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Formulation and Evaluation of *Cymbopogon citratus* Antiacne Peel Off Mask

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ABSTRACT

Acne disease affects the oil glands of the skin. The small pores in the skin connect to oil glands which make an oily substance called sebum. The pores connect to the glands by a canal called a follicle inside which the oil carries dead skin cells to the surface of the skin. When these follicles snag up, a pimple starts to develop, sometimes the sebum, hair, and skin cells clump gather into a plug. The swelling is caused by the growth of bacteria in the plug. Lemongrass (*Cymbopogon citratus*), is a member of the Poaceae family. It is a medicinal plant with compounds capable of controlling pathogens and increasing herbal resistance to pathogenic diseases. Lemongrass is widely used in herbal teas and other non-alcoholic beverages in baked food, and also in confections. Essential oil from lemongrass is commonly used as a fragrance in the perfumes and cosmetics, such as creams and soaps. Lemongrass essential oil comprises a vast amount of citral, which is used as a source for the fabrication of β carotene, vitamin A and more. Lemongrass oil has different uses in pharmaceutical industries due to the presence of various chemical constituents present in its analgesic, antipyretic, bactericidal, antiseptic, carminative, and astringent properties.

INTRODUCTION

Conventional medicine is praxis for many centuries by a prolific proportion of the population. It is perceived in some developing countries; plants are the main medicinal source to treat various infectious diseases. Approximately 20% of the plants are found in the world have been submitted to pharmacological and biological tests and a substantial number of new antibiotics introduced into the market are obtained by natural sources. According to WHO, medicinal plants would be the best source for obtaining a variety of drugs and can be of great significance in the treatment of various microbial infections. Lemongrass (*Cymbopogon citratus*) is a plant that belongs to the family Poaceae, a tall tufted perennial with long linear longitudinal leaves and short rhizomes cultivated throughout India for its aromatic oil. Macroscopically leaf bases are flexible, tough 8 to 12cm in length and 1 to 3cm in breadth, glabrous, longitudinally folded with parallel venations. The principle chemical components are citral, geraniol, and citronella which show antimicrobial activity. Hence oil extract of lemongrass can be used as an antimicrobial agent. Acne is a chronic inflammatory skin disease that affects the skin's sebaceous glands. One of the main causative factors of acne is the bacterial activity on the skin surface. Some skin microbiota is resistant or less sensitive towards several antibiotics, so to overcome this problem natural herbs are being used. Lemongrass is one of the natural herbs which act as an antibacterial agent due to the presence of citral. The peel-off face mask is one of the popular forms of topical applications used to enhance the quality of facial skin. The peel-off face mask is useful to recover and treat facial skin by incorporating antimicrobial agents like lemongrass oil. The peel-off mask has the advantage of being easily removed as an elastic membrane. With these considerations, this study was aimed at developing and testing a peel-off face mask from lemongrass oil extract, which possesses antibacterial activity as an alternative facial skin product.

AIM AND OBJECTIVE

The aim and objective of this project are to formulate and evaluate an anti-acne and skin whitening peel-off mask that exploits the pharmacological benefits of extracted Lemongrass oil. The rationale of this project works to bring together the physicochemical properties of a natural clay peel-off mask and use a naturally obtained oil that helps to combat various skin issues with the primary focus being acne. Face masks which are recommended for acne, pimple, blackheads usually control the over-discharge of sebum from sebaceous glands and remove the harmful bacteria and dead cells inside acne lesions. These clay peel-off masks are

recommended for oily skin types as they are generally drying in nature but our lemongrass oil-infused formulation doesn't have any such limitations as it leaves the skin sufficiently hydrated due to the emollient nature of the oil. The Lemongrass oil infused in the peel-off mask is free from any adulteration or dilution as it was extracted and characterized within the premises. The antimicrobial assay was performed to ascertain the antibacterial properties of Lemongrass oil. All the viscoelastic properties of the peel-off mask were determined.

PLAN OF WORK

To extract oil from Lemongrass (*Cymbopogann citratus*)

Lemongrass is extracted using Clavenger's apparatus.

Clevenger's apparatus used is an oil lighter than water since lemongrass is less dense than water (density of lemongrass = 0.88 g/ml).

The procedure for extraction was according to "Quality Standard of Indian Medicinal Plants", Volume X, 2012.

To carry out an Antimicrobial assay of extracted lemongrass oil

Dilutions with concentrations (20, 40, 60, 80,100µg/ml) of oil are made using DMSO as a solvent. These dilutions are tested against Bacterial strains *E. coli* and *S. aureus* using the Disk Plate method (Kirby-Bauer diffusion disc Method). The plates are incubated in BOD (biological oxygen demand) for 24 hrs. Zone of inhibition is measured and reported.

To formulate a Clay-based peel off mask

The lemongrass oil is incorporated into an argillaceous earth masks i.e clay mask. The procedure for the clay-based peel-off mask was referred from "Harry's Cosmeticology", Volume I. Due to the presence of lemongrass oil, the face mask refers to Antiacne along with bentonite which helps for soothing skin.

To evaluate clay-based peel off mask

The formulated peel-off mask is evaluated by carrying out the following test:

a) Peeling time

b) pH

c) Viscosity

d) Irritation test

e) Spreadability

EXPERIMENTAL WORK

Part I: Extraction of Lemongrass oil from Cymbopogon citratus

Method of Extraction: Extraction using Clavenger's Apparatus

Theory - Hydro-distillation is extensively used and it is a versatile method for the extraction of essential oils. The main feature of this method is that the material is immersed and is in direct contact with the boiling water. The essential oil along with steam is condensed through a condensation system and the oil floats on top are separated. The hydro distillation process is normally used for quantification of essential oils at laboratory level using Clevenger apparatus Electric mantle is used to heat the system, the long vertical glass tube and condenser are made up of glasses that require discreet handling. The peril involved in the process is that the still can run dry or be overheated, burning the aromatics and affecting the quality of essential oil.

Fig No. 1: Extraction of Lemongrass oil using Clavenger's Apparatus

•Fresh lemongrass was collected.

•Fresh and healthy lemongrass was selected and washed with tap water to remove the dust and dirt over its surface.

•After straining free water off the surface of the lemongrass stem. It has been refrigerated for one night and then the second day it was taken out from refrigerated and was shade dried under for about 60 minutes.

•The fan-dried stem was chopped into different sizes like 2.5cm, 2.0cm, 1.5cm, and 0.5cm with the help of a chopping board and knife.

•The chopped pieces were added in a 250ml round bottom flask and the apparatus was then used as per the density of the oil. Since lemongrass oil is lighter than water, the Clavengers apparatus for oils Lighter than water were used.

Part II: Antimicrobial Assay of extracted Lemongrass Oil

•Kirby-Bauer diffusion disc Method

Theory - In this well-known procedure, agar plates are inoculated with a standardized inoculum of the test microorganism. Then, filter paper discs (about 6 mm in diameter), containing the test compound at the desired concentration, are placed on the agar surface. The Petri dishes are incubated under suitable conditions. Generally, antimicrobial agent diffuses into the agar and inhibits germination and growth of the test microorganism and then the diameters of inhibition growth zones are measured.

•Petri plates, pipettes, beakers, and test tubes were sterilized using moist heat sterilization.

•Agar was prepared using 4g in 100ml which was also sterilized using MHS.

•The bacteria's (*E.coli* and *S.aureus*) to be inoculated was prepared using Mc Farlands method.

•The lemongrass oil was diluted using inert solvent DMSO in the following concentrations 20ppm, 40ppm, 60ppm, 80ppm, and 100ppm.

•After sterilization the respective bacteria were inoculated using the pour plate method.

•Discs of 6mm diameter were cut out and dipped in the dilutions and placed and the resulting Petri plates were incubated for 24 hours in BOD.

Part III: Formulation of Peel Off Mask Infused with Lemongrass oil

•Wet Gum Method

TABLE NO. 1: TABLE OF INGREDIENTS USED IN CLAY-BASED PEEL OFF MASK

Ingredients	Quantity	Roles
Bentonite	4%	Rheology Modifier
Xanthum Gum	1%	Thickener or Emulsifier
Talc	5%	Oil absorbent
Glycerine	2%	Humectant
Sodium Lauryl Sulphate	2%	Surfactant
Titanium Dioxide	1%	Opacifier
Buffer	Adjust between 5 and 8	Adjusting to pH
Lemongrass Oil	2%	Anti-Acne and Whitening
Water	q.s	Vehicle

Theory: In this method, the proportions of oil, water, and emulsifier are the same (4:2:1), but the order and approach of mixing are different. The one-part gum is triturated with two parts water to form a mucilage then the four parts oil is added slowly, in portions, while triturating.

FIGURE NO. 2: CLAY BASED PEEL OFF MASK

RESULT

I. Evaluation of Extracted Lemon Oil: Table No. 2

Test	Observation
1. Extracted Practical Yield	10ml
2. Colour&odour	Yellow color with a strong and stimulating pleasant odor
3. Solubility	Soluble in Dimethyl sulfoxide (DMSO)
4. Specific gravity	0.890 – 0.906 at 20°C
5. Anti-microbial Assay	Shows anti-bacterial activity against *E.coli* and *S.aureus*

II. Anti–Microbial Assay by Kirby Bauer Disc Diffusion Method: Table No. 3

The concentration of Lemongrass oil in (µg/ml)	Zone of Inhibition in *E. coli*	Zone of Inhibition in *S. aureus*
20	10 mm	10mm
40	15mm	19mm
60	25mm	28mm
80	34mm	37mm
100	39mm	47mm

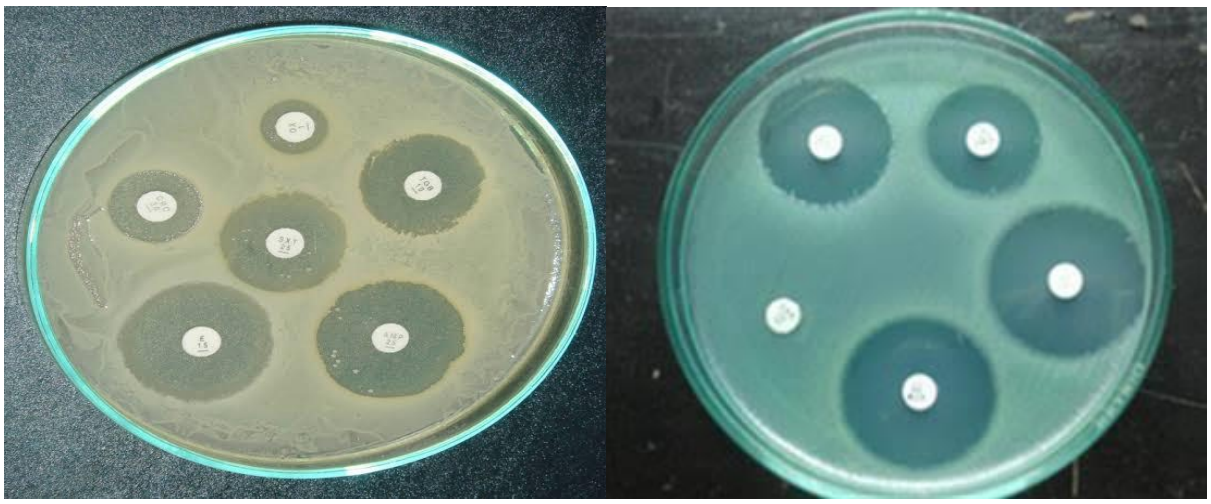

FIGURE NO. 3: ANTIBACTERIAL ACTIVITY IN *S. AUREUS* & *E. COLI* RESPECTIVELY

III. Evaluation of Peel-off Mask: Table No. 4

• Organoleptic: The consistency and the color were checked visually. The odor was evaluated manually by smelling the product.

• Viscosity: The viscosity of the formulation was checked using a Brookfield Viscometer.

• pH: 1% solution was prepared and checked.

• Spreadability: A small amount of the mask was applied on paper charts coated transparent glass given the particular load (1g, 2g, 5g) and then left to stand for 60 seconds. Then calculate the area given by the dosage is calculated.

• Irritation test: This parameter is analyzed with a patch test. Irritated skin at the patch site may suggest an allergy.

• Peeling time: A small amount of the mask was applied on the skin, left for few minutes and the time was noted until it formed a peel-off consistency mask.

Name of the test	Observation
1. Peeling Time	22 minutes
2. Viscosity	780cP
3. pH	6.0
4. Skin Irritation test	Non-Irritant
5. Spreadability test using 5g of load	24.38cm²

DISCUSSION

Lemongrass (*Cymbopogon citratus*), is a member of the Poaceae family. It is a medicinal plant with compounds capable of controlling pathogens and increasing herbal resistance to pathogenic diseases. Lemongrass is widely used in herbal teas and other non-alcoholic beverages in baked food, and also in confections. Essential oil from lemongrass is commonly used as a fragrance in the perfumes and cosmetics, such as creams and soaps. Lemongrass essential oil comprises a vast amount of citral, which is used as a source for the fabrication of β carotene, vitamin A and more. The aim and objective of this project are to formulate and evaluate an anti-acne and skin whitening peel-off mask that exploits the pharmacological benefits of extracted Lemongrass oil. The rationale of this project works to bring together the

physicochemical properties of a natural clay peel-off mask and use a naturally obtained oil that helps to combat various skin issues with the primary focus being acne. Lemongrass is extracted using Clavenger's apparatus.

The lemongrass oil is incorporated into an argillaceous earth masks i.e clay mask. The evaluation was done for antimicrobial activity against *S. aureus* and moderate activity on *E. coli.*

CONCLUSION

The extracted lemongrass oil showed good antimicrobial activity against *S. aureus* and moderate activity on *E. coli*. This antimicrobial assay was used to determine if the extracted Lemongrass oil showed appropriate antimicrobial activity which was suitable to be incorporated into an Anti-Acne Peel Off mask.

The Clay-based anti-acne peel-off mask when applied to the skin of four panelists showed a non-irritating and left a cooling effect.

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