Review Article

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WOUND HEALING POTENTIAL OF MURIVENNA, AN INDIGENOUS FORMULATION: A REVIEW

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ABSTRACT

The field of wound care and ulcer management is constantly evolving, with a relentless search for a therapeutically effective and cost-efficient drug. The present article focuses on the potential of Murivenna, an indigenous formulation used in the Southern part of India for wound healing and ulcer management. A thorough review of available online and offline literature was done using appropriate keywords and filters. The data produced was analysed, and the results were interpreted, revealing that every ingredient in Murivenna has significant wound-healing potential. Moreover, the drug's efficacy in various clinical scenarios associated with ulcer healing was also observed, further substantiating the result.

Keywords: Ayurveda, Dushta Vrana, Healing, Murivenna, Vrana, Wound dressing

INTRODUCTION

The skin or cutaneous membrane is the largest organ in the human body, contributing around 15-16 % of total body weight. When normal skin and the underlying mucus membranes are uninterrupted by wounds, it is considered intact. Skin integrity is influenced by several internal and external factors such as genetics, age, underlying health of the individual, physical activity, etc. Any break in skin and mucous membrane integrity is termed an ulcer. It may either follow the molecular death of the surface epithelium or its traumatic removal[1]. Ulcer healing is a normal physiological function that occurs in a sequential proceeding from haemostasis of the wound to terminal remodelling. An impairment in the normal course of these events results in a chronic nonhealing ulcer. Successful management of an ulcer demands an appropriate healing environment alongside sustaining patients' local and systemic health. An ideal dressing should be able to provide or maintain a moist environment, promote epidermal migration, support angiogenesis, and connective tissue synthesis, allow gaseous exchange within the wound bed and prevent infection; at the same time, it should also be nontoxic, non-adhering and easy to remove [2]. It should also be cost-effective and readily available.

In ayurveda, tvak (skin) is among the 'jnanendriya' or sensory organs entitled to the perception of tactile sensation. There are seven layers of tvak (skin). [3]

When the tvak (skin) and its underlying layers are damaged due to certain intrinsic or extrinsic factors, it is termed a vrana or ulcer. Sushruta has defined vrana (wound) as that which heals completely by leaving a permanent scar at the site of vrana (wound). Vrana lakṣhaṇa (symptom) is "vrana gatra vichurnane". Gatra refers to a part of a body or body tissue, including the skin and vichurnane means to break, disintegrate or rupture. Thus, vrana means 'a break/rupture/discontinuity of the body tissue'. [4,5,6]

Acharya Sushruta has classified vrana into sadyo vrana and dusta vrana based on healing time and chronicity of ulcer, where dushta vrana can be co-related to contaminated or chronic nonhealing ulcers. Features of dusta vrana are excessively narrow mouth (atisamvrato), wide mouth (ativivrato), indurated (atikaṭino), soft (atimrudu), excessively elevated (utsanno), depressed (avasanno), very cold (atishita), elevated temperature (atyushna), different colours like black, red, yellow or white (krashnaraktaptashuuklavarnana), fierce-looking (bhairava), containing pus and sloughed muscles, tissues etc (putipuyamamsasirasnayuprabhrati, purnah), associated with putrefied pus discharge, multiple tracks, odour, severe pain, burning sensation, redness, oedema, itching, discharge of vitiated rakta (blood) and should be long-standing in nature[7]. Charaka has classified the same into 12 based on the permutations and combinations of dosha [8]. Acharyas have put forward a protocol for vrana chikitsa (treatment), which begins with detoxification therapy (shodhana) alongside efforts to rekindle the metabolism. Along with these, measures to maintain a proper ulcer bed must

be taken. This is done using the sashti upakramas or sixty therapeutic procedures for ulcer management.
These are categorised into three stages
• Purvakarma (Pre-operative procedure)
• Pradhana karma (Operative procedure)
• Paschat karma (Post-operative procedure)

The first 11 procedures, from apatarpana (fasting) to virechana (purgation), are mentioned for treating vrana sopha. These come under the purvakarma (pre-operative procedures) for vrana chikitsa. The next procedure, i.e. from chedhana (excision) to sivana (suturing), comes under sastrakarma (surgical procedure), which is considered as the pradhana karma (operative procedure). Sandhana (adhesion) to rakshavidhi (sterilisation or protection) is done to heal vrana and treat its complications, which is mentioned under paschat karma (post-operative procedure). The asta vidha shastra karma (8 surgical procedures) may be used to improve circulation and nutrition for surgical debridement. Upakramas like alepa (plastering), parisheka (spraying), and shodhana (purification) are done to cleanse the wound and prevent contamination.

Following this, shonitasthapana (arrest of bleeding) and rakshavidhana (protection) is performed to protect the tissue. Medicines can be administered in the form of kashaya, varti (plug), kalka (paste), sarpi (ghee), taila (oil), rasakriya (drug extract application), avachurnana (dusting medicinal powder) which helps in shodhana (purification) and ropana (healing) of vrana (wound). In modern science, based on the stages of healing, it is classified as haemostasis, inflammatory phase, proliferative phase, and remodelling phase.[9] Healing in chronic ulcers is restricted to the post-inflammatory stage. Vata and Kapha's involvement can cause this. In such a scenario, taila should be used for shodhana and ropana, which controls exudation. Shodhana can be understood as the ability of the taila to prevent further contamination, maintain a clean wound bed and prevent slough tissue sedimentation. Ropaṇa refers to the property of taila that supports healing by initiating granulation tissue formation. Hence, taila is an ideal choice for chronic wounds with delayed healing. In the context of parisheka, under sasti upakrama (60 procedures), Acharya has mentioned that in both Vataja and Kaphaja vrana, characterised by pain and exudation, respectively, taila is an inevitable choice.[10] Murivenna is one such taila that is readily available and cost-effective, which is used for healing a dushta vrana.[11]

SYSTEMIC REVIEW

Eligibility criteria: Literature review, *in-vitro* studies, *in-vivo* studies, non-randomised controlled trials and case studies were considered eligible.
Literature search was done on online platforms like Pubmed, Scopus, Science Direct, Ayush Portal, Dhara and Google Scholar with keywords like wound dressing, dushta vrana, healing index, Murivenna, and Ayurveda. Boolean operators like 'And', 'Or' and 'Not' were used. A total of 33715 articles were found, out of which 33475 were excluded based on filters applied: mesh, free full text, human, *in-vitro*, clinical trial and review. Hence, 240 articles were screened based on relevance. Of the 240 articles, 222 were excluded, and 18 with the most comprehensive findings were selected as main references. Figure 1 shows the search results from a systematic review.

Murivenna

Murivenna is a popular formulation in the Kerala Ayurveda pharmacopoeia, and it is used extensively for managing ulcers, wounds, and bone and soft tissue injuries. It is a medicine that is commonly seen in every household in the Southern part of India. 'Murivenna' is made up of two words, 'Muriv' meaning injury or wound and 'Enna' meaning oil. The primaeval description of Murivenna can be traced back to Tamil Marma medical texts that originated during prehistoric times. Over the years, more than 150 variations of Murivenna have evolved as a result of permutations and combinations of drugs, earning it the title of an 'Anubhuta Yoga'. The drug's wound healing, bone healing, analgesic and anti-inflammatory activities have been considered while using externally. As the medicine is prepared using coconut oil as its medium, the shita virya reduces inflammation and maintains skin integrity. Murivenna can also be used for internal administration because of the same reason.

There are eight main ingredients in Murivenna. The ingredients and Ayurvedic understanding of Murivenna are given in Table 1 and Table 2.

Karanja - *P. pinnata* may be useful in tropical wound healing management, evidenced by increased wound contraction, and antioxidative and moderate antimicrobial activity. The phytochemical evaluation of the drug revealed the presence of karanjin, pongamol, alkaloids, and steroids, which caused an induction in cytokine production and accelerated wound-healing. [12]
Shigru - The results suggest that *Moringa oleifera* is effective in treating skin diseases by enhancing keratinocyte hyperproliferation due to the presence of amino acids like arginine, histidine and lysine. Along with this, it was also found that the leaf extracts are capable of producing Ag nanoparticles extracellularly, making it a potent antimicrobial drug.[13]
Nagavalli - The extracts of *Piper betel* contain amino acids that support the proliferation of fibroblasts and re-epithelialisation, rendering them effective in managing cutaneous wounds and ulcers[14].
Shatavari - The drug *Asparagus racemosus* has potent antioxidant activity, making it ideal for wound healing.[15]
Paribhadra - The study concluded that the plant has active alkaloids and shows cytotoxic, antidiuretic, antioxidant, analgesic, antiulcer, anthelminthic, as well as osteoporotic activity.[16]
Kumari - *Aloe vera* was found to possess glucomannan, a mannose-rich polysaccharide, and gibberellin, a growth hormone, which interacts with growth factor receptors on the fibroblast, stimulating its activity and proliferation, which in turn significantly increases collagen synthesis after topical administration of *Aloe vera*. Aloe gel not only increased the collagen content of the wound but also changed collagen composition (more type III) and increased the degree of collagen cross-linking. This accelerated wound contraction and increased the breaking strength of the resulting scar tissue. An increased synthesis of hyaluronic acid and dermatan sulphate in the granulation tissue of a healing wound following oral or topical administration has also been validated.[17]
Palandu - The phytochemical screening of *Allium cepa* Linn showed the presence of tannins, flavonoids, alkaloids, proteins and other important constituents. Flavonoids in the plant supported wound healing. It may be due to free radical scavenging action and the antibacterial property of the phytoconstituents.[18]
Vasuka - The Ethanolic extract of the whole plant of *Borreria hispida* possess anti-inflammatory and antioxidant activity.[19]
Narikela - Virgin coconut oil possesses steroids and alkaloids that portray high angiogenic and wound healing properties.[20]

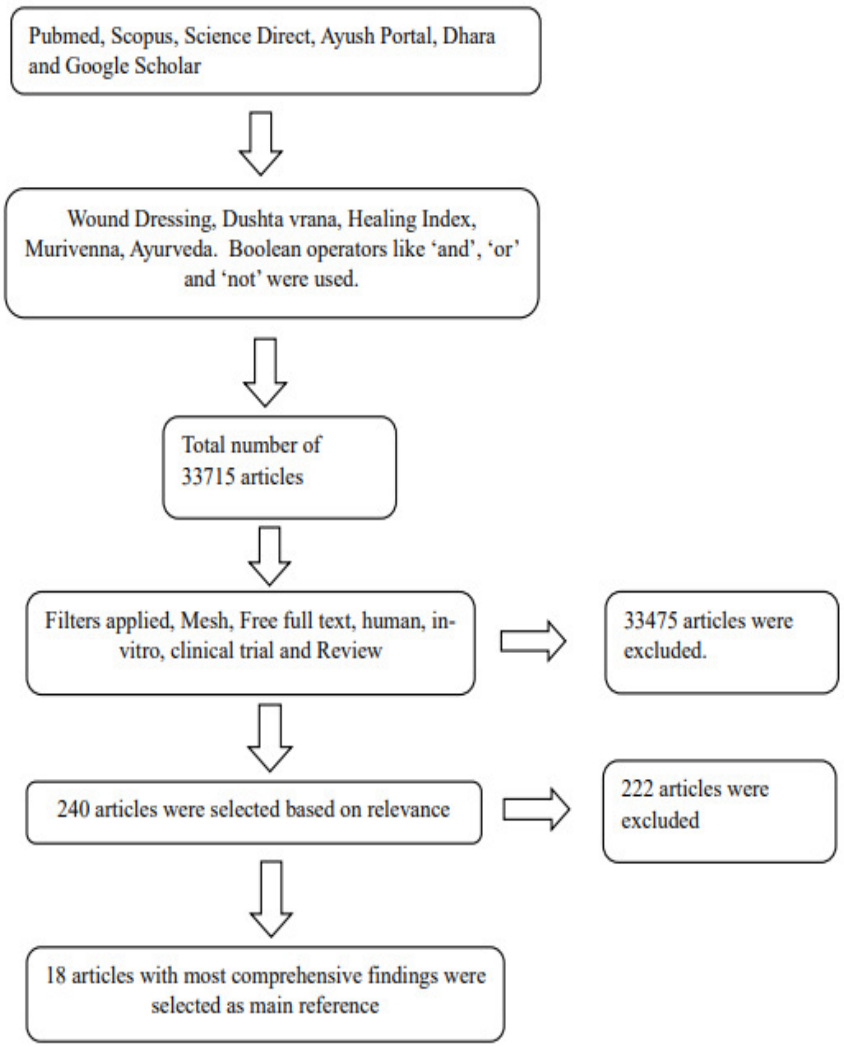

Figure 1: Results of systemic review

Table 1: Ingredients of Murivenna

Sanskrit Name	Botanical Name	Parts Used	Quantity
Shigru	*Moringa oleifera*	Leaf	384 gm
Paribhadra	*Erythrina indica*	Leaf	384 gm
Kumari	*Aloe vera*	Leaf Pulp	384 gm
Shatavari	*Asparagus racemosus*	Root	144 gm
Palaṇḍu	*Allium cepa*	Bulb	384 gm
Nagavalli	*Piper betel*	Leaf	384 gm
Karanja	*Pongamia pinnata*	Bark /leaf	384 gm
Vasuka	*Borreria hispida*	Whole plant	384 gm
Narikela taila	*Cocos nucifera*	Oil	768 ml
Water			3.07 L

Table 2: Ayurvedic understanding of Murivenna

Name	Botanical Name	Rasa	Guṇa	Vīrya	Vipaka	Karma
Karanja	*Pongamia pinnata*	Kaṭu, Tikta	Tikshna	Ushna	Kaṭu	Kapha-Vataghna
Nagavalli	*Piper betle*	Tikta, Kaṭu	Tikshna	Uṣhna	Katu	Kapha-Vataghna
Vasuka	*Borreria hispida*	Kaṭu, Tikta	Laghu, Ruksha	Ushna	Katu	Kapha-Vataghna
Paribhadra	*Erythrina variegeta*	Katu	Laghu, Ruksha	Ushna	Katu	Kapha-Vataghna
Shigru	*Moringa oleifera*	Madhura	Guru, Ruksha, Tikshna	Sheeta	Madhura	Kapha-Vataghna
Kumari	*Aloe vera*	Tikta, Madhura	Guru, Snigdha	Sheeta	Katu	Kapha-Pittaghna
Palandu	*Allium cepa*	Katu, Madhura	Tikshna, Guru	Anushna	Madhura	Kapha-Vataghna
Shatavari	*Asparagus racemosus*	Madhura, Tikta	Snigdha, Guru	Sheeta	Madhura	Vata-Pittaghna

Wound healing generally requires support at three levels, which starts with improving general resistance and support mechanisms that could be obtained from rejuvenation, adaptogenic, palliative, antioxidant, cleansing, detoxifying, buffering and lubricous activities. The second level includes stimulating the repair and regenerative mechanisms to prolong cell life, cell migration and binding, remove skin blemishes, improve the tensile strength or elasticity of the skin, and improve the skin's moisture-holding capacity. Therapeutic and nutritional activities, including anti-inflammatory, antiseptic and antimicrobial, protein and collagen synthesis and increased bio-membrane stability, are required in the third level. [21]

It can be found that the individual drugs of Murivenna possess properties like anti-inflammatory, antioxidant, etc. (Table 3)

Table 3: Active ingredients and their action on ulcer healing

Ingredient	Active ingredient	Action on wound
Pongamia pinnata	Karanjin and Quercetin	Enhances wound contraction [22]
Piper betel	Amino acids and Essential oils	Supports re-epithelialisation and proliferation of fibroblasts in wounds.
Aloe vera	Glucomannan, gibberellin,	Increases wound proliferation, contraction and collagen synthesis
Erythrina indica	Glycosides, flavonoids, amino acids	Supports re-epithelialisation[23]
Allium cepa	Cycloalliin, Quercetin, Oleanolic acid	Antimicrobial activity[24]
Moringa oleifera	Arginine, histidine, lysine and ascorbic acid.	Antibacterial activity[25]
Borreria hispida	Tannins, Saponins, Flavonoids, Phenols	Anti-inflammatory and antioxidant activity
Asparagus racemosus	Glycosides, Saponins, Sitosterol, Quercetin	Antioxidant activity
Cocus nucifera	Steroids and alkaloids	Enhances angiogenesis

Effect of Murivenna ointment in Parikarthika (Fissure-in-ano)

The pilot study conducted on 22 patients found that Murivenna ointment can be considered a better alternative for symptomatic relief in managing acute fissures-in-ano. A marked improvement was also noted in most patients who were ulcer-healing. [26]

Efficacy of Murivenna application on Episiotomy wound

A clinical study on 30 subjects who underwent normal vaginal delivery with episiotomy was conducted where Jathyadi taila was used in the control group and Murivenna in the trial group. It was concluded that Murivenna showed better results on 3rd day itself, though statistically, both were found to be equally effective within seven days of application. [27]

Murivenna and wound healing

In research, the efficacy of Murivenna was evaluated against a pure polyurethane matrix. It was found that there was a significant decrease in the percentage of lysis of red blood cells using Murivenna, indicating better blood compatibility and enhanced wound healing. Murivenna, being lipid-based, facilitates wound healing by reducing surface roughness and delayed activated partial thromboplastin time (APTT) and prothrombin time (PT).[28]

Mode of action of Murivenna

Murivenna is a traditional medicine mentioned in Kerala Ayurveda Pharmacopoeia, which is indicated for ulcers and injuries. It contains phytochemicals such as alkaloids, glycosides, tannins, saponins and steroids that support natural wound healing[29]. Murivenna, being formulated in Nalikera taila, has the advantage of being snigdha (unctuous), brahmana (nourishing) and balavardhaka (strengthening) meaning it ensures a moist environment facilitates nourishment and improves skin integrity. The cumulative dosaghnata can be understood as being Vata-Kaphagna. Thus, making it an ideal option in Vata, predominantly dushta vrana. Coconut oil, the base of Murivenna oil, increases the permeability of skin and, in turn, increases the bioavailability of the drugs. The drugs of Murivenna also have sandhaneeya (combining) properties, and the active principles provide synergistic action to relieve the symptoms of soft tissue injuries. Sushruta has cited that it is the veeryam (potency) of the externally applied medicines that enters the ending of the dhamanis (channels), which portrays therapeutic effect; Murivenna is anushna-sheeta, making it ideal in all inflammatory conditions.[30-32]

CONCLUSION

The present review focuses on the drug Murivenna's wound-healing potential, a traditional Ayurveda formulation commonly prescribed for wounds, burns, and ulcers in bone and soft tissue injuries. The wound healing, antimicrobial and anti-haemolytic abilities of Murivenna have already been validated. It is oil-based and can pass through lipophilic skin effortlessly, giving sustained results. Moreover, the drug arrests further progress of the disease and heals the wound by reversing the pathology, thus making it an ideal wound dressing scaffold. Being a typical household medicine, which is both cheap and readily available, murivenna qualifies as a perfect alternative for contemporary wound dressing.

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