

Research Article

FORMULATION AND EVALUATION OF POLYHERBAL MOUTH GEL FROM HONEY, OCIMUM TENUIFLORUM, JASMINUM GRANDIFLORUM, PSIDIUM GUAJAVA, TURMERIC, ALOEVERA GEL EXTRACT FOR MOUTH ULCER TREATMENT

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ABSTRACT

The current study is about making and testing a gel for oral ulcers. This gel has things like Tulsi, Turmeric, Honey, Aloe vera, Guava and Jasmine. We picked these things because they are good at fighting microbes reducing swelling and helping wounds heal. The gel was made with an agent that helps it stay together and other things that make it easy to use. We tested the gel to see if it is good for the mouth. We checked things like how acidic it's how thick it is and if it stays the same over time. The results showed that the gel is just right for the mouth. When we combined all these things they worked together really well to help oral ulcers heal faster. They reduced swelling stopped microbes from growing and helped ulcers heal quickly. Using things like these also means that the gel is less likely to cause bad side effects, which is a problem, with some man-made medicines.

INTRODUCTION

Mouth ulcers are small. They can be very painful. They show up on the gums the inside of the cheeks the tongue or the roof of the mouth. Some people call them canker sores. A lot of things can cause mouth ulcers to appear. For example, if you get hurt in the mouth you can get mouth ulcers. Stress and changes, in your hormones can also cause them. The food you eat can even cause mouth ulcers. Sometimes a health problem that you already have can cause them to show up.

You can use mouthwash or special medicine that you put right on the mouth ulcer to help it feel better. It is very important to go see a doctor or a dentist to get an idea of what is going on.

These are excruciating oval or round ulcers that develop in the mouth, often inside the lips or cheeks. Aphthous sores, another name for mouth sores, can hurt when we eat, drink, or wash our teeth. Lack of iron and vitamins, particularly B12 and C, poor dental hygiene, illness, depression, indigestion, mechanical damage, food intolerance, hormonal imbalance, skin conditions, etc. are common causes of mouth sores. A fracture of the mucous membrane in the middle of the mouth is called a mouth ulcer. It typically appears as pressure on the mouth and is either yellow or white on mucous membrane.^[1]

A mouth ulcer is sometimes defined as a fracture or rupture in the mucous membrane lining the mouth. It usually manifests as a whitish or yellow mouth depression. Numerous factors, including biting the inner layer of the cheek, food sensitivities, hard teeth brushing, hormonal shifts, vitamin shortages, bacterial infections, and illnesses, can produce mouth ulcers^[2].

More than three-quarters of the world's population primarily relies on plants and herbal remedies made from them. Thirty percent of plant species have therapeutic uses. The market for the global cost of plant-based medications is estimated to be over Rs. 200,000 crores. India currently contributes less than Rs. 2000 crores. India's raw drug exports increased steadily from Rs. 130 crores in 1991–1992 to Rs. 165 crores in 1994–1995, a 26% increase. The yearly production of raw material from medicinal and aromatic plants is worth about Rs. 200 crores. By 2000, this is probably going to reach US \$1150 and US \$5 trillion by 2050.^[3]

Plant-based medications have been shown to make about 25% of all pharmaceuticals in developed nations like the United States, whereas in rapidly emerging nations like China and the contribution from India is more than 80%. Therefore, compared to the rest of the globe, medicinal plants are far more important economically in India. Two thirds of the plants utilized in modern medicine come from these nations, while the rural population's health care system is provided by indigenous medical systems^[4].

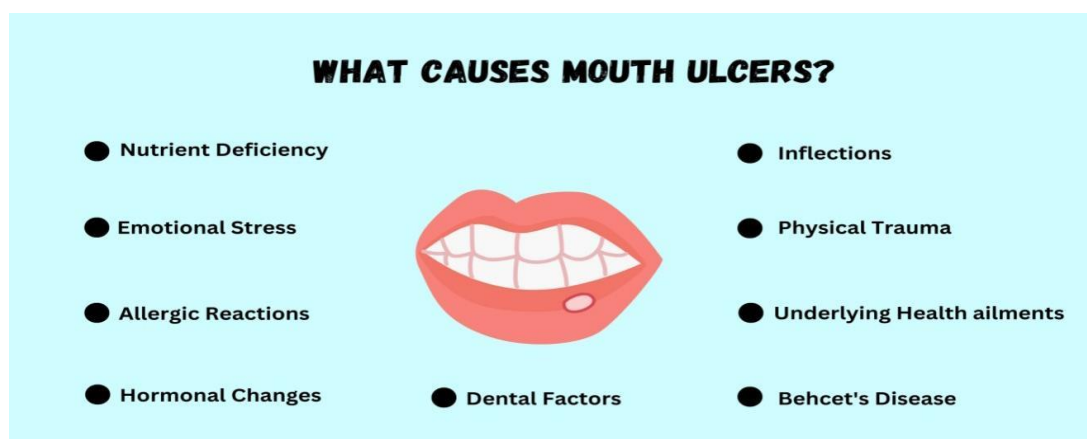


Figure 1 Causes of Mouth Ulcer

Disadvantages-

Slower Action: People who use options need to be patient because it takes a long time to see results. This is because herbal options work slower than kinds of medicine.

Lack of Standardisation: If people do not use options correctly they may not get the results they want. They might even get sick because there is no way of using these options.

Drug Interactions: When people take options with other medicine it can cause problems. The herbal options can interact with the medicine in a bad way.

Risk of Poisoning: Sometimes people pick the plants and this can be very bad. They might eat parts of the plant that're poisonous like the leaves of the rhubarb plant.

Inadequate Evidence: We do not know if herbal options really work for all kinds of ulcers. This is because there is not research, on herbal options to say for sure if they are effective. Herbal options need to be studied to see if they really work for ulcers. [5]

IMPORTANCE OF POLYHERBAL GEL

Enhanced Pain Relief and Faster Healing: Polyherbal gels help reduce pain, burning and irritation from mouth ulcers. They also help heal the tissue. The gels soothing effect helps fix the mouth lining faster.

Safer and Natural Ingredients: Polyherbal gels are made from plants so they are safer than man-made medicines. They have side effects and are easy to use for a long time.

Multiple Benefits: Polyherbal gels have herbal ingredients that work in different ways. They help kill germs reduce swelling and prevent damage. This helps get rid of mouth ulcers and stops them from getting worse.

Easier to Use and More Comfortable: The gel is easy to apply and creates a layer over the ulcer. It sticks to the mouth lining. Stays there longer which helps it work better.

Prevents Infections: Polyherbal gels have properties that help prevent bad germs from growing. This reduces the risk of infections and complications, from mouth ulcers.

Helping Tissue Regeneration: Lots of herbs help our body make cells and form collagen, which makes damaged tissues heal faster and better. Tissue regeneration is very important for our body to heal.

Fighting Against Harmful Things: The things in these gels like phytochemicals stop the bad guys called free radicals, which reduces stress on the ulcer and stops more cells from getting damaged. This helps our body to heal the ulcer.

Boosting Our Immune System: Some herbs make our immune system stronger which helps our mouth to fight against ulcers and infections that keep coming. This is very good for our health.

Easy to Get: Compared to treatments these polyherbal gels do not cost a lot of money and we can easily buy them so we can use them all the time. Polyherbal gels are an option for us.

Good for the Earth: Because these gels come from plants they are good for the earth. Help us use fewer synthetic chemicals, which is a more natural way to take care of our health. This is very good for our environment and, for us.^[6]

MATERIALS AND METHODS

Method of Preparation

Step-1 Collection of the All Materials

Step-2- Extraction Of Materials Is Collected Directly from Market

Step-3 Weigh All the Materials

Step-4 Take Motar Pestle and Clean It and Dry It

Step 5: Now we need to prepare the gel base. To do this we have to mix Carbopol 934 with distilled water.

We must stir the mixture all the time so that Carbopol 934 spreads evenly in the distilled water. This is a step in preparing the gel base, with Carbopol 934. Allow It to Hydrate and Swell For 1–2 Hours to Remove Lumps.

Step 6: Preparation Of Preservative Solution-Dissolve **Methyl Paraben** in A Small Quantity of Warm Water or Propylene Glycol.

Step 7: Addition Of Humectant- Add **Propylene Glycol** to The Hydrated Carbopol Dispersion and Mix Well.

Step 8: Incorporation Of Herbal Extracts- Add:

- Tulsi Extract
- Guava Extract
- Turmeric Extract
- Jasmine Extract
- Aloe Vera Gel
- Honey -Mix Uniformly to Obtain a Smooth Mixture

Step 9: Neutralization- Add Triethanolamine Dropwise with Gentle Stirring. This Converts the Dispersion into a Clear Gel by Adjusting Ph (~6.5–7). And Add 1-2 Drop Pf Peppermint Oil.

Step 10: Final Adjustment-Make Up the Volume with Distilled Water. Mix Gently to Avoid Air Entrapment^[7-8]

MATERIALS

Honey

Biological source - Honey is a liquid that is full of sugar. This sugar rich liquid is made by bees. Bees, like the honey bee and the giant honey bee make honey. These bees are part of the Apidae family. Are found in the Apis genus. Honey is mainly made by the honey bee, the giant honey bee and other bees that belong to the Apis genus and the Apidae family. Family. --**Family** – Apidae- **Part Used**-glucose and fructose



Figure.2- Honey

Key constituents- Fructose 40-50%, Glucose 30-40%, Sucrose 2-10%

-Uses –

*Honey has a lot of benefits for our skin. Honey is really good at keeping our skin hydrated and clean. It also helps to get rid of the skin cells without being too harsh. This is why honey is great for people who have acne, eczema or dry skin.

* Honey is good for our stomach too. When we take honey with warm water it helps our body to digest food properly. Honey also helps when we are constipated and it makes sure that our gut has bacteria.

* Honey is also good, for our heart. When we eat honey regularly it helps to keep our cholesterol levels in check. It reduces the cholesterol and increases the good cholesterol. Honey also helps to keep our blood pressure under control.

Aloevera

Biological Name- Aloe Barbadensis Milller, **-Family**-Asphodelaceae, **Part Used**-Dried latex (sap) obtained from the leaf rind, along with the inner parenchymatous gel tissue.

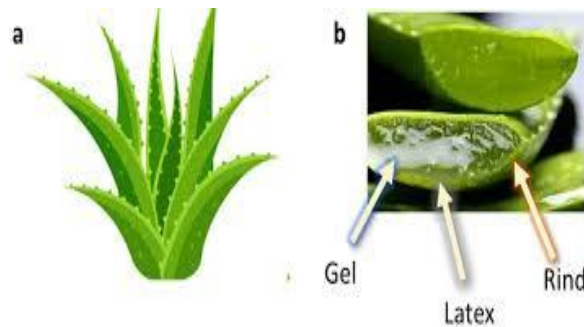


Figure. 3 Aloe vera

Uses-

Oral Health: Aloe vera is really good for your mouth. You can use it as a mouthwash to get rid of the stuff on your teeth and to make your gums healthier.

-Metabolic Control: There is some proof that drinking aloe vera can help control the fats in your blood and it can also help lower your blood sugar levels, which is great for people, with diabetes and it might even help prevent diabetes.

TURMERIC

Biological Name-Curcuma Longa Linn,**Family-**Zingiberaceae,**PartUsed-**Rhizomes



Figure.4 turmeric

Uses

Digestive Support: It helps your gallbladder make bile, which aids digestion and can ease problems, like IBS. It also helps get rid of gas.

Neuroprotective: This stuff might help your brain make more of a protein that keeps it healthy. That could lower your chances of getting depression or Alzheimers.

Antimicrobial: It can kill bacteria and fungi which helps prevent infections and heal wounds. ^[9-10]

Ocimum Tenuiflorum

Biological Name-Ocimum tenuiflorum L., **Family**-Lamiaceae, **Part Used**- leaves or some time seeds.



Figure .5 Tulsi

Uses- Wound Healing: Helps heal wounds faster and boosts your immunity.

Oral Health: People often use it as a mouthwash to keep their mouth clean.

Culinary Use: This spice is very popular in Southeast Asian cooking especially in Indonesia, where it adds a clove-like flavor to dishes like gulai fish.

Cultural & Insect Repellent Use: In some cultures, it is considered sacred. People also use it to keep insects, from stored grains.

Jasminum Grandiflorum

Biological Name-Jasminum grandiflorum jasmine, **-Family**-Oleaceae,

Part Used- flower, leaves, roots



Figure 6 Jasmine

Uses- Skin Care: Tea tree oil helps with skin issues, like dermatitis, acne, wounds and minor skin infections because it kills germs. It also makes skin look better and feel softer.

h-Oral Health: Traditionally used for conditions like stomatitis (mouth ulcers), gingivitis, and for strengthening gums and teeth.

Gynaecological Uses: Employed in traditional medicine for postpartum care and managing certain uterine disorders.

Digestive Health: Used to relieve abdominal discomfort and support liver health in conditions such as hepatitis.

Psidium Guajava

Biological Name- Psidium Guajava, family-Myrtaceae, **Part Used-** fruits, leaves, bark



Figure.7 guava

Uses-

Medicinal and Therapeutic Uses of Guava

Digestive Health Support:

Guava leaves are widely used to manage digestive disorders such as diarrhea, dysentery, gastroenteritis, and stomach cramps.

Anti-Diabetic Properties:

Consumption of guava leaf tea helps regulate blood glucose levels and enhances insulin sensitivity, making it useful in diabetes control.

Oral Care Benefits:

Leaf extracts possess strong antibacterial action, helping relieve toothache, mouth ulcers, bleeding gums,

and gum inflammation.^[11]

Carbopol 934. Carbopol 934 is a white powder that absorbs a lot of water. When you mix it with water it forms a kind of mixture and when you add certain agents like triethanolamine or sodium hydroxide it turns into a clear thick gel. This gel forms because the powder swells up a lot in water. The powder is made of -linked acrylic acid chains that expand when they come into contact with water making it thick and forming a stable gel.

Methyl Paraben- Methyl paraben is a preservative that prevents the growth of microbes in products, such as medicines, cosmetics and food. It belongs to a group of chemicals called parabens.

Propylene Glycol- Propylene glycol is a chemical used in products, like medicines to help mix things together. It is good at mixing with water and other substances.

Triethanolamine-Triethanolamine is a chemical used in products, like medicines and cosmetics. It helps adjust the level mix things together and turn powders into gels.

Peppermint Oil- Peppermint oil comes from the leaves of the Peppermint plant. People use it in medicines, cosmetics and oral care products because it is cooling, soothing and good at preventing microbes from growing.

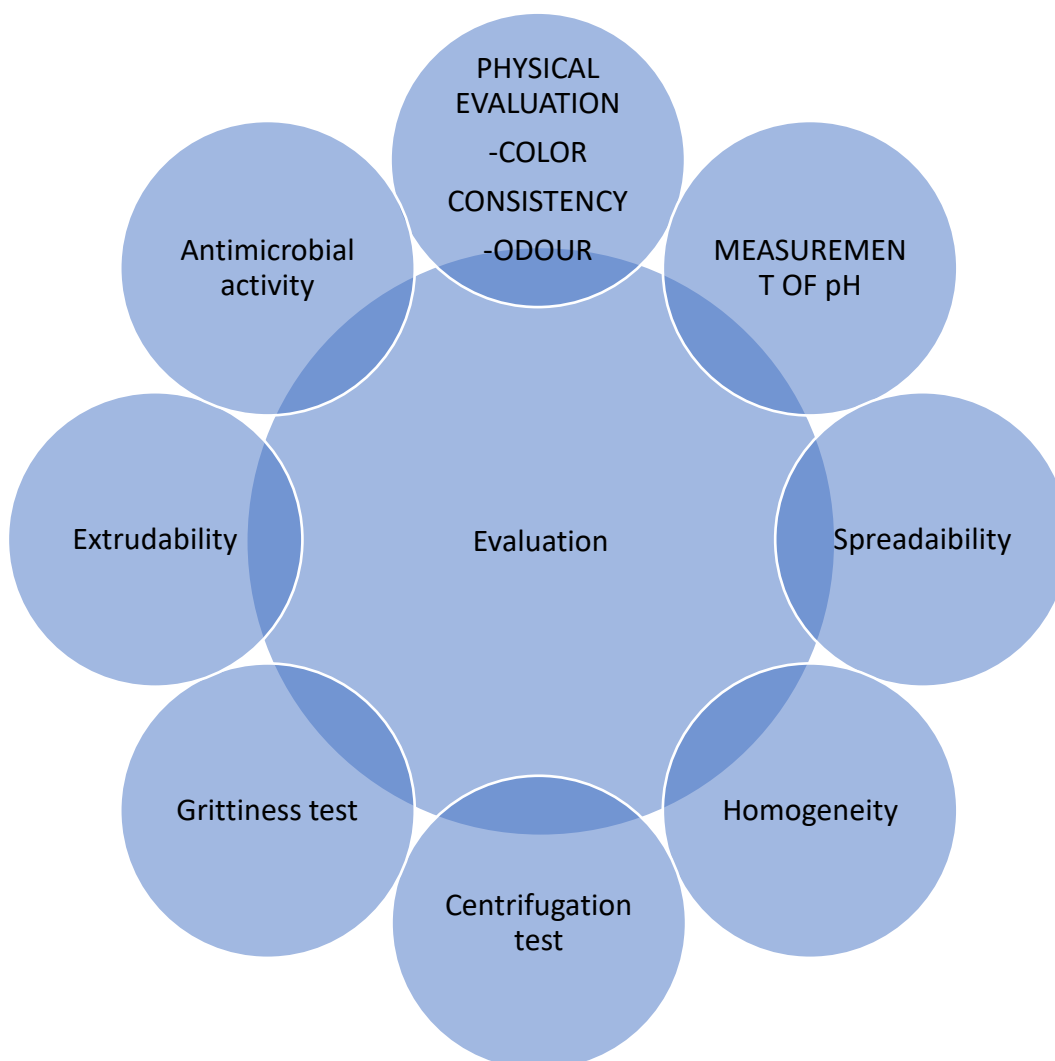
Table-1 Formulation of Gel

S.NO	INGREDIENTS	F1%	F2%	F3%	F4%	F5%	F6%
1	HONEY	2	2	2	2	2	2
2	TULSI EXTRACT	3	3	3	3	3	3
3	JASMINE EXTRACT	0.5	0.3	0.5	0.4	0.2	0.5
4	GUAVA EXTRACT	0.3	0.4	0.5	0.5	0.2	0.4
5	TURMERIC EXTRACT	0.5	0.3	0.3	0.3	0.4	0.5
6		3	3	3	3	3	3

	ALOVERA EXTRACT						
7	CARBOPOL 934	0.4	0.3	0.5	0.5	0.3	0.3
8	TIEETHANOLAMINE	0.2	0.2	0.2	0.2	0.2	0.2
9	Methylparaben	0.3	0.3	0.3	0.3	0.3	0.3
10	Pippermint Oil	0.2	0.2	0.2	0.2	0.2	0.2
11	Propylene Glycol	1	1	1.5	1.5	1	1.5
12	Water	q.s	q.s	q.s	q.s	q.s	q.s

Evaluation of result

Evaluation is when we carefully look at something to see how well it works. We do this to figure out if it is good enough for what we want to use it for. This process of evaluation helps us understand the quality of something. How well it performs. We use evaluation to decide if something is suitable for a purpose like using a new tool for a project. Evaluation is a step because it helps us make informed decisions, about the things we use.



Physical evaluation-

We looked at the characteristics of the gel like its color, smell and consistency by simply looking at it and using our senses.

Color: The color of the gel tells us if it looks good and if it is stable. The color should be the same over and look okay with no weird colors that might mean it has gone bad or got contaminated.

Consistency: The consistency of the gel is, about how thick or thin it's. It should be smooth and not too hard or too runny so it is easy to put on the skin where it is needed.

Odour: The smell of the gel is important. It should smell nice. Not smell too much because a bad smell can make people not want to use it.

Measurement of pH

We measured the pH of the gel to make sure it is okay to use on the skin. We took one gram of the gel and mixed it with ten milliliters of clean water. Then we let it sit quietly for two hours so the gel could get fully wet and mix well. After that we put the tool from the pH meter into the mixture and read the pH. We

did this three times to make sure we got it right. Then we took the average of the three readings and used that as the final answer.

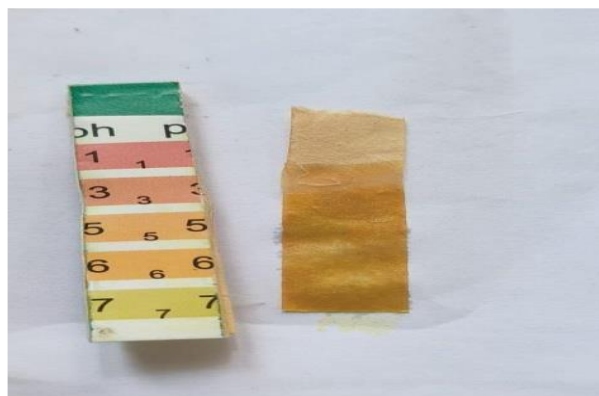


Figure-8 – Ph Measurement

Spreadability The gel formulation was tested to see how easily it can be spread over a surface. We used a method with a glass slide. A glass plate, with a circle that's one centimeter across was used. About half a gram of the gel was put inside the circle. Then another glass slide was put on top of the gel to make a layer. A weight of 250 grams was placed on top of the slide. Left there for about five minutes so the gel could spread properly. After five minutes the slides were pulled apart. The time it took for the top slide to slip off was written down. The gel formulation spreadability was then calculated using the formula. The gel formulation spreadability is a thing to know about the gel formulation.

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

The place where we measure things is important. We have a thing to think about: * S is the spreadability of the gel. * M is the weight that we put on the slide. * L is how long the glass slide is. * T is the time it takes to pull the slide. When the spread ability of the gel is high it is really easy to put on. It goes on evenly. This means that a higher value of the gels spread ability is a thing. The spreadability of the gel is what matters here.



Figure-9 Spreadiblity Test

Homogeneity-All the cream samples were checked to see if they were the throughout. The samples were looked at carefully after they had been left to set. This was done to make sure that all parts of the cream were mixed properly. The cream was checked for lumps, clumps. If it had separated. If it looked smooth and the same over it meant that it was mixed well and the ingredients were stable. The homogeneity of the gel was. Reported based on these checks.

Centrifugation test-All six batches of the gel were tested for stability using a centrifuge. A measured amount of each batch was put into tubes. Spun at 1000 rpm for an hour. After the test the gel was checked for any signs of separation like liquid coming out or layers forming. If no changes were seen it meant that the gel was stable and the results were recorded. The gel formulation was tested for stability, like this..



Figure 10: CENTRIFUGATION TEST

Grittiness test-

The cream was. Felt to see how smooth it was. A little bit of the cream was put between the thumb and index finger. Rubbed gently. This helped to see if the cream was smooth and if it had any bits in it. If the cream had bits that would mean it was not mixed properly. The way the cream felt on the skin was also checked, like how soft it was and how easily it spread. If the cream felt smooth and nice that was a sign that it was made well.

Extrudability-

Easily the cream comes out of the tube. This is called extrudability. This test checks how easy it is to get the cream out of the tube when you squeeze it. This is important because it shows how easy it is to use the cream. In this study the mouth ulcer cream was tested to see how easily it came out of the tube. A special weight was put on the tube to squeeze out the cream and the amount of cream that came out was measured.

The amount of cream that came out was compared to the amount that was put in the tube.

The extrudability was calculated using a formula:

Extrudability percentage = amount of mouth ulcer cream that came out of the tube / total amount of mouth ulcer cream put in the tube * 100

If the percentage is high that means the cream is easy to squeeze out which is good, for people who use it. It means they can get the cream out of the tube easily without having to try hard.

Anti-microbial Activity

The antimicrobial activity of the formulation was tested using a method. This method is called the agar well diffusion method. To start a special food for microbes called nutrient agar medium was. Cleaned in a big machine that uses high pressure and temperature to kill all the bad things that might be in it. The machine is called an autoclave. It was set at 121°C for about 15 minutes. After the food for microbes was cleaned it was poured into plates called Petri plates. These plates were also very clean. The food for microbes was allowed to cool down and become solid in a clean environment. When the food for microbes became solid a special kind of microbe called *Lactobacillus* was put on the surface of each plate. This was done in a way that made sure the microbes were spread out evenly. Next small holes were made in the food for microbes using a clean tool. The formulation that was being tested was put into these holes using a tool that can measure small amounts of liquid. The plates were left alone for a while so that the formulation could spread out into the food for microbes. Then the formulation was given some time to work. The plates were kept at a warm temperature like the temperature of the human body, which is 37°C for 24 hours. After 24 hours the antimicrobial activity of the formulation was checked by looking at the area around each hole where the formulation was put. If the microbes did not grow in that area it meant that the formulation was working well against the microbes. The size of this area was measured to see how well the formulation was working. The antimicrobial activity of the formulation was very important to check. The formulation was tested to see how well it could stop the growth of microbes, like *Lactobacillus*. The antimicrobial activity of the formulation was the main thing being tested..



Fig.11- Anti Microbial Growth

RESULTS AND DISCUSSION

Table -2 Physical Evaluation Of Polyherbal Ulcer Gel

FORMULATION	COLOUR	CONSISTENCY	ODOUR
F1	Brownish Yellow	Smooth	Characterstic
F2	Yellow	Smooth	Characterstic
F3	Yellow	Smooth	Characterstic
F4	Yellow	Smooth	Characterstic
F5	Yellow	Smooth	Characterstic
F6	Brownish Yellow	Smooth	Characterstic

TABLE -3 Ph OF POLYHEBAL ULCER GEL

FORMULATION	pH
F1	5.8
F2	6
F3	6.5
F4	6.3
F5	6.2
F6	5.9

Table-4 Spreadability of Gel Formulation

FORMULATION	SPREADABILITY [cm]
F1	5.3
F2	5.6
F3	7
F4	6.9
F5	5.7
F6	5.2

Table -5 Homogeneity of Gel Formulation

FORMULATION	HOMOGENITY
F1	GOOD
F2	GOOD
F3	GOOD
F4	GOOD
F5	GODD
F6	GOOD

Table-6 Centrifugation Of Gel Formulation

Formulation	Centrifugation
F1	Phase Seperated
F2	No Phase Seperated
F3	No Phase Seperated
F4	Nophase Seperated
F5	No Phase Seperated
F6	Phase Seperated

Table – 7 Extrudability Of Gel Formulation

Formulation	Extrudability [%]
F1	78%
F2	79%
F3	84%
F4	80.1%
F5	80%
F6	78%

Table-8 Grittiness Of Gel Formulation

Formulation	Result
F1	Grittiness Upon Application On Skin
F2	No Grittiness Upon Application On Skin
F3	No Grittiness Upon Application On Skin
F4	No Grittiness Upon Application On Skin
F5	No Grittiness Upon Application On Skin
F6	Grittiness Upon Application On Skin

Table- 9 Antimicrobial Activity Of Gel Formulation

Formulation	Antibacterial Studies [Mm]
F1	Lactobacilli
F2	13[Blank]
F3	24
F4	27[Standard]
F5	14[Blank]
F6	Lactobacilli

DISCUSSION

The prepared polyherbal gel worked well in tests. It had physical and biological properties. This means it could be used to help mouth ulcers heal. All the gel mixtures looked smooth. The same throughout. They did not have any lumps or separate layers. This shows that the ingredients were mixed properly and were stable. The gels also turned into a gel- substance properly. This means that the base and gelling agents were used in the amounts. The gel was not too hard or too soft. It had the strength. This means it can keep its shape when applied without being too stiff or too runny. Tests also showed that the gel could fight bacteria that cause infections in the mouth. These bacteria, like *Staphylococcus aureus* and *Escherichia coli* can make mouth ulcers worse. Keep them from healing. The gel had a mix of *Curcuma longa*, also known as turmeric *Psidium guajava* or guava *Jasminum grandiflorum*, *Ocimum tenuiflorum*, honey and aloe vera. This mix makes the gel more effective. Each of these ingredients has properties that help reduce inflammation fight microbes and heal wounds. Together they help mouth ulcers heal faster reduce infection and soothe tissues. So, this polyherbal gel seems like a treatment, for mouth ulcers.

CONCLUSION

The present study successfully formulated and evaluated a polyherbal mouth gel containing honey, *Ocimum tenuiflorum* (Tulsi), *Jasminum grandiflorum* (Jasmine), *Psidium guajava* (Guava), *Curcuma longa* (Turmeric), and *Aloe vera* for the management of mouth ulcers. The prepared formulations demonstrated satisfactory physicochemical characteristics, including acceptable pH, smooth consistency, good homogeneity, desirable spreadability, and adequate extrudability, making them suitable for oral application. Among the developed formulations, **F3** exhibited the most promising overall performance, showing optimal pH, excellent spreadability, absence of phase separation, no grittiness, and the highest antimicrobial activity against oral microorganisms. The synergistic combination of herbal ingredients provided antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties that can promote faster ulcer healing while minimizing the adverse effects commonly associated with synthetic therapies. Therefore, the developed polyherbal mouth gel represents a safe, effective, economical, and patient-friendly alternative for the treatment of mouth ulcers. Further preclinical and clinical studies.

REFERENCE

1. Singh, R.; Bansal, S.; Mishra, M. K. Formulation and Evaluation of Herbal Oral Gel Containing Extracts of Powdered *Psidium guajava* Linn Leaves with *Curcuma longa* Linn Rhizomes to Treat Mouth Ulcer. **Int. J. Drug Dev. Res.** **2020**, *12*.
2. Healthline Media. *Honey: Uses, Benefits, and Side Effects*. Healthline. <https://www.healthline.com> (accessed 2026-07-01).
3. Joy, P.; Thomas, J.; Samuel, M.; Baby, S. P. *Medicinal Plants*; Kerala Agricultural University, Aromatic and Medicinal Plants Research Station: Kerala, India, 1998.
4. Thomas, J. Medicinal and Aromatic Plants Research in India. In *Proceedings of the UNDP Training Course on Indigenous Medicinal and Aromatic Plants*; Beijing, China, 1997; pp 17–27.
5. International Journal of Pharmaceutical Research and Applications. **2023**, *8* (1), 265–277.
6. Kokate, C. K.; Purohit, A. P.; Gokhale, S. B. *Pharmacognosy*; Nirali Prakashan: Pune, India.
7. *Indian Pharmacopoeia*; Government of India, Ministry of Health and Family Welfare: New Delhi, India.
8. *Remington: The Science and Practice of Pharmacy*.
9. Mayo Clinic Staff. Honey. *Mayo Clinic*. <https://www.mayoclinic.org/drugs-supplements-honey/art-20363819> (accessed 2026-07-01).
10. Evans, W. C. *Trease and Evans Pharmacognosy*, 16th ed.; Elsevier: London, U.K., 2009.
11. Evans, W. C. *Trease and Evans Pharmacognosy*; Elsevier: London, U.K.
12. Rowe, R. C.; Sheskey, P. J.; Quinn, M. E., Eds. *Handbook of Pharmaceutical Excipients*; Pharmaceutical Press and American Pharmacists Association: London, U.K.