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FORMULATION & EVALUATION OF TOPICAL ANTIBACTERIAL HERBAL GEL OF EUCALYPTUS OIL

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Abstract: Most of the antibacterial agents were originally derived from plants. Herbal medicine refers to the use of any oil of seeds, leaves for medicinal purposes. Along with other dosage forms, herbal drugs are also formulated in the form of gel. A gel is a jelly like semisolid preparation used topically on a variety of body surfaces. The objective of the study was to formulate and evaluate the antibacterial herbal gel from the local medicinal plants. The oil of the selected plants was taken in different ratio randomly to formulate gel. The topical formulation was developed and tested for physical parameter, drug content, uniformity, spreadibility (SP). The result showed that coriander and eucalyptus herbal gel showed the MIC values of 50%v/v and 50 %v/v against Bacillus subtillis and staphylococcus Aureus respectively. The formulation second (ECG50) showed the maximum drug content 65% and maximum stability and zone of among the formulation.

The herpes simplex virus is a human pathogen which can cause skin or mucous membrane infections. Melissa, sumac, licorice, rosemary, and geranium have Antibacterial, antimicrobial, antiviral, anti-inflammatory, and local analgesic effect. Control of viral protein formation are the other effects of these herbs. The aim of this study is design, formulation, and evaluation of the gel containing of these eucalyptus oil.

Keywords - Antibacterial; Herbal Gel, Eucalyptus oil; Formulation; Evaluation.

I.INTRODUCTION

Gels are semisolid systems made up of inorganic particles or large organic molecules interpenetrated by a liquid. They can be classified as two-phase systems or single-phase gels and jellies. Single-phase gels consist of uniformly distributed macromolecules, while inorganic gels are formed by inorganic colloidal clays. Gel structure and rheology are crucial for understanding their physical properties. Type 1 gels are irreversible, while Type 2 gels are heat reversible.

These gels are used as jellies for drug application, as they dry rapidly upon application, leaving a plastic film with the drug in contact with the skin.

The topical drug delivery system targets cutaneous disorders or general diseases by delivering therapeutic amounts to the skin, using semi-solid formulations. Advantages include avoiding first-pass metabolism, convenience, and selective drug delivery. However, disadvantages include skin irritation, poor permeability, and allergenic reactions. The skin is the largest organ in the body.

The epidermis is a stratified keratinized squamous epithelium with no blood vessels on nerve endings. Its deeper layers are filled with interstitial fluid from the dermis, providing oxygen and nutrients. The epidermis is replaced monthly by hairs, secretions, and sweat glands. Blisters develop when trauma separates the dermis and epidermis, and serous fluid collects between the two layers.

Skin color is influenced by factors like melanin and sunlight exposure, protecting the skin from harmful UV rays. White skin has a pink color due to normal hemoglobin and blood circulation, while cyanosis occurs when oxygen saturation is low.

The sol-gel transition is a crucial process in the pharmaceutical industry, involving the formation of a gel by polymers and solvents. The critical gelling concentration depends on factors like polymer-polymer and solvent interactions, hydrophilic-lipophilic character, and molecular weight and flexibility. There are two thermal gel points associated with thermo reversible gels: setting point and melting point. Hydrophilic polymers in gel-forming substances have led to interest in developing therapeutic agents for various applications. Physical aging is a crucial factor in measuring gel properties, affecting microstructure and instabilities caused by non-equilibrium states. Rheological properties of gels are difficult to characterize due to attributes, sample history, and experimental conditions. Rigidity measures a gel's ability to resist deformation, with a minimum rigidity of 100 Pa for a 1 cm long sample.

II.NEEDS OF PRESENT INVESTIGATION:

His research aims to create an herbal gel without side effects and adverse reactions, derived from local medicinal plants. The gel provides essential nutrients for the skin and is derived from the genus Eucalyptus. The study aims to develop a safe and stable antibacterial gel, evaluate the gel's effectiveness, and develop a topical drug delivery system. Eucalyptus' antiseptic, anesthetic, anti-bacterial, and warming properties make it a valuable resource for treating burns, sores, ulcers, scrapes, boils, and wounds.

III.PLANS OF WORK:

Conduct literature survey, select herbal drug, formulate herbal gel, procure excipient, and perform evaluation tests for physical appearance, pH, color, odor, consistency, grittiness, homogeneity, clarity, skin irritancy, spreadability, viscosity, and UV Visible Spectroscopy.

IV.MATERIALS AND METHODS:

Eucalyptus oil, also known as Dinkum oil or Nilgiri, is a biological source from fresh Eucalyptus leaves, belonging to the Myrtaceae family. It has 80% cineole, pinene, camphene, phenelandrene, cittronellal, and geranyl acetate.

COMPOSITION FORMULA:

Table No.01: Composition Formula&Role of ingredient's

NAME OF INGREDIENTS	ROLE	QUANTITY TAKEN
Eucalyptus oil	Anti-bacterial	2ml
Carbopol 934	Gelling agent	5gm
Methyl paraben	Antimicrobial preservative	0.075gm
Propyl paraben	Antimicrobial preservative	0.015gm
Propylene glycol	Humectant, solvent, dispersing agent	5ml
Triethanolamine	PH &buffer adjusting agent	q.s
Distilled Water	vehical	50m

MEDICINAL USE OF EUCALYPTUS OIL:

Eucalyptus is used in various forms for various ailments, including internal and external relief. Its antiseptic, anesthetic, anti-bacterial, and warming properties make it a valuable resource for treating burns, sores, ulcers, scrapes, boils, and wounds. Topically, it relieves rheumatism, aching, pain, stiffness, and neuralgia. Eucalyptus oil can also help with allergies, headaches, and stress.

CONTRAINDICATIONS:

Eucalyptus is safe when used in moderation, but may be difficult to eliminate from the kidneys. It's best to avoid it for kidney or liver problems or pregnant women. Applying eucalyptus oil to the skin can be unsafe, potentially causing nervous system problems.

V.RESEARCH METHODOLOGY:

- Accurately weighed Carbopol 934 was taken in a beaker and dispersed in 50 ml of distilled water.
- Kept the beaker a side to swell the Carbopol for half an hour and then stirring should be done using mechanical/lab stirrer at 1200 rpm for 30 min.
- Take 5 ml of propylene glycol and required quantity of Extract that is Eucalyptus oil 2mL.
- Take 5 ml propylene glycol in another beaker and add weighed quantity of propyl paraben and methyl paraben, Eucalyptus oil to it and stirred properly.
- After all, Carbopol dispersed, 1gm extract and preservatives solutions were added with constant stirring.

Finally, volume made up to 100 ml by adding remaining distilled water and Triethanolamine was added drop wise to the formulations for adjustment of required skin pH (6.8-7) and to obtain the gel at required consistency.

VI.RESULTS AND DISCUSSION:

The formulation, containing eucalyptus oil and Carbopol 934 as gelling agent, is colorless, glossy, translucent, and has a good consistency. Its pH ranges from 5.7 to 6.0, making it suitable for topical application without discomfort. The spreadability test showed good viscosity with Carbopol content, and the skin irritation test showed the gel's safety.

Physical appearance:

Colour:

The Colour of the formulation was checked out against white background. No any different colour particle are shown.

Odour:

The odour of the gel was checked by mixing the gel in water and taking the smell camphor us scent that is sharp and highly pungent.

Consistency:

The consistency was checked by applying gel on skin. Smoothly and easily sprayed on skin.

Grittiness:

The formulation was evaluated microscopically under 40 x magnifications
there is no any presence of any particulate matter or aggregates.

Homogeneity:

Homogeneity was tested by visual inspection by naked eye after allowing them to
Set in a container they were evaluated for their appearance and presence of aggregates.
No aggregate is forme.

Clarity:

The clarity of various formulations was determined by visual inspection under white background there is no any particular matter.

Skin irritancy test:

This test was performed on 10 healthy human volunteers of either sex after obtaining consent for the same. About 0.5 gm. of gel was applied to an area of about 6cm on skin of hand covered with a gauze patch. The patch was held in contact with the skin for period of 1hr, the gauze was removed and residual test substance was scrapped, without altering the existing response or integrity of the epidermis. The skin was observed at 1 hr., 3hrs, 6hrs, and 12hrs.24hrs. 48hrs. and 72hrs.For any visible response on the skin. No any irritation can take place.

Measurement of pH:

The pH of developed gel formulations was determined using digital pH meter. 1 gm of gel was dissolved in 100 ml distilled water and kept aside for two hours. The measurement of pH of each formulation was done in triplicate and average values are calculated.

Table No.02: Measurement of PH

SR.NO.	OBSERVATION TIME	PH OBSERVED
1	After 12 hrs.	5.7
2	After 24 hrs.	6.0

Spreadability:

Spreadability of formulations was determined by an apparatus suggested by Multimer 45, which was fabricated itself in laboratory and used for slide fixed on wooded block and upper slide with one end tide to glass slide and other end tied with other end tied to weight pan. An excess of gel (2-5 gm.) was placed in between two glass slides and then 1000 gm. weight was placed on slides for 5 min to compress the sample to a uniform thickness, Weight (80 gm.) was added to pan. They show good spreadability.

Spreadability = m x l / t

Where,

m= weight tied to upper slide,

l= length of the glass slide (6cm)

t= time in seconds

TableNo.03: Spreadability

TEST	OBSERVATION
Spreadability	Easily spreadable

Viscosity:

The viscosity of prepared gel will be measured with Brookfield viscometer at a setting of 100 RPM at 25℃. viscosity is good.

Table No. 04 Viscosity Observation

SR. NO.	TRIALS	OBSERVATIONS
1	1 sttrial	1695 dyne/cm^2
2	2 nd trial	1633 dyne/cm^2
3	3 rd trial	1755 dyne/cm^2

UV VISIBLE SPECTROSCOPY:

Sample: - Eucalyptus oil gel formulation

Stock solution: -

Make a 1000micro gram/mL solution. Take 1gm of drug and dissolve in 100mL of water.
Stir continuously up to small particle dissolve, if any particle seen in solution filter out the solution.
After filtration take a solution in volumetric flask placed in sonicator bath for 10 min.

Reference Sample:

The formulation is soluble in distilled water is the reference sample

10 microgram/mL solution

Take 1mL solution into stock solution and volume make up to 10 mL
While identify UV rang of sample is
Wavelength- 210.50 nn
Absorbance – 0.445

20 microgram/mL solution

Take 2mL solution into stock solution and volume make up to 10mL
While identify UV rang of sample is
Wavelength- 211.10 nn
Absorbance – 0.764

VII. CONCLUSIONS:

The present study was done with formulation and evaluation of Anti-Bacterial gels from eucalyptus oil. The sample material used for the manufacturing of the formulations was from the eucalyptus plant is eucalyptus oil. Eucalyptus is medicinal as well as green leafy plant that belongs to family Myrtaceae. The main reason behind this investigation was to formulate a stable and safe Anti-Bacterial gel. Different evaluation test was performed to check the performance of gel. Such as physical appearance, Colour, odour, consistency, greasiness, grittiness, homogeneity, skin irritancy test, pH determination, Spreadability (SP) and viscosity. From the result of performed test we conclude that gel formulation from eucalyptus oil is safe to use.

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