

Formulation And Evaluation of Herbal Antiseptic Balm

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Abstract—Herbal antiseptic balms are natural topical formulations prepared using medicinal plant extracts and essential oils with antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties. The growing demand for safer and eco-friendly alternatives to synthetic antiseptic products has increased interest in herbal-based formulations. These balms are commonly used for the treatment of minor cuts, wounds, burns, insect bites, skin irritation, and microbial infections.

The present work focuses on the formulation and preparation of an antiseptic herbal balm using medicinal ingredients such as neem, turmeric, aloe vera, tulsi, and essential oils. These herbal ingredients contain various bioactive compounds including flavonoids, terpenoids, phenolics, and alkaloids that contribute to their therapeutic activities. The formulation process involves the selection of suitable herbal extracts, preparation of the balm base, incorporation of active ingredients, and evaluation of the final product.

Various evaluation parameters such as appearance, pH, spreadability, consistency, stability, and antimicrobial activity are used to assess the quality and effectiveness of the prepared balm. The reviewed studies indicate that herbal antiseptic balms possess significant antimicrobial and wound-healing potential with minimal side effects compared to many synthetic formulations.

The findings suggest that herbal antiseptic balms can serve as effective, economical, and natural alternatives for topical antiseptic applications. Further research and clinical studies are needed.

I. INTRODUCTION

Herbal antiseptic balms are topical preparations made from medicinal plants, herbal extracts, and essential oils. These balms are applied externally on the skin to prevent microbial infections, promote wound healing, reduce inflammation, and provide relief from minor skin problems. Since ancient times, people have used plant-based remedies for treating cuts, burns, wounds, insect bites, and skin infections.

In recent years, there has been a growing interest in herbal products because they are considered safer and

more environmentally friendly than many synthetic preparations. The increasing awareness of side effects associated with some chemical-based antiseptic products has encouraged researchers to explore natural alternatives. Herbal antiseptic balms combine the therapeutic benefits of traditional medicine with modern pharmaceutical approaches. [1] Gupta et al. conducted a comprehensive review on herbal antiseptic balms and reported that medicinal plants such as neem, turmeric, aloe vera, and tulsi possess significant antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties. The authors highlighted the importance of herbal formulations as safe and effective alternatives to synthetic antiseptic products. [2]

Saini et al. evaluated an herbal antiseptic formulation and observed effective antimicrobial activity with minimal skin irritation. The study concluded that herbal antiseptic preparations can provide satisfactory protection against microbial infections while maintaining good skin compatibility. [3]

Jagtap et al. formulated and evaluated an herbal antiseptic-hemostatic preparation containing medicinal plant extracts. The results demonstrated good antimicrobial activity, enhanced wound-healing potential, and satisfactory formulation stability, supporting the use of herbal ingredients in topical antiseptic products. [4]

Kumar et al. formulated an herbal balm using plant-derived ingredients and evaluated its physicochemical properties. The prepared formulation exhibited satisfactory consistency, spreadability, stability, and therapeutic effectiveness, suggesting that herbal balms can serve as economical and effective alternatives to conventional topical preparations. [5]

Medicinal Plants Used in Herbal Antiseptic Balm

Medicinal plants play an important role in the preparation of herbal antiseptic balms. These plants contain various bioactive compounds that provide

antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties. The effectiveness of a herbal antiseptic balm largely depends on the selection of suitable medicinal plant and their active constituents. Some of the most commonly used medicinal plants in herbal antiseptic formulations are discussed below. [6]

Neem (*Azadirachta indica*)

Neem is one of the most widely used medicinal plants in traditional medicine systems. Different parts of the neem plant, including leaves, bark, seeds, and oil, possess significant medicinal value. Neem contains various phytochemicals such as nimbin, nimbidin, azadirachtin, and flavonoids that contribute to its therapeutic properties.

Neem is well known for its antibacterial, antifungal, antiviral, and anti-inflammatory activities. It helps inhibit the growth of harmful microorganisms and supports the healing of wounds and skin infections. Due to its strong antimicrobial action, neem is frequently included in herbal antiseptic formulations.

Turmeric (*Curcuma longa*)

Turmeric is a popular medicinal herb commonly used in traditional healthcare practices. The rhizome of turmeric contains curcumin, which is responsible for its characteristic yellow color and many of its medicinal properties.

Curcumin possesses antimicrobial, antioxidant, anti-inflammatory, and wound-healing activities. It helps reduce inflammation, prevents microbial growth, and promotes tissue repair. Turmeric has been traditionally applied to cuts, burns, and wounds and is considered an important ingredient in herbal antiseptic products.

Aloe Vera (*Aloe Barbadensis* Miller)

Aloe vera is a succulent medicinal plant widely recognized for its soothing and healing properties. The gel obtained from aloe vera leaves contains vitamins, enzymes, amino acids, minerals, and polysaccharides that contribute to its therapeutic effects. Aloe vera helps maintain skin hydration, reduces inflammation, and promotes tissue regeneration. It also exhibits mild antimicrobial activity and is frequently used in skincare and wound-care products.

Tulsi (*Ocimum Sanctum*)

Tulsi, also known as Holy Basil, is an important

medicinal herb in Ayurveda. It contains several bioactive compounds including eugenol, ursolic acid, and essential oils. Tulsi exhibits antibacterial, antifungal, antiviral, and antioxidant activities. It helps protect the skin against microbial infections and reduces inflammation. Due to its broad-spectrum antimicrobial properties, tulsi is commonly included in herbal formulations.

Tea Tree Oil (*Melaleuca alternifolia*)

Tea tree oil is an essential oil obtained from the leaves of the tea tree plant. It is rich in terpinen-4-ol and other terpenoid compounds that possess strong antimicrobial activity. Tea tree oil is effective against various bacteria, fungi, and microorganisms responsible for skin infections. It is widely used in antiseptic products, skincare preparations, and wound management formulations.

Phytochemical Constituent of Herbal Antiseptic Balm
Phytochemicals are naturally occurring chemical compounds found in medicinal plants.

These compounds are responsible for the therapeutic properties of herbal formulations. In herbal antiseptic balms, phytochemicals provide antimicrobial, anti-inflammatory, antioxidant, analgesic, and wound-healing activities. The effectiveness of an herbal antiseptic balm depends largely on the type and concentration of phytochemicals present in the selected medicinal plants.

Various medicinal plants used in herbal antiseptic balms contain important groups of phytochemicals such as flavonoids, terpenoids, phenolic compounds, alkaloids, tannins, saponins, and essential oils. These compounds work individually as well as synergistically to improve the overall therapeutic effect of the formulation [7].

Curcumin

Curcumin is the principal bioactive compound present in turmeric (*Curcuma longa*). It is responsible for the characteristic yellow color of turmeric and possesses numerous medicinal properties. Curcumin exhibits antimicrobial, anti-inflammatory, antioxidant, and wound-healing activities. It helps reduce microbial growth, protects tissues from oxidative damage, and accelerates the healing process of wounds and skin injuries.

Flavonoids

Flavonoids are a large group of plant-derived polyphenolic compounds commonly found in neem, tulsi, aloe vera, and many other medicinal plants. These compounds are known for their strong antioxidant activity. Flavonoids help neutralize free radicals, reduce inflammation, and support tissue repair. They also contribute to antimicrobial activity by inhibiting the growth of certain microorganisms.

Terpenoids

Terpenoids are naturally occurring compounds commonly found in essential oils such as tea tree oil, eucalyptus oil, camphor oil, and clove oil. They possess significant antimicrobial and anti-inflammatory activities. Terpenoids contribute to the characteristic aroma of essential oils and play an important role in protecting plants from microbial attack. In herbal balms, these compounds help control infections and reduce skin inflammation.

Phenolic Compounds

Phenolic compounds are widely distributed in medicinal plants and are recognized for their strong antioxidant properties. These compounds protect cells against oxidative stress and contribute to antimicrobial activity. Phenolics also help reduce inflammation and improve the stability of herbal formulations by preventing oxidation.

Alkaloids

Alkaloids are nitrogen-containing organic compounds found in many medicinal plants. They possess various biological activities and contribute to the therapeutic value of herbal formulations. Some alkaloids exhibit antimicrobial and anti-inflammatory properties that support the effectiveness of herbal antiseptic balms.

Essential Oils

Essential oils are volatile aromatic compounds extracted from medicinal plants. Common essential oils used in herbal antiseptic balms include tea tree oil, eucalyptus oil, clove oil, peppermint oil, and camphor oil. These oils possess strong antimicrobial, analgesic, anti-inflammatory, and antiseptic activities. Essential oils not only improve the therapeutic effectiveness of the balm but also enhance its fragrance and consumer acceptability.

II. MECHANISM OF ACTIONS OF HERBAL ANTISEPTIC BALM

Herbal antiseptic balms exert their therapeutic effects through a combination of antimicrobial, anti-inflammatory, antioxidant, analgesic, and wound-healing mechanisms. The medicinal plants and essential oils present in these formulations contain bioactive compounds that work together to protect the skin from infection and promote faster healing. The effectiveness of herbal antiseptic balms depends on the synergistic action of phytochemicals such as flavonoids, terpenoids, phenolics, alkaloids, tannins, and essential oils. These compounds target different stages of infection and tissue repair, making herbal balms multifunctional topical preparations. [8, 9]

Antimicrobial Action

The primary function of an antiseptic balm is to inhibit or destroy harmful microorganisms present on the skin. Herbal ingredients such as neem, tea tree oil, turmeric, tulsi, and clove oil contain natural antimicrobial compounds that interfere with the growth and survival of bacteria, fungi, and other pathogens.

Anti-Inflammatory Action

Inflammation is a natural response of the body to injury or infection. However, excessive inflammation can delay wound healing and cause discomfort.

Antioxidant Action

During infection and tissue injury, harmful molecules known as free radicals are produced. Excessive free radical formation can damage healthy cells and delay healing.

Many medicinal plants contain antioxidant compounds such as flavonoids and phenolic compounds. These antioxidants neutralize free radicals and protect tissues from oxidative damage.

Wound-Healing Action

Herbal antiseptic balms promote the natural healing process of the skin. Ingredients such as aloe vera, turmeric, and neem stimulate tissue repair and support the formation of new skin cells.

The wound-healing process involves:

Protection of the wound from infection. Reduction of inflammation.

Formation of new tissue. Regeneration of healthy skin. This combined action accelerates recovery and minimizes complications.

Moisturizing and Protective Action

The balm base, usually composed of beeswax and natural oils, forms a protective layer on the skin surface. This layer helps prevent moisture loss and protects the affected area from environmental contaminants.

Analgesic Action

Certain herbal ingredients such as clove oil, peppermint oil, eucalyptus oil, and camphor provide mild analgesic effects. These compounds help relieve discomfort associated with cuts, wounds, insect bites, and minor skin irritation.

Herbal antiseptic balm works through multiple mechanisms including antimicrobial, anti-inflammatory, antioxidant, wound-healing, moisturizing, and analgesic effects. The combined action of medicinal plant extracts and essential oils makes these formulations effective in preventing infections, reducing inflammation, promoting tissue repair, and maintaining healthy skin. This multifunctional approach contributes to the growing popularity of herbal antiseptic balms as natural alternatives to synthetic topical products.

III. MATERIALS REQUIRED FOR FORMULATION OF HERBAL ANTISEPTIC BALM

The formulation of an herbal antiseptic balm requires the selection of suitable medicinal plant extracts, essential oils, and base materials. Each ingredient performs a specific function in the formulation, such as providing antimicrobial activity, improving consistency, enhancing spreadability, or increasing the stability of the final product.

The ingredients used in herbal antiseptic balms are generally classified into two categories: active ingredients and base ingredients [10,11].

IV. ACTIVE INGREDIENTS

Active ingredients are responsible for the therapeutic activity of the balm. They provide antimicrobial, anti-inflammatory, antioxidant, analgesic, and wound-healing effects.

Neem Extract

Neem extract is used because of its antibacterial, antifungal, and wound-healing properties. It helps protect the skin from microbial infections and supports tissue repair.

Turmeric Extract

Turmeric extract contains curcumin, which possesses antiseptic, anti-inflammatory, and antioxidant activities. It helps reduce inflammation and promotes faster healing.

Aloe Vera Gel

Aloe vera gel provides moisturizing, soothing, and wound-healing effects. It helps maintain skin hydration and supports tissue regeneration.

Tulsi Extract

Tulsi extract exhibits antimicrobial and antioxidant properties. It helps inhibit microbial growth and protects the skin from environmental damage.

Tea Tree Oil

Tea tree oil is widely used for its strong antimicrobial activity. It is effective against various bacteria and fungi that may cause skin infections.

Clove Oil

Clove oil possesses antimicrobial and mild analgesic properties. It helps reduce microbial contamination and provides pain-relieving effects.

V. BASE INGREDIENTS

Base ingredients provide structure, consistency, and stability to the balm.

Beeswax

Beeswax acts as the primary base material. It gives the balm its semi-solid consistency and forms a protective barrier on the skin.

Coconut Oil

Coconut oil acts as an emollient and carrier oil. It improves skin hydration and facilitates the uniform distribution of active ingredients. Enhances absorption of herbal ingredients.

Vitamin E Oil

Vitamin E oil acts as an antioxidant and helps improve product stability.

Formulation

The quantities may be adjusted according to the desired consistency and therapeutic requirements.

S.No.	Ingredient	Quantity
1	Beeswax	15 g
2	Coconut Oil	40 mL
3	Aloe Vera Gel	20 g
4	Neem Extract	10 g
5	Tulsi Extract	10 g
6	Turmeric Extract	5 g
7	Tea Tree Oil	2 mL
8	Vitamin E Oil	2 mL

VI. EQUIPMENTS REQUIRE**Beakers**

Measuring cylinders electronic weighing balance

Glass stirring rod

Water bath Thermometer Spatula

Storage containers

VII. FORMULATION AND PREPARATION OF HERBAL ANTISEPTIC BALM

The formulation and preparation of herbal antiseptic balm involve the careful selection of herbal ingredients and their incorporation into a suitable semi-solid base. The objective of the formulation process is to produce a stable, safe, and effective topical preparation that provides antimicrobial protection and supports wound healing.

The preparation process should be carried out under hygienic conditions to minimize contamination and ensure product quality. [12]

VIII. PRINCIPLE OF FORMULATION

An herbal antiseptic balm consists of active herbal ingredients dispersed uniformly in a semi-solid base. The base acts as a carrier for the active constituents and facilitates their application to the skin. The selected herbs and essential oils contribute antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties.

The formulation should possess: Good consistency Uniform appearance Adequate spread ability Physical stability herapeutic effectiveness Acceptable odor and texture [13]

IX. PREPARATION METHODS**Step 1: Weighing of Ingredients**

All ingredients are accurately weighed according to the formulation requirements. Accurate weighing is important to maintain uniformity and reproducibility of the formulation.

Step 2: Melting of Base

The required quantity of beeswax is transferred into a clean beaker. The beaker is placed in a water bath and heated gently until the beeswax completely melts. After complete melting, coconut oil is added slowly and mixed thoroughly to obtain a uniform oily phase.

Step 3: Incorporation of Herbal Ingredients

After removing the mixture from direct heat, herbal extracts are added gradually. The ingredients are added in the following order:

Neem extract Tulsi extracts Turmeric extract Aloe vera gel Continuous stirring is maintained to ensure uniform distribution of all active ingredients.

Step 4: Addition of Essential Oils

Tea tree oil and vitamin E oil are added after the temperature decreases slightly. This step prevents the loss of volatile components present in the essential oils.

During cooling:

The balm solidifies gradually. Desired consistency develops. Final texture is obtained.

The prepared balm is then ready for evaluation and testing. [14,15]

X. PRECAUTIONS DURING PREPARATION

The following precautions should be observed:

Use clean and sterilized equipment. Avoid overheating of herbal ingredients. Add essential oils at lower temperatures.

Store the final product in airtight containers. Protect the formulation from direct sunlight. [16]

XI. EVALUATION PARAMETERS OF HERBAL ANTISEPTIC BALM

After preparation, the herbal antiseptic balm must be evaluated to ensure its quality, safety, stability, and effectiveness. Evaluation tests help determine whether the formulation meets the desired pharmaceutical and

therapeutic standards. These tests also help identify any defects that may affect the performance of the final product. [17]

The prepared balm is evaluated using various physical, chemical, and microbiological parameters. The spread ability of the balm was found to be satisfactory, allowing easy application for topical preparations, indicating compatibility with human skin.

Stability studies revealed that the formulation remained stable under normal storage conditions without significant changes in colour, odor, texture, or consistency. The herbal ingredients maintained their effectiveness throughout the storage period.[18]

The antimicrobial evaluation demonstrated that the formulation possessed inhibitory activity against selected microorganisms. The presence of medicinal plant extracts and essential oils contributed significantly to the antimicrobial effectiveness of the balm. The combination of neem, turmeric, aloe vera, tulsi, and tea tree oil enhanced the overall therapeutic potential of the formulation.

Overall, the prepared herbal antiseptic balm exhibited satisfactory pharmaceutical characteristics and demonstrated potential as an effective topical antiseptic preparation [19,20]

XII. ADVANTAGES OF HERBAL ANTISEPTIC BALM

Herbal antiseptic balms offer several advantages compared to conventional synthetic formulations.

Antimicrobial Activity

Medicinal plants and essential oils used in herbal balms possess broad-spectrum antimicrobial activity. They help inhibit the growth of bacteria, fungi, and other microorganisms.

Anti-inflammatory Properties

Herbal ingredients like turmeric and aloe vera reduce inflammation, redness, and swelling. This provides faster relief and promotes healing.

Wound Healing

Bioactive compounds in neem, turmeric, and aloe vera stimulate tissue repair and regeneration. They accelerate the natural wound healing process.

Minimal Side Effects

Being plant-based, herbal balms are generally safer

and cause fewer side effects than synthetic chemical products. They are suitable for sensitive skin.

Cost Effective

Herbal ingredients are easily available and economical. The formulation process is simple, making the final product affordable. Eco-friendly Herbal balms are biodegradable and do not cause environmental pollution like some synthetic antiseptics.

REFERENCES

- [1] Stefi SM, Joseph J, Shamy AM, Kumar VR, Suresh A, Thirunavukarasu R. Evaluation and formulation of antiseptic herbal hand wipes. *Asia Pac J Pharmacother Toxicol.* 2022;2(1):22-28.
- [2] Gupta N, Agrahari M, Raj M, Afreen N, Jaiswal N, Shukla AK. Comprehensive review on herbal antiseptic balm: composition, pharmacological activities, and formulation aspects. *World J Pharm Res.* 2026;15(2):456-472.
- [3] Saini M, Manjula, Kotecha M. Evaluation of an herbal antiseptic. *J Appl Pharm Sci.* 2018;8(7):112-118.
- [4] Jagtap S, Sawant D, Salunke P, Gujarathi N, Jadhav A, Sagade A. Formulation and evaluation of herbal antiseptic-hemostatic solution. *Indo Am J Pharm Sci.* 2018;5(1):234-241.
- [5] Kumar A, Kumar P, Mishra P, Roy SP. Herbal based pain balm formulation for pain relief. *Int J AYUSH.* 2023;12(3):45-52.
- [6] Lima S, Diaz G, Diaz MAN. Antibacterial chemical constituent and antiseptic herbal soap from *Salvinia auriculata* Aubl. *Evid Based Complement Alternat Med.* 2013; 2013:867698.
- [7] Visht S, Salih SS, Mohammed DA, Abduljabbar AA, Hama SJ, Khudhair IA. Formulation and evaluation of lip balm using different herbal pigments. *Pharmacogn Res.* 2024;16(1):78-84.
- [8] Pawar JC, Kandekar UY, Vichare VS, Ghavane PN. Production and analysis of lip balm using herbal resources. *J Pharm Res Int.* 2021;33(45A):112-119.
- [9] Patil NJ, Pandav AS, Chougule NB.

- Preparation and evaluation of herbal lip balm. *Int J Multidiscip Res.* 2024;6(1):1-8.
- [10] Fadhullah H, Megantika A, Alifia KCH, Nugroho P, Gofara TZ. Durable moisturizing herbal lip balm with honey, hyaluronic acid, and SPF. *J Cosmet Dermatol Sci Appl.* 2024;14(1):15-24.
 - [11] Sharma S, Singh L, Verma S. Formulation and evaluation of herbal antiseptic cream. *Int J Pharm Sci Res.* 2021;12(5):2890-2896.
 - [12] Pal RS, Pal Y, Wal P, Wal A. Development of a novel herbal balm with *Leea indica* for topical application. *J Herb Med.* 2020; 24:100396.
 - [13] Jadhav ST, Patil DA, Patil SV. Development of a novel herbal balm using *Mimosa pudica* for wound healing. *Int J Pharm Res.* 2021;13(2):4123-4130.
 - [14] Khan MA, Ahmad S, Sharma N. Development and characterization of analgesic herbal balm. *Asian J Pharm Clin Res.* 2019;12(8):155-159.
 - [15] Mishra US, Murthy PN, Kumar P. Formulation and evaluation of herbal ointment for antimicrobial activity. *Res J Pharm Technol.* 2018;11(9):4027-4032.
 - [16] Dwivedi S, Gupta S. Formulation and evaluation of herbal gel containing *Azadirachta indica* and *Curcuma longa*. *Int J Drug Dev Res.* 2012;4(3):175-179.
 - [17] Kaur LP, Guleri TK. Topical gel: A recent approach for novel drug delivery. *Asian J Biomed Pharm Sci.* 2013;3(17):1-5.
 - [18] Pandey A, Jagtap JV, Polshettiwar SA. Formulation and evaluation of antibacterial and antifungal activity of herbal gel containing *Ocimum sanctum*, *Azadirachta indica* and *Curcuma longa*. *J Chem Pharm Res.* 2011;3(4):699-706.
 - [19] Bijauliya RK, Alok S, Singh M, Mishra SB. A comprehensive review on herbal cosmetics. *Int J Pharm Sci Res.* 2017;8(12):4930-4949.
 - [20] Sawant SE, Tajane MD. Formulation and evaluation of herbal ointment containing neem and turmeric extract. *J Sci Innov Res.* 2016;5(4):149-151.