwamsa* and *UpasargikaRoga* which is also on the basis of *Anumana*.

**Literary Review**

Etymology: The word *Kriiis* derived from *dhatu‘KujnaHimsayam’* (*sidhantakaumudi*) which means to kill or to yield harmful effect. *AcharyaYashka* has given the meaning of *Krimi* in the following way

1. Which means those organisms which grow on raw flesh

2. That which moves with legs

In *Atharvaveda* the following synonyms are used for *Krimi*

*Rakshas*: the organism which is a parasite of man. Hence it is required to protect the body from these organisms. These killed in lonely place and roam in night. (*nirukta 4/18*)

*Pishacha*: which eat raw flesh (*vachspatya*)

*Yatudhana*: which cause pain (*sabdakalpadruma*)

*Kimidi*: which can penetrate. (*nirukta 6/11*)

*Gandharva*: they are attracted by both smell and appearance (*Satapathabrahmana 9/4/1/4*)
Apsara: which lives in water (Satapathabrahmana 10/5/2/20)

Historical review of Krimi:

In Vedic period:

In Rigveda

In Rigveda there is description of Durnama and amoeba Krimi,[3] affects the Garbhayantra and leads to Garbhanasha. [4]

In Yajurveda:

Yajurveda describes the development of diseases by the Krimi present in utensils after eating food.[5]

In Atharvaveda

In Atharvaveda two types of Krimi are described – ‘Drishya’ & ‘Adrishya’. The ‘Kururu’, ‘Alagandu’ and ‘Shaluna’ are said causes diseases due to lack of hygiene.[6]

Atharvaveda explained that there is krimi which causes diseases rajayakshma from one person to other by bird[7], and mentioned that the micro-organisms may live in milk, butter milk and different type of food[8], they enter into human body and produces diseases.

Some examples of Krimi those are mentioned in Atharvaveda like Atrina (which eat), Anvaantrya (lives in intestine), Asrikpawa (which take blood), Udumbal (killer), Ejatka (which make shiver the body), Yatumana (which give pain), Sirshyanya (lives in head)

In ayurvedic text

After Vedic period the description of Krimi is found in Samhita Kala, in 1000 BC in Caraka Samhita details of Krimiroga is found in Vimansthana, in the parlance of KrimijaHridroga & Shirashoola, and indirectly in Janapadodhwamsa chapter. In SusrutaSamhita (600-400 BC) description of Krimi found in KrimirogaNidana and Chikitsha. Caraka was mentioned about BahyaKrimi, where Acharya Susrutawas silent about it. Susruta in KusthaNidana chapter said about that Kustha is a Upasargika Roga [9]

which means it is a contagious disease, where infection occur and microbes is responsible for it, from this it can say that Krimi is responsible for contagious diseases. Both of them consider Kaphaja, Raktaja and PurishajaKrimi but no. and name were different. In 5th century Vagbhatta follow Caraka in case of classification. He also mentioned Chikitsha and about KrimijaShiraroga. In 7th century Madhavkara described about BahyaKrimi and Abhyantara Krimi. [10] In 13th century Sarangadhara also mentioned about Bahya and AbhyantaraKrimi,[11] but he also mentioned about BranajaKrimi.[12] So, it is clear that we may get a complete knowledge about Krimi with the help of all Samhita Granthas.

Table No.1: Classification of Krimi according to Caraka and Madhavkara

<table>
<thead>
<tr>
<th>According to function</th>
<th>According to location</th>
<th>According to cause</th>
<th>According to Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sahaja</td>
<td>Bahya</td>
<td>Purishaja</td>
<td>Bahya-1.Yuka,2. likha</td>
</tr>
</tbody>
</table>
Krimi and worms: Worms are described in helminthology. Here all parasitic worms are described. Some Krimi can be correlated with worms in which KaphajaKrimi are reside in Amasaya and Purishajakrimis are reside in Pakwasaya. Based on their shape and other characteristics, helminthes are classified into two broad groups:

1. Phylum Nemathelminthes—cylindrical worms
2. Phylum Platyhelminthes—flat worms
   i) Class Trematoda or flukes
   ii) Class Cestoda or tapeworm

KaphajaKrimicirculate in upward and downward direction from Amasaya (~stomach). So worm can move up to these region. The Purishajakrimicirculates towards downwards and when increases they move towards Amasaya (~stomach).

<table>
<thead>
<tr>
<th>Table no. 2: Location of some helminthes in the following region.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trematoda</td>
</tr>
<tr>
<td>Biliary tract(liver flukes): e.g. Clonorchissinensis gastrointestinal tract(intestinal flukes): small intestine- e.g. Heterophyesheterophyes Large intestine-e.g. Gastrodiscoideshominis Respiratory tract(lung fluke) e.g. Paragonimuswestermani</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Some examples of common worm which can be correlated with Krimi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>----------------</td>
</tr>
</tbody>
</table>

Jour. of Ayurveda & Holistic Medicine
Volume-III, Issue-IV

60

2. Vaikarika
2. Abhyantara
2. Kaphaja
Raktaja
Malaja

Abhyanatra –
1. Purishajakakeruka, Makeruka, Leliha, Sashulak, Saurasarad
2. Raktaja: Kesad, Lomad, Lomdipa, Sauras, Udumbara, Jantumata
<table>
<thead>
<tr>
<th>Shape</th>
<th>Colour</th>
<th>Sign and symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stout, cylindrical-e.g.hook worm [21], large cylindrical worms, with tapering ends- e.g.round worm [22] short, fusiform worms with pointed ends, looking like bits of white thread- e.g. pin worm [23]</td>
<td>pale pink or grayish white, white(tape worm, pin worm) black(liver fluke almost bright red to black in colour), yellowish(dipylidiumcaninum, it is dog tapeworm), brown(spider worm ), red(red worm) [26]</td>
<td>Anemia,.Constipation,Diarrhoea,Fatigue ,GasandStomachBloating,Nervousness, Distended belly , Loss of appetite,Vomiting,Itchyanus,Loose bowel movements or diarrhea ,Itchy skin rash,Swelling around the eyes,During sleep, some worms may leave the body through the mouth, nose or anus [29] Hookworm can also produce abdominal pain, weight loss and diarrhea. Roundworm, or ascariasis, can cause severe abdominal pain and vomiting [30]</td>
</tr>
<tr>
<td>Prithu(large/board/wide), Gandupada(earthworm like), Dhanyaankur(sprout/ bud/shoot), Tanu (short), Dirgha(long), Anava(minute), Vritta(round), Sthula(large) [24],[25]</td>
<td>Sweta/sita(white), Tamra(coppery/reddish brown), Pita(yellow), Asita(black) [27],[28]</td>
<td>Hrillas(nausea), Asyasravana(excessive salivation), Avipakama(indigestion), Arochaka(anorexia), Murccha(fainting/nervousness), Chardi(vomiting), Jwar(fever), Anaha/Vistambha(constipation), Karshya(emaciation), Khavathu(sneezing), Pinasha(nasal catarrh), Vidbheda(diarrhea), Shooka(colic), Parushya(roughness), Panduta(pallor),Agnisadana(poor digestion), Guda Kandu(itchy anus), Vimarga(leave the body through the mouth, nose or anus) [31],[32]</td>
</tr>
</tbody>
</table>
**Causes / Nidana**

Raw unwashed vegetables, undercooked infected meat of domestic pig, freshwater fish or wild animals (bear, walrus, etc.) From sugar, refined carbohydrates, alcohol \(^{[33]}\)

**Saka** (vegetable), **Matsya** (fish), **Mamsa** (meat), **Guda** (jagerry, contain sucrose), **Masha** (Phaseolus mungo), **Pistanna** (sugar containing substance), **Sukta** (~alcoholic substance), \(^{[34]}\)

**Krimi** and microbes: Microbes are described in microbiology. Microbiology is the study of microorganisms, most of which are too small to be seen with the naked eye, including bacteria, algae, protozoa, and fungi, as well as acellular agents, such as viruses. Some microbes (e.g., algae and fungi) are large enough to be visible, but are still included in the field of microbiology; it has been suggested that microbiology be defined not only by the size of the organisms studied but by techniques employed to study them (isolation, sterilization, culture in artificial media) \(^{[35]}\).

Invisible living creatures were thought to exist and were thought to be responsible for disease long before they were observed. \(^{[36]}\)

**Raktaja Krimi** are those which reside in **Raktavahi Sira**, they are very minute, without legs, **Round** and **Tamra** (coppery colour). Some of them can’t visualized by naked eyes. These are 6 in number. In Ayurvedic text it is mentioned that this type of **Krimi** produced **Kustha** like diseases, **Kesh**, **Nakh**, **Lomaupadhwamsa**, **Branagata**, **Twak**, **Sira**, **Snayu**, **Mamsa**, **Tarunasthi Bhakshana**. \(^{[37]}\)

Some microbes are found in blood stream. Here we make some examples of etiological agents of bloodstream infections \(^{[38]}\) like-

- **Bacteria** – e.g. staphylococcus aureus, betahaemolytic streptococci, klebsiella pneumonia etc.
- **Virus** – e.g. HIV, Epstein Barr, Cytomegalo virus
- **Fungi** – e.g. candida, cryptococcus, coccidiodes immitis etc.
- **Parasites** – e.g. Plasmodium, trypanosome, Babesia, wucheria etc.

**Table no. 4: Some examples of common microbes of blood stream which can be correlated with Raktaja Krimi**

<table>
<thead>
<tr>
<th>Morphology</th>
<th>Microbes</th>
<th>Krimi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microscopic</td>
<td>Which are invisible due to subtle nature (Sukshmaadadrarshpanat) (^{[39]})</td>
<td></td>
</tr>
</tbody>
</table>
### Media for growth/ nidan for raktajakrimi

<table>
<thead>
<tr>
<th>Media for growth/ nidan for raktajakrimi</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood agar- e.g. Staphylococcus, streptococcus, neisseria</td>
<td>Rakta (because Raktaja Krimi survive in Raktavahini Sira)</td>
</tr>
<tr>
<td>Blood – e.g. plasmodium vivax(erythrocyte)</td>
<td>Madhura Dravya- (which contain sugar)</td>
</tr>
<tr>
<td>Sugar– e.g. glucose broth (streptococcus), virus, fungi (Sabouraud dextrose agar)</td>
<td>Pistanna – different type of sugar containing food.</td>
</tr>
<tr>
<td>Guda (jaggery) - it contain sucrose (sugar)</td>
<td>Gudajaggery-</td>
</tr>
</tbody>
</table>

### Sign and symptom

<table>
<thead>
<tr>
<th>Sign and symptom</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damaged skin-staphylococcus</td>
<td>Symptoms like Kustha</td>
</tr>
<tr>
<td>Impetigo – streptococcus pyogenes</td>
<td>Symptoms like Kustha</td>
</tr>
<tr>
<td>Wound or burn-streptococcus pyogenes</td>
<td>Branagata</td>
</tr>
<tr>
<td>Nerve damage- e.g. in HIV pyomyositis, Chondritis e.g. staphylococcus aureus</td>
<td>Snayu Bhakshana</td>
</tr>
<tr>
<td>Nail and body hair damage in – beta haemolytic streptococci</td>
<td>Mamsabhakshana, Tarunasthibhakshana Nakha and Loma Dhwamsa.</td>
</tr>
</tbody>
</table>

**Purishaja Krimis** are reside in intestine. In *Ayurvedic* text it is not mentioned that these are invisible but in modern science there are some microbes found in intestine which causes gastroenteritis. In gastroenteritis diarrhoea, dysentery, tenesmus, vomiting etc. occur. In *Purishaja Krimi* also Malabhedha, Shoola, Krishata, Agnimandya etc. occur. Some examples of etiological agents of gastroenteritis infections.

- Bacteria – vibrio cholera, E. coli, Salmonella species, Shigella species etc.
- Virus- Rotavirus, adenovirus, Astrovirus
- Fungi- Candida albicans
- Parasites- E. histolytica, B.coli, T. solium, H. nana etc.

**Krimi and Janapadodhwamsarogas** *(Epidemic or Endemic Diseases)*

In Vimansthana Chakrapani said, the commentator of Charaka that though the individuals have difference in physical constitution (Prakriti), food habits (Ahara), suitability (Satmya), strength (Bala), age (Vaya) etc. still there are some factors which are common to all individuals and vitiation of these factors produce diseases of same symptoms at same time and cover a huge area and destruct the community. The factors which are common for all the individual of a country are air, water, land and season. Charaka has divided the etiological factors into Sadharana and Asadharana Hetu. The Asadharana Hetu are the inevitable disastrous factors includes the harmful effects of Ahara, Vihar which vitiates Vata, Pitta and Kapha whereas the Sadharana Hetu are the evitable disastrous
factors includes air, water, land and season. All these factors not only influence the individuals but also the society leading to destruction of community and even responsible for the disease causing organisms. These will results into spread of epidemics. Such diseases are termed as *JanapadodhwansaRogas*. No specific disease of this nature is described but depending on the situation a variety of diseases could be produced due to a common cause of polluted natural calamities such as in air, water, land and climate etc. *Atharvaveda* explained that the micro-organisms can originate from plants, water, earth and forest. In time being and after getting the favorable condition they enter into human body and produces diseases. This concept support that *Janapadodhwamsa*- the calamities, is not natural but behind it the main culprit is micro-organism or Krimi.

**Table no.5: Some examples of common microbes of intestine which can be correlated with Purishajakrimi. Though theses microbes but according to its habitat and sign and symptoms are like Purishajakrimi**

<table>
<thead>
<tr>
<th>Media for growth/ source of infection/nidan for purishajakrimi</th>
<th>Microbes</th>
<th>Purishajakrimi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude sea salt media (VenkatramanRamkrishnana)- e.g. Vibrio cholera[^56]</td>
<td>Lavana</td>
<td></td>
</tr>
<tr>
<td>MacConkey agar-(here salt used for electrolyte supply and osmosis balance of microbes)e.g –shigella[^57]</td>
<td>Masa (phaseolusmungo), Guda, Pistanna-contain carbohydrate(sugar )[^59]</td>
<td></td>
</tr>
<tr>
<td>Sabouraud glucose neopeptone agar-e.g. candida albicans[^58]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Sign and symptom | | |
|------------------|------------------|
| Diarrhoea-Vibrio cholera, acute infection of E. histolytica, rotavirus[^60] | Vidbheda, |
| Constipation – chronic infection of E. histolytica, Gripping pain in the lower abdomen over caecum and pelvic colon and around the umbilicus,flatulence,loss of appetite---e.g.E. histolytica, pigmentation of face- E. histolytica,[^61] | Malabaddha |
| Shoola | Shool |
| Vistambha | Vistambha |
| Bhaktadwesa[^62] | Bhaktadwesa |
| Vaivarnata[^63] | Vaivarnata |

[^56]: Venkatraman Ramkrishna
[^57]: Shigella
[^58]: Candida albicans
[^59]: Carbohydrate
[^60]: Vibrio cholera
[^61]: E. histolytica
[^62]: Bhaktadwesa
[^63]: Vaivarnata
**Krimi and Upasargicrogas (Contagious Diseases)**

Diseases which is spread from one person to another by contact is termed as SankramikaRogas. Sushruta has mentioned that diseases (UpasargikaRogas) like kushta (skin disorder), Jwara (fever), Sosha(tuberculosis), Netrabhhishyanda (conjunctivitis) etc. infectious diseases spread from one person to the other. The exposure or contact can be a simple association, touch, inhalation of other’s expired air, eating together, sleeping & lying together and wearing other’s clothes, using cosmetics of others etc trees. Even sexual contact with an infected person can give rise so many sexual transmitted diseases. According tomorden science there are mainly 3 routes by which infection can occur. These are- skin, nasal, and faecoral route.

By skin- syphilis, gonorrhea, titany, eysipelas and measles

By nasal – tuberculosis, influenza, rhinnorea, whooping cough, pneumonia, etc.

By faecoral route- typhoid, diarrhea, cholera etc.

Even though the Ancient authors not clearly described about the various modes infectious diseases transmission, but we can understand from the above statement that the some infectious diseases will spread by direct skin contact or use of used articles of the patient (Kushta, Netrabhhishyandaetc), some by direct droplet infection (Yakshmaetc), some by oral ingestion (Jwaraetc), some by sexual intercourse (Upadamsaetc). In this way the authors of ancient Ayurvedic texts have highlighted the infectious diseases.

**DISCUSSION**

The word Krimi broadly described for worms, microbes. From the Vedic period its existence was felt. But details of it is somewhat found in later period. In modern science due to invention of microscope the study of microbes become easy. Among the two types of Krimi – Drishya and Adrisya, the adrisya one is Anumangamy. The three types of RogiPariksha mentioned in ayurvedic text among which Anumana is used for AdrishyaKrimi. Though there was no microscope but with the help of AnumanPramanait was felt the existence of Krimi by analysis the sign and symptom. Though there is mention of Krimi in different Veda but there is somewhat difference in references to diseases.According to Rigveda there is a particular Krimi that affects the “Garbhayantra” and causes to “Grabhanasha” is the infections of vagina, Yajurveda describes the Krimicausing headache and abdominal pain. In Atharvaveda two types of Krimi are described as ‘Drishya’ & ‘Adrishya’.Atharvaveda explained that the micro-organisms can originate, from plants, water, earth and forest,they enter into human body and produces diseases. In Samhita period
mainly two types – Bahya and Abhyantara is found. In CarakaSamhitaJanapadodhwamsa, can be correlated to endemic/pandemic, which is supported by AdrishyaKrimi existed in environment according to Atharvaveda and produced diseases. Again Susruta mentioned about UpasargikaRogas which mode of transmission support the infectious diseases. Krimis which can be visualized may compare as adult worm and which never visualized with naked eye may be considered as larva stage of worm and microbes. The description of various types of krimi as a whole found in different texts of Ayurveda. They had given stress towards KaphajaKrimi, RaktajaKrimi, and PurishajaKrimi, and in case of RaktajaKrimi they mentioned the word Adarshanator invisible for some types (Krimi) but did not used the same term for PurishajaKrimi and KaphajaKrimi. But now aday’s some microbes are found in intestine, stomach, respiratory system which cannot be visualized through naked eye, which can be considered as PurishajaKrimi and KaphajaKrimi. In case of Purishaja and KaphajaKrimi it is found that they move upward and downward direction, means we can include here all the worms or microorganism reside in liver, bile duct, respiratory system, mouth, anus etc. In case of characteristics of Krimi it is mentioned some specific characteristic. The Nidana mentioned for different Krimi may be compare with the source of infection and different media for the growth, because both this help in growing (as a nutrient) of the microbes for causing or aggravating the diseases.

CONCLUSION

The concept of Krimi is not new. From the period of Veda its existence was felt. All the microbes exists in environment and in our body and worm can be considered as Krimi. That consideration may make a new avenue to think about its remedy.

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Cite this article as: Jeuti Rani Das, Hemanta Bikash Das, Sisir Kumar Mandal, Surendra Kumar Sharma. Concept of Krimi in Perspective of Modern Era-A Review, J of Ayurveda and Hol Med (JAHM).2015;3(4):57-69
Source of support: Nil, Conflict of interest: None Declared.