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Formulation and Evaluation of Herbal Gel Containing Extract of Coat buttons and Cucumber

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Abstract

To develop and evaluate Herbal gel using leaf extracts from Cucumber (Cucumis sativus) and Coat buttons (Tridax procumbens). The formulation is to maximize the potential synergistic effects of these botanical extracts, which are well-known for their therapeutic and cosmetic benefits. Physical properties like pH, viscosity, spreadability, and stability were assessed after different extract concentrations were added to gel bases. To ascertain the gels' anti-inflammatory, antimicrobial, and antioxidant properties, in vitro tests were also conducted on them. The outcomes showed that in addition to having good physical characteristics, the herbal gel formulations had strong antioxidant and antibacterial properties. Moreover, the gels' potential to reduce inflammation implies that they could find a bright future in skincare products. The potential of Coat Buttons is highlighted by this study. This work opens the door for more research into natural medicines and cosmetics by highlighting the potential of cucumber leaf extracts and coat buttons as useful components in herbal gel formulations for skincare.

Keywords - Tridax procumbens, leaf extracts, Carbapol 940, Gel.

INTRODUCTION

The natural origins and possible therapeutic benefits, herbal gels have attracted a lot of attention recently. The botanicals coat buttons (*Tridax procumbens*) and cucumber (*Cucumis sativus*) are well-known for their anti-inflammatory, antioxidant, and skin-soothing qualities. There is a chance to create a unique herbal product with potential dermatological uses by incorporating their leaf extracts into a gel formulation. Because of its antimicrobial and anti-inflammatory qualities, coat buttons, a common weed in tropical areas, have long been used for treating skin conditions, insect bites, and wound healing. Conversely, cucumber is a common component in skincare products due to its well-known cooling and hydrating properties for the skin. Within this research with the help of extracts from coat buttons and cucumber leaves, we hope to create herbal gel and assess its stability, physicochemical characteristics, and potential uses in dermatology [1] The potential for creating a safe and natural skincare product will be determined by examining the synergistic effects of these botanical extracts on skin health and their compatibility within a gel matrix. The results of this study may help create topical herbal formulations that will meet the market's increasing need for sustainable and natural skincare

products. Furthermore, knowing how herbal gels with coat buttons and cucumber extracts are made and evaluated may open up new avenues for researching the use of botanical ingredients in skincare products Herbal medicines help manage wounds by cleaning, debridement, and creating a moist environment that promotes the creation of an environment that is ideal for the body's own healing process. One of the most active fields of study worldwide is the study of medicinal plants. One of the most crucial aspects of wound care is topical antibiotic therapy. Medicinal plants have been widely and very successfully employed in folk medicine to promote wound healing. This has spurred numerous studies aimed at confirming the assertions and identifying the mechanisms that might account for these herbs' potential benefits for wound healing and infection prevention [2,3]

Material and Methods

Tridax Procumben

Advantages of Tridax procumbns

Anti-inflammatory Properties, Antimicrobial Activity, Wound Healing, Antioxidant Effects Diuretic Properties,Antidiabetic Potential, Antiulcer Activity, Anti-cancer Properties, Environmental Benefits[4]

Disadvantages of Tridax procumbens

One disadvantage of Tridax procumbens, also known as coatbuttons or tridax daisy, is that it can be invasive in certain ecosystems, outcompeting native plants and disrupting biodiversity. Additionally, some people may experience allergic reactions to its pollen. [5,6]

Cucumber

Cucumber advantages

Cucumber offers several advantages for skincare

Hydration, Soothing and Cooling, Antioxidant Protection, Anti-Inflammatory, Skin Brightening, Oil Control, Gentle Exfoliation, Anti-Aging, Natural Skin Care, Refreshment.[7]

Disadvantages of cucumber

One disadvantage of cucumbers is that they are susceptible to certain pests and diseases, such as cucumber beetles, aphids, and powdery mildew, which can affect their growth and yield if not properly managed. Additionally, cucumbers require consistent watering and can be sensitive to drought, which may affect their productivity in dry climate.[8]

Procedure

Preparation of Plant Extract

Fresh Tridex procumbens leaves were gathered and then shade-dried. Plant materials were dried, ground into a coarse powder, and stored in airtight containers.

Used a Soxhlet apparatus to extract approximately 100g of powdered plant leaf at a temperature between 45 and 550C.

When not in use, the collected extracts were placed in a vacuum dryer and concentrated using a rotary evaporator.

Cucumbers were thinly sliced, cleaned, and peeled correctly in order to prepare the cucumber extract. After the material was chopped, it was ground into a slurry in a grinder, and the resulting slurry was run through muslin cloth to extract the cucumber juice A temperature was then used to freeze-dried extract. The extracts were stored by keeping in refrigerator till further use.[9]

Formulation of Placebo Gel

The first step in making the gel formulation is to take Carbopol 940, which is then dissolved overnight in distilled water (methyl and propyl paraben) and glycerine, and add it to a polymer dispersion.

The remaining water was then added, and triethanolamine was added while continuously stirring for ten minutes to bring the pH down to 7.[10]

The control batch's placebo gel formulation was chosen based on assessment criteria like spreadability, pH, viscosity, and appearance.

Development of Formulation

The first step in making the gel formulation is to take Carbopol 940, which is then dissolved overnight in distilled water (methyl and propyl paraben) and glycerine.

Take Tridax procumbens extract in propylene glycol, and add it to a polymer dispersion. After that, the remaining water was added, and for ten minutes, continuous stirring was used to neutralize the pH 7 with triethanolamine [11].

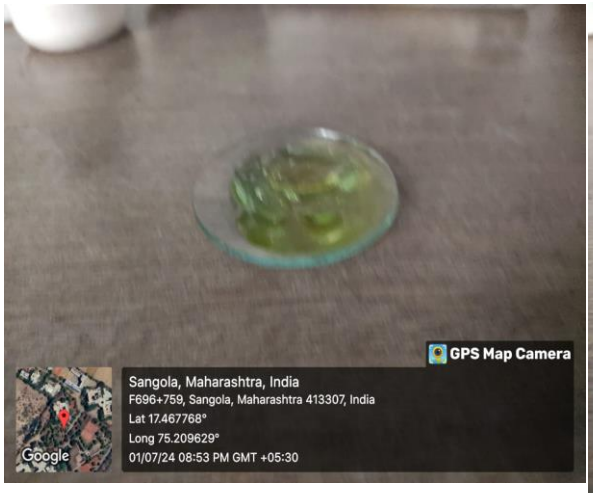

Figure1*: *Formation of placebo

Figure 2*: *Formation of gel

Ingredients	Placebo batch
Carbopol 940	1.0gm
Propylene glycol	10.0ml
Methyl paraben	0.2ml
Propylparaben	0
Glycerine	1.0ml
Triethanolamine	Q. S.
Water	100ml

Table 1*: *Placebo batch

Ingredients	F1	F2	F3	F4
Carbopol 940	0.20gm	0.40gm	0.80gm	1.0gn
Propylene glycol	1.0gm	1.0gm	1.0gm	1.0gm
Methyl paraben	10.0gm	10.0ml	10.0ml	10.0ml
Propylparaben	0.2ml	0.2ml	0.2ml	0.2ml
Glycerine	0.1ml	0.1ml	0.1ml	0.1ml
Triethanolamine	1.0ml	1.0ml	1.0ml	1.0ml
To maintain (Ph)	Q. S	Q. S	Q. S	Q. S
Water	100ml	100ml	100ml	100ml

***Table 2*:** *Formulation table*

Evaluation Test

Homogeneity

Every gel that had developed was checked for homogeneity after it had been put inside the container and visually inspected for appearance and the presence of aggregates [12]

pH

A digital pH meter was used to measure the pH of several gel formulations. Two hours were spent storing 2.5g of meticulously weighed gel that had been diluted in twenty-five ml of distilled water. The average values of the triplicate pH measurements are shown for each formulation. Using a pH meter, the dispersions' pH was determined [13]

Spreadability

The device, which is a wooden block with a pulley at one end, was used to measure spreadability. The slip and drag characteristics of the gels were used in this method to calculate spreadability.[14] On this ground slide, an excess of gel (roughly two g) was being investigated. Subsequently, the gel was positioned between this glass slide and another with a hook that was the same size as a fixed ground slide. To create an even layer of gel between the slides and release any trapped air, a one kg weight was placed on top of each slide for five minutes. I removed the excess gel by scraping it off the edges. After that, a fifty-gram pull was applied to the top plate. Time how long (in seconds) it takes for the top slide to move 6.5 cm by using a piece of string that is fastened to the hook. Better dispersion is indicated by a shorter gap. With the following formula, spreadability was determined [15]

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

Where, S = Spreadability,

M = Pan weight (connected to the upper slide), L = length that the glass slide moved, and

T = The amount of time, measured seconds, needed to fully separate each slide

Viscosity

Using a Brookfield rotational viscometer with spindle number 64, the viscosity of the herbal gel was measured at 5, 10, 20, 30, and 50 rpm. Following the sample's two-minute equilibrium, each reading was obtained. Three attempts were made to determine the samples' viscosity [16,17]

Irritation

A small patch of skin is usually used to test a gel's irritation by applying it there and keeping an eye out for any negative side effects, like redness, itching, or inflammation. Accurate results and safety are ensured by adhering to the correct protocols and guidelines when conducting such tests.[18]

RESULT

Colour and Appearance

Characterization of the polymer Colour and appearance: The polymer's colour and appearance are as indicated in Table 3 below, which has been verified.

Test	Result
Colour	White
Appearance	Powder

Table 3*: Colour *and Appearance

Evaluation of the Formulation for Topical Gel Examining the body Colour and appearance were examined as physical characteristics.

Sr. No.	Batch	Colour	Appearance
1	F1	Light green	Green
2	F2	Light green	Green
3	F3	Green	Green
4	F4	Dark green	Green

Table 4*: *Physical parameters such as colour and appearance

Homogeneity

After the gels were placed in the container, all developed gels were examined visually to ensure homogeneity

Sr.no	Batch	Homogeneity
1	F1	Homogeneity
2	F2	Homogeneity
3	F3	Homogeneity
4	F4	Homogeneity

Table 5*: *Homogeneity

pH

Many gel formulations had their pH values determined using a digital pH meter. We weighed out 2.5g of gel and diluted it in 25ml of distilled water. We then stored it for two hours. Phosphorus was measured three times for each formulation;

Sr. No.	Batch	pH
1	F1	6.7
2	F2	6.8
3	F3	7.1
4	F4	6.9

Table 6*: *pH

Spreadability

After sandwiching the formulation between two glass slides and applying a 100g weight to the upper glass slide for five minutes, the formulation was compressed to a consistent thickness. There were 50 grams of weight in the pan. The time it took to separate the two slides was used to calculate spreadability

Sr.no	Batch	Spreadability
1	F1	16
2	F2	15
3	F3	15
4	F4	14

Table 7*: *Spreadability

Viscosity

The Brookfield rotational viscometer was used to measure the viscosity of the gel at 5, 10, 20 30, and 50 rpm. Following the sample's two-minute equilibrium, each reading was obtained. There were three iterations of the samples

RPM	CP
5	45000
10	32162
20	19561
30	7896
50	4822

Table 8*: *Viscosity

Irritation Test

Testing the irritation of a gel typically involves applying it to a small patch of skin and monitoring for any adverse reactions.

Sr. No.	Formulation	Irritation test
1	F1	Non-irritating
2	F2	Non-irritating
3	F3	Non-irritating
4	F4	Non-irritating

Table 9*: *Irritation

DISCUSSION

Using Tridax Procumbens and cucumber, aloe vera, we create three distinct for polyherbal Gel that are then teste. The three formulations were compared and found to be safe for usage based on the evaluation test. The formulation F3 is more stable than the others, according to the evaluation test.

CONCLUSION

The formulation and evaluation of the herbal gel containing extracts of coat buttons and cucumber show promising potential for skincare applications due to their combined beneficial properties, such as soothing, moisturizing, and antioxidant effects.

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