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MAGGOT THERAPY OR KRIMI UTPATTIKARA CHIKITSA: A REVIEW OF HISTORY AND CLINICAL APPLICATIONS

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ABSTRACT

Maggot therapy is a technique that involves the use of live maggots to treat chronic wounds. Krimi utpatti kara chikitsa means the creation of a swarm of flies over a wound to debride the unhealthy granulation tissue for healthy wound healing. This has to mention in the Indian surgical treatise Susruta Samhita in the management of kaphaja arbuda chikitsa. We summarize the history and technique of maggot therapy, as well as its uses for different indications and contraindications. The use of maggots for wound debridement, antibacterial activity, and promotion of wound healing are discussed, along with the mechanism of action and potential side effects. Finally, the potential of Maggot therapy to become a mainstream treatment option for chronic wounds is being discussed. Overall, this review highlights the promising benefits and the growing interest in maggot therapy as a viable alternative or adjunct to traditional wound care management.

Key words: krimi, maggot, alternative wound management, krimi utpatti kara chikitsa.

INTRODUCTION

There have been several significant social shifts since the dawn of human civilization. They include advances in agriculture, block construction, marketing, and medicine. The treatment of various illnesses underwent significant changes with the rise of new civilizations. Evidence of the earliest surgical or medicinal procedures may have been discovered in ancient Indian medicine. Using insects or larvae for wound

debridement and quicker wound healing is one approach to wound treatment. Maggot treatment, a modern variant of this theme, is increasingly used for wound care. The purpose of this article is to provide a more thorough description of the treatment, as well as to draw attention to some of the hints that may be found in the extensive ancient Indian surgical book Susruta Samhita. Using live maggots to debride and sterilise the wound is the basis of maggot treatment, also known as larval therapy or biosurgery. Maggot treatment was employed in the ancient world, but it has since fallen out of favour due to the development of more effective antibiotics and wound care methods. There has been a resurgence of curiosity in maggot therapy in recent years, in part because of the increasing prevalence of antibiotic-resistant bacteria and the resulting need for innovative approaches to wound treatment. Sushruta mentioned maggot application as a therapy method within the framework of kaphaja arbuda, and now this is commonly used within modern medicine. Both Sushruta's description of the treatment and the explanations given by modern scientists agree that "wound healing" is its primary objective. There is compelling evidence that lives maggot therapy, whatever its foundation, is effective in the treatment of some illnesses. (1)

Aims & objectives:

- Mentioning of the concept of treatment of wound utilising Krimi in Ancient Indian Surgery.
- To explore the details of techniques, proper procedure, mechanism of action, advantages, indications, contraindications, etc of the unique contemporary wound healing method of Maggot Therapy.

Recent history of maggot therapy:

The use of maggots for wound healing dates back to antiquity, with references to maggot treatment recorded in ancient Egyptian, Greek, and Roman medical texts. Maggot treatment was used to treat combat wounds in the Middle Ages, with soldiers permitting maggots to feast on their wounds to avoid infection and aid recovery. At hospitals throughout the 19th century, maggot therapy was employed to treat a variety of lesions, including pressure ulcers and gangrene. With the discovery of antibiotics throughout the middle of the 20th century, however, maggot treatment lost popularity and was virtually abandoned. (2)(3)

Maggots in Susruta samhita:

A treatment known as Krimi Upattikara Chikitsa was described by Ayurveda about 1500 B.C. as a means for removing undesirable substances. When describing the therapy for Kapharbuda, Acharya recommends applying a mixture of Vigna catjang, and Dolichos lablab), Kalka of Nishpava (Shimbi Dhanya - Cyamopsis tetragnolobus, Kulattha (Dolichos biflorus) and Pinyaka (Tilakitta) with Dadhi, Mamsa, and Mastu. This treatment stimulates the development of krimi by promoting the swarming of flies. Attracts insects. When just a little residue remains after worms have devoured a structure, the area can be scraped and burned, or if the base is small, it may be surrounded with thin sheets of copper, tin, lead, or iron. Krimi consumes the harmful portion of Arbuda, eradicating the lesion. (1) (4)

Although described in our classics, Krimi Upattikara Chikitsa has had a sharp decline in India due to a lack of complete understanding, poor acceptability among practitioners and patients, and the discomfort patients feel when having maggots on their bodies. However, it has gained popularity as a primary method of wound debridement in Western nations due to the negative effects of antibiotic use, including systemic side effects (nausea, vomiting, abdominal pain, diarrhoea, loss of appetite), allergic reactions like urticarial or hives, wheezing, coughing, tightness of the throat, and drug resistance. In order to embrace Krimi Utpatthikara Chikitsa as one of the mainstays of wound therapy, it is necessary to educate and raise public knowledge of its advantages over other wound treatment techniques.

Relevance of Susruta's idea of indication of maggots in kaphaj arbuda:

Understanding the idea of Arbuda is crucial before moving on to the subject of chikitsa. The purpose behind Sushruta's recommendation of maggot treatment in the case of kaphaja arbuda will thereafter be made clear. The primary Dooshya mamsa in Arbuda. According to legend, Kaphaja Arbuda has many

characteristics with Kaphaja Granthi. Both the gunas of kapha and mamsa provide a favourable, wet environment for the krimis. Yet, the fact that the primary dushyas in kaphaja arbuda are kapha and mamsa, which have ashraya ashrayi sambandha, can also be seen as the main rationale for suggesting this extremely unusual course of therapy. The primary purposes of applying nispavaadi dravyasare are to draw flies and foster an atmosphere that is conducive to the growth of krimis. In addition to this, it aids in the proper selection of flies since not all fly larvae have an inclination for damaged tissues. This is accomplished by applying mamsa to the afflicted region, which only attracts flies that have a need for dead tissues. By giving the maggots a sick region to feed on, you may provide them with a comfortable environment to dwell in for a while. The krimis are exterminated when there is just a little residue left after they have consumed the land. So that there is no danger of the arbuda continuing to develop, the place is then dahana by agnikarma. As indicated by Acharya Sushrutha while describing the characteristics of trapyadi gana, the utilization of tin, copper, lead, and iron for Veshtana may be due to their krimi hara activity. Dry wounds are contraindicated even with MDT because a damp environment alone can promote the proliferation of maggots. This chikitsa is only mentioned in Kaphaja Arbuda and not in Vata or Pittaja, according to Acharya Sushrutha. Hence, it is a successful therapy for Kaphaja arbuda. (1) (4)

Proper Techniques Of Maggot Therapy (5)(6)

After cleaning the region around the wound, the skin is wiped with a barrier film. As a result, dressing adhesion is improved and adhesive peeling is prevented. Applying barrier film dressing to the wound directly should be avoided. A noniodinated adhesive drape to the skin around the incision using sterile technique is to be used, leaving a hole over the wound, and tie-over suture loops added as necessary. Aseptic measures are to be taken throughout to avoid infection. A wound-sized hole is cut from the middle of a second adhesive dressing using sterile procedures. For subsequent use, place the dressing aside on a clean surface. A polyester mesh screen is cut such that its edges cross the margins of the wound while still staying within the confines of the overlying dressing. This should be set away on a clean surface. Using a sterile ruler, the length and breadth is measured of the incision to determine the approximate number of larvae required (5–8 larvae per cm^2). Using a sterile tongue depressor and sterile gauze soaked in saline, the required number of maggots from the shipping container was carefully removed. The larvae are placed on the wound bed or loosely compress by the gauze holding the larvae into the wound. The remaining sterile adhesive dressing should be used to apply the mesh to the wound hole, ensuring sure that all edges are well-adhered. waterproof tape strips are alternatively used to seal the edges of the wound bed. The fit of the containment dressing should be monitored. The only mesh should be used to cover the wound entrance. Two layers of wide-mesh gauze should be placed over the mesh window. The mesh gauze may be covered with an extra absorbent layer that is fastened with a tie-over bandage. Maggots often start to emerge from the wound at the screen after 36 to 72 hours. the screen and drape are removed. Physically the maggots are then scrubbed off with a gauze sponge or use saline lavage.

Mechanism Of Maggot Therapy

- *Debridement:* A lesion may be debrided in a day or two with maggot therapy because a vast number of small maggots can consume necrotic tissue much more accurately than is possible during normal surgical procedures. The presence of maggots frequently causes the area of the wound's surface to increase because the wound's undebrided surface obscures its real underlying extent. Extracorporeal digestion, in which a variety of proteolytic enzymes are produced to liquefy necrotic tissue, is how they obtain nutrition. Over a few days, they absorb the semi-liquid product. In the ideal wound environment, maggots moult twice, growing in length and girth over the course of 48–72 hours by devouring decaying tissue. After they are removed, the wound becomes clean and devoid of necrotic tissue. (7)(8)

- *Disinfection:* Some of the chemicals found in the secretions of maggots have been studied for their potential to have a broad-spectrum antibacterial effect, including phenylacetic acid, Allantoin, urea, calcium carbonate, phenylacetaldehyde, and proteolytic enzymes. According to in vitro study, maggots suppress and eliminate a number of dangerous bacteria, including methicillin-resistant Staphylococcus aureus (MRSA), group A and B streptococci, and Gram-positive aerobic and anaerobic strains. Some bacteria such as Pseudomonas aeruginosa, E. coli, or Proteus species are not targeted by maggots, and in the case of Pseudomonas, even the maggots are in danger. (9)(10)

Maggot therapy has been shown to be effective in overcoming biofilms through several mechanisms: (11)(12)

1. Physical removal: Maggots are very effective at physically removing biofilms from the wound surface through their movement and feeding behavior. As they move across the wound, they can dislodge and remove biofilm layers, exposing the underlying bacteria to antimicrobial agents.
2. Enzymatic activity: Maggots secrete a range of enzymes that can break down the extracellular matrix of biofilms, making them more susceptible to antimicrobial agents. These enzymes include proteases, lipases, and DNases, which can degrade proteins, lipids, and nucleic acids, respectively.
3. Disruption of Quorum sensing: Quorum sensing is a communication system used by bacteria in biofilms to coordinate their behavior and resist antimicrobial agents. Maggot secretions have been shown to interfere with this system, disrupting the communication between bacteria and making them more susceptible to antimicrobial agents.
4. Enhanced immune response: Maggot therapy has also been shown to enhance the immune response in the wound, which can help to overcome biofilms. Maggots secrete a range of molecules that can stimulate the recruitment of immune cells to the wound, including cytokines and chemokines.

Organisms commonly used for maggot therapy (13):

- Lucilia sericata (commonly known as green bottle fly or blow fly
- Calliphora vicina (called blue bottle fly or blow fly)
- Phaenicia sericata (commonly known as the black soldier fly)
- Cochliomyia hominivorax (commonly known as the screwworm fly)
- Chrysomya rufifacies (commonly known as the hairy maggot blow fly)
- Musca domestica (commonly known as the house fly)

Contradiction:

Due to the fact that maggots need a wet environment, dry wounds are often contraindicated. In order to make the larval removal process easier, the use of maggots should also be avoided in open wounds, bodily cavities, or wounds near big blood arteries. Moreover, people who are allergic to soybeans, eggs, or fly larvae shouldn't utilize maggots. (6) (14)

Some of the applications of maggot therapy and Future Developments: (14)

- Chronic wounds: Maggot therapy can be used to treat chronic wounds that have not responded to other forms of treatment, such as venous stasis ulcers, diabetic foot ulcers, and pressure ulcers.
- Necrotic tissue: Maggot therapy is particularly effective at removing necrotic (dead) tissue from wounds, which can promote faster healing.
- Infections: Maggot therapy has been shown to be effective at killing bacteria in wounds, including antibiotic-resistant strains such as MRSA.
- Burn injuries: Maggot therapy has been used to debride burn wounds, which can improve healing and reduce scarring.
- Oncology wounds: Maggot therapy can also be used to treat wounds that have developed as a result of cancer treatment, such as radiation-induced ulcers.

Overall, maggot therapy is a safe and active treatment option for a variety of wound types.

Maggots can be genetically modified to produce therapeutic proteins. Researchers have genetically modified maggots to produce therapeutic proteins, such as human growth hormone, which can be used to treat a variety of medical conditions. This could potentially be a more cost-effective way to produce therapeutic proteins compared to traditional methods. (15) Maggot therapy is being used in combination with other therapies, such as negative pressure wound therapy, to enhance wound healing. This combination therapy has been shown to be more effective than either therapy alone. (16)

Overall, maggot therapy continues to be a promising and effective treatment option for a variety of medical conditions.

Side Effects:

While maggot therapy is generally considered safe and well-tolerated, there are some potential side effects to be aware of (14)(17)

- Pain: Patients may experience some pain or discomfort during maggot therapy, particularly during the initial application of the maggots.
- Bleeding: Maggots may cause minor bleeding as they feed on dead tissue in the wound bed.
- Infection: Although maggot therapy is often used to reduce the risk of infection in chronic wounds, there is a small risk of developing an infection from the maggots themselves.
- Allergic reactions: Some individuals may develop an allergic reaction to maggots, which can cause itching, rash, or difficulty breathing.
- Odor: Maggots produce a strong odor as they feed on dead tissue, which may be unpleasant for some patients.
- Migration: In rare cases, maggots may migrate away from the wound site, which can cause additional complications.

CONCLUSION

In conclusion, maggot therapy has been shown to be an effective and safe method for treating a variety of chronic wounds. This modality of wound debridement has been used for centuries in ancient Indian surgery and recent research has provided strong evidence supporting its efficacy. Maggots can debride wounds, promote healing, and reduce the risk of infection, making them a valuable addition to wound care management. While not everyone is a candidate for this therapy, it should be utilized in addition to other forms of treatment, whether contemporary or Ayurveda. Like sodhan therapy or any antibiotic usage. Some researchers have proved its antimicrobial actions by finding microbes in the upper gut of the larva. Anyways it offers an exciting and innovative approach to wound care that has the potential to improve the quality of life for many patients. As further research continues to explore the potential of maggot therapy, an ayurveda way to debridement and we can expect to see its use increase in clinical settings as a valuable tool in the management of chronic wounds. Acharya Sushruta was a trailblazer in popularizing this form of medicine. As Ayurvedists, it is imperative that we adopt this therapeutic approach as our own and put it to use.

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