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Research Article

Formulation and Evaluation of Herbal Face Gel Using Cucumber Fruit Extract

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ABSTRACT

To develop and evaluate Herbal gel using fruit extracts from Cucumber (Cucumis sativus L.) 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 product.

INTRODUCTION

Cucumber, which is called Cucumis sativus L., is part of the Cucurbitaceae family and is an important fruit vegetable in the economy.There are three wild or semi-wild types of cucumber:- C. sativus L. var. Hardwick, C. Clover L. var Sikkimensis, and C. sativus L. var. Xishuangbanna. Cucumbers are originally from India and are believed to have come from the foothills of the Himalayas [1,2]. Since a long time ago, people have known that cucumbers have anti-inflammatory properties. Because of this, cucumbers and their extracts are used on the skin to help with various skin issues like sunburns and the puffiness under the eyes [3].Numerous studies have reported on the anti-inflammatory properties of cucumber aqueous extracts, but the active ingredients have not been identified.[4,5] A recent study found that an amino acid fraction reduced the amount of inflammation induced by angiotensin II in human endothelial cells.

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Fig no.1. fruit & extract of cucumber Sativus



Fig.no.2. Flower of cucumber Sativus

Scientific classification of Cucumber :-

1. **Botanical Name**: Cucumis sativus Linn.
2. **Order**: Cucurbitales
3. **Local Name:** Hindi- Khir
4. **Family:** Cucurbitaceae
5. **Kingdome**: Planate
6. **Subfamily:** Cucurbitaceae
7. **Division:** Angiosperms
8. **Genus:** Cucumis
9. **Class**: Eudicots
10. **Species:** C. sativus

Gel :-

A gel is a system comprising at least two parts that is solid or semisolid and is made up of a condensed mass that is surrounded and permeated by a liquid. The epidermal structure that gives gel and jelly their solid-like qualities is one of their distinguishing features. Even though gels and jellies are made up of a tiny number of solids distributed throughout a big volume of liquid, they behave more like solids than like liquids[6].

Ideal properties of gel :-

1. The gel should be translucent and homogeneous.
2. The gel should shatter easily in the event that shear or force is applied when the container is shaking.
3. The composition of the gel need to be inert.
4. The gel can't have any stickiness.
5. The gel must never come into contact with any other formulation ingredient.
6. The gel has to be trustworthy.

MATERIALS AND METHODS :

Materials:

Cucumis sativus L :

Cucumber advantage:- Provides several benefits for skincare:

1. It helps keep the skin hydrated, soothes and cools the skin, offers antioxidant protection, reduces inflammation, brightens the skin, controls oil production, gently exfoliates, fights signs of aging, offers natural skincare benefits, and gives a refreshing feel. [7]

Cucumber disadvantage:-

1. It is that they are prone to certain pests and diseases, such as cucumber beetles, aphids, and powdery mildew, which can harm their growth and reduce yield if not properly managed. Additionally, cucumbers need regular watering and can be affected by

drought, which may lower their productivity in dry climates. [8]

Cucumis sativus L extract was collected:

The plant materials were authenticated at the P.G. Department of botany and research centre, MSG arts, science and commerce college, Malegaon camp, Nasik by Dr. Atul N. Wagh. The carbopol, glycerine, triethanolamine, benzyl alcohol, orange oil and deionized water were obtained from the Department of Pharmaceutics, SVS IOP

Methods:

Preparation of cucumber extract:

1) Pick out fresh cucumber fruits, wash them well, and then rinse them with purified water.
2) After cleaning your workspace and equipment, chop the cucumber into thin slices.
3) Put 120g of the sliced cucumber into a 500ml beaker that has been cleaned and sterilized.
4) Add 200ml of deionized water, 1 gram of methyl paraben, and 5ml of glycerine to the cucumber mixture.
5) Keep the beaker sealed tightly for five days. Shake the mixture for a few seconds at least once each day.
6) After five days, use a clean cotton cloth to filter the extract.Then transfer the cucumber extract to a clean container.[9]



Fig.No.04: 1st day



Fig.No.05: After 5 days

Formulation of gel :-

1) 2.5 grams of fruit extract from Cucumis sativus L. was mixed with 0.25 grams of carbopol and 25 milliliters of deionized water.
2) Then,0.38 grams of glycerin and 0.25 grams of The Benzyl alcohol, 0.35 grams of triethanolamine, and two to three drops of orange oil were added and mixed together.
3) The rest of the deionized water was then added to bring the total volume up to 25 ml, which helped achieve the right consistency for the gel.
4) The gel was placed in a container and stored away from direct sunlight.



Fig . No.06: Formulation of gel

Table 1 : gel base formulation (2.5%)

Name of the ingredient	Quantity Batch A	Quantity Batch B	Quantity Batch C	Quantity Batch D	Properties of Ingredients
Cucumis sativus extract	3.0	2.0	2.5	2.0	Anti-inflammatory (API)
Carbopol	0.20	0.25	0.25	0.25	Gelling agent
Glycerin	0.38	0.40	0.38	0.43	Humectant
Triethanolamine	0.34	0.35	0.35	0.35	Ph adjusting agent
Benzyl alcohol	0.24	0.25	0.25	0.25	preservative
Orange oil	1-2 drops	1-2 drops	2-3 drops	2-3 drops	Fragrance
Deionized water	Qs to 25	Qs to 25	Qs to 25	Qs to 25	Vehicle

Evaluation Test :-

1. Organoleptic evaluations

The gel thus obtained was evaluated for itsorganoleptic properties like colour, odour, and taste. The appearance of the gel was judged by itscolour and roughness and graded. Results arelisted in Table2

2. 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 pHmeter, the dispersions' pH was determined [10]

A pH paper was use to measure the pH of gel formulations. Green coloured indicates the neutrals pH between 6 to 7.

3. 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[11]

4. Spreadability

It illustrates how rapidly the gel spreads across the skin or affected area after application. The degree to which a detail is well-known also affects its utility. Spreadability is defined as the amount of time, under a specific stress, it takes for two slides to separate from the gel that is sandwiched between them. It is possible to achieve better spreadability by separating two slides in less time. 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 [12,13]

5. Grittiness

In the unlikely event that no visible particulate matter was observed with a light magnifying lens, the four definitions were analysed extremely closely to determine whether particles existed. The gel arrangement clearly satisfies the requirements for any effective preparation, including the necessity for independence from specific materials and from coarseness[14].

6 . 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.[15]

7. 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]

8. Accelerated stability studies

All of the formulations underwent accelerated stability experiments, which involved constant time intervals of 20 days at room temperature. Parameters including homogeneity, viscosity, physical changes, pH, and smear type.[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.were examined during the stability studies20.

Table 2: Colour and Appearance

Test	Result
Colour	White
Appearance	Powder

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

Table 3: Physical parameters such as colour and appearance

Sr.No	Batch	Colour	Appearance
1	A	Transparent	Transparent
2	B	Transparent	Transparent
3	C	Transparent	Transparent
4	D	Transparent	Transparent

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.

Table 4: pH

Sr.No	Batch	pH
1	A	6.5
2	B	6.7
3	C	6.9
4	D	7.1

Homogeneity

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

Table 5: Homogeneity

Sr. No	Batch	Homogeneity
1	A	Homogeneity
2	B	Homogeneity
3	C	Homogeneity
4	D	Homogeneity

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.

Table 6: Spreadability

Sr. No	Batch	Spreadability
1	A	15
2	B	15
3	C	14
4	D	14

Grittiness

In the unlikely event that no visible particulate matter was observed with a light magnifying lens, the four definitions were analysed extremely closely to determine whether.

Table 7: Grittiness

Sr.No	Batch	Grittiness
1	A	Non- gritty
2	B	Non- gritty
3	C	Non- gritty
4	D	Non- gritty

Irritation test

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

Table 8: Irritation

Sr No	Batch	Irritation test
1	A	Non-irritating
2	B	Non-irritating
3	C	Non-irritating
4	D	Non-irritating

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.

Table 9: Viscosity

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

DISSCUTION:

The current work was completed on the formulation and assessment of the herbal gel. Anumber of factors are taken into consideration when evaluating gel, including its colour, consistency, pH, Spreadability, grittiness, stability, homogeneity, and skin irritancy test results. The study also found the prepared herbal gel included every necessary component of a gel composition intended for topical use. The goal of the current study was to produce a cucumber face gel. There was good spreadability in the produced mixture. The gel had an excellent PH. During storage, gel does not exhibit any kind of pH separation. The gel had a non-grassy texture and was simple to remove once applied. The composition did not cause irritation or damage to the skin.



Fig.No.07: Before Application of Gel



Fig.No.08: After Application of Gel

CONCLUSION

The formulation and evaluation of the herbal gel containing food extract of Cucumis sativus in the carbapol gel system , show promising potential for skincare applications due to their combined beneficial properties, such as soothing, moisturizing, and antioxidant effects.

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