



“Formulation And Evaluation Of Pain Relief Balm Containing Tridax Procumbens”

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Abstract:

The present study focuses on the formulation and evaluation of a herbal pain relief balm incorporating Tridax procumbens, a plant traditionally known for its anti-inflammatory and analgesic properties. The balm was prepared using a suitable base comprising natural waxes and oils, into which the extract of Tridax procumbens was incorporated in varying concentrations. The formulations were evaluated for physicochemical properties such as appearance, spreadability, pH, viscosity, and stability. The results indicated that the formulation containing optimal concentration of Tridax procumbens showed significant pain-relieving effects with good stability and acceptable organoleptic properties. This study supports the potential of Tridax procumbens as a natural alternative for topical pain management.

Keywords : Tridax procumbens , pain relief , analgesic property , topical treatment , herbal balm.

Introduction :

Medicinal plants have been extensively used since ancient times for treating various mortal affections, with a significant portion of the global population counting on traditional drug. The shift towards eco-friendly and bio-compatible factory-grounded products has led to increased interest in herbal remedies, which offer smaller side effects compared to synthetic medicines and ameliorate patient compliance. Pain management, especially for chronic conditions, now emphasizes safe, effective, and sustained medicine delivery systems similar as topical operations. Topical pain relief remedies offer localized action, reduced systemic side effects, and patient convenience. These formulations work on the principle of counter-irritancy to palliate mild to moderate pain, including pressure headaches, which affect a large chance of the population. Herbal pain remedies, particularly those embedded in Ayurvedic principles, use essential oils and factory extracts to deliver rapid-fire relief from pain, headaches and muscular pain “Formulation and Evaluation of Pain Relief Balm Containing Tridax procumbens”[1].

Plant profile and excipient profile :**1.Plant profile****A.Tridax****Procumbens: -****Scientific Classification:****Family-**Asteraceae**Kingdom-**Plantae**Subkingdom-** Tracheobronta**Division-**Spermatophyta**Subdivision-**Magnoliophyta**Class-**Magnoliopsida**Subclass-**Aseridae**Order-**Asterales**Genus-** Tridax**Species-** Prochumbens**Chemical constituent:**

Alkaloids steroids, flavonoids, carotenoids, fatty acids, phytosterol, tannin and minerals.[2]

**Fig No 1 : Tridax procumben**

Pharmacological activity of Tridax Procumbens:-

Anti-inflammatory: Tridax procumbens extracts have shown anti-inflammatory properties, which could be beneficial in the management of inflammatory conditions.

Antimicrobial: Studies have demonstrated the antimicrobial activity of tridax procumbens against various bacteria and fungi suggesting its potential use in the treatment of infections.[3]

Antioxidant: Tridax procumbens extracts exhibit antioxidant properties. Which help neutralize harmful free radicals in the body and protect against oxidative stress-related damage.

Wound Healing: Tridax procumbens has been traditionally used for wound healing purposes. Some studies have reported its ability to enhance the wound healing process by promoting cell proliferation and tissue regeneration.

Analgesic Properties: Studies have shown that Tridax procumbens extracts can provide pain relief in animal model. Tridax procumbens may inhibit the production of pain mediators, such as prostaglandins. The plant's active compounds may interact with pain pathway

2.Menthol

Biological Source: Crystallized compound obtained from *Mentha arvensis*

Family: Lamiaceae

Common Name: Field Mint, Pudina

Chemical Constituents: Menthol, Menthone, Isomenthol

Description: Transparent to white crystalline solid with a minty aroma

Morphological Features: Derived from green, serrated mint leaves.

Habitat & Distribution: Cultivated in India, China and Japan

Medicinal Properties: Cooling agent, analgesic, decongestant

Uses: Used topically for headache, muscle cramps and joint pain



Fig No 2 : Menthol

2.Excipient profile

A.Petroleum Jelly

Category: Emollient ,skin Protectant

Description: It is colourless or pale yellow, translucent, and has a smooth, greasy texture. It has no odour or a faint petroleum-like smell and is tasteless

Odour: Odourless or faintly aromatic

Texture : Petroleum jelly has a smooth, greasy, and semi-solid texture. It is soft and jellylike at room temperature, spreads easily on the skin, and melts slightly upon contact with body heat.

Melting Point : Petroleum jelly has a melting point range of approximately 37°C to 60°C (98.6°F to 140°F)

Solubility :

1.**Water:** Insoluble

2.**Alcohol:** Insoluble

3.**Organic Solvents:** Soluble in chloroform, ether, benzene and oils

Pharmacological Action:

1.Emollient

2.Occlusive Agent

3.Protectant [4].



Fig No 3 : Petroleum jelly

B.Beeswax

Category: Emollient, thickening Agent ,skin Protectant ,excipient (in ointments, creams, lip balms)

Chemical Name: Main component: Triacetylpalmitate ($C_{30}H_{60}O_2$) beeswax is a complex mixture of esters of fatty acids and long-chain alcohols

Description: Beeswax is a natural wax secreted by honeybees (*Apis mellifera*) to build honeycomb structures. It is solid at room temperature, pale yellow to brown (depending on purification), and has a mild honey-like scent. Used widely in cosmetics, pharmaceuticals, and food as a natural thickener and barrier agent.

Odour: Mild, sweet, honey-like aroma

Texture: Solid, slightly brittle at room temperature becomes soft and pliable when warmed waxy and smooth when applied to skin or mixed with oils

Melting Point: Approximately 62°C to 65°C (144°F to 149°F)

Solubility:

Water: Insoluble

Alcohol: Slightly soluble (especially warm ethanol)

Organic Solvents : (e.g., chloroform, ether, oils) Soluble

Pharmacological Action:

- 1.Emollient
- 2.Barrier-forming agent
- 3.Soothing agent[5].



Fig No 4 : Beeswax

C. Camphor

Category: Terpenes and is specifically a monoterpene.

Chemical Name : 1,7,7-Trimethylbicyclo[2.2.1]heptan-2-one.

Description : It is primarily derived from the wood of the camphor tree, *Cinnamomum Camphora*, though it can also be synthetically produced.

Odour: Camphor has a strong, characteristic, aromatic odour, which is often described as pungent and cooling.

Texture: It appears as a white, waxy solid, which can be either crystalline or granular in form. It is typically hard and brittle at room temperature.

Melting Point (MP): Camphor has a melting point of around 175°C.

Solubility: Camphor is soluble in alcohol, ether, chloroform, and oils, but it is only slightly soluble in water.

Pharmacological Action:

- 1.Pain relief
- 2.Anti-inflammentry [6].



Fig No 5 : Camphor

D.Coconut Oil

Category: Virgin Coconut Oil, Refined Coconut Oil, Cold-Pressed Coconut Oil ,Expeller-Pressed Coconut Oil , Fractionated Coconut Oil (MCT Oil), Organic Coconut Oil, Non-Organic Coconut Oil

Chemical Formula: Coconut oil is primarily composed of triglycerides, with the major fatty acids being lauric acid (C₁₂H₂₄O₂), myristic acid (C₁₄H₂₈O₂), and palmitic acid (C₁₆H₃₂O₂).

Description: Coconut oil is a pale, semi-solid oil at room temperature, derived from the meat of mature coconuts.

Odour: Coconut oil has a mild, pleasant, and slightly sweet aroma, often described as tropical or nutty.

Texture: Coconut oil has a smooth, creamy.

Melting Point: 24-26°C (76-78°F).

Solubility: Coconut oil is insoluble in water but soluble in organic solvents like ethanol, Chloroform, and ether. It is also soluble in other oils

Pharmacological Action:

- 1.Antimicrobial properties
- 2.Anti-inflammatory
- 3.Antioxidant effects
- 4.Skin health[7] .



Fig No 6 : Coconut oil

E. Eucalyptus oil

Category : Essential oil / Volatile oil

Chemical Name: The primary active compound: 1,8-Cineole (also known as Eucalyptol)

Description: Eucalyptus oil is a colorless to pale yellow liquid obtained from the leaves of eucalyptus trees (especially *Eucalyptus globulus*).

Odour: Strong, fresh, and penetrating camphor-like smell

Texture : Oily, thin, and light in consistency

Melting Point : Eucalyptus oil is a liquid at room temperature. 1,8-Cineole has a melting point of $\sim 1-2^{\circ}\text{C}$

Solubility : 1. Insoluble in water

2. Soluble in alcohol, ether and most organic solvents

Pharmacological Action :

1. Antiseptic

2. Anti-inflammatory

3. Analgesic

4. Expectorant

5. Decongestant

6. Antibacterial and antifungal properties[8].



Fig No 7 : Eucalyptus oil

Material and equipment**Material**

Sr No	Ingredient	Function in balm
1.	Tridex Procumben extract	Reduce pain and antioxidant
2.	Menthol	Cooling sensation and pain relief
3.	Camphor	Anti-inflammatory and anti microbial
4.	Cocount oil	Carrier oil and moisturizing agent
5.	Eucalyptus oil	Anti inflammentry and pain relief
6.	Beeswax	Thickening agent and protective agent
7.	Petroleum jelly	Base carrier , soothing agent

Table No 1 : Material**Equipment :**

Sr No .	Equipment
1.	Magnetic stirrer
2.	Mortar and pestle
3.	Digital pH meter
4.	Weighing balance
5.	Stainless steel vessel

Table No 2 : Equipment

Method and evaluation

1.Method

A. Selection of Drug:-

The selection of a drug for wound healing activity depends on various factors, including the type and severity of the wound, the underlying cause, and the desired outcome. Some commonly used drugs for wound healing include:

Antimicrobial agents: These drugs help prevent or treat infections in wounds, reducing the risk of complications. Examples include antibiotics and antiseptics.

Anti-inflammatory drugs: Inflammation can delay wound healing, so drugs that reduce inflammation can help promote healing. Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly used for this purpose.

Analgesics: Pain management is important for patient comfort during wound healing. Analgesic drugs can help alleviate pain associated with the wound. The selection of the most appropriate drug or combination of drugs depends on the specific characteristics of the wound and the individual patient's needs, and presence of infection when determining the most suitable treatment approach [9].

B.Collection of Plant:

The entire plant *Tridax procumbens* were collected from the botanical garden of Shraddha Institute of Pharmacy, Washim. Soon after the collection, parts of these plants are cleaned, dried in shade and crushed to a coarse powder, and stored in an air tight plastic container, until further use

Maceration process

The maceration technique was used to prepare the extraction. As part of the maceration extraction process, finely powdered drug material, such as leaves, stem bark, or root bark, is placed within a container. Menstrual fluid is then poured on top of the drug material until it is completely covered. After that, the container is shut and maintained for at least seven days. To achieve thorough extraction, the substance is periodically mixed and, if placed inside a bottle, shaken. Filtration is used to separate the micelle from the mark following extraction.[10]

C. Preparation of Plant Extract

Powdered parts of plants like *Tridax procumbens* were extracted by using maceration technique. *Tridax procumbens*- 50 gm of dried portion was poured in 250 ml of methanol. Later it was suspended for 7 days by stirring it from time to time. On 2th day it was sorted out by using whatman no.1 filter paper and filtrate was collected and evaporated to obtain semi solid extract.



Fig No 8 : Tridax procumbens extract

D. Method of preparation

1. Weighing all the required herbal ingredients for herbal pain relieving balm preparation were accurately [11]
2. Weighed by using digital balance and weigh all the ingredients and blend menthol, beeswax, petroleum jelly, eucalyptus oil
3. This mixture heat to 80°C with stirring to melt the ingredients. Mix till homogenous.
4. Cool the content to 65°C with mixing
5. Add the camphor at 60°C mix well.
6. Add the tridax procumbens extract to the above mixture with continuous stirring, till the uniform mixing.
7. Fill the mixture into the container when hot. Allow to cool in the container and close it with tight lead



Fig No 9 : Process of formulation balm

2. Evaluation test

Following evaluation parameters were preferred to ensure superiority of prepared pain relieving balm.

A. Colour and odour:

Colour and odour were examined by visual inspection.

B. Consistency:

Smooth and no greening is observed.

C. Spreadability:

The spreadability was determined by placing sample between two glass slides which was compressed to uniform thickness by applying definite time period. The time required to separate the two slides was measured as spreadability less time taken for separation of two slides shown better spreadability calculated by formula,

$$S = M L / T$$

S = Spreadability.

M = Weight applied to slides.

T = Time taken to separate the slides.



Fig No 10 : Spreadability

D. pH Test:-

pH was found to be 5 to 6.



Fig No 11 : pH

E. Non Irritancy:-

Prepared formulations was applied to the skin of human being and observe the effect .

F.Washability:-

Balm was applied to the skin then washability with Water was checked.[12]



Fig No 12 : Washability

Result and Discussion

1. Result:-

The physicochemical parameters of the prepared balm were determined parameters such as colour; odour, appearance and pH were tested. The formulations exhibited good in appearance quality as well as pH was found in the range 7.0 which is the desired PH

Sr No	Ingredient	F1	F2	F3
1.	Tridex procumben	2 ml	3 ml	3 ml
2 .	Menthol	0.5 gm	0.6 gm	0.4 gm
3.	Coconut oil	4 ml	3 ml	3 ml
4.	Eucaptus oil	1 ml	2 ml	1 ml
5.	Camphor	0.4 gm	0.3 gm	2.5 gm
6.	Beeswax	4 gm	3 gm	4 gm
7.	Petroleum jelly	7 gm	6gm	5gm

2.Discussion

The formulation of a pain relief balm containing Tridax procumbens involves the extraction of active compounds from the plant, typically using ethanol or water as solvents. The extract, known for its anti-inflammatory and analgesic properties, is incorporated into a base made of beeswax and carrier oils such as coconut or castor oil, providing the balm with the desired consistency and skin penetration abilities. Optional ingredients like menthol, camphor, or essential oils may be added to enhance the soothing and pain-relieving effects. The preparation involves melting the base materials, mixing in the Tridax procumbens extract and

allowing the mixture to cool and solidify into a smooth, semi-solid balm. Evaluation of the balm includes assessing parameters like spreadability, stability, pH, viscosity, and in vitro or in vivo analgesic activity to ensure its effectiveness and safety for topical application

Summary and Conclusion

1. Summary

The formulation of a pain relief balm using *Tridax procumbens* focuses on utilizing the plant's natural anti-inflammatory and analgesic properties. The process begins with the extraction of active constituents from dried *Tridax procumbens* leaves and stems using solvents like ethanol or water. The extract is then incorporated into a balm base made of beeswax and carrier oils such as coconut or castor oil, which ensures proper consistency and enhances skin absorption. Optional ingredients like menthol, camphor, and essential oils may be added to boost the therapeutic effect. The final balm is prepared by melting, mixing, and cooling the ingredients into a semi-solid form. Evaluation of the balm includes testing its physical properties (appearance, pH, spreadability, and viscosity), stability under various conditions, and biological activity through in vitro and in vivo methods to confirm its pain-relieving efficacy and safety for topical application

2. Conclusion

The formulation of the pain relief balm using *tridex procumbens* extract demonstrates promising Potential as an effective alternative remedy for pain management. Through comprehensive evaluation, including physical appearance, stability, chemical analysis, antimicrobial testing, and user feedback, the balm has been shown to meet quality standards. The *tridex procumbens* extract contributed significantly to the balm's anti-inflammatory and analgesic effects, supporting its use for pain relief. The results indicate that the balm is not only safe for topical use but also provides an effective solution for managing pain. Further clinical trials and long-term safety studies would be beneficial to confirm its sustained efficacy and broaden its application.

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