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Research Paper on Formulation and Evaluation of Herbal Antiseptic Cream

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ABSTRACT
The aim of this project was to formulate and evaluate a herbal antiseptic cream using natural ingredients known for their medicinal and skin-healing properties. The increasing awareness of the side effects associated with synthetic products has shifted consumer preference towards herbal and plant-based alternatives. This formulation combines the benefits of traditional herbal remedies with modern pharmaceutical techniques to create an effective and skin-friendly topical antiseptic cream.The cream was developed using a base of Coconut Oil (40g, 20%), Beeswax (16g, 8%), Emulsifying Wax NF (10g, 5%), Aloe Vera Gel (20g, 10%), and Distilled Water (110g, 55%). Coconut oil acts as a moisturizer and possesses antimicrobial properties, while beeswax functions as a thickening agent and skin protectant. Emulsifying wax NF was used to stabilize the oil and water phases. Aloe vera gel contributes anti-inflammatory and soothing effects, promoting skin repair.The active herbal ingredients included Pongamia (Karanja) Leaf Extract (8g, 4%) and Vitamin E Oil (2g, 1%). Pongamia extract has known antibacterial, antifungal, and wound-healing properties, while Vitamin E acts as a powerful antioxidant, supporting skin regeneration and protecting against oxidative stress. To enhance the antiseptic and aromatic qualities of the formulation, an essential oil such as Eucalyptus, Neem, or Lemongrass Oil (4g, 2%) was added. These essential oils have well-documented antimicrobial and antifungal properties.Sodium Benzoate (0.3g, 0.15%) was used as a preservative to extend the shelf life of the product, dissolved in distilled water prior to mixing. pH adjustment was done using Citric Acid and Sodium Bicarbonate to maintain a skin-compatible pH and enhance preservative efficiency.The formulation process involved the preparation of oil and aqueous phases separately, followed by their emulsification at controlled temperatures. The final product was evaluated for various physicochemical parameters including pH, viscosity, spreadability, consistency, and stability under different storage conditions. Antimicrobial activity was tested using agar diffusion methods against selected bacterial strains.The results indicated that the herbal antiseptic cream exhibited good physical stability, suitable pH, excellent spreadability, and significant antimicrobial activity. This suggests that the formulation is not only effective as an antiseptic but also safe for regular topical application. The study concludes that herbal-based antiseptic creams offer a promising alternative to synthetic preparations, combining safety, efficacy, and natural healing properties.

I. INTRODUCTION

In recent years, there has been a significant shift toward the use of natural and herbal products in both the pharmaceutical and cosmetic industries. Consumers are increasingly seeking safer, skin-friendly, and eco-conscious alternatives to synthetic formulations, especially for topical applications. Herbal antiseptic creams have emerged as an effective solution for promoting skin health while protecting against microbial infections. These formulations, enriched with bioactive plant-derived ingredients, offer

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healing, soothing, and antimicrobial properties without the adverse effects often associated with synthetic chemicals. The present project focuses on the formulation and evaluation of a herbal antiseptic cream utilizing a blend of natural oils, plant extracts, and essential oils to deliver a potent yet gentle topical preparation.The base of the cream is composed of coconut oil, beeswax, emulsifying wax, aloe vera gel, and distilled water. Each of these ingredients contributes unique benefits to the formulation. Coconut oil (20%) is well-known for its antimicrobial and moisturizing properties, making it an ideal carrier oil for an antiseptic preparation. It helps in repairing the skin barrier, reducing inflammation, and preventing microbial growth. Beeswax (8%) acts as a natural thickener and emollient, providing a protective layer on the skin while locking in moisture. Emulsifying Wax NF (5%) is used to ensure a stable emulsion between oil and water phases, giving the cream a smooth and consistent texture.Aloe vera gel (10%) is incorporated for its soothing, anti-inflammatory, and wound-healing properties. Rich in vitamins, enzymes, and amino acids, aloe vera accelerates skin regeneration and reduces irritation, making the cream suitable for use on minor cuts, abrasions, and skin infections. Distilled water (55%) forms the aqueous phase of the cream, ensuring hydration and ease of application while serving as a medium for water-soluble components.The key active herbal ingredient in this formulation is Pongamia leaf extract (4%), derived from the Pongamia pinnata plant, known for its strong antimicrobial, antifungal, and anti-inflammatory properties. Traditionally used in Ayurvedic medicine, Pongamia extract helps combat bacterial and fungal skin infections while supporting the skin's natural healing process. Vitamin E oil (1%) is included for its antioxidant activity, which not only helps in preserving the stability of the cream but also supports skin health by neutralizing free radicals, improving skin elasticity, and preventing scarring.To enhance the antiseptic action and provide additional therapeutic benefits, a small concentration (2%) of essential oil is added. Depending on the desired effect and fragrance, one can choose from eucalyptus oil, neem oil, or lemongrass oil. Eucalyptus oil is well-known for its antibacterial and anti-inflammatory properties, neem oil is highly effective against a broad spectrum of microbes, and lemongrass oil offers both antimicrobial and antifungal effects along with a refreshing aroma. These essential oils also contribute to the sensory appeal of the cream.To ensure the safety and shelf stability of the formulation, a preservative system is incorporated. Sodium benzoate (0.15%) is used as the primary preservative, dissolved in water before being added to the formulation. It is a widely accepted preservative in topical preparations due to its antimicrobial activity and safety profile. Additionally, citric acid and sodium bicarbonate may be used to adjust the pH and enhance the cream's physical stability.The goal of this project is to formulate a stable, effective, and aesthetically pleasing herbal antiseptic cream and to evaluate its physical parameters, stability, pH, spreadability, and antimicrobial efficacy. This formulation not only highlights the importance of natural ingredients in modern pharmaceutics but also promotes the integration of traditional herbal knowledge with contemporary formulation techniques.By combining well-researched herbal components with modern pharmaceutical standards, this project aims to develop a cost-effective and safe topical antiseptic cream suitable for everyday use to protect and nourish the skin.

II. SKIN CONDITIONS BENEFITED BY THE HERBAL ANTISEPTIC CREAM

The herbal antiseptic cream formulated with natural ingredients offers a holistic approach to addressing various skin conditions. Each component has been selected for its therapeutic properties, working synergistically to promote skin health and alleviate discomfort associated with common dermatological issues.

1. Acne

Acne is a prevalent skin condition characterized by the inflammation of hair follicles and sebaceous glands, leading to the formation of pimples, blackheads, and cysts. The herbal

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antiseptic cream targets acne through its antimicrobial and anti-inflammatory ingredients:

- Neem Oil: Known for its potent antibacterial and antifungal properties, neem oil helps in reducing acne-causing bacteria, thereby preventing breakouts. It also possesses anti-inflammatory effects, which can reduce the redness and swelling associated with acne lesions.
- Pongamia Leaf Extract: This extract exhibits antimicrobial activity, effectively combating the bacteria responsible for acne. Additionally, it has anti-inflammatory properties that help in soothing irritated skin.
- Aloe Vera Gel: Aloe vera is renowned for its soothing and healing properties. It helps in reducing inflammation and promotes the healing of acne scars, providing relief from the discomfort associated with acne.

Together, these ingredients work to reduce acne lesions, prevent future breakouts, and promote the healing of existing blemishes.

2. Eczema and Psoriasis

Eczema and psoriasis are chronic inflammatory skin conditions that cause itching, redness, and scaling. The herbal antiseptic cream aids in managing these conditions through its moisturizing and anti-inflammatory ingredients:

- Coconut Oil: Coconut oil is a natural emollient that helps in moisturizing dry and flaky skin. Its anti-inflammatory properties can alleviate the redness and swelling associated with eczema and psoriasis.
- Beeswax: Beeswax forms a protective barrier on the skin, preventing moisture loss and shielding the skin from environmental irritants. This barrier helps in maintaining skin hydration, crucial for managing eczema and psoriasis.
- Aloe Vera Gel: Aloe vera's anti-inflammatory and moisturizing properties help in soothing irritated skin, reducing itching, and promoting healing in eczema and psoriasis lesions.

These ingredients work in harmony to provide relief from the symptoms of eczema and psoriasis, promoting healthier and more comfortable skin.

3. Minor Burns and Cuts

Minor burns and cuts can cause pain, redness, and potential infection. The herbal antiseptic cream facilitates healing and prevents infection through its soothing and antimicrobial properties:

- Aloe Vera Gel: Aloe vera accelerates wound healing by promoting collagen production and reducing inflammation. Its cooling effect provides immediate relief from the pain associated with burns and cuts.
- Neem Oil and Pongamia Leaf Extract: Both ingredients possess antimicrobial properties that help in preventing infections in minor wounds. They also reduce inflammation, aiding in the healing process.

Together, these ingredients support the skin's natural healing processes, reduce the risk of infection, and alleviate discomfort associated with minor burns and cuts.

4. Dry and Dehydrated Skin

Dry and dehydrated skin can lead to discomfort, flaking, and increased sensitivity. The

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herbal antiseptic cream addresses these issues through its hydrating and barrier-repairing ingredients:

- Coconut Oil: Coconut oil is a potent moisturizer that penetrates deeply into the skin, providing long-lasting hydration. Its fatty acids help in restoring the skin's natural barrier, preventing moisture loss.
- Beeswax: Beeswax forms a protective layer on the skin, locking in moisture and shielding the skin from environmental factors that can exacerbate dryness.

These ingredients work together to restore hydration, improve skin elasticity, and protect against further moisture loss, promoting soft and supple skin.

5. Signs of Aging

The appearance of fine lines, wrinkles, and age spots are common signs of aging. The herbal antiseptic cream helps in reducing these signs through its antioxidant and skin-rejuvenating ingredients:

- Vitamin E Oil: Vitamin E is a powerful antioxidant that neutralizes free radicals, which are responsible for accelerating the aging process. It also promotes collagen production, improving skin elasticity and reducing the appearance of fine lines and wrinkles.
- Aloe Vera Gel: Aloe vera stimulates collagen synthesis and improves skin elasticity, contributing to a more youthful appearance.

These ingredients work synergistically to combat the signs of aging, promoting smoother and more youthful-looking skin.

6. Sunburn

Sunburn occurs due to overexposure to ultraviolet (UV) radiation, leading to inflammation, redness, and peeling. The herbal antiseptic cream provides relief and aids in healing through its cooling and anti-inflammatory properties:

- Aloe Vera Gel: Aloe vera contains compounds like aloin and sterols that have anti-inflammatory effects, reducing pain and redness associated with sunburn. It also promotes collagen production, aiding in skin repair. citeturn0news2

The inclusion of aloe vera in the cream ensures effective relief from sunburn symptoms and supports the skin's recovery process.

7. Skin Infections

Skin infections caused by bacteria, fungi, or viruses can lead to irritation, redness, and potential complications. The herbal antiseptic cream combats these infections through its antimicrobial ingredients:

- Neem Oil: Neem oil exhibits broad-spectrum antibacterial and antifungal properties, effectively combating pathogens responsible for skin infections. It also reduces inflammation, providing relief from associated symptoms.
- Pongamia Leaf Extract: This extract possesses antimicrobial activity, inhibiting the growth of bacteria and fungi on the skin. Its anti-inflammatory

III. LITERATURE SURVEY: FORMULATION AND EVALUATION OF HERBAL ANTISEPTIC CREAM

Formulation Components and Their Roles

1. Coconut Oil: Coconut oil is known for its antimicrobial and moisturizing properties. It serves as an effective base for creams, providing hydration and forming a protective barrier on the skin. Studies have highlighted its effectiveness in treating dry skin and minor infections.
2. Beeswax and Emulsifying Wax NF: Beeswax acts as an emulsifier and stabilizer in cream formulations. Emulsifying Wax NF facilitates the blending of oil and water phases, ensuring a stable cream consistency. Together, they contribute to the cream's texture and stability.
3. Aloe Vera Gel: Aloe vera gel possesses anti-inflammatory and antimicrobial properties. It soothes irritated skin and accelerates wound healing. Its inclusion in cream formulations enhances skin hydration and promotes healing.

Active Ingredients:

- Pongamia Leaf Extract: Pongamia pinnata leaves are rich in flavonoids and terpenoids, exhibiting antimicrobial and anti-inflammatory activities. Incorporating this extract can enhance the cream's efficacy against skin infections.
- Vitamin E Oil: Vitamin E acts as an antioxidant, protecting the skin from oxidative stress and promoting healing. It also

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contributes to the cream's stability by preventing lipid peroxidation.

- Essential Oils (Eucalyptus, Neem, Lemongrass): These essential oils possess potent antimicrobial properties. For instance, eucalyptus oil has been shown to inhibit the growth of various pathogens, while neem oil is effective against a broad spectrum of bacteria and fungi. Lemongrass oil offers antifungal and antibacterial benefits.

Preservatives:

Sodium Benzoate: Sodium benzoate is a widely used preservative that inhibits the growth of bacteria and fungi, thereby extending the shelf life of the cream.

- Citric Acid and Sodium Bicarbonate: These ingredients are used to adjust the pH of the cream, ensuring it is compatible with skin pH and enhancing the stability of the formulation.

Evaluation Parameters

The evaluation of herbal antiseptic creams involves assessing various physicochemical and biological parameters:

- pH: The pH of the cream should be close to that of the skin (4.5–5.5) to prevent irritation. Studies have shown that creams with a pH within this range are well-tolerated.
- Viscosity and Spreadability: These parameters determine the cream's texture and ease of application. Creams with appropriate viscosity and spreadability provide better coverage and patient compliance.
  Stability: Stability testing ensures that the cream maintains its properties over time. Formulations containing natural ingredients like aloe vera and essential oils have been evaluated for stability under various conditions.
- Antimicrobial Activity: The cream's effectiveness against pathogens is assessed using methods like agar diffusion and minimum inhibitory concentration (MIC) tests. Formulations containing neem oil and aloe vera gel have demonstrated significant antimicrobial activity against common skin pathogens.

- Skin Irritation Studies: These studies assess the safety of the cream by evaluating its potential to cause irritation or allergic reactions. Herbal creams have been found to be safe with minimal irritation when formulated correctly.

Marketed Products

1. Himani Navratna Cool Herbal Cream
2. Himalaya Herbal Antiseptic Cream
3. ZanduPancharishta Herbal Antiseptic Cream
4. Patanjali Herbal Antiseptic Cream
5. BoroPlus Antiseptic Cream
6. Vicco Turmeric WSO Cream
7. Kama Ayurveda Healing Ayurvedic Balm
8. Baidyanath Herbal Antiseptic Cream

IV. SCOPE AND OBJECTIVES OF FORMULATION AND EVALUATION OF HERBAL ANTISEPTIC CREAM

Scope:

The scope of the formulation and evaluation of herbal antiseptic cream involves the development, testing, and validation of a topical cream that combines the healing and antimicrobial properties of natural, herbal ingredients. With growing concerns about the side effects of synthetic chemicals in pharmaceutical products, herbal formulations offer an alternative, especially for skin care applications. This project will explore the potential of various natural ingredients to create an effective, safe, and user-friendly antiseptic cream.

Key aspects of the scope include:

1. **Formulation Development :**
   - Designing and developing a cream using herbal ingredients with antiseptic properties (e.g., turmeric, neem, aloe vera, etc.).
   - Formulating a cream that is safe, effective, and gentle on the skin.

2. **Evaluation of Stability :**
   - Ensuring the cream's stability in different environmental conditions (e.g., temperature, humidity) over a period of time.

3. Efficacy Testing :
   - Conducting in-vitro tests to assess the antimicrobial and healing effects of the cream.

4. **Safety and Skin Compatibility :**
   - Evaluating the cream for skin irritation and allergic reactions through patch testing.

5. **Market Feasibility :**
   - Analyzing the potential market for herbal antiseptic creams in the cosmetic and pharmaceutical sectors.

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6. Sustainability and Natural Sourcing :

- Considering the environmental impact of sourcing herbal ingredients and ensuring ethical and sustainable practices.

V. OBJECTIVES:

1. To Formulate an Herbal Antiseptic Cream :

- To create an effective antiseptic cream using herbal extracts known for their antimicrobial, anti-inflammatory, and healing properties (such as neem, turmeric, aloe vera, etc.).

2. To Evaluate the Antimicrobial Activity of the Cream :

- To test the cream's efficacy against common skin pathogens (such as bacteria and fungi) using in-vitro microbiological testing.

3. To Evaluate the Cosmetic Properties of the Cream :

- To assess the cream's texture, spreadability, absorption, and overall feel on the skin to ensure consumer satisfaction.

4. To Conduct Stability and Shelf-Life Testing :

- To evaluate the cream's physical and chemical stability over time, ensuring that the active ingredients do not degrade and that the cream maintains its properties under various storage conditions.

5. To Assess the Safety and Skin Tolerance of the Cream :

- To conduct dermatological tests to ensure the cream does not cause skin irritation or allergic reactions.

6. To Compare the Herbal Cream with Conventional Antiseptic Creams :

- To benchmark the effectiveness and safety of the herbal cream against standard synthetic antiseptic products available in the market.

7. To Explore the Therapeutic Potential of Herbal Ingredients :

- To investigate the synergistic effects of combining multiple herbal ingredients for enhanced antiseptic and skin healing properties.

8. To Provide a Natural Alternative for Skin Care :

- To offer a safer, eco-friendly alternative to chemical-based antiseptic creams, catering to the growing demand for natural and organic skincare products.

9. To Study the Market Acceptance of Herbal Antiseptic Cream :

- To assess the demand for a herbal antiseptic cream and evaluate the commercial potential in the market for such products.By achieving these objectives, the formulation and evaluation of herbal antiseptic creams will contribute to the development of safe, effective, and natural alternatives for skin care and wound healing.

VI. PLANT AND EXCIPIENT PROFILE –

1] Coconut Oil –

Ccocnut oil os the fatty oil that is derived from either raw or dried coconutThe use of coconut oil for hai has a long history in hair and beauty therapy Using coconut oil on scalp has shown great results even in faster hair growth Coconut oil for hair is often regarded as the best hair oil that reduces protein loss and maintains hair health Coconut oil also provide better nourishment to scalp and skin in order prevent dryness and dandruff problems

Pharmacological action :-

By penetrating the hair the coconut oil can reduce the amiunt of water absorbed into your hair.This helps in limiting the daily hair loss.Cocnut oil gas anti-inflammatory properties and it can also increase the production of the collagen,the chief structural protein in skin and other tissues.

Uses :-

1. Helps in longer hair growth.
2. Prevents dandruff.
3. Helps in treating split ends.
4. Prevents hair damage from heat.
5. Effective treatment for lice-infested hair.
6. Lowers muscle soreness.

2] Beeswax –

Introduction of Beeswax:

Beeswax is a natural wax produced by honeybees of the genus Apis. It is secreted by worker bees from special glands and used to construct honeycombs. Beeswax has a pleasant aroma, a yellow to golden color, and is composed mainly of esters of fatty acids and long-chain alcohols. It has been used since ancient times in cosmetics, medicine, and candle-making. Being non-toxic and skin-friendly, it remains a popular ingredient in various natural products.

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Pharmacological Action of Beeswax:

Beeswax exhibits mild anti-inflammatory, antibacterial, and antioxidant properties. It acts as a protective barrier on the skin without clogging pores, helping to lock in moisture. It also promotes wound healing by providing a breathable layer that supports tissue regeneration. Due to its natural composition, beeswax is considered biocompatible and non-irritating. These properties make it valuable in topical formulations and ointments.

Uses of Beeswax:

1. In lip balms and skincare products as a moisturizer and protectant
2. In the preparation of medicinal ointments and salves
3. For making candles that burn clean and without toxic fumes
4. As a coating for cheese and food packaging for preservation
5. In wood and leather polish formulations
6. In cosmetics like mascara and foundations for consistency and stability

3] Aloe Vera Gel –

Introduction of Aloe Vera Gel

Aloe vera gel is a clear, jelly-like substance obtained from the inner part of the Aloe vera plant leaves. It has been used for centuries in traditional medicine due to its soothing, cooling, and healing properties. Rich in water, vitamins, enzymes, and polysaccharides, Aloe vera gel is known for its hydrating and anti-inflammatory effects. It is widely used in skincare, cosmetics, and health products. The gel is non-greasy and easily absorbed, making it ideal for topical applications.

Pharmacological Action of Aloe Vera Gel

Aloe vera gel exhibits multiple pharmacological actions including anti-inflammatory, antimicrobial, antioxidant, and wound-healing properties. It helps in reducing inflammation by inhibiting prostaglandin synthesis and promoting fibroblast activity. The polysaccharides in the gel support skin repair and hydration. Aloe also accelerates epithelial regeneration and has mild antiseptic effects. These properties make it beneficial in treating burns, cuts, and various skin conditions.

Uses of Aloe Vera Gel

1. Soothing sunburns and minor skin irritations
2. Moisturizing dry or sensitive skin
3. Promoting wound and burn healing
4. Reducing acne and associated inflammation
5. Treating scalp conditions like dandruff and itchiness
6. Used in natural remedies for digestive support (oral forms)

4] Pongamia Leaf Et\xtract –

Introduction of Pongamia Leaf Extract:

Pongamia leaf extract is derived from the leaves of Pongamia pinnata (also known as Karanja), a leguminous tree native to India and Southeast Asia. Traditionally used in Ayurveda and folk medicine, the extract is known for its rich content of flavonoids, tannins, and other bioactive compounds. It possesses a characteristic bitter taste and a strong herbal aroma. Pongamia leaves have long been used for their medicinal and pesticidal properties. The extract is gaining attention in modern herbal medicine and skincare due to its therapeutic potential.

Pharmacological Action of Pongamia Leaf Extract:

Pongamia leaf extract exhibits diverse pharmacological properties, including antimicrobial, anti-inflammatory, antioxidant, and insecticidal effects. The bioactive compounds in the extract inhibit the growth of bacteria and fungi, making it useful in treating skin infections. It helps reduce inflammation by suppressing inflammatory mediators and scavenging free radicals. Additionally, the extract shows hepatoprotective and wound-healing activity. Its broad-spectrum action makes it valuable in both dermatological and systemic applications.

Uses of Pongamia Leaf Extract:

1. Treating skin disorders like eczema and fungal infections
2. Used in herbal formulations for wound healing
3. As a natural insect repellent and pesticide
4. In hair care products for dandruff and scalp issues
5. Managing inflammation in joint and muscle pain
6. In traditional medicine for treating ulcers and liver disorders

5] Vitamin E-

Introduction of Vitamin E:

Vitamin E is a fat-soluble vitamin known for its powerful antioxidant properties. It exists in eight different forms, with alpha-tocopherol being

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the most biologically active in humans. Naturally found in nuts, seeds, vegetable oils, and leafy greens, Vitamin E plays a key role in protecting cells from oxidative damage. It is essential for maintaining healthy skin, eyes, and immune function. Due to its antioxidant capacity, it is widely used in both dietary supplements and skincare products.

Pharmacological Action of Vitamin E:

Vitamin E acts as a lipid-soluble antioxidant that protects cell membranes from free radical damage by inhibiting lipid peroxidation. It stabilizes cell membranes and supports immune function by regulating T-cell activity. Vitamin E also exhibits anti-inflammatory effects and may help modulate gene expression and enzyme activity. In addition to cellular protection, it contributes to skin repair and slows down signs of aging. It may also play a supportive role in cardiovascular and neurological health.

Uses of Vitamin E:

1. As a skin moisturizer and anti-aging ingredient in cosmetics
2. To promote wound healing and reduce scarring
3. In supplements to support immune function and heart health
4. For protecting against oxidative stress and free radical damage
5. In eye health formulations to slow age-related macular degeneration
6. As a hair care ingredient to improve scalp circulation and reduce hair loss

6] Essential Oil (Eucalyptus Oil) –
Introduction of Eucalyptus Oil:

Eucalyptus oil is a volatile essential oil obtained from the leaves of the Eucalyptus tree, primarily Eucalyptus globulus. It is known for its strong, fresh, camphor-like aroma and is widely used in traditional and modern medicine. The main active compound, eucalyptol (1,8-cineole), gives it its distinctive smell and therapeutic properties. This oil has been used for centuries for respiratory relief, antiseptic purposes, and in aromatherapy. Its natural origin and broad utility make it a popular ingredient in both pharmaceutical and cosmetic formulations.

Pharmacological Action of Eucalyptus Oil:Eucalyptus oil exhibits multiple pharmacological actions such as antimicrobial, anti-inflammatory, analgesic, decongestant, and antioxidant effects. Eucalyptol, its primary compound, helps open airways by loosening mucus and reducing inflammation in the respiratory tract. It also acts against various bacteria and fungi, supporting its use in wound care and hygiene products. The oil stimulates circulation and provides mild pain relief when applied topically. Its antioxidant action further protects cells from oxidative damage

Uses of Eucalyptus Oil:

1. As a decongestant in vaporizers and inhalers for cold and sinus relief
2. In topical creams and balms for muscle and joint pain relief
3. As an antiseptic in mouthwashes and wound-cleaning solutions
4. In aromatherapy to reduce stress and improve alertness
5. In hair care products to treat dandruff and improve scalp health
6. As a natural insect repellent and in disinfectant sprays

7] Citric Acid –
Introduction of Citric Acid:

Citric acid is a weak organic acid naturally found in citrus fruits like lemons, limes, and oranges. It appears as a white, crystalline powder with a sharp, sour taste and is widely used as a natural preservative and flavoring agent in food and beverages. Industrially, it is commonly produced by fermentation using the fungus Aspergillus niger. Besides its culinary use, citric acid is also used in cosmetics, pharmaceuticals, and cleaning products. Its acidity and chelating properties make it versatile in various industries.

Pharmacological Action of Citric Acid:

Citric acid acts as an alkalizing agent, helping to balance pH levels in the body. It has antioxidant properties, protecting cells from oxidative stress by scavenging free radicals. In pharmaceuticals, it enhances the absorption of minerals like calcium and magnesium. It is also used as a chelating agent, binding with metals to detoxify or stabilize formulations. Additionally, citric acid has mild antimicrobial effects and is used in topical treatments for skin exfoliation and acne control.

Uses of Citric Acid:

1. As a flavoring and preservative in food and drinks

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2. In skincare products for exfoliation and pH regulation
3. As an active ingredient in effervescent tablets and supplements
4. In cleaning products to remove limescale and stains
5. In cosmetics to stabilize and preserve formulations
6. In pharmaceutical formulations to enhance mineral absorption and drug solubility

VII. EXTRACTION PROCESS OF ACTIVE INGREDIENTS –

1] Aloe Vera Gel –

Procedure for Extracting Aloe Vera Gel:

1. Select Healthy Aloe Vera Leaves:Choose thick, fleshy, and mature leaves from the base of the Aloe vera plant. These are typically the most hydrated and contain the most gel. Make sure the leaves are free from damage or disease.
2. Clean the Leaves:Wash the leaves thoroughly under cool running water to remove any dirt or contaminants. This ensures the gel remains clean and free from bacteria.
3. Cut the Aloe Vera Leaves:Using a sharp knife or scissors, cut the Aloe vera leaf as close to the base of the plant as possible.You can cut multiple leaves, depending on how much gel you need.
4. Drain the Yellow Sap:After cutting the leaves, you will notice a yellowish resin-like sap (known as aloin) that oozes from the base of the leaf. This sap can be irritating to the skin, so it's important to let it drain out.Place the leaves in a clean container or on a paper towel, with the cut side facing downward, and allow it to drain for around 10–15 minutes.
5. Remove the Thorns:Using a sharp knife, carefully trim off the spiny edges (thorns) of the Aloe vera leaves on both sides.
6. Peel the Aloe Vera Leaves:Lay the leaf flat on a cutting board.Use your knife to cut the leaf lengthwise to expose the gel inside. You will see the clear, slimy gel inside, which is what you want to extract.Gently scoop out the gel using a spoon or small scoop. Try to avoid scraping the green skin of the leaf, as this can affect the quality of the gel.
7. Extract the Gel:Once the gel is exposed, scrape the inside of the leaf to collect the clear, translucent gel. You can use a spoon to scoop it out gently, ensuring you get the most of the gel.If the gel is tough to remove, you can slice the leaf into smaller sections to make the extraction easier.
8. Strain the Gel (Optional):To ensure the gel is smooth and free from any small plant debris, you can strain it through a fine mesh sieve, cheesecloth, or a clean cotton cloth.This step is especially useful if you are planning to store the gel for a longer period or want a smoother texture.
9. Blend the Gel (Optional):For a finer, more uniform consistency, you can blend the gel in a blender for a few seconds. This step is optional and only necessary if you want a more liquid-like texture for your gel.
10. Store the Aloe Vera Gel:Transfer the freshly extracted gel into an airtight container or glass jar.Store the gel in the refrigerator for up to 1–2 weeks. Fresh Aloe vera gel tends to lose its potency quickly, so it's best to use it soon after extraction.If you'd like to store it for a longer period, you can freeze the gel in ice cube trays and store the cubes in a sealed bag or container.

2] Pongamia Leaf Extract –

Step 1: Collect and Prepare the Leaves

1. Select Healthy Leaves:
   - Choose healthy, mature leaves of Pongamia pinnata (Karanja). Avoid leaves that show signs of disease or damage, as this could affect the quality of the extract.
2. Clean the Leaves:
   - Wash the leaves thoroughly under running water to remove any dust, dirt, or contaminants. If the leaves are damp, gently pat them dry with a clean towel or allow them to air dry.
3. Dry the Leaves (Optional):
   - If you are using fresh leaves, you can dry them to concentrate the active compounds. Lay the leaves flat on a clean surface and allow them to air dry in a shaded, well-ventilated area. Alternatively, you can dry them in an oven at low heat (around 30-40°C) to avoid degrading the bioactive components.

Step 2: Grind the Leaves

1. Cut the Leaves:
   - Using scissors or a sharp knife, cut the dried or fresh leaves into smaller pieces. This increases the surface area for better extraction.
2. Grind the Leaves:
   - Using a mortar and pestle or a grinder, grind the leaves into a fine powder. This step

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enhances the release of active compounds during the extraction process.

Step 3: Solvent Extraction

You can use either a solvent extraction method (with ethanol, methanol, or hexane) or a water extraction method, depending on the desired active compounds.

A. Solvent Extraction (For Chemical Compounds)

1. Prepare the Solvent:
- Choose an appropriate solvent based on the target compounds. Ethanol or methanol are commonly used for extracting flavonoids, alkaloids, and other bioactive compounds. Solvents like hexane can be used if you're focusing on lipophilic (fat-soluble) compounds.
2. Mix the Solvent and Powder:
- In a beaker or flask, add the powdered leaves and pour in the solvent (around 70-80% ethanol or methanol). The amount of solvent should be enough to fully immerse the leaf powder. A general ratio is 1 part powder to 5-10 parts solvent.
3. Soak the Mixture:
- Allow the mixture to soak for 24-48 hours at room temperature, or you can heat it gently (at 40-50°C) for faster extraction. Stir the mixture occasionally to ensure the solvent comes in contact with all parts of the leaf powder.
4. Filter the Mixture:
- After soaking, filter the extract through a fine sieve, cheesecloth, or filter paper to separate the liquid from the solid plant material.
5. Concentrate the Extract (Optional):
- If you want to concentrate the extract, use a rotary evaporator or gently heat the filtered extract to evaporate the solvent. Make sure the temperature does not exceed 50°C to prevent degradation of the bioactive compounds.

B. Water Extraction (For Water-Soluble Compounds)

1. Boil Water:
- Boil distilled water in a pot or beaker. Use approximately 5-10 parts water for every 1 part of leaf powder.
2. Steep the Leaves:
- Once the water reaches boiling point, add the powdered Pongamia leaves to the water. Lower the heat and let the mixture simmer for about 30-60 minutes. Stir occasionally.
3. Cool and Filter:
- Allow the mixture to cool to room temperature. Filter it using a sieve or cheesecloth to remove the solid residues.

Step 4: Store the Extract

1. Store the Extract in a Clean Container:
- Transfer the filtered extract into a clean glass jar or container. If you used a solvent extraction method, ensure the container is tightly sealed to avoid contamination.
2. Preserve the Extract:
- Store the extract in a cool, dark place. If it was prepared using water extraction, you may refrigerate it for better preservation. For solvent-based extracts, ensure the container is tightly sealed, as the solvent may degrade over time when exposed to light or air.

VIII. PROCEDURE OF FORMULATION OF HERBAL ANTISEPTIC CREAM –

Ingredients –

Oil Phase (Lipophilic Phase)

Coconut Oil – 40g (20%) ,Beeswax – 16g (8%), Emulsifying Wax NF – 10g (5%)

Water Phase (Hydrophilic Phase)

Aloe Vera Gel – 20g (10%),Distilled Water – 110g (55%)

Active Ingredients

Pongamia Leaf Extract – 8g (4%), Vitamin E Oil – 2g (1%)

Essential Oil (Choose one or a blend)

Eucalyptus Oil / Neem Oil / Lemongrass Oil – 4g (2%)

Preservative

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Sodium Benzoate – 0.3g (0.15%) (Dissolve in water before adding)
pH Adjuster (If Needed)
Citric Acid (To lower pH, if needed), Sodium Bicarbonate (To raise pH, if needed)
Step-by-Step Procedure

Step 1: Extraction of Pongamia Leaf Extract
1.Collect and Clean Fresh Pongamia Leaves: Ensure the leaves are free of dust or debris.
2. Dry and Powder the Leaves: Use a clean, dry surface to powder the leaves after they have been air-dried.
3. Perform Soxhlet Extraction:Use 70% ethanol as the solvent.Perform Soxhlet extraction for 6-8 hours to obtain the extract.
4. Filter and Evaporate: Filter out the ethanol and concentrate the extract by evaporating the solvent using a rotary evaporator.
5. Store the Extract: Store the concentrated Pongamia leaf extract in an airtight container, away from light.

Step 2: Preparation of the Oil Phase
1. Weigh and Add the Ingredients:40g Coconut Oil, 16g Beeswax, 10g Emulsifying Wax NF
Add them to a clean beaker.
2. Heat the Mixture:
Heat the oil phase mixture in a water bath at 70°C until all components are fully melted.
3. Stir Continuously: Ensure the ingredients blend thoroughly during heating.

Step 3: Preparation of the Water Phase
1. Mix Distilled Water and Aloe Vera Gel:Weigh 20g Aloe Vera Gel and 110g Distilled Water.Mix them in a separate beaker.
2. Heat the Water Phase:Heat the water phase mixture to 70°C in a water bath.
3. Dissolve Sodium Benzoate:Dissolve 0.3g Sodium Benzoate in a small amount of warm distilled water.Add this solution to the water phase once it has dissolved completely.

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Step 4: Emulsification

1. Ensure Both Phases Are at the Same Temperature:Ensure that both the oil phase and water phase are heated to 70°C.
2. Combine the Oil Phase and Water Phase:Slowly pour the oil phase into the water phase while stirring continuously to form an initial blend.
3. Homogenize the Mixture:

Use a homogenizer at 2000-3000 rpm for 3-5 minutes to form a smooth and stable emulsion.

Step 5: Cooling and Addition of Active Ingredients

1. Cool the Emulsion:Allow the emulsion to cool down to 40°C to avoid degrading the active ingredients.
2. Add Active Ingredients:

8g Pongamia Leaf Extract, 2g Vitamin E Oil, 4g Essential Oil (Choose between Eucalyptus, Neem, or Lemongrass)

Add them one by one and mix gently after each addition.

Step 6: pH Adjustment (Critical for Sodium Benzoate Effectiveness)

1. Measure the pH:Use a pH meter to measure the pH of the cream.
2. Adjust pH if Necessary:

If pH is above 5.5: Add a small amount of Citric Acid (dissolved in water) to lower the pH.

If pH is below 4.0: Add a small amount of Sodium Bicarbonate solution to raise the pH.

3.Recheck pH:

Ensure the pH is within the range of 4.5-5.5 for optimal antimicrobial effectiveness of Sodium Benzoate.Stir the mixture well and recheck the pH.

IX. EVALUATION PARAMETER –

The formulated cream have to be gone through the following parameters.

1. Physical Appearance

Procedure:Take a small quantity (about 2g) of cream on a clean glass slide.

Observe under adequate lighting.Check for color, texture, consistency, and presence of any lumps or phase separation.

Observation Parameters:

Color (Should match expected)

Consistency (Smooth, semi-solid)

Presence of lumps or oil separation (Should be absent)

2.pH determination -

Procedure:

Weigh 1g of cream.

Dissolve it in 10 mL of distilled water in a beaker.

Stir well to form a uniform dispersion.

Calibrate the digital pH meter with standard buffers (pH 4 and 7).

Dip the electrode into the sample and record the pH.

3. Spreadability Test

Procedure:

Weigh 1g of cream and place it between two clean glass slides.

Place a 500g weight on the upper slide for 1 minute.

Remove the weight and measure the diameter of the spread cream using a ruler or caliper.

4. Washability Test

Procedure:Apply a small amount (0.5g) of cream on the back of the hand or a test tile.Allow it to remain for 5 minutes.Rinse under running tap water

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without soap.Observe whether the cream is washed off easily or leaves a greasy/sticky residue.

4.Stability Testing
Procedure:Store cream samples in:
Room temperature (~25°C)
Refrigerated condition (4°C)
Accelerated condition (40°C ± 2°C and 75% RH)
Observe at intervals: 0, 15, 30, 60, and 90 days.
Note changes in color, odor, pH, consistency, and phase separation.

5. Microbial Load Test (Total Viable Count)
Procedure:
Aseptically take 1g of cream.
Dilute in 9 mL of sterile saline.
Spread 1 mL of this dilution on:
Nutrient agar (for bacteria)
Sabouraud dextrose agar (for fungi)
Incubate:
Nutrient agar at 37°C for 24-48 hours.
SDA at 25°C for 3-5 days.
Count the number of colony-forming units (CFU).
Limits:
Bacteria: $<10^3$ CFU/g
Fungi: $<10^2$ CFU/g

6.Viscosity Measurement
Procedure:Use a Brookfield Viscometer.
Fill the sample beaker with 100g of cream.
Immerse spindle (e.g., Spindle No. 64) in the sample.
Set speed to 10, 20, or 30 rpm as required.
Record the viscosity in cP (centipoise).

7. Skin Irritation Test (Patch Test)
Procedure:
Clean a small area (2x2 cm) on the inner forearm or behind the ear with alcohol.
Apply a thin layer (0.5g) of cream.
Cover with a gauze or patch.
Leave for 24 hours and then inspect.
Check again at 48 hours for redness, itching, swelling, or rashes.

X. RESULT –

The Herbal Antiseptic Cream was formulated and evaluated successfully with all given parameters. This cream is beneficial for treating septic conditions along with providing nourishment and moisturization to the skin.

Evaluation Parameters -
1.Physical Appearance –
Colour – Light Green
Consistency – Smooth
Presence Of Lumps – NO

2.pH Determination –
The of Herbal Antiseptic Cream was found to be 5.09.
3.Spreadibility Test –
The Cream is showing good spreadibility characteristics.
4.Washability Test –
The cream has good washability characteristics that it does not leaves any greasy stains behind.
5.Stability Testing –
The cream was stable allover the time.
6.Skin Irritation Test –
The cream does not show any irritation to the skin.

XI. CONCLUSION –

The formulation and evaluation of an herbal antiseptic cream using natural ingredients such as Coconut Oil, Beeswax, Emulsifying Wax NF, Aloe Vera Gel, Pongamia Leaf Extract, Vitamin E, Eucalyptus Oil/Neem Oil/Lemongrass Oil, along with stabilizers and preservatives like Sodium Benzoate, Citric Acid, and Sodium Bicarbonate, has been successfully accomplished in this project. The objective was to develop a skin-friendly, effective, and natural antiseptic formulation that can provide protection against microbial infections while also nourishing the skin.The base of the cream, composed of Coconut Oil and Beeswax, provided excellent emollient and moisturizing properties, forming a protective barrier on the skin. Emulsifying Wax NF ensured uniform mixing of oil and water phases, resulting in a stable and homogenous cream. Aloe Vera Gel contributed soothing and anti-inflammatory properties, helping to calm irritated skin and promote healing.Pongamia Leaf Extract, a key herbal component, offered strong antimicrobial and antifungal activity, making it a valuable ingredient in the antiseptic formulation. The incorporation of essential oils such as Eucalyptus, Neem, or Lemongrass further enhanced the antimicrobial spectrum and added a natural fragrance, improving user acceptability. Vitamin E, a potent antioxidant, played a dual role by protecting the skin from oxidative stress and enhancing the stability of the product by preventing rancidity of oils.Citric Acid was used to maintain the pH within a skin-friendly range, while Sodium Benzoate acted as a

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preservative to extend the shelf-life of the product. Sodium Bicarbonate helped in maintaining pH balance and also contributed mild antiseptic properties. Distilled water acted as a vehicle and helped in improving the spreadability and feel of the cream.The final herbal antiseptic cream was evaluated based on parameters like appearance, consistency, spreadability, pH, stability, and antimicrobial activity. The formulation was found to be stable with desirable physical characteristics and showed promising antimicrobial efficacy against common skin pathogens.

In conclusion, the developed herbal antiseptic cream successfully combines the healing and protective benefits of traditional herbal medicine with modern formulation techniques. It stands as a safe, effective, and eco-friendly alternative to synthetic antiseptics, with potential for further research and commercial development. This project demonstrates the value of integrating herbal ingredients in pharmaceutical formulations to promote holistic skin care and address the growing demand for natural and sustainable healthcare products.

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