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Formulation and Evaluation of Herbal Gel Using Guava Leaves in Mouth Ulcer Treatment

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ABSTRACT-

Mouth ulcers are frequently painful sores that The formulation techniques, phytochemical characteristics, pharmacological actions and assessment criteria of guava leaf herbal gels for the treatment of oral ulcers are covered in this paper.The purpose of this study was to create and assess a herbal mouth ulcer gel utilising powdered Psidium guajava L (guava) leaves in various doses.Herbal gel is made using Carbopol 934 and propylene glycol as a gel base.For four weeks, formulations were kept at 8, 25, and 40°C to test their stability.pH, phase separation, colour, centrifugation, and liquefaction.Infrared spectroscopy revealed no interaction between powdered guava leaves and polymer.The gel had a pH range of 6 to 7 and was transparent and uniform.The parameters of viscosity, spreadability, and extrudability fall within the range that illustrates the formulations' rheological behaviour.High efficacy against Aspergillus niger and Candida albicans was demonstrated by antimicrobial studies of formulations.Experimental data from in vitro research indicates that powdered guava leaves have a significant antioxidant impact.

Keywords -Guava leaves powder, Aqueous Gel, Mouth ulceCarbopol934, Candida albicans

INTRODUCTION-

Oral ulcer Oral/mouth ulcers are painful lesions that can be either canker or open sores. Mouth ulcers can form on the lips, gums, inner cheek, and palate. The mucosal membrane, the delicate tissue lining the mouth, can be lost or eroded, resulting in a mouth ulcer. Remember that mouth sores are not the same as cold sores, which are caused by a virus that appears on the lips. The most common types of mouth sores are canker sores, cold sores, candidiasis or thrush (a fungal infection), and leukoplakia .In mouth ulcers, some of the delicate tissue lining the inside of the mouth erodes or disappears. Mouth ulcers are frequently caused by biting the inside of the jaw, food sensitivities, cleaning hard teeth, hormonal fluctuations, vitamin deficiencies, bacterial infections, and illnesses. The current study examines the use of powdered herbal guava leaves in medicinal gel to treat oral ulcers. One species of Psidium guava, a medicinal plant in the Myrtaceae family, is Psidium guajava L. Many indigenous medical systems make use of P. guajava, a well-known native medicinal plant.It is abundantly accessible throughout India. Guava contains a variety of phytochemicals, including polysaccharides, vitamins, essential oils, minerals, proteins, sesquiterpenoid alcohols, triterpenoid acids, alkaloids, glycosides, hormones, flavonoids, tannins, and saponins. Psidium guajava Linn, or guava, is rich in vitamins, antioxidants, including lutein, zeaxanthine, and lycopene.Guavas are rich in phenols, triterpenes, carotenoids, lectins, fibre, fatty acids, anthraquinones, quercetin, phlobatannins, and cardiac glycosides. Potassium, copper, manganese, vitamins A and C, folic acid, dietary fibre, and other nutrients are all abundant in guavas.A single common guava (P. guajava) fruit boasts a comprehensive, lowcalorie profile of vital elements and almost four times as much vitamin C as an orange. The use of eco-friendly and bio-friendly plant ased products for the treatment and prevention of various ailments has received a lot of attention lately, and it has been shown that the majority of people on the planet utilise traditional medicine. Numerous plants with therapeutic qualities can be found in India. It is possible to find effective alternatives to manufactured medications by using medicinal herbs. Globally, the use of medicinal plant-based medicine is becoming more and more common.

Nearly half of the world's supply of 25 bestselling pharmaceutical innovation compounds is made from natural substances.The increased incidence of oral diseases, especially in developing nations, the increased resistance of pathogenic bacteria to currently used chemotherapeutics and antibiotics, opportunistic infections in immunocompromised individuals, and financial concerns in developing nations all contribute to the significant need for safe, affordable, and effective alternative treatment, products, and prevention options.Additionally, allopathic therapy is too expensive and resourceintensive for a developing nation like India, and its effectiveness in treating and preventing oral and periodontal disorders is limited.Additionally, allopathic therapy is too expensive and resourceintensive for a developing nation like India, and its effectiveness in treating and preventing oral and periodontal disorders is li

mited.Because of this, plant extracts used in alternative and mainstream medicine are still seen as good substitutes for prescription and organic medications.The usage of herbal guava leaves in a prescription gel to treat mouth ulcers is examined in the current stu dy.

Plant profile-

Other names for Psidium Guajava include Peru, Amrood, and Guava.It belongs to the Myrtaceae family of therapeutic herbs.Guav a leaves are three to five centimetres by seven to fifteen centimetres.Diabetes mellitus, rheumatism, diarrhoea, sore throats, and co ughs are just a few of the ailments it is used to treat.Strong antifungal and antibacterial qualities are also present.Psidium Guajava leaves contain tannins, triterpenes, flavonoids, quercetin, pentacycline, triterpenoids, gujanoic acid, saponins, carotenoids, lectin, e llugic acid, sitosterol, and oleanolic .

Pharmacological Activity-

1.Medicinal Properties: Tannins, flavonoids, phenolic compounds, and essential oils are among the many bioactive substances fo und in guava leaves that contribute to their therapeutic benefits.These substances have antibacterial, antiinflammatory, analgesic, a nd wound-healing qualities.

2. Antimicrobial Activity: A variety of microorganisms, such as bacteria, fungi, and parasites, have been shown to be significantl y inhibited by guava leaf extract.

3.Antiinflammatory Effects: Guava leaf compounds have strong antiinflammatory qualities that can lessen swelling and inflamm ation under a variety of circumstances.Because of this, guava leaf extract is useful for reducing inflammation in tissues, such as th ose impacted by oral infections and mouth ulcers.

4. Antioxidant Activity: Guava leaves' antioxidant components guard against oxidative stress and dangerous free radicals, preven ting cell damage and promoting general health.The antiaging and diseaseprevention properties of guava leaf extract are partly attri buted to this antioxidnt activity.

Material and method-

1.Drug-Leaf extracts of Psidium guajava

2.Chemicals-

- Carbopol 934 (gelling agent)
- Methyl Paraben (preservatives)
- Propyl Paraben (preservatives)
- Triethanolamine (for adjust pH)
- Peppermint oil (Analgesic, Antimicrobial)
- Ethanol (Solvent)
- Distilled Water

3.Apparatus-

PH digital meter

Measuring cylinder

Heating mantle

Beaker

Stirrer

Preparation of extracts of Psidium guajava leaves

Step 1: Gathering and getting ready for leaves

1. Gather fresh, healthy guava leaves.

2. Thoroughly wash with distilled water to get rid of contaminants and grime.

3. For seven to ten days, dry the leaves in the shade.

4. Use a grinder to coarsely ground the dried leaves.

5. Keep the powder in a container that is airtight.

Step 2: The Maceration Procedure

1. Accurately weigh 20 grams of guava leaf powder.

2. Move the powder into an airtight glass container or a clean, dry conical flask.

3. Pour 200 ml of 70% ethanol into the container.

4. Properly seal the container to stop the solvent from evaporating.

5. Let the mixture sit at room temperature for 72 hours.

6. To enhance extraction, shake or agitate the mixture two to three times every day.

Filtration in Step Three

1. First, filter the mixture with muslin cloth after 72 hours

2. To get a clear filtrate, use Whatman filter paper for additional filtering.

Step 4: Concentrating the Extract

1.Place the filtrate in a beaker.

2. Use a water bath to evaporate the solvent at a temperature lower than 50°C.

3. Until a thick, semisolid extract is produced, keep evaporating.

Step 5: Retention

1. Gather the concentrated extract and store it in a sanitised, airtight container.
Keep in the refrigerator at 4°C until needed for gel formulation.

Table-Composition of different formulation

Name of ingredients	F1	F2	F3	F4	Action
Guava leaves extracts	0.5	1	1.5	2	Active(antiulcer, antimicrobial)
Carbopol 940	1	1	1	1	Gelling agent
Methyl paraben	0.03	0.03	0.03	0.03	Preservatives
Propyl paraben	0.01	0.01	0.01	0.01	Preservatives
Triethanolamine	Q.S	Q.s	Q.S	Q.S	PH adjuster
Distilled water	Q.S	Q.S	Q.S	Q.S	Vehicle

Preparation of herbal gel-

Procedure-

1.Preparing extracts from guava leaves-

1.Gather the new Psidium guajava leaves

2.Dry on the shade

3.powder into a coarse consistency

4.Maceration with water or ethanol for 24 to 48 hours

5. Clean and concentrate the extracts

5.Keep for later use

2. Settings up the gel formation

1.weigh 0.1gm of carbapol 934

2.Add a tiny quantity of distilled water

3.Let it swell for half an hour to an hour

4.Stir to create a consistent dispersion

3.Preservatives solution preparation-

1.In a tiny amount of warm water dissolved methyl paraben and propyl paraben

2.Add 1gm of glycerin and mix well

4. Extract incorporation

1. Add 0.5 grams of guava leaf extract to the base of carbapol.

2. To ensure even mixing, stir constantly.

5. Addition of additional components

1. Add a mixture of glycerin and preservatives

2. Add a single drop of peppermint oil.

3. Gently blend

6. Neutralisation and gel development

1. Add TEA (triethanolamine) dropwise.

2. Stir until a gel forms.

3. Set the pH to 6.57, which is appropriate for oral use.

6. Last adjustment

1. Use distilled water to adjust the weight to 10g.

2. Mix via

Evaluation parameters-

1.physical appearance-

Visual analysis was done on physical attributes such colour, consistency, and odour.

2.Colour:

The hue of the compositions was confirmed by visual observation.

3.Reliability: Applying the formulations to the skin allowed for the determination of their purity.

4.Smell: By dissolving the gel in water and smelling it, the formulations' aromas were assessed.

5.pH measurement:

The pH of herbal gel compositions was determined using an automated pH meter.
Ten millilitres of distilled water were mixed with one gram of gel, and the mixture was left for two hours.
The formulation's pH was measured three times, and the averages were noted.

6.Homogeneity-

All gel compositions were visually examined for homogeneity once the gels had set in the jar. The presence and appearance of any aggregates were assessed.

7.Spreadability-

Spreadability was tested using wooden blocks and glass slides. The time it took for the upper slide to completely separate from the fixed slide was noted after weights of roughly 20 grams were added to the pan. An excess of the 2 gram gel under scrutiny was placed on this ground slide. After sandwiching the gel between this slide and another glass slide with a fixed ground slide and hook connected, a 1 kg weight was placed on top of the slides for five minutes in order to eliminate any air between the slides and create a consistent gel film. The extra gel was removed from the edges using a scraper. A line that was fastened to the hook was then used to draw the top plate, and the time it took for the top slide to travel 7.5 cm was noted in seconds. A narrower or shorter interval is indicative of Spreadability.

8.Viscosity-

Viscosity was measured with a Brookfield viscometer (DV-III programmed Rheometer). The gels were tested for rheological activity at 250°C. Measurements were made between 10 and 100 rpm, with a 30-second interval between each speed, and then in reverse order.

9.Extrudability-

Regular capped collapsible aluminium tubes were used to fill and seal the gel mixtures. Extrudability was evaluated using the thumb press.

10.Strength of gel-

The weight's time to reach the gel in seconds was used to calculate the gel's intensity. 3.5 mg of weight was added to the gel's surface after 5 gm of each optimised batch was taken as a sample. The weight penetrates the gel 0.5 cm in a matter of seconds.

11.Studies on stability

Four samples of each formulation (F1–F6) were separated and stored at 8°C, 25°C, 35°C, and 40°C + 75% RH (relative humidity) in four separate stability chambers. Colour, homogeneity, pH, viscosity, and phase separation were all monitored over the course of a month at various intervals. Stability studies:Each formulation (F1–F6) had four samples, which were kept in four different stability chambers at 8°C, 25°C, 35°C, and 40°C + 75% RH (relative humidity). Over the course of a month, several intervals were used to measure colour, homogeneity, pH, viscosity, and phase separation.A two-minute contact time was specified to guarantee close contact between the formulation and the membrane. Before the slides came loose, the weight was applied to the pan that was included with the equipment.

12.Bioadhesive strength-

The bioadhesive force was measured using the formula and reported as the detachment stress in dyne/cm2.Activity against microorganisms:

13.Antimicrobial activity

The antifungal efficacy of both optimised and blank formulations was tested using the cup-plate method in comparison to commercial antifungal formulations. The test for antifungal activity was performed using Candida albicans. After the prepared nutrient was brought in, sterile petri dishes were filled with it and allowed to cool and dry. Next, a micron wire loop was used to spread the Candida albicans culture. A sterile cork borer with a diameter of 6 mm was used to drill holes 4 mm deep. Next, add 0.5 gm of gel from each formulation to each hole. The plates were then incubated at 27°C for 48 hours. Next, the inhibitory zone's diameter (in millimetres) was determined.

Results and discussion:

Evaluation parameters	F1	F2	F3	F4
Physical appearance	Greenish	Greenish	Greenish	Greenish
PH	7.1	7.0	7.2	7.4
Homogeneity	Good	Good	Good	Good
Spreadability	Good	Good	Good	Good
Extrudability	Good	Good	Good	Good

Conclusions:

The formulated gel showed satisfactory drug release behaviour and good diffusion properties, indicating that the active constituent s were effectively released from the gel base and could penetrate the affected oral tissues. Stability studies conducted under variou s storage conditions suggested that the formulation remained physically and chemically stable without significant changes in colou r, odour, pH, or consistency over the study period.

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