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Review on Wound Healing Property of Tridax Procumbens

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ABSTRACT:
Use of herbs as a source of medicine is inherited for ages and is recently used in cosmeceutical formulations which are an important component for healthcare system.This review emphases on the wound healing property of the Tridax procumbens. Tridax procumbens Linn is a plant that belongs to the Asteraceae family is an ayurvedic herb in Asia that has been used traditionally. Tridax procumbens have been used to treat wounds, skin disordersand to stop blood clotting in traditional medicines. It also hasvarious pharmacological activities like hepatoprotective activity, anti-inflammatory, antidiabetic activity, hypotensive activity, immunomodulatory activity, dysentery, prevent falling of hair, promotes hair growth and antimicrobial activity against both gram-positive and gram-negative bacteria. The phytochemical screening of Tridax procumbens revealed the presence of chemical constituents like alkaloids, carotenoids, flavonoids(catechins and flavones), fumaric acid, saponins and tannins. The leaf of T. procumbens possess kaempferol, lutein, ferulic acid, tannins, stigmasterol and caffeic acid that shows antimicrobial, anti-inflammatory, antioxidant and anticancer activity.

KEYWORDS: Tridax procumbens Linn, Wound healing activity, Flavonoids, Saponins, Tannins

I. INTRODUCTION:

Tridax procumbens Linn belongs to Asteraceae family [1]. It is commonly known as‘Ghamra’ and in English popularly called ‘coat buttons’ because of the appearance of flowers. The plant has been extensively used in Ayurvedicsystem of medicine for various disorders. The plant is theinnate of tropical America and enfranchised in tropical Africa, Asia, Australia and India. It is a wild herb distributed throughout India. Coat buttons is also found along roadsides, waste grounds, dikes, railroads, riverbanks, meadows, and dunes. Its widespread distribution and importance as a weed are due to its spreading stems and abundant seed production[2].

Kingdom: Plantae
Division: Spermatophyta
Subdivision : Angiospermae
Class : Dicotyledonae
Subclass : Cotyloideae
Order : Asterales
Family : Asteraceae
Common name : Coat buttons
Botanical Name : Tridax procumbens L.

Fig 1: Tridax procumbens Linn.[10]

TRADITIONAL USES [2]:

Tridax procumbens possesses significant anti-inflammatory, hepatoprotective, wound healing, antidiabetic activity and antimicrobial activity against both gram-positive and gram-negative bacteria. The leaf juice possesses antiseptic, insecticidal and parasiticidal properties and it is also used to check hemorrhage from cuts, bruises and wounds. The leaves are used for bronchial catarrh, dysentery, diarrhoea, prevent falling of hair and also promotes the growth of hair,

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insect repellent. Interestingly it also has hypotensive effect and potent immunomodulating property. In the West Africa sub-region and tropical zone of the world, Traditional medical practitioners and the native peoples of these areas use the leaves of the plant as a remedy against conjunctivitis. It is also used as bio adsorbent for chromium (VI) which is one of the highly toxic ions released into the environment through leather processing and chrome platingindustries.

WOUND HEALING ACTIVITY:

WOUND

A wound is defined as an injury to the body (as from violence, accident, surgery) that typically involves laceration or breaking of a membrane such as the skin and usually damage to underlying tissues[3].

There are two types of wounds namely open wounds and closed wounds.[4]

Open Wounds

Open wounds are classified as[4]:

- Incisions or incised wounds – caused by a clean, sharp-edged object such as a knife, razor, or glass splinter.
- Lacerations – a messy looking wound caused by tearing or crushing force. Lacerations and incisions may appear linear (regular) or stellate (irregular). The term laceration is commonly misused in reference to incisions.
- Abrasions (grazes) – superficial wounds in which the topmost layer of the skin (the epidermis) is scraped off. Abrasions are often caused by a sliding fall onto a rough surface such as asphalt, tree bark or concrete.
- Avulsions – injuries in which a body structure is forcibly detached from its normal point of insertion. A type of amputation where the extremity is pulled off rather than cut off.
- Puncture wounds – caused by an object puncturing the skin, such as a splinter, nail or needle.
- Penetration wounds – caused by an object such as a knife entering and coming out from the skin.

Closed Wound

Closed wounds are classifies as[4]:

- Hematoma is defined as a collection of blood outside of blood vessels. It occurs because the wall of a blood vessel (artery, vein or capillary) has been damaged and blood has been leaked into tissues. Hematoma is a term used to describe bleeding which has more or less clotted, different from hemorrhage which signifies active ongoing bleeding. A bruise is an example of hematoma. During surgery, hematomas are caused by an injury to the wall of a blood vessels, prompting blood to seep into the surrounding tissues.
- Crush injury which caused by a great or extreme amount of force applied over a long period of time.

Wound healing is a complex and dynamic process of replacing devitalized and missing cellular structure and tissue layers. The human adult healing process can be divided into 4 phases that involves hemostasis, inflammatory, proliferation and remodeling.[5]

Wound healing involves an interaction between epidermal cells, dermal cells, extra cellular matrix, controlled angiogenesis and plasma-derived proteins which is all coordinated by an array of cytokines and growth factors. [5]

Pathophysiology Of Wound Healing:[6]

The normal wound repair process consists of four phases that occur in a predictable sequence:

- Hemostasis
- Inflammation
- Proliferation
- Remodeling

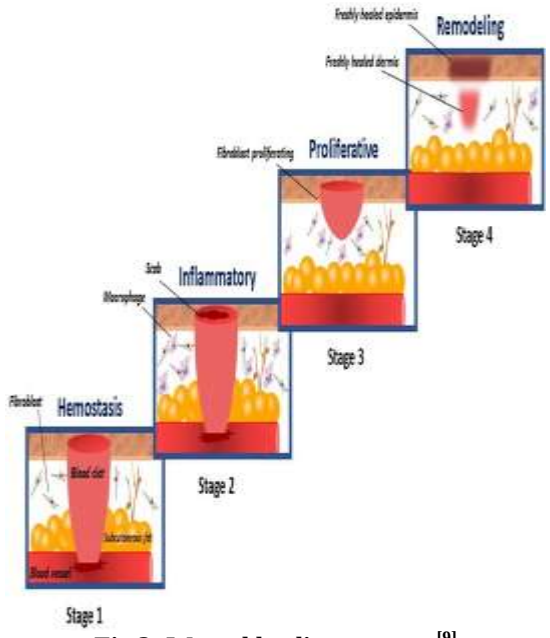

Fig 2: Wound healing process [9]

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Hemostasis phases: Hemostasis is the mechanism that leads to cessation of bleeding from a blood vessel. It is a process that involves formation of fibrin that clots the blood. This cascade culminates into the formation of a "plug" that closes up the damaged site of the blood vessel controlling the bleeding.

Inflammation phase: Inflammatory Phase focuses on destroying bacteria and removing debris that prepare the wound bed for the growth of new tissues. During this phase, Neutrophils enter the wound to destroy bacteria and remove debris. These cells often increase between 24 and 48 hours after injury. As the white blood cells leave after three days, specialized cells called macrophages arrive to keep on clearing debris. These cells also secrete growth factors and proteins that attract immune system cells to the wound to facilitate tissue repair. This phase lasts four to six days and is often associates with edema, erythema, heat and pain.

Proliferation phase: This phase focuses on filling and covering the wound. The proliferative phase consists of three distinct stages: filling the wound, contraction of the wound margins and covering the wound which is also known epithelization. This phase lasts from 4 to 24 days.

Maturation phase: During the maturation phase the new tissue slowly gains strength and flexibility. In this phase, collagen fibers reorganize and increase in tensile strength of the tissues.

WOUND HEALING PROPERTY OF TRIDAX PROCUMBENS:

Tridax procumbens leaf extract act by increasing granulation, hexosamine formation and hydroxyproline content of the granulation tissues of the wound thereby rapid collagen formation which leads to rapid wound healing.It increases rate of contraction, tensile strength and fasten epithelization of the burn wound by increasing biochemical tissue markers like Hydroxyproline, Collagen and Hexosamine. Histopathologically, there is increase in granulation and dermal collagen content. There is also reduced polymorphonuclear leukocytes (PMNLs), congestion, oedema, mononuclear leukocyte infiltration that helps in healing of the wound.[1]

PREPARATION OF TRIDAX PROCUMBENS EXTRACT:

The plant Tridax procumbens were collected from the surroundings of Dhanalakshmi Srinivasan College of Pharmacy, Perambalur, Tamil Nadu-India. The plant is authenticated from Dr,S.R.Senthil Kumar., Head of Department of Botany., St.Joesph's college., Tiruchirappalli. The leaves of Tridax Procumbens are collected and shade dried. The dried leaves are then coarsely powdered and kept in well closed container. About 40gms of powdered leaves are packed in Soxhlet apparatus. The extract was done by using ethanol as a solvent. The temperature was maintained between 70-40°C for 24 hours. The collected extract was then concentrated by evaporating the ethanol. Now the crude extract of Tridax procumbens was obtained.

Fig:3 Extraction of Tridax Procumbens Linn

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PHYTOCHEMICAL SCREENING ANALYSIS:[7]

The extract was subjected to the qualitative phytochemical screening for the presence of chemical constituents.

Experiment	Observation	Result
Test for Steroid: 1ml extract of dissolved in 10ml of chloroform & equal volume of Concentrated H_2SO_4 added from side of the test tube.	The upper layer turns red and H_2SO_4 showed yellow with green fluorescence.	Presence of Steroid.
Test of tannin: 2ml extract was added to 1% lead acetate.	A yellowish precipitate.	Presence of tannins.
Test for Saponin: 5 ml extract was mixed with 20 ml of distilled water then agitated in graduated cylinder for 15 mins.	Formation of foam.	Presence of saponin
Test for Anthocyanin: 2 ml of aqueous extract added to 2ml of 2N HCl & NH_3.	Appearance of pink red turns to blue violet.	Presence of Anthocyanin.
Test for Alkaloids: 3ml of concentrated extract taken into a test tube and 1 ml HCl added and heated gently for 20 min cooled and filter, filtrate was used for following test for alkaloid. **a)Wagner Test:** Filtrate treated with Wagner's reagent. **b) Hager's Test:** Filtrate was treated with Hager's reagent.	Formation of brown reddish. Yellow colored precipitate.	Presence of alkaloids. Presence of alkaloids.
Test for Flavonoids: **a)Alkaline reagent test:** Extract was treated with 10% NaOH solution. **b) Mg turning test:** Extract treated with Mg	Formation of intense yellow color. Formation of crimson red color.	Presence of Flavonoid. Presenceof Flavonoids.

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turning and add concentrated HCl. To this solution add 5ml of 95% ethanol.		
Test for Phenol: **Ferric chloride Test:** Test extract were treated with 4 drops of alcoholic $FeCl_3$ solution.	Formation of bluish black color.	Presence of phenol.
Test for Proteins: **a) Xanthoproteic test:** Extract treated with few drops of concentrated HNO_3.	Formation of yellow.	Presence of proteins.
Test for Amino acids: **Ninhydrin test:** To 2ml extract, add 2ml ninhydrin regent was added and boil for few minutes.	Formation of blue color.	Presence of amino acids.
Test for Diterpenes: **Copper acetate test:** Extract dissolved in water and treat with 10 drops of copper acetate solution.	Formation of Emerald Green color.	Presence of diterpenes.

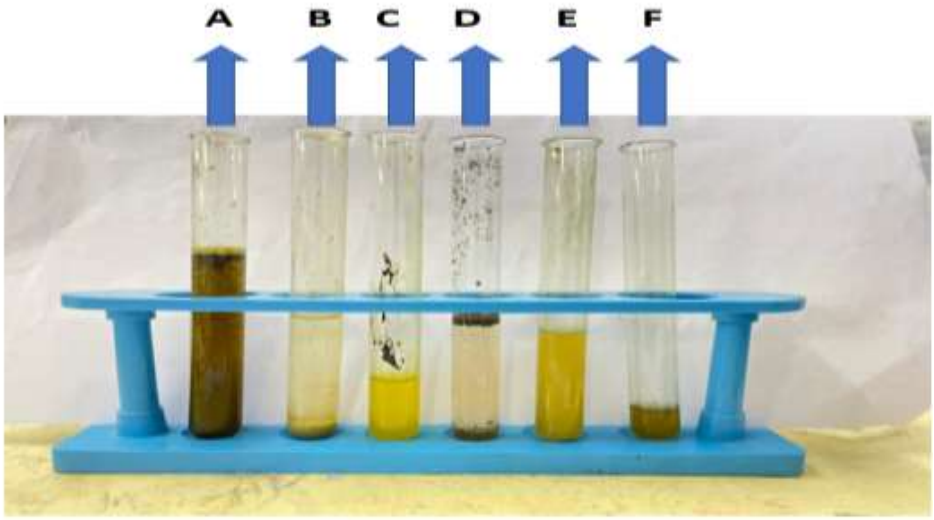

Fig 4: Phytochemical Screening of Tridax Procumbens Linn

A – Saponin Test:

5ml of plant extract was taken in test tube containing 10 ml of water and was shaken vigorously. This led to the formation of foam that shows the presence of saponin.

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B – Flavonoid Test:
1 ml of plant extract and 6ml of lead acetate solution was mixed together. Yellow color precipitate occurs which shows the presence of flavonoid.

C- Alkaloid Test:
Plant extract was taken and 4ml saturated picric acid was added. Yellow precipitate occurred that shows the presence of alkaloid.

D- Flavonoid Test:
Take the dry plant powder and excess amount of sodium hydroxide was added. Yellow color appears which disappears on addition of concentrated hydrochloric acid. This shows the presence of Flavonoid.

E- Tannin Test:
Take 0.5ml of plant extract and add 1% lead acetate solution into it. Yellow precipitate confirms the presence of tannin.

F- Amino acid Test:
0.5ml of plant extract was taken and 3ml of ninhydrin solution was added. Boil it for 15 minutes. No bluish color appears which confirms the absence of amino acid.

PHYTOCHEMICAL FEATURES: [8]

The phytochemical studies for ethanolic extract of Tridax procumbens leaf were done. The leaf shows the presence of flavonoids, alkaloids, carotenoids, tannins and saponin. It shows the absence of amino acid and proteins.

Flavonoids which are present in Tridax procumbens have the activity of anti-allergic, antiplatelet aggregation, antimicrobial, antiulcer, antiviral, hair growth, antihepatotoxicity and wound healing. Kaempferol is the main flavonoid found in Tridax procumbens leaves. Another bioactive molecule in Tridax procumbens leaves include caffeic acid and ferulic acid, tannins, stigmasterol and lutein that shows antioxidant, anti-inflammatory, anticancer and antimicrobial function.

The presence of fumaric acid, β-sitosterol and pentacyclic triterpenoid oleanolic acid has also been reported. Luteolin, glucoluteolin, quercetin and isoquercetin have been reported in flower extracts.

II. CONCLUSION:

This review article is about Tridax procumbens which have been used to treat wounds, skin disorders and to stop blood clotting in traditional medicines. It also has various pharmacological activities like hepatoprotective activity, anti-inflammatory, antidiabetic activity, hypotensive activity, immunomodulatory activity, dysentery, prevent falling of hair, promotes hair growth and antimicrobial activity against both gram-positive and gram-negative bacteria. The phytochemical screening of Tridax procumbens shows the presence of chemical constituents like alkaloids, carotenoids, flavonoids (catechins and flavones), fumaric acid, saponins and tannins which is responsible for wound healing activity.

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