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Research article

Formulation and evaluation of polyherbal topical gel for antiacne purpose

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ABSTRACT

The present work aimed to formulate and evaluate a polyherbal gel using Tulsi, Aloe vera, Neem for the treatment of acne, a disorder of the skin in which hair follicles and sebaceous glands are blocked, causing inflammation and redness of the skin. It has been used for skin benefits since ancient times.Tulsi, Aloe vera, Neem and formulated into a gel using Carbopol 940, triethanolamine, and propylene glycol as the gelling agent, viscosity modifier, and pH modifier, respectively. The gel was evaluated for its antimicrobial properties against Staphylococcus aureus, Escherichia coli, and Candida albicans. Antimicrobial agents, such as gentamycin and fluconazole, were used as the standards. The developed formulation showed promising zone of inhibition. The gel was further evaluated for its physicochemical properties. The formulation showed a promising effect on acne together with the additive effect of Aloe barbadensis on skin.

Keywords: Aloe Vera**,** Neem, Tulsi, Carbopol 940, Polyherbal gel, Acne.

INTRODUCTION

Since the beginning of time, humans have employed natural herbals in their life to treat Increased attention has been focused on the development of polyherbal formulations because of their cost effectiveness, Currently, there are numerous treatments available that employ topical, biological, and systemic medicines. Some of the medications assist in lessening the symptoms of diseases, but they also have some adverse effects. The development of a medication with high efficacy and few adverse effects is crucial in the interim. Herbal medications are safer and more effective in reducing symptoms than allopathic ones. Any plant that includes compounds with therapeutic properties or compounds that can be utilized as building plants against microbial infections [1]. Acne, a skin disorder, develops when dead skin cells clog hair follicles. Acne vulgaris, which is defined by the development of inflammatory and non-inflammatory lesions of hair follicles and sebaceous glands, affects approximately three-fourths of individuals in the age range of 11 to 25 [2]. Acne may be brought on by hormonal imbalance, environmental conditions, or a hereditary predisposition that result Gels are employed to ensure the best possible cutaneous and percutaneous medication delivery [3]. They can prevent gastrointestinal medicine-absorption issues brought on by acidic gastrointestinal conditions. Gels have the ability to prevent medication interactions with food and drink, as well as enzymatic activity. When the oral route is inappropriate, they may be used in place of oral administration of medicines. They can avoid the first to dispense some viscous oral suspensions, such as aluminum hydroxide gel [4].When compared to creams and ointments, topical administration of gels at pathological locations has significant advantages in terms of direct drug release and speedier absorption. In skin care products, single-phase gel is widely used. Organic macromolecules are uniformly Antibiotics and anti-inflammatory medications can be used orally or topically as part of current acne treatment. For mild and moderate acne, topical therapy is the first line of short-

season legumes. It contains a variety of chemical components that are renowned for their antioxidant, antibacterial, and anti-inflammatory properties, including flavonoids, phenolic acids, and organic acids. Aloe barbadensis is a crucial ingredient [5].

Materials and Methods

Plant material

The whole parts of different plants (Tulsi, Aloe Vera, and Neem) and roots were separately dried, powdered and then extracted to use for evaluation of various physicochemical, phytochemical and pharmaceutical parameters [6].

Chemical

Ethanol, Liquid Paraffin, Carbopol 940, Propylene Glycol, Methyl Paraben, Propyl Paraben, Trietanolamin.

Apparatus

Precision balance, Hot air oven, Soxhlet apparatus, pH meter, Laboratory stirred.

Extraction of Neem leaves

Collect fresh leaves from Neem plant .Wash them with distilled water. Allow the leaves for sun drying .Place them into hot air oven at 60°C for half hour for removing excess moisture .Make coarse powder of Neem leaves with the help of mortar and pestle. Make a Pocket of tissue paper and place 10 gm of Neem powder in it. Set soxhlet apparatus and put cotton plug at bottom of the extraction chamber then put pocket on the cotton plug in extraction chamber. Pour 150 ml ethanol through condenser with the help of funnel .The ratio of solute and solvent should be 1:15.Start soxhlet apparatus and keep temperature 70°c for 6 hour .Concentrate it up to 20%. Filter the extraction through muslin cloth and sealed in pre washed ampule [7].

Extraction of Tulsi leaves

Collect fresh leaves from Tulsi plant. Wash them with distilled water .Allow the leaves for sun drying .Place them into hot air oven at 60°C for half hour for removing excess moisture. Make coarse powder of Tulsi leaves with the help of mortar and pestle. Make a Pocket of tissue paper and place 10 gm of Tulsi powder in it. Set soxhlet apparatus and put cotton plug at bottom of the extraction chamber then put pocket on the cotton plug in extraction chamber. Pour 150 ml ethanol through condenser with the help of funnel .The ratio of solute and solvent should be 1:15.Start soxhlet apparatus and keep temperature 70°c for 6 hour.Concentrate it upto 50 %. Filter the extraction through muslin cloth and sealed in pre washed ampule [8].

Figure 1: Extraction of Neem and Tulsi leaves

Extraction of Aloe-Vera

Collect fresh and thick Aloe Vera leaves wash them with distilled water. Dry leaves in hot air oven for 30 minute at 60°c.Remove upper part with sterile knife remove gel with the help of sterile knife .filter the gel through muslin cloth and sealed in air tight container.

Excipients used

Collection of excipients i.e. Carbopol 940, propylene glycol, methyl paraben, propyl paraben, Trietanolamin from the laboratory of college [20].

Gelling Agent

Gelling agent generally used are synthetic macromolecules such as carbomers (Carbopol 940). Carbopol having high molecular weight water soluble agent.

Batches Formulation of Gel Base

Take 50 ml of water in beaker. Add 0.2 gm of methyl paraben and 0.2 ml of propyl paraben. Dissolve it by stirring. Dispersed 1 gm of Carbopol uniformly with continuous siring. Allow the mixture for socling overnight. Add 0.2 ml of propylene glycol. And stir with the help of laboratory stirrer. Then adjust the pH “between” (6.5) with help of Trietanolamin [9].

Formulation of Polyherbal Gel

Take 50 ml of water in beaker. Add 0.2 gm of methyl paraben and 0.2 ml of propyl paraben. Dissolve it by stirring. Dispersed 1 gm of Carbopol uniformly with continuous siring. Allow the mixture for soaking overnight. Add 0.2 ml of propylene glycol. And stir with the help of laboratory stirrer. Add 0.1, 0.3, 0.5, and 0.7, 0.9 ml of Neem and Tulsi extract in F1, F2, F3, F4, and F5 beaker respectively. And then dispersed 0.5, 1, 1.5, 2, and 2.5, 3 ml of Aloe Vera gel into F1, F2, F3, F4, and F5 beaker respectively.

Figure 2: Polyherbal Gel Batches with Different Concentration 6.15.evaluation of polyherbal topical gel

RESEULT AND DISCUSSION

Physical Appearance

The prepared polyherbal gel formulation were inspected visually for their colour, homogeneity, consistency.

Result - Off white yellowish

pH

Dissolved 1 gm of gel in 10 ml of water ,start pH meter ,click on the pH button then enter AgCl electrode into the solution and click on enter button. After the waiting of 10 to 12 sec pH meter will show pH on the screen then put out the electrode and click on abort button and so on.

Result - 5.66 at 25.6^{o}C temperature

Viscosity

1.0 gram of gel was added in 30 ml of water. Choose RV because our sample is medium viscous, and check the viscosity. The measurement of viscosity of prepares gels were carried out with Brookfield with DVNext software.

Result – 0.36 poise

Spreadability

Spreadability was determined by glass slides and a wooden block, which was provided by a pulley at one end. By this method, Spreadability was measured on the basis of Slip and Drag characteristics of gels. A ground glass slide was fixed on this block. Approx. 1.0 gram gel of different formulations were placed on the ground slide. The gel was then sandwiched between this slide and another glass slide having the dimension of fixed ground slide. Excess of the gel was scrapped off from the edges. The top plate was then subjected to pull of 20 grams, lesser the time taken for separation of two slides better the Spreadability.

Spreadability was then calculated using the following formula.

$$S = M \times L / T \ldots.$$

Where,

S = is the Spreadability

M = is the weight in the pan (tied to the upper slide), L = is the length moved by the glass slide

T = represents the time taken to separate the slide completely from each other.

Result –

Spreading of 1.0 gram of the gel on a circle of 6 cm diameter pre-marked on a glass plate and then a second glass plate was employed. 20 kilogram of weight was permitted to rest on the upper glass plate for 5 min

S = 1.0 Gram x 6 c.m. / 5 minutes

S = 1.2

Excludability

The apparatus used to measure it is Excrudability apparatus a closed collapsible tube containing formulation was pressed firmly at the crimped end by keeping weight. When the cap was removed, formulation extruded until the pressure dissipated. Weight in gram require to exclude a 0.5 cm ribbon of the formulation in 10 sec was determined.

The experiments were repeated trice and the average value is reported [10].

Result – 0.59 cm ribbon found as average value.

Stability test

Stability of the gel formulation were studied at different storage condition (80C and 400C) Samples were withdrawn at 7, 15 and 30 days and checked for their physical characteristics like appearance, homogeneity, pH, viscosity and Spreadability [11-12].

Time (Days)	7	15	30
Physical Appearance	Off white yellowish	Off white yellowish	Off white yellowish
pH	5.60	5.76	5.91
Viscosity	0.33 poise	0.37 poise	0.39 poise
Spreadability	1.3	1.4	1.2
Excludability	0.62 cm	0.58 cm	0.63 cm

CONCLUSION

The development of polyherbal formulations has drawn increasing attention due to its historical roots, economic viability, and patient compliance. The preliminary assessment and antimicrobial study of Neem, Tulsi and Aloe Vera demonstrated a strong antimicrobial effect of the extract against acne infection. Gels are becoming more and more popular. Compared to other semisolid preparations, including ointments, creams, pastes, etc., they can give controlled release and are more stable. Making gels can result in improved absorption, which increases medicinal drugs' bioavailability. Gels' long-term stability features open up possibilities for their beneficial application to patients. Gels are simple to make, but extensive drug and excipient modification is required to produce a stable, effective, and secure product. The polyherbal gel formulated in this study indicates that it might be a good gel for topical application that has the additive effects of Aloe barbadensis. Additionally, the exact mechanism of action of the gel on the skin can be explored through extensive pharmacological tools at the molecular level so that it would be an effective way to use in a rational way.

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