

**“Scientific Contribution Of Ayurveda In Healing Of Chronic  
Wound (Dusta-Vrana): A Critical Review.”**

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## ABSTRACT:

**Background:** Chronic ulcers (*Dusta vrana*) are defined as spontaneous or traumatic lesions which not respond by initial therapy to proceed healing in 4 wks to 3 month time period with systemic disease or local disorders. Herbal products seem to possess moderate efficacy with no or less toxicity and are less expensive as compared with synthetic drugs. Main aim of this article is to review herbal drugs and other methods which is effective in healing of chronic wound (*Dusta vrana*).

## Methodology:-

This review work was carried out by using a widespread and planned data mining approach. To achieve significant literature author uses the key words “chronic wound” “Dusta vrana”, “herbal medicine for chronic wound” and “role of Ayurveda in healing of chronic wound” searched in Google Scholar, web of science, Science direct, Scopus, Medline and PubMed Central journal literature

## Result:-

Eleven publications were included in the final selection after systematic analysis.

## Conclusion:-

In *Ayurveda*, *Vrana* is mention which has very similar features to Wound. In a surgical practice wound healing is a burning problem because of a notable increase in the traumatic cases. Ayurveda describes many plant origin and animal origin products which are found very effective in wound healing of chronic wound such as leech therapy, application of honey, Haridra (*Curcuma longa* Linn.), Betel (*Piper betle*), Ghrita kumari (*Aloe vera. ex Linn.*), Neem (*Azadirachta indica* A. Juss) and Arjun (*Terminalia arjuna*) etc.

## Key words: -

Ayurveda, leech therapy, chronic wound, Dusta vrana, Haridra, Neem leaves, Ghrita kumara.

**1.0 Introduction: -**

Wound is an injury to the body from any mode (such as violence, accident, or surgery) that usually involves laceration or breaking of a membrane (such as skin) and usually damage to underlying tissues.<sup>1</sup> In the references of pathology, it refers to a sharp injury which damages the epidermis of the skin. Chronic ulcers or non-healing ulcers (*Dusta vrana*) are defined as spontaneous or traumatic lesions which not respond by initial therapy to proceed healing in 4 wks to 3 month time period with systemic disease or local disorders. The immense majority of chronic wounds can be classified into three types i.e. venous ulcers, pressure ulcers and diabetic ulcers and.<sup>2-3</sup> Non-healing ulcers are common in lower extremities.<sup>4-5</sup> The normal wound healing process is completed in three phases: inflammation, tissue formation and tissue remodeling. But if the normal healing process is interrupted then an ulcer can convert chronic in nature due to lack of growth factors and cytokines which delay the process of healing.<sup>6</sup> Management of wound is an important and mounting health problems in the society.<sup>7</sup> In a surgical practice wound healing is a burning problem because of a notable increase in the traumatic cases. Wound healing generally depends upon two kinds of factors, systematic and local. Systemic factors such as Septicemia, Anemia, Nutritional deficiency can be corrected by proper diet and medication. Hyperbaric Oxygen Therapy (100% oxygen) is used to treat chronic wound and very serious wounds. The oxygen dissolves into the blood and dispersed all over the body, and provides extra oxygen to the wound cell which attempt to heal. Hyperbaric oxygen therapy is very effective in increase the rate of collagen deposition and bacterial clearance. Extra oxygen to the wound area is not providing favorable environment to the growth of serious infections. This method has been used for many years in treating chronic or complicated, non-healing wounds.

In *Ayurveda*, *Vrana* is mention which has very similar features to Wound. Various *Ayurvedic* literatures, mainly *Sushruta samhita* described detail about *Shalya Tantra*. *Acharya Sushruta* (father of surgery) has scientifically classified it in a systemic manner, whose principles of management related to surgical diseases are even valid in present era. *Shalya Tantra* (surgical branch of *Ayurveda*) is one of the essential branches of *Ayurveda*, in which surgical and para-surgical methods has described for treatment of various diseases. In *Sushruta samhita*, *Vrana* (wound) is described as:-“*Vrana Gatra Vichoorney, Vranayetey itee Vrana*” i.e. discontinuity

of the skin is known as *Vrana* (Wound).<sup>8</sup> Wound healing is a complex process of recovering the forms and functions of injured tissues. Wound healing is characterized by a sequence of actions such as inflammation, cellular phase (granulation), contraction of wound region, formation of collagen deposition, epithelialization), and scar remodeling (cicatriziation).<sup>9-10-11</sup> A normal wound healing occur usually occurs in 7 to 10 days.<sup>12</sup> A variety of conditions may donate to impaired wound healing such as infections, underlying diseases and medications etc. *Acharya Sushruta* described *Shashti Upakramas* (sixty procedures) for wound management. Out of these first 12 procedures are described for remove the contamination of wound and prepare the wound for specific therapy. Next 10 procedures are for surgical Intervention and further 12 procedures are for induction of healing. Last 26 procedures described detail to remove complications and consequence of wound.<sup>13</sup> According to *Acharya Charaka*, nature has the power to cure all the ailments. (*Swabhavoparamvad*). As a fact nature takes a complete care during the healing of wounds. The defense mechanism of the body like phagocytosis and its local enzymatic action on the deep tissues helps to keep a wound clean.

*Ayurveda*, the Indian traditional system of medicine, mentioned 1200 diseases in different classical texts. Treatment of various diseases is made with more than 1000 medicinal plants minerals, metals, animal and marine products. It has been estimated that 70% of the wound healing drugs of *Ayurveda* are of plant origin, 20% of mineral origin, and rest 10% consisting of animal products.<sup>14</sup> According to *Ayurveda*, wounds have been treated mostly by topically application of different medicinal herbs or with their extracts solely or in combination with some other plant. Many scientific studies shows that herbal drugs have anti-inflammatory, antioxidant, antibacterial and pro-collagen synthesis properties which act as wound healing agents. Their medicinal action can be due to bioactive phytochemical such as alkaloids, tannins, saponins, essential oils, flavonoids, and phenolic compounds of herbal drugs. The main aim of this review article is to review systematically the published research pertaining to wound healing drugs in *Ayurveda* by using the PubMed, Scopus and various other databases.

## **2.0 Methodology:**

This review work was carried out by using a wide-ranging and organized data mining approach. To achieve significant literature author uses the key words “Dusta Vrana and Chronic wound” and “Ayurvedic drugs in chronic wound healing, wound healing property,

Ayurveda” were parallel searched in Google Scholar, web of science, Science direct, Scopus, Medline and PubMed Central journal literature. Inclusion criteria were literature sources such as peer reviewed journal articles, UGC care list journal, conference/ seminar proceedings book, refereed books and abstracts.

### **3.0 Observation:-**

In Ayurveda, Several drugs from plant origin (Herbal extracts), mineral origin, and animal origin are described for their wound healing properties under the term Vranaropaka (wound healing agent). Wound healing activities of some plants have been screened scientifically in different pharmacological models, but some of them remain unexplored. Ayurveda describes many plant origin and animal origin products which are found very effective in wound healing of chronic wound such as leech therapy, application of honey, Haridra (*Curcuma longa* Linn.), Betel (*Piper betle*) Durva (*Cynodon dactylon Pers.*), Lodhra (*Symplocos racemosa Roxb.*), Ghrita kumari (*Aloe vera. ex Linn.*), Neem (*Azadirachta indica A. Juss*), Yashtimadhu (*Glycyrrhiza glabra* Linn.), Daruharidra (*Berberis aristata DC.*) and Arjun (*Terminalia arjuna*).<sup>15</sup> This process wound healing is divided into four predictable phases: blood clotting (hemostasis), inflammation, tissue growth (proliferation), tissue remodeling (maturation) and Ayurvedic drugs acts on these phases. According to Ayurveda, wounds have been treated mostly by topically application of different medicinal herbs or with their extracts solely or in combination with some other plant. In this article author reviewed various Ayurvedic drugs (Herbal based and animal based) and their preparations which have been reported for wound healing -

### **3.1 Leech therapy in Chronic wound (Non healing ulcer):-**

Leech saliva produce Carboxypeptidase A inhibitors enzyme to wound area which reduces vascular congestion. Leech saliva also has Histamine and Acetylcholine like substance which act as peripheral vasodilator effects, improves blood circulation and manage ischemia around the wound, thus promotes wound healing.<sup>16</sup> Leech application also improves the hypoxic condition and provides a moist environment for wound healing. It is observed that leech saliva stimulates the enzymatic debridement of the slough material present in the wound. Leech therapy show efficacy against bacteria, such as methicillin-resistant *Staphylococcus aureus* (MRSA). The recalcitrant nature and complexity of chronic wounds continue to challenge health practitioners in the field, with many of the standard treatment options often failing to provide good outcomes. Chronic wounds are often infected with bacteria resistant to antibiotics, compounding the problem. Some alternative biologic forms of treatment have

been used and are gaining recognition; they include apitherapy (application of honey), maggots and leeches.

### **3.2 Honey application in Chronic wound:-**

Honey is a yellowish color, sugary and thick solution collected from nectar of flowers by bees insects.<sup>17</sup> It contains maximum amount of carbohydrates (80–85%) and other is water (15–17%), protein (0.1–0.4%), ash (0.2%) with small quantities of enzymes, vitamins, minerals, amino acids, organic acids etc.<sup>18-19</sup> Many clinical studies proves that honey accelerated the healing of wound including burns, surgical and infected wounds. Honey work to improvements in area of epithelialization, tissue granulation, collagen deposition, and wound contraction. The aesthetic outcome of honey treatment reported, as thinner scars at wound site.<sup>20</sup> A pilot study showed that honey is effective to reduce redness, edema, ecchymosis, discharge and approximation of wound edges (REEDA) score at day 7 and 14.<sup>21</sup> Honey have antimicrobial activity<sup>22</sup> and when honey is diluted with water it produce hydrogen peroxide which produce bacteriostatic and bactericidal properties. pH of Honey is 3.2–4.5 and due to its acidic nature it prevents colonization and growth of bacterial in tissues.<sup>23</sup> Most microorganisms do not grow in pure honey because of its low water activity also.<sup>24</sup> Many scientific believes that honey may be a potent immunomodulator, anti-inflammatory and anti-oxidant at different stages of wound healing processes.

### **3.3 Turmeric (*Curcuma longa*) in Chronic wound:-**

Curcumin is the main found and most active constituent in *C. longa*. Many in vitro and in vivo studies showed curcumin have anti-inflammatory, anti-carcinogenic, anti-infectious, antioxidant and wound healing properties.<sup>25-26</sup> Curcumin enhanced wound healing activities by good epidermal regeneration, dense granulation and improved collagen content.<sup>27</sup> Cucurmin has antimicrobial activity, hence it is very effective in infected wounds also. A study proved that the levels of collagen were drastically elevated in curcumin-treated wounds than control group, consequential into increased wound tensile strength.<sup>28</sup> Curcumin improved expression of Transforming growth factor-beta (TGF- $\beta$ 1) which is very important in wound healing process.<sup>29</sup> Cucurmin also improves new skin formation and migration of cells such fibroblasts, macrophages etc. which are necessary for healing at the wound area.<sup>30-31</sup> So it can be said that Turmeric (*Curcuma longa*) can be uses as therapeutic agent for wound healing by its manifold biological actions such as regulating anti-oxidant, anti-inflammatory properties and promoting collagen deposition at the wound area.

**3.4 Arjuna bark powder in Chronic wound:-**

Arjuna (*Terminalia arjuna*) has wound debridement property which is very essential to remove slough, edema and discharge of wound area. Vagbhata clearly said that Arjuna is to be topically applied (locally application) in the treatment of wounds, hemorrhages and ulcers. In *Shashti Upakramas* (sixty procedures) for wound management *Kalka* (paste) is indicated in cases of chronic wounds which are unwilling to heal.<sup>32</sup> *Kalka* (paste) is effective for cleansing and in addition to healing of wounds. One study proved that locally application of Arjun (*Terminalia arjuna*) bark powder and mixed with coconut oil daily once in the morning on wound area is very effective in wound healing.<sup>33</sup> Another reports proved that coconut oil has antiulcer property and when combined with Arjuna bark it may accelerate the wound healing.<sup>34</sup> Herbal powder of Arjuna (*Terminalia arjuna*) improve circulation on wound area which plays important role in healing of chronic wound mainly in cases of varicose ulcer where hampered blood circulation is main etiology.

**3.5 Cow ghee (*Goghrita*) in Chronic wound :-**

Nutritional value present in the Cow ghee delivered to tissue very easily because it crosses the cell membrane due to lipid solubility. Cow ghee is very good for rejuvenating, for the eyes and vision, digestion, enhances memory and stamina, increases intellect, promotes longevity and protects the body from many diseases. It is clinically proven that Cow ghee have wound healing property due to its antibacterial and anti-inflammatory property because it have fatty acids.<sup>35</sup> *Goghrita* (Cow ghee) have cold, oily qualities help guard the body's mucous membranes and surrounding wound area.

**3.6 Ghritha kumari (*Aloe vera*) in Chronic wound :-**

Powder of *Aloe vera* have many active constituents like anthraquinone C-glycosides, anthrones, and lectins which promotes wound healing in various clinical studies due to anti-inflammatory, anti-arthritis, antibacterial and antifungal activities. *Aloe vera* promoted keratinocyte proliferation and improved the process of wound healing very fast. *Aloe vera* plant has mucilage secretion which improves the dermal intake of drugs as well the mucilage of this plant can be used for treatment of internal and external wounds.<sup>36-37</sup>

**3.7 Neem leaves (*Azadirachta indica A. Juss*) in Chronic wound:-**

The main active compounds of Neem (*Azadirachta indica*) are alkaloids, flavonoids, phenolic, steroids, carotenoids, ketones and azadirachtin compound.<sup>38</sup> Current studies and research mention that Neem has many therapeutic effects such as anti-inflammatory, antibacterial, anti-diabetic, antifungal, antiviral and anti-malarial. Clinical studies prove that Neem accelerates the wound healing process by control the infection which can extend the time of wound healing. Neem plant has anti-inflammatory effect which provides additional effect in healing of wound. Neem helps the body to quickly create collagen fibers to close the wound and it has anti-diabetic property so this is most effective in diabetic foot ulcer. It has wound healing process by enhancing the proliferation phase.<sup>39</sup>

### **3.8 Betel (*Piper betle*) in Chronic wound :-**

The leaves of Betel (*Piper betle*) contain alkaloids, steroidal, flavonoids, carbohydrate, tannins and terpene like components.<sup>40</sup> It have anti-diabetic, anti-oxidant, anti-inflammatory and anti-microbial properties.<sup>41</sup> Betel (*Piper betle*) can repair the wound tissue in hyperglycaemic state such as diabetic foot ulcer. Flavonoid compounds of *Piper betle* promote the wound repair process by improving the healing process and increasing re-epithelialization of wound tissue.<sup>42</sup>

### **3.9 Nutritional support in Chronic Wound:-**

Research has shown that vitamin C play very important role in wound healing. Citrus fruit such as lemon, orange and guava is rich source of vitamin C. It produces collagen, which is essential for the granulation of tissue that heals a wound and the helping component in blood vessel walls formation.<sup>43</sup> The amino acid glutamine is an important substrate for rapidly proliferating cells in chronic wound. Bromelain is found in pineapple which has proteolytic that can be very helpful in chronic. Severe zinc deficiency affect bad impression on immune response of body and Zinc is also necessary development and activation of T-lymphocytes. Topically or orally use of Zinc is very effective to encourage wound healing. A published review article mentioned that vitamin C plays very important roles in the prevention and treatment of carcinoma by stimulating the immune system of body. Wound healing requires extra vitamin C than diet provide. Vitamin B5 (Pantothenic Acid) is very helpful in healing of wound by relocation of cells into the affected area.<sup>44</sup> Vitamin A is important for wound healing by tissue synthesis and decrease probability of infection.<sup>45</sup> Vitamin B-Complex is also needed for cell proliferation and prevent bleeding so this is also very important for wound healing.<sup>46</sup>

**4.0 Conclusion:-** Wounds are a major clinical challenge very frequently encountered by as in our clinical practice. The worldwide prevalence of wounds is believed to be 1% of world population. The process of healing which is a natural phenomenon starts right after an injury and continues in sequential manner till the formation of healthy scar. Oxygen is critical for wound healing. Consistent delivery of oxygen is required to meet high metabolic demands of the tissues, collagen synthesis, fibroblast proliferation, neo-vascularization and epithelialization. For management of chronic wound (*Dushta vrana*) bloodletting was advised by leeches therapy along with proper wound cleaning by *Sushruta*. *Acharya Charaka* was also of same opinion regarding the management of non healing ulcers. Now modern world is adopting the ancient methods in the management of chronic ulcers. Herbal products seem to possess moderate efficacy with no or less toxicity and are less expensive as compared with synthetic drugs. . Ayurveda describes many plant origin and animal origin products which are found very effective in wound healing of chronic wound such as leech therapy, application of honey, Haridra (*Curcuma longa* Linn.), Betel (*Piper betle*), Ghrita kumari (*Aloe vera. ex Linn.*), Neem (*Azadirachta indica* A. Juss) and Arjun (*Terminalia arjuna*) etc. Leech saliva contain Histamine and Acetylcholine like substance which act as peripheral vasodilator, improves blood circulation and manage ischemia around the wound, thus improve wound healing. Honey is potent immune-modulator, anti-inflammatory and anti-oxidant so very helpful in wound healing processes. Turmeric (*Curcuma longa*) is uses for wound healing by its manifold biological actions such as regulating anti-oxidant, anti-inflammatory properties and promoting collagen deposition at the wound area. Locally application of Neem leaves accelerates the wound healing process by control the infection and anti-inflammatory effect. Research has shown that vitamin C play very important role in wound healing because it produces collagen, which is essential for the granulation of tissue that heals a wound and the helping component in blood vessel walls formation.

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