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A Review Article on Wound Healing Herb: *Ekdandi* (*Tridax Procumbens*)

Dr. Mohd Imtiyaz¹, Dr. Aarti Sharma², Dr. Ashwini Kumar Sharma³

^{1, 2}P.G.Scholar, ³Associate Professor, (Dept.of Dravyaguna)

Abstract: *Ayurveda can be considered the best ethnological source for naturally obtained drugs for wound healing property. Numerous drugs have been described in different texts for wound healing property, but particularly a few of them have been screened scientifically. One of such potent ayurvedic herbs, Ekdandi, Tridax procumbens from the family Asteraceae is described in this present article. An effort has been put into describing the plant for its wound healing attribute from both modern and Ayurvedic prospects in the present review.*

Keywords: *Ayurveda, Ekdandi, Tridax procumbens, Vrana, Wound healing, Jayanti*

I. INTRODUCTION

Ayurveda can be considered the best ethnological source for naturally obtained drugs for wound healing property since the first pieces of evidence in this aspect are available in *Ayurveda*. Detailed descriptions about the treatment of *Vrana* (wounds) and *Vranaropaka dravya* (wound healing drugs) are deliberately explained in the text, *Sushruta Samhita* (ca. 1000 BC)¹. While describing the pathogenesis of wound or *Vrana*, three stages are mentioned as unsupported (*Ama* stage) wound, early suppurated (*Pachyamana* stage) wound, and fully suppurated (*Pakva* stage) wound. Specific symptoms are mentioned for different stages of wounds in this text and a series of 60 steps of treatment for wounds (*Sasti Vrana Upakrama*) is mentioned here beginning from the dissolution of inflammation or stage of an abscess and ending with correction of deformities in the wound area or cosmetically accepted scar.

Out of these series of 60 steps of treatment, seven steps are considered most important and one of which is the use of plants, minerals, and animal products as *Vranaropaka Dravyas* (wound healing agents). The use of *Ayurvedic* drugs excels those of modern remedies for wounds, but very few of those have been screened in a scientific way to prove their efficacy. In different classical *Ayurvedic* texts, about 164 medicinal plants, 24 metals and minerals, and 18 animal products are described for their wound healing activity under the term '*Vranaropaka*'. Some of these agents are already reported for potentiality in the management of wounds. One of such potent ayurvedic herbs, *Ekdandi* is described in this present article.

Ekdandi is a perennial plant from the *Asteraceae* family. It is a native plant of tropical America but has been introduced to the tropical, subtropical, and mildly temperate regions throughout the world. *Ekdandi* is commonly known as 'coat buttons'². Local people know it as '*Ghamra*', '*raktrodhi*' and '*kalali*'. Traditionally it has been used in India for wound healing and as an anticoagulant, antifungal, and insect repellent. The extract of *Ekdandi* is directly applied to the wound. It is used in liver disorders, as hepatoprotective, and for gastritis and heartburn in *Ayurvedic* medicine. It is also used to treat blisters, boils, and cuts. In tribal areas, it is used to treat infectious skin diseases. Some of the reported chemical constituents present in the aerial parts of the plant are phytosterols; beta-sitosterol, stigmasterol, campesterol, and a characteristic triterpene; beta-amyrin.

The *Madanpal nighantu* states three varieties of *Bhrinraj* namely *shwet*, *peet*, and *neel bhringraaj* of which the *peet bhrinraaj* is considered as *Tridax procumbens* Linn. While the *shwet bhringraaj* is *Eclipta alba*. *Shodal nighantu* of the 12th Century has described two varieties of *bhrinraaj* i.e. *shwet bhringraaj* (white-flowered) which has been called '*Jayanti*' and *peet bhrinraaj* (yellow-flowered) which is '*Awanti*'. Here, *Shweta bhringraja* is considered as *Tridax procumbens*. *Tridax procumbens* comes as '*Pardesi bhringraj*' in *Nighantu Aadarsh*. Its fresh juice is applied to the boils present on the scalp and it is known to be present in abundance during monsoons.

So as is evident from the above description that *Tridax procumbens* has been considered a variety of *Eclipta alba* by most of the *nighantus* and the present article reflects its use in traditional medicine making a point on its wound healing property.

A. AIM

- 1) To study complete literary and therapeutic review of *Ekdandi* (*Tridax procumbens*).
- 2) To accentuate the wound healing property of *Ekdandi* from the *Ayurvedic* aspect.

II. MATERIALS AND METHOD

A thorough study was done of the plant, *Ekdandi* from *nighantu* like *Madanpal nighantu*, *Adarsh Nighantu*, and *Shodhal Nighantu*. Reference articles were studied about the wounds and wound healing properties of plants from an *Ayurvedic* point of view.

A. Classification³

Kingdom –Plantae

Subkingdom- Tracheobionta

Division – Magnoliophyta

Class – Magnolipsida

Subclass – Asterideae

Order – Asterales

Family – Asteraceae

Genus – *Tridax*

Species – *procumbens*

Binomial name – *Tridax procumbens*

B. Vernacular Names⁴

English – coat buttons, tridax daisy

Latin – *Tridax procumbens* Linn.

Sanskrit – Jayanti veda

Hindi – ghamra, bisalyakarni, tunki, phanafuli

Marathi – dagadi pala

Malayalam – chiravanak

Oriya – bishalya karni

Tamil – thatapoodu

Telugu – gaddi chemanthi

C. Ayurvedic Properties⁵

Rasa – Kashaya, amla, tikta

Guna – Guru, Snigdha

Virya – Sheet

D. Botanical Description

The plant belongs to the Asteraceae family and is a native of tropical America. It is a perennial plant having short, blade-like leaves. The plant is 15 – 40 cm in height, herbaceous with semi prostrate habit. Leaves are simple, opposite, hairy, ovate, and have serrate margins. Leaves are toothed and arrow-head shaped. Flowers are tubular, whitish-yellow, or yellow-centered white with three-toothed ray florets. Fruits are covered with stiff hairs and are hard achene. Fruits also have plumes like white feathery pappus at one end. The calyx is reduced to scales or sometimes reduced to pappus. It has an herbaceous, cylindrical, and branched stem. Seeds possess pendulous embryos and endosperm is absent. The root system of the plant is the taproot system. The plant is invasive in nature since it produces around 1500 achenes per plant and each achenes are capable of catching wind in its pappus to travel some distance. It can be found in fields, meadows, croplands, roadside etc, in areas with tropical or semi-tropical climates.

Ekdandi, *Tridax procumbens* is described with synonyms like *Sita bhringa*, *Lakshmipriya*, *Jayavati*, *Jayanti* and *Shwetpushpika* in *Ayurvedic* text, *Shodhala nighantu*.

“*Bhringraja samaanou duou patrato api pramantah*”

It is similar to *bhringraja* and it possess two leaves.

E. Chemical Constituents

Several chemical constituents have been isolated from the plant *Ekdandi* such as quercetin, lauric acid, linolic acid, oxoeaster, and various other alkaloids, carotenoids, and flavonoids. Other isolated constituents are 3, 6-Dimethoxy-5, 7, 2', 3', 4'-pentahydroxyflavone, 7-O- β -D-glucopyranoside which is named procumbatine Z. Some primary metabolites are methyl 14-oxooctadecanoate, methyl 14 oxononaosanoate, β -amyrone, β -amyrin, fucosterol⁶.

F. Traditional Uses⁽⁷⁻¹¹⁾ -

In India the plant is used mainly to check hemorrhage, for the treatment of diarrhea, in hair loss, inflammation, diabetes, bronchial catarrh, and as an insect repellent. In Africa, the plants are used to treat mastitis in livestock, as antimalarial, as an antipyretic for the treatment of typhoid fever and to treat abdominal and gastrointestinal mycosis. In rural areas, the juice of the plant is quite efficiently applied to the wounds to stop the hemorrhage. It was widely used by tribals to treat infectious skin disease. Along with these uses, it is also an effective hepatoprotective and well-known medicine for liver disorders. The tribal healers of Udaipur used this plant to treat diabetes and earache. The plant is effective in removing highly toxic Cr (VI) from industrial wastewater.

G. Pharmacological Properties

- 1) **Wound Healing Property:** Tridax procumbens aqueous extract promoted healing and also overcame steroid depressed healing in an experiment conducted on male Wistar rats¹².
- 2) **Antidiabetic Property:** In a model of alloxan-induced diabetes in rats aqueous and alcoholic extract of leaves of tridax showed a significant decrease in blood glucose level¹³.
- 3) **Hepatoprotective Property:** The aerial part of Tridax procumbens was investigated against d-galactosamine induced rates and was found to be effective in hepatitis. Tridax procumbens has antihepatotoxic action and thus used in liver disorders¹⁴.
- 4) **Anti-inflammatory Property:** The leaf extract of tridax was assessed for anti-inflammatory action on carrageenin-induced paw edema along with the standard drug, ibuprofen¹⁵.
- 5) **Antioxidant Property:** The ethanolic extract of Tridax procumbens has a percentage antioxidant activity of 96.70 which is higher than gallic acid (92.92) and ascorbic acid (94.81)¹⁶.
- 6) **Anti-arthritis Property:** Tridax at 250 and 500 mg/kg has an anti-arthritis activity that is comparable to indomethacin. The whole plant extract of tridax significantly altered the pathogenesis during FCA-induced arthritis in female SD rats and showed antiarthritis activity¹⁷.
- 7) **Anticancerous Property:** In cytotoxicity against human lung cancer, Tridax procumbens compounds were tested by MTT assay¹⁸. Anticancer activity was shown in ethanol and acetone leaf extract of the plant on A549 (human lung cancer cell line)¹⁹.
- 8) **Hypotensive Property:** I.V. administration of 3, 6 and 9mg /kg of aqueous extract from leaf of *Tridax procumbens* was investigated on anaesthetized Sprague- Dawley rats which significantly decreased the mean arterial blood pressure in dose related manner²⁰.

III. DISCUSSIONS

Wound healing is a complex process and has always been the subject of intense research. Plants are natural sources that have been widely used for wound healing. Despite the advances that have been made, the management of chronic wounds is still a challenge for the clinician. Acharaya Sushruta has described *Shashthi Upakramas* (sixty measures) for *Vrana Ropana* (wound healing) focussing on the importance of wound management.

Tridax procumbens leaves have been traditionally used for decades for their variable therapeutic properties. Biosynthesis of silver nanoparticles from the leaf extract of *Tridax procumbens* was found to be cost-effective and time-conserving. Collagen deposition and fibrosis formation occurred much earlier on wounds treated with silver nanoparticles from *Tridax procumbens*²¹. Wound healing is a diverse mechanism in the process of cell repair involving multiple biological factors. Flawless healing is achieved by successful closure of wounds in least days and without any adverse effect. As per *Ayurveda*, It has been described to have properties like *Sthambana* (Refrigeration), *Sandhana* (union), *Shodhana* (purification), *Ropana* (healing), and *Tridoshashghna* (pacifying all three *Doshas*: Vata, Pitta, and Kapha) due to its *Kashaya-Amla-Tikta rasa*, *Guru-Snigdha guna* and *Sheeta virya*. It is used as an external application in *Vrana* (wound)

Ekdandi has *Vranaropak* properties as per the principles of the sixty *Upakramas* of *Vrana* management described in the *Sushruta Samhita*. It is believed to act by 'pacifying' the three vitiated *Doshas*, i.e, *Vata*, *Pitta*, and *Kapha* by multiple actions attributable to its *Kashaya* (astringent) *Rasa*, *Amla* and *Tikta Uparasa*, *Guru* (Heaviness), and *Snigdha* (Unctuousness) *Guna*, *Sheeta* (cold) *Virya*. *Kashaya Rasa* provides *Lekhana* (scraping) that helps in desloughing, preparing the wound for healing. This way, *Ekdandi* serves as an excellent wound healer under its *Sodhana* (purification), *Ropana* (healing), and *Sandhana* (union) actions.

The recent emergence of nanotechnology has provided a new pharmacological modality for silver nanoparticles to be used in the wound healing process²². Silver nanoparticles are a good source for drug targeting due to their high chemical stability, catalytic activity, wound healing activity, and antimicrobial nature. Currently, much research work has been focused on the investigations of the antimicrobial potential of medicinal plants.

The antibacterial activity of *Tridax procumbens* leaf extracts was examined against 5 pathogens causing illness in humans. There is a dire need to evaluate this plant to expand the knowledge stock of medicinal plants and make it available to the common man.

IV. CONCLUSION

Tridax procumbens is particularly known for its wound healing property besides used in various other disorders. Its leaves have been traditionally used for their uncounted therapeutic properties. *Ekdandi* has been described to have properties like *Sihambana* (Refrigeration), *Sandhana* (union), *Shodhana* (purification), *Ropana* (healing), and *Tridoshaghna* (pacifying all three *Doshas*: *Vata*, *Pitta*, and *Kapha*) due to its *Kashaya-Amla-Tikta rasa*, *Guru-Snigdha guna* and *Sheeta virya*. It is used as an external application in *Vrana* (wound).

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