Formulation and Evaluation of aqueous gel of powder guava leaves and neem leaves for Mouth Ulcer treatment

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Abstract- This study delved the development and evaluation of a new herbal gel for mouth ulcers using pulverized guava leaves. The gel incorporated colorful attention of the leaves with Carbopol 934 and Propylene glycol as a base. Evaluation included assessments of the gel's physical parcels and natural exertion. Infrared spectroscopy verified no adverse commerce between the leaves and the gelatinizing agent. The performing gel was transparent, invariant, and had a neutral pH range(7-7.5). also, it demonstrated good rheological parcels, spreading and banishing fluently. Anti-fungal tests revealed significant effectiveness against Candida albicans and Aspergillus aureus. In vitro analysis verified the presence of flavonoids in the guava leaves, contributing to their potent antioxidant exertion. This suggests implicit for combating oxidative stress associated with mouth ulcers. The formulated gel offered a stable, safe, and potentially superior volition to conventional synthetic treatments for mouth ulcers. Its overall parcels suggest a promising advancement in this area. In conclusion, the herbal gel displayed a range of desirable characteristics- translucency, unity, good rheology, potentanti-fungal exertion, and significant antioxidant parcels. These findings place it as a potentially safe and effective herbal remedy for mouth ulcers, potentially outperforming being synthetic options.

Keywords- Guava Leaves Powder, Gel, Mouth Ulcer, antioxidant, mucosal layer

1. INTRODUCTION

Psidium guajava, also known as guava, is a plant in the Myrtaceae family. The essential oil of guava leaves contained sesquiterpenes including transcaryophyllene, humulene, and caryophyllene oxide as well as monoterpenes such 1,8-cineole and limonene, which had antibacterial, insecticidal, and fungicidal properties. Psidium guajava leaf extract contains a flavonoid with antiulcer properties. . The quercetin found in Psidium guajava exhibits antioxidant, anti-inflammatory, spasmolytic, antiviral, and anticancer action. High amounts of both organic and inorganic chemicals, including secondary metabolites such polyphenols, antioxidants, antiviral, and anti-inflammatory substances, can be found in guava. More vitamins and minerals are present. Flavonoids and other phenolic compounds are important inside guava. Flavonoids and lycopene are significant antioxidants. They assist in the treatment of malignant cells and slow down accelerated ageing of the skin [8]. Myocardial inotropsia may be affected by guava[9]. Guava skin extract can lower blood sugar levels when used for 21 days [10]. Guava has potent antimicrobial qualities.

1.1 Topical drug delivery system :

The topical route offers numerous advantages, particularly when compared to other drug delivery techniques, including continuous medicine delivery, less side effects, and improved patient compliance. To be applied externally, topical pharmaceutical products are designed. They are made to work on the surface of one or more layers of the skin, locally (for example, sunburn, keratolytic agents, local anaesthetics, antiseptics, and anti-inflammatory drugs).

1.2 Oral mouth ulcer:

An inflamed, painful depression with red borders and a yellowish or white colour on the mucus lining of the oral cavity is known as a mouth ulcer[11].Canker sores, also known as mouth ulcers, are often tiny, painful lesions that appear in the mouth or at the gum line. A mouth ulcer can make it unpleasant to talk and eat. According to their clinical condition, mouth ulcers are categorised into three groups:

1.3 Minor mouth ulcer –Minor ulcers have a diameter of less than a centimetre and heal in one to two weeks

Fig 1: Minor Ulcer

Major mouth ulcer –Major ulcers have a diameter of two to three centimetres, are deeper, and take longer to heal.

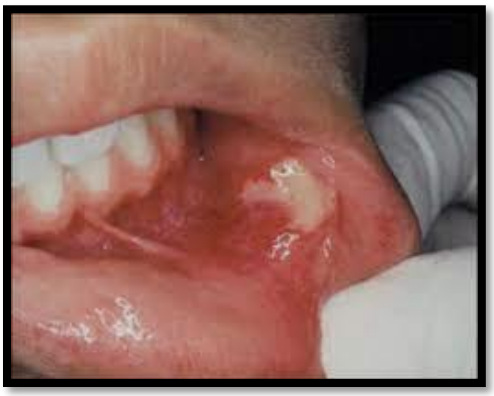

Fig : Major Ulcer

1.4 Common cause of mouth ulcer –

Although there is no recognisedaetiology or pathophysiology for mouth ulcers, some factors are thought to be significant, such as iron and vitamin deficiencies, particularly B12 and C, poor dental hygiene, infections, stress, indigestion, mechanical injury, skin disease, etc. [12]

1. Hereditary factors:. Hereditary factors About 30 – 40 of cases with aphthous ulcers have a family history(13), indicating that there's a inheritable element to this condition. In certain cases, a family history of intermittent aphthous ulcers is apparent. Youthful age of onset and symptoms of lesser inflexibility are two common connections.

2. Physical or psychological stress: Aphthous ulcer incidence are strongly correlated with stressful living circumstances [14]. Psychological stress may act as a trigger or a moderating element in the development of recurrent aphthous stomatitis. Stress has not been conclusively shown to be the cause of or a contributing factor in investigations to recurrent apthous stomatitis [15].

3. Nutritional deficiencies: including those affecting iron, folic acid, vitamin B12, B1, and B2 and B6, have been linked to a subset of aphthous ulcer patients. Depending on diet and dietary supplementation, different regions' contributions of nutritional deficits to aphthous ulcers are likely to differ [16].

4. Trauma: Stress and ocalized trauma are the most common causes of aphthous ulcers. Accidental selfbiting, dental work, sharp- edged foods(like potato chips), anaesthetic injections, and tooth encounter bristles can all beget damage to the oral mucosa. In addition to this, stress from the surroundings and your feelings might beget an aphthous ulcer(17).

5. Food sensitivities: Numerous foods have the potential to trigger allergies. Patients with recurrent apthous stomatitis exhibit anti-cow milk and antiwheat protein antibodies (celiac illness). As a result, several typically allergenic foods (such as strawberries, tomatoes, and nuts) haven't been directly linked to recurrent apthous stomatitis [18].

6. Immunological diseases:Apthous ulcers are more prevalent and more severe in people with immune disorders, such as cyclic neutropenia, inflammatory bowel disease, Behçet's illness, and HIV disease. [19] The most common topical treatments for mouth ulcers in Western medicine include corticosteroids, antibiotics, and analgesics. But when used for a longer time and more frequently, they all run the risk of having negative side effects[20].

2. MATERIALS AND METHOD

The fresh factory accoutrements of Psidium guajava were collected from original area from Agricultural grange(Karad, Satara quarter). Fresh factory leaves

were washed under running distilled water as well as valve water and shade drying was carried out.

2.1 Preparation of herbal Gel

A specific amount of Carbopol 934 was dispersed in the desired amount of distilled water while stirring continuously. Then, 5 ml of distilled water was measured out. The required quantities of methyl paraben and propyl paraben were dissolved in this water by gently heating it on a water bath. After cooling, propylene glycol was added.

Next, varying amounts of Psidium guajava cream and Azadirachta indica leaf extract were mixed into the previously prepared solution. Distilled water was then added to bring the total volume to 20 ml.

Finally, the fully mixed ingredients were thoroughly incorporated into the Carbopol 934 gel with continuous stirring. Triethanolamine was then added dropwise until the mixture reached the desired pH of 6.8-7. (Das, 2010)

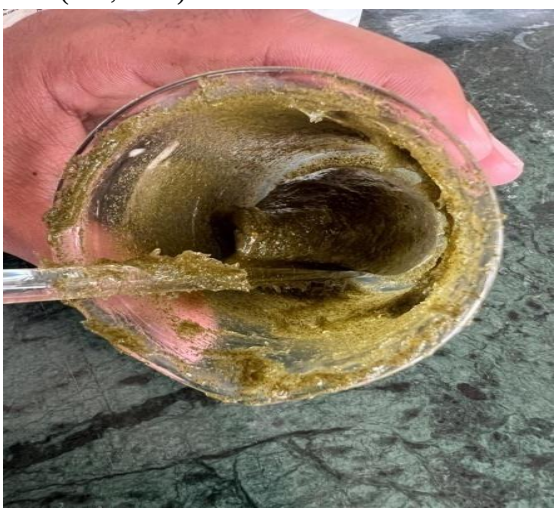

Fig - Herbal mouth ulcer gel

Table 1: Composition of various gel formulations containing powdered guava leaves & neem extract.

Ingredients	G1	G2	G3
Guava leaves powder	3%	2%	1%
Azadirachtaindica leaves extract	3%	2%	1%
Carbopol 934	5%	5%	5%
Methyl Paraben	0.0015%	0.0015%	0.0015%
Propyl Paraben	0.01%	0.01.%	0.01%
Triethanolamine	q.s + pH 6.5-7	q.s + pH 6.5-7	q.s + pH 6.5-7
Distilled water	Up to 20 ml	Up to 20 ml	Up to 20 ml

3. EVALUATION OF HERBAL GEL

3.1 Physical Appearance:

Physical parameters such as appearance and colour were checked.

3.2 Measurement of pH:

The pH of the herbal gel was measured using a digital pH cadence. A one- gram sample of the gel was dispersed in 10 ml of distilled water and set away for two hours. The pH dimension was performed three times, and the average value is reported (Sanghavi, 1989). The reported pH values can be set up in Table 2.

Fig- pH Testing

3.3 Homogeneity:

All gel phrasings passed unity testing through visual examination after being set into holders. The examination concentrated on detecting any summations or irregularities in their appearance(Gupta, 2010). The unity of gel phrasings was proved in Table 2.

Spreadability:

Spreadability was determined by glass slide and rustic block outfit. Weights about 20 gm were added to the visage and the time were noted for upper slide to move to separate completely from the fixed slide(Shivhare, 2009). An spare amount of gel 2 gm under study was placed on this ground slide. The gel was also squeezed between this slide and another glass slide having the fixed ground slide and there's handed with the hook.

A 1 kg burdened was placed on the top of the slides for 5 beats to give a steady film of the gel and remove air between the slides. redundant of the gel was removed off from the edges. The top plate was also subdued to pull with the help of string attached to the

hook and the time in seconds demanded by the top slide to cover a distance of7.5 cm be noted. A shorter or lower interval indicates better Spreadability. The spreadability of the gel was determined using the formula handed by Pawar,(2013). and is proved in Table 2.

$S = M \times L / T$

Where, S = Spreadability,

M = Weight in the pan which is tied to the upper slide,

L = Length moved by the glass slide

T = Time in second taken to separate the slide completely each other.

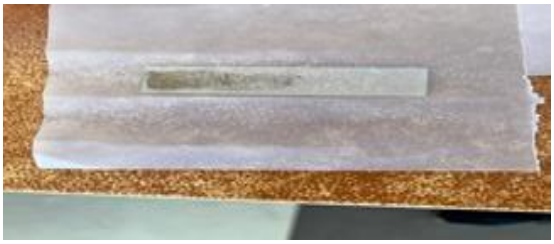

Fig-Spreadability Test

3.4 Clarity:

Visual Examination was employed to determine the clarity of all three batches(Pandey, 2011).

3.5 Viscosity:

Density was determined by using Brookfield viscometer(DV- III programmable Rheometer). Formulated gels were tested for their rheological actions at 250 C. The dimension was made over range of speed from 10rpm to 100rpm with 30seconds between 2 consecutive pets and also in a rear orders(Bhramaramba, 2015).

3.6 Extrudability:

The gel phrasings were filled in standard limited collapsible aluminium tubes and sealed to the end. The ability to be squeezed or pressed was tested by using the thumb.

4.RESULT AND DISCUSSION

Table 2: In vitro evaluation parameters

Formulation	G1 (2%)	G2 (1%	G3 (0.5%)
Physical Appearance	Greenish	Greenish	Greenish
pH	6.13	7±0.09	6.9±0.5
Spreadability (gm.cm/sec)	5.30 ± 0.1	5.76 ± 0.15	6.23 ± 0.057
Viscosity (Pa·S)	3.111 ± 0.004	3.029 ± 0.049	2.292 ± 0.012
Extrudability	Good	Good	Good
Homogeneity	Good	Good	Good
Stability study for 1 Month	Open Container	Not Stable	
	Closed Container	Stable	

From the results it's easily shows that all the set gel phrasings having good unity and gelatinizing property(Gupta, 2010). The pH of all gel phrasings was in the range compatible with normal pH range of the skin(Sanghavi, 1989). The rheological geste was studied with rheometer ranging between2.292 to3.111 .Which is indicated that formulated gel was neither too thick and nor too thin(Bhramaramba, 2015).

The study of Spreadability shows that with adding the density of expression Spreadability diminishments and vice versa(Shivhare, 2009). Extrudability study was done by pressing thumb and it's fluently extendable. The gelatinizing &bioadhesive strength of all the batches was set up in the suitable range(Jaiswal, 2012). 1 Month stability study was done with open and close vessel and it's showed that open vessel containing gel wasn't stable and close vessel gel was stable. Formulated gel containing open vessel when expose to medium room temperature also syneresis was observed it means liquid exudates separating(Kaur, 2013). Syneresis arises when the commerce between patches of the dispersed phase intensifies to the point where separation occurs upon standing. In that dispersing medium is squeezed out in driblets forms and the gel shrinks. Syneresis it means the form of insecurity in waterless gels. In syneresis system separation of a solvent phase is do only because of the elastic compression of the polymer means polymeric

motes(Allen L). Infrared gamuts of gel phrasings did not show the presence of any fresh peaks so infrared spectroscopy revealed that there was no commerce between pulverized Guava leaves and polymer. Infrared gamuts have shown groups2925.48-CH,476.93- Hematite,1717.3- C=O,1187.46,1187.72-C-O. The major peaks of medicine gamuts remained unchanged in the admixture were observed in Infrared gamuts. All the three batches of developed expression showed antifungal exertion against Aspargilious aureus & Candida Albicans this are main microorganism responsible for mouth ulcer and expression it can also use to treat mouth ulcer infection(Koland, 2011). A farther DPPH assay study it was observed that pulverized guava leaves contains flavonoids so it showed significant antioxidant effect(Blois, 1958) &(Mathangi, 2013).

5. CONCLUSIONS

Currently there's a lot of demand for herbal phrasings in the request due to their cost effectivity and absence of any side goods. From the below experimental data it is clear that a gel expression with herbal constituents similar as aloe, neem and tulsi has good characteristics, density and also possesses a good antimicrobial exertion which is necessary in the operation of mouth ulcers.

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