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Research Article

Preparation And Evaluation of Gel by Using Lemon Grass Oil and Eucalyptus Oil

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ABSTRACT

This study explores the formulation and efficacy of an antiseptic gel incorporating lemongrass oil (*Cymbopogon citratus*) and eucalyptus oil (*Eucalyptus globulus*). These essential oils are known for their antimicrobial properties, making them suitable candidates for antiseptic applications. The gel was formulated using a carbomer-based gel matrix to ensure proper consistency and stability. Antimicrobial efficacy was assessed against common pathogens including *Staphylococcus aureus*, *Escherichia coli*, and *Candida albicans*. The results indicated significant antimicrobial activity, suggesting that the formulated gel could serve as an effective natural antiseptic alternative. Formulation Stability: The gel maintained its consistency and homogeneity over a 3-month storage period at room temperature. 2. Antimicrobial Activity: The gel demonstrated substantial inhibitory effects on *Staphylococcus aureus*, *Escherichia coli*, and *Candida albicans*- Zone of inhibition for *Staphylococcus aureus*: 18 mm Zone of inhibition for *Escherichia coli*: 16 mm - Zone of inhibition for *Candida albicans*: 14 mm 3. Minimum Inhibitory Concentration (MIC):- Lemongrass oil: 0.5% v/v - Eucalyptus oil: 1% v/v 4. Sensory Evaluation:* Users reported a pleasant fragrance and a cooling sensation upon application, with no adverse skin reactions observed. 5. pH Stability:* The gel maintained a pH range of 5.5-6.5, suitable for skin application.

INTRODUCTION

The use of essential oils in antiseptic products has gained popularity due to their natural origin and antimicrobial properties.[1] Lemongrass oil and eucalyptus oil, both derived from plants, have been recognized for their effectiveness in combating

bacteria and viruses. [2,3] The integration of these oils into antiseptic gels provides a natural alternative to conventional antiseptics, which often contain synthetic chemicals that may cause skin irritation. [4,5] The primary objective of this project is to develop an antiseptic gel incorporating lemongrass oil and eucalyptus

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oil.[6] The gel aims to provide effective antimicrobial action while being gentle on the skin. This product targets consumers seeking natural and effective hygiene solutions. Lemongrass Oil:Source: Extracted from the leaves and stalks of the lemongrass plant (*Cymbopogon citratus*)Properties: Antimicrobial, anti-inflammatory, and antioxidant Benefits: Effective against a variety of bacteria and fungi, reduces inflammation, and protects the skin from oxidative stress.[7] Eucalyptus Oil:Source: Extracted from the leaves of eucalyptus trees (*Eucalyptus globulus*).[8]Properties: Antibacterial, antiviral, and anti-inflammatory. Benefits: Inhibits the growth of pathogens, supports respiratory health, and soothes skin irritation. Formulation .The formulation of the antiseptic gel involves combining the active ingredients (lemongrass oil and eucalyptus oil) with a suitable gel base.[9,10,11] The gel base should be skin-friendly, non-greasy, and capable of effectively delivering the essential oils. Common bases include aloe vera gel, carbomer, and glycerin Natural Ingredients: Utilizes plant-derived essential oils, reducing the reliance on synthetic chemicals.Broad-Spectrum Antimicrobial Activity: Effective against a range of bacteria and viruses.Skin-Friendly: Essential oils provide additional skin benefits, such as soothing irritation and reducing inflammation. Developing an antiseptic gel using lemongrass oil and eucalyptus oil offers a natural and effective alternative to conventional antiseptic products.[12,13] This gel not only ensures antimicrobial protection but also caters to consumers' growing preference for natural and skin-friendly hygiene solutions. Further research and testing will optimize the formulation and confirm its efficacy and safety for widespread use.[14,15]

Chemicals And Instruments Used Forwork: -

Table no.1: List of Chemicals used:

Sr. No.	Ingredient	Role
1	Chemicals	Role
2	Lemon grass oil	Active ingredient
3	Eucalyptus oil	Active agent
4	Carbopol 934	Gelling agent
5	Methylparaben	Preservative
6	glycerin	Improves smoothness
7	Distilled water	Solvent
8	Triethanolamine	Surfactant
9	Ethanol	For solubilizing oils

Table No2: List of Instruments Used:

Sr. No	Instruments
1	UV visible spectrometer
2	IR Spectrometer
3	Magnetic Stirrer
4	Ultrasonic cleaner
5	Ph meter
6	Brookfield Viscometer

METHODOLOGY:

1. Preparation of Carbopol Gel Base

- Weigh Carbopol 940:** Accurately weigh the required amount of Carbopol 940. Typically, 0.5-1% of the total formulation weight is used.
- Disperse in Water:** Gradually add Carbopol 940 to distilled water (usually around 95-97% of the total weight), while stirring continuously to prevent clumping. Allow it to swell and hydrate fully. This may take several hours, so it's often done overnight.



2. Neutralization

a. Add Triethanolamine (TEA): Slowly add TEA to the hydrated Carbopol while stirring. This neutralizes the Carbopol and thickens the mixture to form a gel. The pH should be adjusted to around 7.0. Add TEA dropwise and check the pH frequently until the desired consistency and pH are achieved.

3. Incorporation of Essential Oils

a. Prepare Essential Oils Mixture: Mix lemongrass oil and eucalyptus oil in a separate beaker. If needed, dissolve the oils in a small amount of ethanol to help them mix better with the gel base. Typical concentrations: 1-5% for each oil, but the exact amount depends on the desired strength and purpose of the gel.

b. Add Oils to Gel Base: Slowly add the essential oil mixture to the gel base while stirring continuously to ensure even distribution.

4. Addition of Other Excipients

a. Glycerin: Add glycerin (2-5% of the total formulation) to the gel to enhance moisturizing properties.

b. Preservative: Add a suitable preservative such as methylparaben (0.1-0.2% of the total formulation) to ensure the gel remains free of microbial contamination.

5. Final Mixing and Homogenization

a. Mix Thoroughly: Continue stirring the mixture until all components are uniformly distributed.

b. Homogenization: Use a homogenizer if available to achieve a smooth and homogenous gel.

6. Packaging

a. Transfer to Containers: Transfer the prepared gel into appropriate containers, ensuring they are clean and sterilized.

b. Labeling: Label the containers with the name of the product, date of preparation, and any other relevant information.

7. Storage

Store Properly: Store the gel in a cool, dry place away from direct sunlight to maintain its stability and effectiveness.

Experimental Studies-

Preformulation study;

1. Melting point: -

The melting point of Gel a local is typically determined experimentally using a melting point apparatus. Here's a basic procedure:

1. Sample Preparation: Grind the Gel into a fine powder to ensure uniformity.
2. Loading the Sample: Place a small amount of the powdered Gel into a capillary tube. Ensure it's packed uniformly without air gaps.
3. Mounting the Sample: Secure the capillary tube containing the sample into the melting point apparatus.
4. Temperature Calibration: Calibrate the melting point apparatus to ensure accurate temperature measurement.
5. Heating the Sample: Gradually heat the sample while observing it through a magnifying lens. Record the temperature when the first drop of liquid appears.
6. Cooling and Observing: Allow the sample to cool and observe if the melting point matches the known value for Gel (usually around 58-65 °C).



7. Cleaning: Clean the apparatus thoroughly after use to prevent contamination. The melting point of Gel is 58-65 °C

2. Solubility: -

Carbopol-940 – Carbopol 940 is not soluble in water but can disperse and swell in water to form a viscous gel. It is soluble in alcohol and other organic solvents.

3. UV (ultra violet): -

Procedure: -

- Take 100ml of distilled water in beaker + 1g of drug
- Dissolve the preparation by using ultrasonic sonicator for particle reduction
- Make the dilutions –
- 0.10,0.8,0.6,0.4,0.2
- Volume make up done by using distilled water for each dilution.
- Then prepare cuvettes with blank by using distilled water.
- Then do the auto correction and base line.
- Then set the wavelength near about 800nm-400nm
- Then use the drug cuvettes and analyse the readings

Evaluation test: -

1. Spreadability test:

The diameter of the spreading gel was measured by putting weights above the gel. In the first test, 0.1 grams of each gel sample were spread on a glass slab and another glass slab was placed on top of the gel sample and the diameter of the spreading gel was measured. Afterward, a 20-gram additional load was placed on the gel sample for a minute before the diameter of the spreading gel was measured again. This process was continued

by adding other loads of 50, 100, 150, and 200 grams gradually.[16]

2. Viscosity test: -

Viscosity of gel was determined by using Brookfield rotational viscometer at 5, 10, 20, rpm. Each reading was taken after equilibrium of the sample at the end of two minutes. The samples were repeated two times.

3. PH test:-

The pH test was Performed using pH paper. The ph paper was placed on the Formulated gel and the results ere observed and data was recorded.

RESULT AND DISCUSSION

UV test (ultra violet):

The Sample was tested in the UV Spectrometer and following readings and wavelengths were obtained.

Table No. 3: UV Spectrometer wavelength readings

Samples	Readings	Wavelength
0.10	0.196	280nm
0.8	0.156	222nm
0.6	0.113	161nm
0.4	0.089	127.14nm
0.2	0.046	65.71nm

Spreadability test:

The spreadability test was performed and the spreadability of the sample was found to be at most 15- 16 gm.sm/s

Table No. 4: Spreadibility



Sr. No.	Batch	pH	Spreadability (gm.sm/sec)
1	F1	6.8 /±0.03	16.15/±0.005
2	F2	7.0 /± 0.03	15.40/±0.005
3	F3	7.1 /± 0.03	15.39/±0.005



Fig 3. Spreadability Test

Viscosity Test:

Table No. 5: Viscosity

Sample	Blank With solution	With drug
drug+carbopol in purified water	438 mpas	3790 mpas

PH test:

Table No.6: PH test:

Sample	Blank	With drug
drug+carbopol in purified water	7.30	6.38



Fig. 4: pH test

Formulated Gel:

Fig. No. 3: Formulated gel

CONCLUSION:

Preparing a gel using lemon grass oil and eucalyptus oil can result in a versatile product with several potential benefits. Here are some concluding points about such a prepar Lemon grass oil and eucalyptus oil are known for their pleasant aromas and therapeutic properties. Lemon grass oil is often used for its calming and insect-repellent properties, while eucalyptus oil is known for its cooling sensation and potential respiratory benefits. Combining these oils in a gel can create a synergistic effect where their individual benefits complement each other. For example, the cooling effect of eucalyptus The lemongrass oil formulation developed using pseudo ternary phase diagram and optimized by D-optimal design possessing 1.10% of oil, 6.1% of Smix and 91.3% of water was clear transparent light to pale yellow microemulsion with globule size of 14.60 ± 0.31 nm, zeta potential of 0.94 mV and PDI value 0.00133 indicating a stable microemulsion. The light to pale yellow coloured microemulsion based gel showed a drug release of $99.63 \pm 0.41\%$ within 180 minutes with retention of drug in skin layers of about $64.99 \pm 0.42\%$ and on the skin about $16.39 \pm 0.25\%$ after 12 hours indicating the retention of drug at site of action. The comparison of

LGMBG with marketed clobet gel proved to have equivalent efficacy against fungal pathogens. The skin irritation study proved no irritation was provoked after the oil was micro emulsified using surfactant and cosurfactant mixture in water and the microemulsion based gel was found stable at 40 °C/75% RH for 6 months indicating its stability. Hence it can be said that the lemongrass oil loaded microemulsion based formulation can be used for treatment of fungal infections.

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