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Efficacy of *Enicostemma Littorale Blume* (Vellarugu) and *Achyranthens Aspera* (Naayuruvi) for wound healing in cattle

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Abstract
Vellarugu (*Enicostemma Littorale Blume*) is a swallow-wort plant found in all dry, barren and high grounds. Its botanical name synonyms are *Enicostemma axillare (Lam.)* and *Adenema Hissopifolia*. In Tamil it is called vellarugu, arukumuli, chakkiraviraiyantan, in English as Whitehead and its common name is Chota-kirayata. It is an eminent plant used in Tamil siddha medicine, ayurveda, allopathic, homeopathy treatments and home remedies. It is used in the treatment of breathing problems, cough, colds, cholera, eye problems, eczema, flu, hair lice and itching, jaundice, migraine, poisonous bites urinal problems and wounds. *Achyranthens aspera* or naayuruvi is a powerful ayurvedic herb belong to the family Amaranthaceae and it has been traditionally used in the topical management of wounds. An herbal formulation is prepared with an equal proportion of vellarugu dried plant materials and *Achyranthens asperia* juice mixed with lime powder for treating wounds in cattle. This herbal preparation is applied topically on the wound and repeated 2-3 times a day. Healing status was monitored macroscopically by observing the wound size and stages, daily, it completely cures the wound in 4-7 days according to the severity. The astringent and anti-inflammatory properties of vellarugu and naayuruvi formulation help clean wounds and promote tissue regeneration. This formulation may be suggested as an efficient and cost-effective home remedy for the treatment of wounds. Further detailed clinical evidence supporting this study's results would expand the application of this home remedy in wound treatment in livestock.

Keywords: Vellarugu, *Enicostemma littorale Blume*, Naayuruvi, *Achyranthens aspera*, wound healing

1. Introduction
Wounds in cattle occur due to injuries during grazing, transport, accidents, slippery flooring, fighting, and insect/animal bites. If the wounds are treated immediately and appropriately, the microbes will release the toxins that may lead to an infection which further complicated to abscess, necrosis, etc. Non-healing or chronic wounds result in major economic loss to farmers in terms of treatment cost and loss of production. Hence suitable wound healing management is essential in livestock. Wound healing is a biologically complex event and is a natural healing response that includes inflammatory, proliferative, epithelialization and remodeling phases. Wound healing frequency be determined by the elements such as medicine used, nature and degree of the injury. (Bhoopendra Kumar Mishra and Dharmendra Kumar, 2022) [3]. In recent decades, due to antibiotic resistance by microbes, traditional herbal medicines which include herbs, herbal materials, herbal preparations containing an active ingredient, and parts of plants are becoming popular in the treatment of various ailments. Herbal medicines have been traditionally used in wound control that involves disinfection, debridement, and providing of a favourable environment for assisting the normal sequence of healing (Ananda A. Dorai, 2012) [1]. The vellarugu and naayuruvi are used for a long time in Indian medicine for infectious disease treatment. Vellarugu (*Enicostemma littorale Blume*) is a swallow-wort plant found in all dry, barren and high grounds. Its botanical name synonyms are *Enicostemma axillare* (Lam.) and *Adenema Hissopifolia*. In Tamil it is called vellarugu, arukumuli, chakkiraviraiyantan, in English as Whitehead and its common name is Chota-kirayata. It is a renowned plant used in Tamil Siddha medicine, ayurveda, homeopathy, allopathic, treatment and home remedies. It is used in the treatment of breathing problems, cough, colds, cholera, eye problems, eczema, flu, hair lice and itching, jaundice, migraine, poisonous bites urinal problems and wounds (Vinotha *et al.*, 2014) [8]. *Achyranthens aspera* or Naayuruvi is a powerful ayurvedic herb that is a species of plant in the family Amaranthaceae and it has been traditionally used in the topical management of wounds.

With this background, we have studied the efficacy of *Enicostemma Littorale Blume* (vellarugu) and *Achyranthens aspera* (Naayuruvi) for wound healing in cattle.

2. Materials and Methods

Earlier the wound in the cattle is treated with traditional antibiotic ointment but unsuccessful to the treatment, or was delayed in complete healing. Hence a new herbal formulation is prepared with an equal proportion of vellarugu dried plant materials and Naayuruvi root mixed with lime powder for treating wounds in cattle maintained at the Dairy section, Livestock Farm Complex, VCRI, Tirunelveli. This herbal preparation is applied topically on the wound with a cotton gauze and the wound is left exposed devoid of dressing and repeated 2-3 times a day. Healing status was monitored macroscopically by observing the wound size and stages.

3. Results and Discussion

Bestowing to earlier reports, *Enicostemma littorale* has diverse therapeutic pharmacological actions. The curative properties of *Enicostemma littorale* are due to its metabolites such as alkaloids, coumarins, flavonoids, glycosides, lignins, terpenoids, steroids, and phenols. It has antioxidant, anti-diabetic, hypolipidemic, hepatoprotective, antimicrobial, anti-inflammatory, analgesic, anti-arthritic, immunomodulatory, and anti-tumor actions. In the current study, the astringent and anti-inflammatory properties of vellarugu and naayuruvi formulations help clean wounds and promote tissue regeneration and completely heal the wound in 3-4 days. This formulation may be suggested as an efficient and cost-effective home remedy for the treatment of wounds. Further detailed clinical evidence supporting this study's results would expand the application of this home remedy in wound treatment in livestock.

Deore *et al.*, 2008 [4], stated that extracts of Enicostemma littorale exhibited anti-microbial activity against microbes such as *Escherichia coli, Aspergillus Niger, Bacillus subtilis, Staphylococcus aureus, Proteus vulgaris, Pseudomonas aeruginosa,* and *Candida albicans*. Praveena *et al.* (2011) [6] also reported the antimicrobial actions of *Enicostemma littorale* against *Shigella sonnei, Staphylococcus aureus, Salmonella typhi, Pseudomonas aeruginosa,* and antifungal activity against *Aeromonas hydrophila, Candida albicans*. Also earlier studied described that the methanolic extract of *Enicostemma littorale* has antiulcer action and its anti-inflammatory action may be accredited to the antioxidant potential. Saba Hasan (2014) [8] reported the roots extract of the *Achyranthes aspera* showed anti-inflammatory activity. similarly Gayathri *et al.* (2009) [10] stated antioxidant action in leaves and roots of *Achyranthes aspera*. Bhoomika *et al.* (2007) [11] stated that the extract of *Achyranthes aspera,* has anti-inflammatory and anti-arthritic action. Gupta *et al.* (2010) [5] observed that the seeds of *Achyranthes aspera* budding on cattle dung exposed antibacterial action against bacterial strains of *Pseudomonas cichorii, Bacillus subtilis,* and *Salmonella typhimurium.*

Vellarugu in Siddha Medicine – Tamil Song

"குன்மமொடு வாய்வு குடல்வாதம் சூலையிவை
சென்மம்விட் டோடிச் சிதைஉங்காண்-வன்முலையாய்
உள்ளுறுகி ரந்திசொறி யொட்டிய சிரங்குமறும்
வெள்ளறுகு தன்னை விரும்பு".
"Kunmamodu vayvu kutalvatam sulaiyivai
Senmamvit todic sithaiunkan vanmulaiyai
Ulluruki ranthisori yottiya sirankumarum
Vellaruku thannai virumpu"

Naayuruvi in Siddha Medicine – Tamil Song

"ஓதமுறு சோபை யுயர்பாண்டு வைப்போக்குந்
தீதறுகா மாலைநோய் தீர்க்குமினார்-சூதகநீர்
பொய்ப்புறுகா லத்தனைப்பொங்குவிக்குங் காரமொடு
கைப்புறுசெந் நாயுருவி காண்".
"Othamuru sobai yuyarpantu vaippokkun
Thitharuka malainoi tirkkuminar suthakaneer
Poippuruka lattanaipponkuvikkun karamodu
Kaippurusen nayuruvi kaan"

4. Conclusion

The therapeutic value of *Enicostemma littorale Blume* (Vellarugu) and *Achyranthens aspera* (naayuruvi) indicates that these plants may serve as lead for the identification of new medicines having well efficiency in several diseases. However, fewer data are existing concerning the chemical elements of these plants. With this prime information, auxiliary studies may be executed like phyto-pharmacology of different extracts, identification, and segregation of active principles and pharmacological studies of compounds. Advanced techniques are available to assess the effectiveness of new compounds of these plants over biological assessment, toxicity studies, analysis of the molecular principles of action of isolated components and clinical trials. Examination of the chemical ingredients of the plants and pharmacological analysis may afford us the source for developing the leads for the new drugs.

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