

“FORMULATION AND EVALUATION OF HERBAL MOUTH ULCER GEL BY UTILIZING : GUAJAVA, COCCINIA GRANDIS AND CURCUMA LONGA”

***Mr. Nilesh S. Mhaske^{1*}, Ms. Akshada D. khair², Ms. Abhijita D. Narsing³, Ms. Rani G. Neharkar⁴, Ms. Bhagyashri D Rathod⁵, Mr. Onkar S Thorat⁶**

Dr. Vithalrao Vikhe Patil Foundation's College of Pharmacy, Ahilyanagar
Savitribai Phule Pune University, Pune

^{1*}Asst Prof. Department of Quality Assurance at Dr V.V. Patil Foundation's
College of Pharmacy Vilad Ghat Ahilyanagar India 414111.

^{2,3,4,5,6} Department of Quality Assurance Dr V.V. Patil Foundation's College of
Pharmacy Vilad Ghat Ahilyanagar, India 414111.

***Corresponding Author:** Nilesh S. Mhaske.

Address: Department of Pharmaceutical Quality Assurance, Dr. V.V Patil Foundation's College of Pharmacy, Vilad Ghat, Ahilyanagar, Maharashtra, India, 414111.

ABSTRACT:

Mouth ulcers, also known as aphthous ulcers or canker sores, are among the most common oral mucosal disorders, characterized by painful lesions that interfere with eating, speaking, and swallowing. They can arise from multiple causes such as trauma from sharp teeth or dental appliances, nutritional deficiencies, hormonal imbalances, stress, or underlying systemic conditions. Conventional treatments, such as corticosteroid-based ointments and anesthetic gels, provide only symptomatic relief and may lead to side effects on prolonged use. Hence, the development of polyherbal mouth ulcer gels offers a safe, effective, and natural alternative for managing these lesions.

Clinical evaluations of herbal formulations containing similar ingredients have demonstrated significant reduction in ulcer size, pain intensity, and healing time compared to synthetic formulations. The combination of herbal extracts in gel form not only accelerates epithelial regeneration but also reduces recurrence rates due to their immunomodulatory effects.

Overall, polyherbal mouth ulcer gels present a promising, holistic approach to oral ulcer therapy, offering enhanced healing and comfort with minimal side effects. For persistent or severe cases, professional consultation is still recommended.

KEYWORDS: Mouth ulcer, Polyherbal gel, Anti-inflammatory, Antimicrobial.

INTRODUCTION:

Aphthous stomatitis, also known as a Mouth Ulcer, is a condition that lining of mouth and causes painful sores that come back regularly in the mouth and throat. Mouth ulcer can be caused by various factors, including accidentally biting the inside of the cheek, allergic reaction to certain foods, brushing too hard, hormonal changes, lack of vitamins, bacterial infection, and underlying health conditions.

Gels are semisolid substances made by thickening an ingredient. They are commonly used on the skin or to help medicines pass through the skin into the body. Gels can also be applied to mucous membranes for localized treatment. A mouth ulcer is a small, round sore or wound that can appear red, yellow, white or grey in colour. It forms on soft lining inside the mouth, most often on the inner side of the lips or cheeks. Herbal medicines are becoming more popular due to their natural origin and fewer side effects compared to allopathic (conventional) medicines, leading to higher patients' acceptance.

However, there are still concerns about their safety, effectiveness, and quality, which are important issues for both industrialized and developing nations. It's noteworthy that around 1.42 billion people—about a quarter of world's population—rely on traditional medicines to treat a wide range of health conditions.

Types of Oral Ulcers Based on Lesion Size :

1. **Minor ulcers** : These are small ulcers, typically ranging from 2 to 8 millimeters in diameter. They are usually mild in pain and tend to heal on their own within 1 to 2 weeks without leaving scars.
2. **Major ulcers** : Larger and deeper than minor ones, major ulcers often have irregular or raised edges. They may take longer to heal and can be more painful and persistent.
3. **Herpetiform wounds**: These are collections of pinhead-sized lesions that typically occur near one another.
4. **Ulcerative conditions**: Mouth sores are quite common and often result from physical damage like ill-fitting dentures, sharp or broken teeth, or dental fillings.

A number of things can lead to mouth ulcers, such as:

1. **Toothpastes and mouthwashes with sodium lauryl sulfate**: This common foaming agent can irritate the lining of the mouth in some people.
2. **Emotional or mental stress**: High stress levels can weaken the immune system, making the mouth more prone to ulcers.
3. **Hormonal fluctuations**: Changes in hormone levels, such as those during

menstruation pregnancy can trigger ulcers in some individuals.

4. **Lack of essential nutrient:** Mouth sores can develop as a result of vitamin deficiencies, including those in folic acid, iron, and vitamin B12.
5. **Physical irritation:** Injuries from the sharp teeth, dental appliance, accidental bite can cause ulcer
6. **Viral infection:** Viruses such as herpes simplex can lead to painful sores in the mouth.

Herbs used in mouth ulcer:

1. GUAVA LEAVES:

- **Taxonomical classification :**

Kingdom : plantae

Sub Kingdom : Tracheobionta Vascular plant

Intra kingdom : Streptophyta

Super division : Embryophyte

Division : Magnoliophyta

Subdivision : Angiospermae

Class : Magnoliopsida

Super order : Myrtales

Family : Myrtaceae

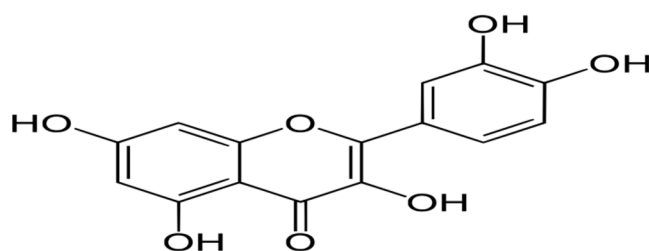
Genus : Psidium

Species : P. guajava



FIG 1: GUAVA LEAVES

Chemical Constituents : It contains tannin, resin and crystals of calcium oxalate. Leaves contain quercetin, resins, fat, cellulose, tannin, volatile oil, chlorophyll, and mineral salt vitamin C, vitamin B, antioxidant tannin.



Quercetin

Uses: Guava leaves help heal mouth ulcers due to their antibacterial, anti-inflammatory, and astringent properties. People consuming guava leaves at home will help curb toothaches. They reduce pain, swelling, and infection, promoting faster healing when used as a mouth rinse.

2. COCCINIA GRANDIS:

Taxonomical classification

Kingdom: plantae

Division: Magnoliophyte

Class: Magnoliopsida

Subclass: Dilleniidae

Order: Cucurbitales

Family: Cucurbitaceae

Genus: Coccinia

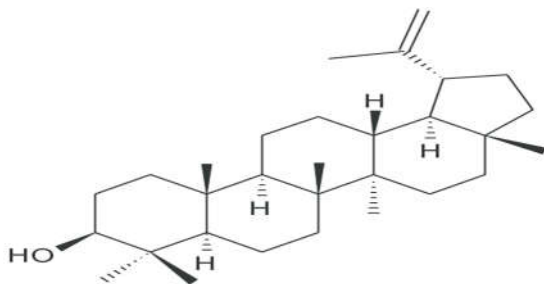
Species: Coccinia grandis

Another binomial: Coccinia grandis



FIG 2. COCCINIA GRANDIS

Chemical Constituents: It contains of alkaloids, flavonoids, saponins, phenols, tannins, terpenoids, and glycosides in *C. grandis*. Lupeol and taraxerone in *C. grandis* having anti-inflammatory activity using in treatment of mouth ulcer.



Lupeol

Use: Nature is blessed with numerous plants that have been cherished for their

therapeutic properties for centuries. One such medicinal plant is *Coccinia grandis*, commonly known as Ivy gourd or scarlet gourd which belongs to the Cucurbitaceae. Traditionally different parts of this plant are used in medicine for several purposes like jaundice, diabetes, wound healing, ulcers, stomach ache, skin disease, fever, asthma, cough. The Fruit powder showed a significant dose related decrease in ulcer index.

3.TURMERIC :

Kingdom: Plantae

Division: Angiosperm

Class: Liliopsida (Monocots)

Order: Zingiberales

Family: Zingiberaceae

Genus: Curcuma

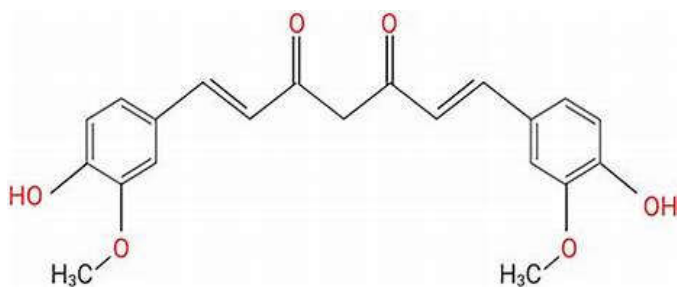
Species: Curcuma longa



FIG 3. TURMERIC

Chemical Constituents:

The rhizomes contain important chemical compounds called curcuminoids, that include curcumin, bisdemethoxycurcumin and desmethoxycurcumin.



Curcumin

Uses: Turmeric, due to its medical properties can heal any kind of internal wound in no of times. This Indian spice has the power to fight infection and can also help in smoothening down the ulcer inside the mouth.

MATERIAL AND METHOD:

1. Collection of material :

- 1.Guava leaves were collected from the campus & coccinia grandis fruit & curcumin purchased from local market.
- 2. Leaves & fruits were dried at room temperature in shade.
- 3. The plant material was then powdered & prepared for extracting.

2. Preparation of extract:

Sr. No	Material	Chemical constituent	Process of extraction	Images
1	Guava leaves extract	Quercetin	Maceration: Maceration is an extractive technique and carried out at room temperature. Powdered herbal leaves of Guava is further immersed in alcohol and continuous shaking by using mechanical shaker. After 3 days the concentrated extract was collected and filtered.	
2	Coccinia grandis extract	Lupeol	Soxhlet extraction: Coccinia grandis were collected from Local market. Further fruit were shade dried for 4 days and size reduced using mixer grinder converted into coarse powder and passed through sieve number 22. The extraction was carried out by using Soxhlet extraction method up to 3 hrs. taking 100 gm of plant material with 500 ml of ethanol	
3	Turmeric Extract	Curcumin	Solvent extraction method Solvent extraction is one of the most common methods used to obtain curcumin from turmeric. This process involves using organic solvents such as ethanol, and extract curcuminoids. The turmeric powder is mixed with the solvent, and the mixture is then filtered to separate the liquid extract from the solid residue. The solvent is then evaporated, leaving behind a concentrated curcumin extract.	

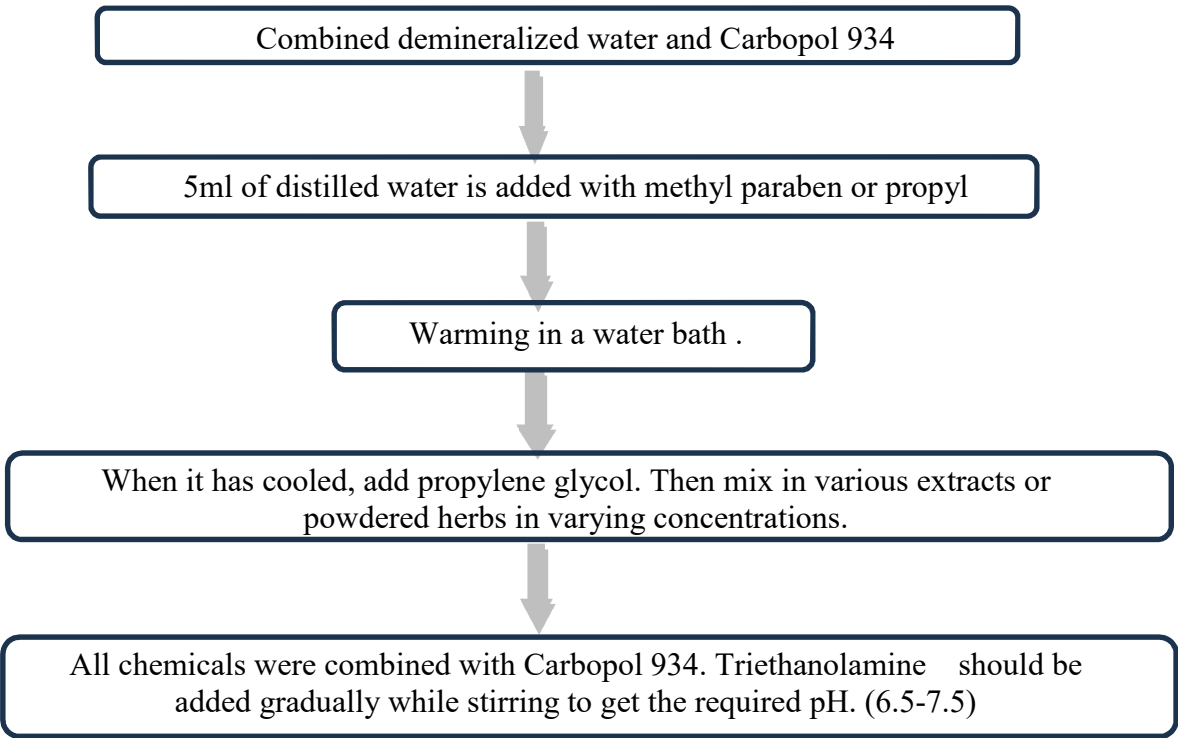
TABLE 1: METHOD OF EXTRACTION OF HERB

3. Formula for Anti-ulcer gel:

Sr.No	Ingredient	F1	F2	F3	Role
1	Guava leaves extract	0.3	0.5	0.5	Anti-microbial activity
2	Coccinia extract	0.1	0.3	0.5	Anti-Inflammatory
3	Turmeric extract	0.5	0.3	0.3	Anti-Bacterial
4	Carbapol934	0.3	0.3	0.5	Gelling agent
5	propylene glycol	1	1.5	1.5	Humectant
6	Methyl paraben	0.3	0.5	0.5	Preservative
7	Peppermint oil	0.2	0.2	0.2	Flavoring agent
8	Glycerin	0.2	0.2	0.2	Lubricant
9	Distilled water	Q.S	Q.S	Q.S	Vehicle

TABLE 2: FORMULA FOR GEL

4. Method for preparation of Simple herbal gel:-



EVALUATION PARAMETER FOR GEL:

1. Physical evaluation:

Physical parameters such as color, odour and consistency were checked visually.
Color: The color of the formulations was checked by visual inspection.
Consistency: The consistency of formulations was checked by applying on skin.
Odour: The odour of the formulations was checked by mixing the gel in water and observing the smell. Physical evaluations of gel formulations were reported in **TABLE NO 3**

Formulation	Color	Consistency	Odor
F1	Greenish	Good	Minty
F2	Greenish	Good	Minty
F3	Greenish	Good	Minty

TABLE 3: PHYSICAL EVALUATION OF GEL

2. Measurement of pH:

The pH of the cream formulation was determined by using digital pH meter. 1gm of cream was taken and dispersed in 10 ml of distilled water and keep aside for two hours . The measurement of pH of formulation was carried out in three times and the average values are reported in **TABLE NO 4**.

Formulation	pH
F1	6
F2	5.8
F3	6.3

TABLE 4: PH OF GEL

3. Spread ability:

A glass plate with a circle that was already marked with a 1 cm diameter was coated with 0.5 g of cream to test the spread ability. 250g of weight was placed on the top glass plate and left there for five minutes.
The formula was used to calculate it is,

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

L = Length of glass slide
T = Time required to separate the slides
M = weight fastened to upper

Formulation	Spreadability(gm.cm/sec)
F1	5.3
F2	6.5
F3	7

TABLE 5: SPREADABILITY OF GEL**4. Homogeneity:**

All developed cream formulations were tested for homogeneity by visual inspection after the cream have been set into the container. They were tested for their presence and appearance of any aggregates. Homogeneity of cream formulation was reported.

Formulation	Homogeneity
F1	Good
F2	Good
F3	Good

TABLE 6: HOMOGENEITY OF GEL**5. Viscosity:**

With the aid of a Brookfield viscometer, the cream's viscosity was determined (Model LMDV 60).

Formulation	Viscosity(CPS)
F1	2.6
F2	3.4
F3	3.6

TABLE 7: VISCOSITY OF GEL**6. Centrifugation Test:**

All 3 batches of cream were put into centrifuged equipment for centrifugation testing. The centrifuge was turned on for an hour at 1000 rpm to evaluate the separation of the two phases.

Formulation	Result
F1	Phase separation
F2	No phase separation
F3	No phase separation

TABLE 8: CENTRIFUGATION OF GEL**7. Grittiness Test:**

It was tested manually by pressing a small quantity of the formulated cream between the thumb and index finger. Immediate skin feel was evaluated.

Formulation	Result
F1	Yes
F2	No
F3	No

8. Extrudability Test:

Extrudability test is the measure of the force required to extrude the material from a collapsible tube when certain amount of force has been applied on it in the form of weight.

Extrudability(%)

Amount of cream extruded from the tube

Total amount of ointment filled in the tube

x 100

Formulation	Extrudability %
F1	80
F2	79.2
F3	84.8

TABLE 10: EXTRUDABILITY OF GEL

9. Antimicrobial Activity:

Agar well diffusion method Nutrient agar medium was prepared and sterilized by autoclaving at 121°C for 15 minutes. The three to four agar plates were prepared and labeled. The nutrient agar after sterilization was poured into the two plates and allowed to solidify. After solidification the culture, lactobacillus was applied on each plate. Then the wells were prepared using corn borer. Then the samples were poured in respective wells using micropipette. The plates were incubated at 37°C for 24 hours.



FIG 4: ANTI-MICROBIAL ACTIVITY

Formulation	Anti-microbial studies (mm) Lactobacillus
Standard	27
F- Mixed	24
Blank	14

TABLE 11 ANTI-MICROBIAL ACTIVITY

RESULT AND DISCUSSION OF HERBAL MOUTH ULCER GEL

Three batches of gel were prepared and optimized batch is reported. All the parameters that are evaluated are mentioned in table No. 6 From the evaluation of formulation of herbal gel was smooth, greenish yellow in color and homogeneous. It was found that the gel’s pH was 6.3 which is identical to the skin’s pH. A Brookfield viscometer was used to measure the gel’s viscosity which was found to be 3.8 p . The extrudability is good as it is more than 80%. The gel’s spread ability was assessed to be 7gm/cm/sec. The gel was evaluated for content uniformity. All the desired parameters of the gel are within specification.

Evaluation Parameter	Observation	Inference
Visual inspection	Homogeneous & Smooth	Phase Separation
pH measurement	6.3	Matches with pH of skin
Viscosity	3.8 p	Sufficiently Viscous
Spread ability	7	Easily Spreadable
Extrudability	84.8 %	Good

DISCUSSION

From the results it is clearly shown that the all-prepared gel formulations having good homogeneity and gelling properties. The pH of all gel formulations was in the range of compatible with normal pH range of the skin. The rheological behavior also indicates that the gel was neither too thick nor too thin. The spreadability shows that the increasing viscosity of formulation, spreadability decreases. Study was done by pressing thumb and its easily extendable. The gelling and strength were found in the suitable range. The Patch test was done by prepared gel applied on skin there are no irritation found. The all-prepared gel formulations clarity was good.

SUMMARY AND CONCLUSION

The study highlights the promising potential of a polyherbal gel combining *Coccinia grandis*, Curcumin, and *Psidium guajava* leaf extract for effective mouth ulcer management. Natural remedies like these are gaining popularity due to their safer profile and fewer side effects compared to synthetic drugs. The formulation demonstrated enhanced antifungal, antibacterial, anti-inflammatory, and antioxidant properties, contributing to accelerated healing and protection of the oral mucosa. Among the tested formulations, F3 showed higher viscosity due to Carbopol 934 content, but F4 was selected as the superior formulation for its ideal appearance, uniformity, stability, and therapeutic efficacy. Overall, this novel herbal cream offers a safe, stable, and effective alternative for treating mouth ulcers, reflecting the growing demand and acceptance of herbal medicines in modern healthcare.

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