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Naresh Kumar Ghodela
Department of Shalya Tantra,
I.P.G.T. & R.A. Gujarat
Ayurved University, Jamnagar,
Gujarat, India

Tukaram Dudhamal
Department of Shalya Tantra,
I.P.G.T. & R.A. Gujarat
Ayurved University, Jamnagar,
Gujarat, India

Wound healing potential of Ayurved herbal and herbo-mineral formulations: A brief review

Naresh Kumar Ghodela and Tukaram Dudhamal

Abstract

Healing of wound is a challenging task to surgeon in ancient time and even in today's era. Healing is protective mechanism of our body to invade against infection. In modern science many antibacterial formulations are available with their own limitations. Ayurveda is a science of medicine where there are so many pieces of pearl available to treat wound without any complication. Our Acharyas broadly described about treatment principles of wound management and classified the drugs related to *Vrana shodhana* and *Vrana ropana*. In this article an attempt has been made to review clinically validated evidence based herbal and herbo-mineral formulations. These scientific evidences definitely impact our Ayurveda system too really on them and need keen interest to apply different formulations according to the nature and type of wounds. For that purpose the research articles and case reports were searched in PubMed, DHARA online and AYUSHPORTAL (a research portal of Govt. of India.) in the month of June 2016. Total 536 research papers were found on wound key words but after evaluating each free assess research paper 48 clinical studies while 98 pharmacological studies were found. Free accessible 28 clinical studies till June 2016 were included in this article. This review article is definitely helpful to the new researcher to study on the same plant in more number of patients with different indication for its scientific validation.

Keywords: *Dushta vrana*, herbal, herbo-mineral, non-healing wound, *Ropana*, *shodhana*, *Vrana*, wound

1. Introduction

Sushruta the father of Indian surgery in 1000 BC has elaborated the concept of *Vrana*. *Sushruta* has elaborately explained sixty types of procedures for the management of wounds to achieve good approximation, early healing, without complication and acceptable scar. He advocated numerous herbal drugs for local application as well as systemic use. His techniques are broadly classified as *Vrana Shodhana* (wound cleaning) and *Vrana Ropana* (wound healing). The concepts and principles of *Vrana* such as causes, classification, examination, treatment, bandaging, complications etc. mentioned in Ayurved classic *Sushruta Samhita* by *Acharya Sushruta* remained unchanged even in this 21st century [1]. *Sushruta* mentioned as leprotic wound, diabetic wound, tubercular wound are nonhealing in this advance era [2].

Wounds are physical injuries that result in opening or break of the skin. Proper healing of wounds is essential for the restoration of disrupted anatomical continuity and disturbed functional status of the skin. Wound healing is complex phenomenon and is differing from patient to patient. The wounds are said to be non-healing when does not improve after four weeks or does not heal within eight weeks.

The causes of delay healing are many that is local causes and systemic diseases but the root causes are reduced tissue regeneration, angiogenesis and neurological problem [3]. In Ayurveda many research works have been carried out for the management of chronic and non-healing wounds. Many experimental studies were carried out on the single and compound herbal and herbo-mineral formulations for wound healing. In this study the review has been done only the clinical studies carried out on the single and compound formulation of Ayurveda herbal, herbo-mineral. Some review on wound healing has been done but that was up to institute and university level with limited data [4].

2. Why This Review

In this modern era wound treatment is most difficult to heal. Skin disruption allows to invade organisms to grow and infect the area. In Ayurveda literatures various treatments are available but still not authenticated within new diagnosed modern diseases on scientifically highlighted to open. This review helps to new researcher to select new research work that not conducted.

Correspondence
Tukaram Dudhamal
Department of Shalyatantra,
I.P.G.T. & R.A. Gujarat
Ayurved University, Jamnagar,
Gujarat, India

3. Materials and Methods

In this review work the clinical studies carried out at different Ayurved centres and published in the indexed and referred (ISSN numbered journals) were included. The research articles and case reports were searched in PubMed, DHARA online and AYUSHPORTAL (a research portal of Govt. of India.) in the month of June 2016. In these review keywords *Vrana*, *Dushta vrana*, wound were used for searching the research data on wounds. In PubMed [5] 26 papers were found with keyword *Vrana*, ayurved. In DHARA [6] total 18 and 161 results were observed on *Vrana*, and wound respectively. In AYUSHPORTAL [7] search on Ayurveda section 536, 4 and 78 research articles were noted with keywords that are wound, non healing wound and *vrana* respectively. Total 536 research papers were found on wound key words but after evaluating each free assess research paper 48 clinical studies while 98 pharmacological studies were found. Maximum papers were found on animal experimental studies. In this review we summarised only clinical trial papers and case reports. The research papers which are paid were not included as these are having only in abstract form. So in this review free accessible 28 clinical studies till June 2016 were included. This review article is definitely helpful to the new researcher to study on the same plant for more number of patients with different indication for its scientific validation. This study is also helpful to the researcher to find wound healing herbal formulation in this single review article.

4. Results and Discussion:

4.1 *Katupila (Securinega leucopyrus)* paste in *Dushta vrana*

In this case study researcher treated a case of 40 years aged female patient of non-healing chronic wound on the right buttock (3 inch × 3 inch × 1 inch) presented with foul smelling and black slough area since 2 months. Case managed by cleaned with decoction of *Panchavalkala* and local dressing of wound by *Katupila powder* [8-9] mixed with sesame oil once daily along with oral multivitamin capsule consist of vitamin B₁₂, Ferrous Fumarate, Vit-C and Folic acid once a day for 30 days. It was observed that the black slough removed on 4th day without surgical debridement, wound became clean with healthy granulation on 21st day and complete wound healing was observed by 5 weeks. Study concluded that paste of *Katupila (Securinega leucopyrus)* mixed with sesame oil is effective and showed excellent healing effect in a case of chronic and non-healing wound [10].

4.2 *Katupila (Securinega leucopyrus)* paste for diabetic wound:

In this case 55-year-old male patient had infected round shaped wound sized (4.5 cm × 4 cm × 2 cm) at mid lateral tibial aspect of the right lower limb. Wound associated with burning pain foul-smelling pus discharge, local swelling with necrosed subcutaneous tissue and skin, difficulty in walking and occasional fever. Patient was Type II diabetes mellitus since last 15 years and taking antidiabetic medicines irregularly. This case was managed by cleaning with freshly prepared *Panchavalkala kwath* and local application of *Katupila* [11-12] paste mixed with sesame oil. Wound was covered with sterile gauze and loosely bandaged once daily in the morning. Along with local application tablet metformin 500 mg once daily was continued before the meal. Author observed that after 3rd day necrotized skin and subcutaneous part was removed without surgical intervention and on 7th day fresh granulation tissues appeared. On 15th day wound contraction appeared and wound healed completely within 30 days with minimum scar [13].

4.3 Honey (*Madhu*) in *Dushta Vrana*: Author selected a 70 year old female patient of chronic infected wound of size 22 cm × 4.5 cm on anterior aspect of right tibia extending from the knee to the ankle joint with complaint of foul-smelling pus discharge, difficulty in walking and occasionally fever. Case was managed by daily cleaning with freshly prepared lukewarm *Neem* bark decoction and there after apply *Madhu* with the help of a spatula and the wound covered with sterile gauze and loosely bandaging. Along with the local wound treatment, the following drugs were given orally along with lukewarm water in powdered form 12 hourly that is *Yashtimadhu (Glycyrrhiza glabra)*, *Shatavari (Asparagus racemosus)*, *Gokshura (Tribulus terrestris)* and *Guduchi (Tinospora cordifolia)* 2 gm. each. Wound completely healed leaving only a minimal scar by 35th day. This single case concluded that daily dressing of the wound with *Neem* bark decoction helped to inhibit the growth of microorganisms [14].

4.4 Honey in cutaneous wound healing: In this trial the efficacy of honey has been evaluated in the management of *Vrana Ropana* (wound healing). In 10 patients of cutaneous wounds (Trauma/injury) honey was applied as dressing material twice daily for 20 days. Assessment of wound shape, size, floor and margin was done on 7th, 15th, 20th days and after complete healing of wound. Honey promotes rapid healing as it stimulates tissue regeneration, angiogenesis, and fibroblast activity. Study concluded that Honey possess antibacterial and wound healing properties without showing any adverse effects [15].

4.5 *Laksha choorna* and *Madhu* on wound after removal of *Danta Sharkara*:

The efficacy has been evaluated in the management of *Dantasharkara* (tartar). Author selected 60 patients of *dantasharkara* and divided into two groups. In trial group (n=30) *Laksha Churna* with *Madhu* was rubbed on the surface of teeth and gingiva twice daily for 7 days. In control group (n=30) Tab. Ciprofloxacin 500 mg and Tab. Diclofenac sodium 50 mg prescribed after scaling twice a day after meal for 5 days. Regeneration, repair and new attachment are the aspects of periodontal healing that are achieved by gingival physiotherapy on scaling wound. Study concluded that the *Pratisarana* (local application) of *Laksha Churna* with *Madhu* [16] on scaling wound found better line of treatment in the successful management of tartar without any systemic use of drugs [17].

4.6 Efficacy of *Panchavalkala* cream as *Vrana Shodhana*

Author tried *Panchavalkala* cream [*Vata (Ficus bengalensis L.)*, *Ashwatha (Ficus religiosa L.)*, *Udumbara (Ficus glomerata Roxb.)*, *Plaksha (Ficus lacor Buch-Ham.)*, *Parish (Thespesia populenea Soland.)*] to assess antimicrobial load in selected 50 patients of infected, non-malignant, chronic non-healing wounds. Local application of *Panchavalkala* cream was done once daily on wound debridement with special reference to wound infection and the microbial load until complete surgical debridement. *Panchavalkala* cream was prepared from *Ghanasatwa* (water extract) of the individual drugs of *Panchavalkala* [18]. Efficacy of *Panchavalkala* cream was evaluated by wound biopsies at a single microbiology laboratory. Significant reduction in parameters (Slough, swelling, redness, pain, discharge, tenderness and malodour) by grading pattern was observed. Author evaluated that antioxidants, Tannins, phytosterols and flavonoids are main chemical constituents in cream that having anti-inflammatory in action, reduces microbial load and promotes the healing process by wound contraction with increased capillary formation [19].

4.7 Panchavalkala ointment in a post-fistulectomy wound

The efficacy of *Panchavalkala* ointment was evaluated in post-fistulectomy wound [20]. In this case report author selected a 35 years male patient post fistulectomy wound at perianal area. Wound was managed by cleaning with freshly prepared *Panchavalkala kwatha* and then application of *Panchavalkala* ointment daily. Author observed that post-fistulectomy wound was healed within two and half months without any complications due to the *Pachavalkala* used in different forms [21] such as Sitz bath, cleaning and dressing (*Panchavalkala* ointment). The case study concluded that the ointment potentiates the healing process by preventing infection at the wound site [22].

4.8 Jatyadi taila and Kshara taila in Diabetic foot

Author reported a 40 years female patient of non-healing wounds over left foot (planter aspect) along with gangrenous condition of all the toes of foot. Wound washed daily with *Panchavalkala* decoction and dressing was done with *Jatyadi tail* and *Kshara-taila* along with previously prescribed oral anti-diabetic drugs. Combination of *Panchavalkala kwatha*, *Kshartaila* and *Jatyadi tail* formulations have quite satisfactory results in gangrenous conditions of diabetic foot. *Jatyadi tail* is having properties like antimicrobial antibacterial. Wound completely healed within 4 weeks. Study concluded that *Panchavalkala* decoction act as disinfectant and *Kshara taila* and *Jatyadi taila* promote healing of wound [23].

4.9 Jatyadi Taila in Diabetic Foot

The efficacy of *Vimlapana karma* was evaluated in a case of 70 year old male patient with diabetic foot ulcer [24]. Patient had severe pain and reddish skin discoloration over a ventral aspect of the third toe of right foot since 2 months. Patient was k/c/o DM since 8 years and was on medication using tablet Glycinase 1 bid. Case was managed by *Vimlapana karma* with *Jatyadi taila* for about 15-20 minutes daily followed with *Jatyadi taila* dressing and bandaging [25] for 10 days and follow-up was done for period of 45 days. It was observed that gentle massage using *Jatyadi taila* with the help of the thumb and pulp of the fingers leads to rise in the local temperature; vasodilatation thereby supplied necessary nutrients, oxygen, insulin etc. to the wound site. This case highlighted that *Vimlapana karma* showed a significant role in wound healing of diabetic foot ulcer without recurrence [26].

4.10 Jatyadi Ghrita in Dushta vrana

Author reported a case of 50 year old man with chronic oval shaped (6x4 cm) ulcer on the dorsum of the right foot associated with pain, discharge, slough, foul smell, oedema and discoloration. On local examination tenderness present near by the lesion with increased local temperature and surrounding indurations. Author managed this case by *virechana karma* and *Jatyadi ghrita as local application*. In *virechana karma Guggulu Tikta Ghrita* used for *Doshauklesha* and *Trivrit Lehya* for *virechan* (purgative). Wound was completely healed at the end of 4th week leaving only a minimal scar. Author concluded that the combination of *sodhana karma* that is *Virechana* and local *ropana* with *Jatyadi ghrita* results in proper and early healing of the *Dushta vrana* [27].

4.11 Nyagrodhadi Kwatha and Jatyadi ghrita in non-healing wound

In this study author selected 28 patients of non-healing wound viz. diabetic wound, infected cellulitic wound, Hanson's

topical wound and Bed sores. The study was simple randomized open design over a period up to 60 days. Wound was cleaned with *Nyagrodhadi Kwatha* and then applied *Jatyadi ghrita*. Author concluded that in Chronic Wound care *Nyagrodhadi Kwatha* and *Jatyadi Ghrita* were found very effective as *Vrana Shodhana* and *Vrana ropana* respectively [28-30].

4.12 Hingulamrutadi malahara and Jatyadi Ghrita in Dushta vrana

In this study 40 patients of *Dushta vrana* were divided into two groups, in group 1 (n=20) *Hingulamrutadi Malahara* and group 2 (n=20) *Jatyadi Ghrita* were applied on wounds once in a day for one month. *Hingulamrutadi Malahara* contains *Hingula*, *Siktha*, *Tankana*, *Rasa Karpura* and *Sphatika*. *Hingulamrutadi Malahara* group showed better results than *Jatyadi Ghrita* group [31-32].

4.13 Kaseesadi avachurnana and Jatyadi Ghrita

In this work author selected 90 patients of *Dushta Vrana* and randomly assigned into three groups. Control group (n=30) treated with *Jatyadi ghrita* application, Trial group (n=30) treated with *Kaseesadi avachurnana* and another Trial group (n=30) treated with combination of both trial drugs for a duration of 1 month daily once and follow-up at the interval of every 1 month up to 3 months. Author evaluated that *kaseesadi avachurnana* group and another combination group were in better result than *Jatyadi Ghrita* alone application [33].

4.14 Leech therapy and Varicose ulcer

In this case report a case of varicose ulcer on medial aspect of left leg associated with pain, swelling, discoloration, serous discharge since 2 years was treated with leech application [34]. After Leech application wound area dressed with *Yashtimadhu Ghrita* and this therapy repeated weekly for duration of 30 days. Local *Taila Dhara sweda* and *Sariva Ghana vati as* internal medication and *Yashtimadhu Ghrita* for external application prescribed along with leech therapy. Author observed the parameters (Ankle flare, peripheral hyper pigmentation, size of ulcer, granulation tissues and pain relief) on every week for 5 weeks. Leech application facilitates fresh blood supply and promotes wound healing by formation of healthy newer tissues [35]. Hence study concluded that leech therapy and *Ayurved* adjuvant medicine had potential to heal varicose ulcer [36].

4.15 Nimbadhya taila in Dushta vrana

In this study 20 patients of *Dushtavrana* were selected and divided into 2 groups. In trial group (n=10) *Nimbadhya taila* and in control group (n=10) H₂O₂ & EUSOL (Edinburg University Solution) application once daily for 30 days. Author concluded that *Nimbadhya taila* initially help in removing slough and necrotic tissues and further improvement in granulation tissues and sufficiently efficient in *vrana shodhan* and *ropan* [37].

4.16 Nimba taila and Manjistha Churna in non-healing ulcers

Author selected 51 patients for evaluating efficacy of *Nimba taila* and *Manjistha churna* in non-healing ulcers. Patients divided into 3 groups. In group 1 (n=16) topical application of *Nimba taila* [38], in group 2 (n=15) *Manjistha churna* oral (6 gm BD) and externally use as *avachurnan* [39] and in group 3 (n=20) both that *Nimba taila* and *Manjistha churna* were used for more than 6 weeks of trial period and follow-up of 2

weeks. Lastly it was found that combined use of both drugs in third group was more effective^[40].

4.17 *Neem oil and Haridra in non-healing wounds*

Author selected 60 patients of wounds with more than 6 weeks duration allocated to Group-I (n=16) topical application of *Neem* oil, Group II (n=11) *Haridra* powder capsules, 1 gm 3 times orally and Group III (n=20) both that is *Neem* tail as well as *Haridra taila*. Wound biopsy was done for assessment of angiogenesis and deoxyribonucleic acid (DNA) analysis. Assessment of regenerated tissues for vascular proliferation and DNA concentration were on microscopic angiogenesis grading system score^[41-42], Deoxyribonucleic acid (DNA) analysis^[43] by help of molecular genetics. Assessment was done on 4th and 8th week. Result of group III were found effective than single intervention in first and second group for chronic non-healing wounds^[44].

4.18 *Manjishthadi Ghrita in Shuddha vrana*

Author selected 45 patients of *shuddha vrana* (postoperative cases of aemorrhoids and fissure wounds.) and divided into two groups, trial group (n=24) *Manjishthadi Ghrita* used for local application and control group (n=21) Povidone Iodine used as local application for 21 days once daily. Author evaluated that *Manjishthadi Ghrita*, defends against micro organisms and wound healed within 21 days without any complication which possesses high efficacy in *Vrana Ropana* than Betadine^[45-46].

4.19 *Vranasodhana Taila in Post-operative wounds*

Author selected 20 cases of wounds and divided into two groups. Group I (n=10) having general wounds and Group II (n=10) having postoperative wound in fistula-in-ano. Prepared drug was applied locally on wound and dressed daily till 60th day or till complete healing of wound. Wound assessment was made at the beginning of the treatment (initial) on 15th and 30th day. *Vranasodhana taila*^[47] contains *Trivrat (Merremia turpethum)*, *Haridra (Curcuma longa)*, *Tila (Sesamum orientale)*, *Nimba (Azadirachta indica)* and oil of *sesamum (Sesamum orientale)*. Author concluded that *Vranasodhana taila* is safe and effective for general wounds; fistula-in-ano wounds and prevents scab formation on wound. After completion of healing, fibrosis or keloid did not develop at the site of wound surface^[48].

4.20 *Shikari (Cordia macleodii) Ghrita in Post-fistulectomy wounds*

Author selected 20 patients of *Shuddha vrana* (post fistulectomy wounds) and divided into two groups, trial group (n=10) managed with *Cordia macleodii*^[49] *Ghrita* and trial group (n=10) treated with povidone iodine. In both groups drug applied locally on wound for 21 days daily. Assessment was done on 7th, 14th and 21st days. Author observed that highly significant change were seen in all parameters at 7th, 14th as well as 21st days of observational periods except wound floor at 7th day in control group than trial group^[50].

4.21 *Karanjadhya Ghrita in chronic wounds*

In this research work 40 patients of chronic wound and post-operative fissurectomy wound were randomly divided into two groups. Wounds in trial group (n=20) treated with topical application of *Karanjadhya Ghrita*^[51-52] dressing and wounds in control group (n=20) were treated with H₂O₂ and EUSOL and dry Gauze bandaging daily. The treatment period in both groups was 30 days and follow-up taken at the interval of

every 10 days up to 30 days. Author observed that wound size decreased 69.23% and considerable improvement (> 80 %) was seen in swelling and unhealthy margin. Author concluded that *Karajadhya Ghrita* is efficacious in the wound healing and possesses sufficient efficacy in “*Vrana Shodhan and Ropana*” without adverse effects^[53].

4.21 *Durvadi Taila in Vrana*

Author randomly selected 34 patients of *Vrana* and divided into two groups. Trial group (n=18) treated with *Durvadi Taila* and control group (n=16) treated with Povidone iodine as topical application for 4 weeks. Author observed that *Durvadi Taila* showed better improvement in pus discharge (90%), wound size reduction, swelling, tenderness, discoloration of *Vrana* than control group^[54-55].

4.22 *Durvadi Taila in Dushta vrana*

Reported a case of 34 yrs. old male patient presented with the complaints of a non-healing ulcer sized 7 cm x 5 cm. x 0.5 cm. over the dorsum of Right foot associated with surrounding indurations, purulent discharge, tenderness and local rise in temperature since 2 months by traumatic injury. Case was managed by new technique in Ayurved i.e. *Vranabasti*^[56]. Wound was cleaned with the freshly prepared lukewarm *Triphala kwatha* daily then *Durva Taila*^[57] applied locally in the form of *Vranabasti* for 30 minutes. Author observed that on 7th day slough completely reduced and healthy granulation tissues appeared and at the end of 2nd week wound healed with minimal scar. This case concluded that *Vranabasti* is the new substitute for *Dushata Vrana* as *Shodhan & Ropan* properties^[58].

4.23 *Dvi-Avartita Bhringaraja Taila in Dushta vrana*

Author selected 15 patients of chronic infected ulcers in open clinical trial for 60 days. *Dvi-avartita Bhringaraja taila* applied externally twice a day in sufficient quantity. Author observed that significant result found in various parameters (pain, pus discharge, foul smell and Oedema/ induration) and concluded that the *Dviavartita Bhringaraja Taila* possesses anti-inflammatory, antibacterial and antiseptic properties^[59].

4.24 *Karpoor Ghrita in Sadyovrana*

The efficacy of *karpoor ghrita*^[60-61] was evaluated in *Sadyovrana*^[62] patients. Author selected 60 patients of *Sadyovrana* and divided into two groups. Trial group (n=30) treated with *karpoor ghrita* dressing and control group (n=30) treated with povidone-iodine dressing daily upto 3 weeks. Author observed assessment on various parameters (*Vedana, srava, varna, aakruti* and *gandha*). Study concluded that *karpoor ghrita* was more effective than with povidone-iodine in symptomatic relief in clinical parameters like *Vedana, Varna, Akruti* and *Gandha*^[63].

4.25 *Virechana and Ksharabasti in Varicose ulcer*

Author selected a case of 61 year old male patient presented with the complaint of reddish ulcer of size 3 cm x 2 cm x 1.75 cm with three to four small ulcers above lateral malleolus of the right leg associated with pricking pain, burning sensation around the ulcers, edema and blackish discoloration over the right lower limb since 2 weeks having previous history of varicose ulcer last 2 years back on the medial aspect of the ankle joint on the same leg. Case managed by *Nitya virechanakarma* with *Nimbamritadi* castor oil and *Manjishthadi basti karma*^[64]. 50 ml *Nimbamritadi* castor oil used with *anupana* of 50 ml *sunthi kashaya* for 3 continuous days and on 4th day followed by *Manjishthadi Basti*

[*Manjisthadi Kshara Basti* and *Manjisthadi Kshira Basti*] with *Balagudduchyadi anuvasanabasti* (60 ml) in *kalabasti* pattern for 8 days. Study concluded that *Shodhana* therapy helps to healing of chronic wounds^[65].

4.26 *Palash Kshara* in the management of *Dushta Vrana*

In this clinical study of 30 patients where the efficacy of *Palash kshara* has been evaluated in 10 infected wound (*Dushta vrana*) patients. *Palash Kshara* was used for cleaning of the wound and applied as *Pichu* form over wound once daily for 14 days or on till the wound healed completely. The dressing was changed daily. Author obtained that *Palash kshara* is very effective debriding agent which helps in reduction of pain, discharge and slough tissue of infected wound. Study concluded that *Palash kshara* has significant wound healing properties^[66].

4.27 *Ksharaplot* in Lacerated Infected Wound

Author selected a Case of 36 year old male patient with complaints of wound over palmar aspect of right thumb since 7 days with history of road traffic accident associated with pus discharge, slough, devitalized tissue and hyper granulation tissues. This case was managed by application of *Ksharaplot*^[67] (A sterile coated gauze which is smeared with *Snuhi kshira*, *Apamarga kshara* and *Haridra* powder). Infected wound was cleaned with normal saline & then *Kshara plot* was applied an alternate day for 10 days. This *Kshara plot* applied to remove devitalized tissue, slough. After 5th sitting author observed wound site present with healthy granulation tissues. After 10 days *Jatyadi Ghrta* was applied daily two times for one week. Author found that wound was healed with minimal scar^[68].

5. Conclusion

In this review most of articles are case studies on the following formulations like *Katupila*, Honey, *Panchavalkala*, *Jatyaditaila*, *Kshartaila*, *Nyagrodhadi Kwatha*, *Jatyadighrita*, *Nimbaditaila*, *Manjisthachurna*, *Hingulamrutadi Malahara*, *Manjisthadi Ghrta*, *Vranasodhanataila*, *Shikari Ghrta*, *Karanjadhya Ghrta*, *Kaseesadi avachurna*, *Durvadi Taila*, *Dvi-AvartitaBhringaraja Taila*, *Nityavirechana*, *ksharabasti karma*, *Durva Tail Vranabasti Karpoor Ghrta*. Almost all above formulation are described in the classics for wound healing activity.

By thorough review of article related to *Vrana*, *Dushta-Vrana* and non-healing wound, it can be concluded that these types of wound need special care to patient and *Ayurveda* management gives satisfactory results and for validation of those drugs RCTs on more number of patients is required.

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