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Research Article

Formulation And Assessment of Oral Gel for The Treatment of Mouth Ulcer Using Extract from Jamun Seed Powder

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ABSTRACT

The majority of the world's population, particularly in developing nations, still relies on herbal medicines for primary health care because they are more culturally acceptable, more compatible with the human body, and have fewer adverse effects. Herbal treatments are made from a plant or its components and are used to cure ailments, diseases, and injuries, as well as to promote health and healing. People are now more conscious of the side effects and the ingredients used in the preparation of gels and other formulations. In the Unani and Ayurvedic health systems, the native Indian Jamun (*Syzygium cumini* Skeels) has been used as medicine for the last century. As a traditional will, jamun is utilized quite effectively to prevent inflammation and ulcers in the therapy. The subject of "herbal gel for the treatment of mouth ulcers" is covered in this article. A mouth ulcer is an open sore on the skin or mucous membrane lining that is distinguished by the shedding of inflammatory dead tissue. Jamun seed powder contains bioactive compounds that have antiulcer effects, such as flavonoids, terpenes, triterpenoids, and anthocyanin.

INTRODUCTION

Mouth ulcers, often painful round or oval sores, develop on the oral cavity's mucous membrane. Common causes include deficiencies in iron, food allergies, hormonal imbalances, infections, stress, indigestion, mechanical injuries, vitamins, poor dental hygiene, and skin conditions. They cause discomfort during teeth cleaning, eating, or drinking. It can be caused by spicy or acidic foods,

hot food or beverages, chemical irritation from toothpaste or mouthwash, tongue bites, poorly fitted dentures, painkillers, beta-blockers, anxiety, and hereditary factors. Other common causes include hot food, hot beverages, and improperly fitted devices.

There are three forms of mouth ulcers: small, big, and herpetiform.

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- Minor ulcers often disappear in two weeks and range in diameter from 2 to 8 mm.
- Major ulcers are deeper, larger, and may cause a scar.
- Herpetiform ulcers are dozens of tiny lesions [1],[3].

Traumatic ulcers, caused by teeth brushing, harsh foods, chemical burns, and ill-fitting dentures, can

cause complications. Within ten days, the trauma is resolved when the underlying cause is removed. After three weeks, if the ulcer has not healed, a biopsy is necessary to rule out cancer. Up to 20% of people have Recurrent Aphthous Stomatitis (RAS), a common illness that causes recurrent oral ulcers. Its exact cause is unknown, but risk factors include nutrient deficiencies, genetics, stress, and certain conditions. It may also be an early sign of systemic diseases like HIV or Behcet's disease [2].



Figure no.1 (a) Major RAS, (b) Minor RAS



Figure no.2 Traumatic ulcers

Since the beginning of time, medicinal plants have been used to treat human ailments. One-fourth of the world's population, or 1.42 billion people, use traditional medicines to treat a wide range of illnesses, which is not surprising. Evidence suggests that most populations on the earth have been using herbal therapy since prehistoric times. Numerous medicinal plants and plant parts can be

found in Indian flora. These plants can be exploited to find efficient substitutes for pharmaceuticals. Numerous human ailments can be effectively treated by plants, and people are increasingly turning to herbal remedies because they don't have the typical side effects of allopathic medications. Additionally, Indian traditional medicine prescribes drugs for a wide

range of conditions, such as snake bites, diarrhea, scabies, leprosy, wound healing, inflammation, skin infections, venereal illness, and ulcers of any type. It follows that herbal remedies are clearly a significant part of the treatment plans that are being used all over the world ^[4].

Herbal Treatments for Mouth Ulcers: In order to avoid and treat ulcers Historically, phytogetic substances have been utilized by herbalists and traditional healers. ^[1] The medicinal plant's initial photochemical screening identified the proximity of important optional metabolites such as tannins and flavonoids ^[5]. Terpenes and triterpenoids have demonstrated in recent decades that they are physiologically significant in reducing a variety of inflammatory symptoms, most likely by blocking several pathogenic processes in the inflammatory process ^[6]. A gel is a system that is either solid or semisolid. consisting of two or more constituents with a condensed bulk and liquid interpenetration. Despite having a solid-like consistency rather than a liquid-like one, gels and jellies are composed of a small amount of solids dispersed among a large volume of liquid. A defining characteristic of gel and jelly is the existence of some kind of epidermal structure, which gives them their solid-like properties.

ADVANTAGES

- Avoid the initial metabolism by the liver.
- Easy, favourable, and straightforward to execute.
- Capability to more accurately target medications to a designated area.
- Permitting the use of drugs that have a brief biological half-life.
- Enhancing the physiological and pharmacological reaction of the drug.

- Boost patient compliance.
- It is suitable for self-treatment.
- Mitigate the hazards and disadvantages of intravenous therapy, along with the differing absorption circumstances, like enzyme activity and pH changes.
- It can conveniently stop the medications when necessary.

DISADVANTAGES

- The medication and/or excipients may trigger skin irritation in individuals with contact dermatitis.
- Certain medications exhibit low permeability
- Through the skin or mucous membrane, which
- Could result in allergic reactions.
- Only utilized for drugs that necessitate a very low
- Plasma concentration to operate.
- Drugs might be altered by an enzyme in the epidermis.
- Drugs with larger particle sizes are harder to absorb via the skin^[3].

Eugenia jambolana Lam. (Syn. Syzygium cumini Skeels or Syzygium jambolana Dc or Eugenia cuminii Druce), which is part of the Myrtaceae family, is a large evergreen tree native to the Indian subcontinent. These trees are found growing in Madagascar, South America, Eastern Africa, the Asian subcontinent, and the warmer regions of the United States of America. Their fruits are the trees' most famous feature, and the fruits are linked to their popular names, which include Java plum, Portuguese plum, Malabar



plum, black plum, Indian blackberry, jaman, jambu, jambul, and jambool. The two main morphotypes of jamun in the Indian subcontinent are identified by morphological and organoleptic characteristics, according to botanical research: the Ras Jaman, which is oblong, dark purple or bluish, with sweet, pink fleshy pulp and tiny seeds, and the Kaatha jamun, which is small and has an acidic flavor. The fruits do not all ripen at once and grow in clusters of four to twenty. Each one has a huge seed and can be round, oblong, or elliptical, with a size range of ½ to 2 inches. The fruit's chemical composition varies over the course of its two-month development. When ripe, the fruit turns from green to light magenta and finally dark purple or black. When fully ripe, the fruit can leave a purple stain on the tongue and tastes a combination of sweet, slightly sour, and astringent.

Traditional uses: In nations where the jamun tree is found, traditional medicine has made use of all parts of the tree, particularly the seeds. Ayurveda, Unani, Siddha, Tibetan medicine, and homeopathy all place importance on it. The bark's strong flavor, digestive qualities, and capacity to tighten tissues are all well-known in Ayurveda. It is thought to help with ulcers, biliousness, thirst, bronchitis, asthma, sore throats, and dysentery ^[10]. Comprising essential minerals like sodium, potassium, calcium, phosphorous, iron, and zinc; water-soluble vitamins like ascorbic acid, thiamine, and niacin; carbohydrates like glucose,

mannose, sucrose, maltose, fructose, galactose, and mannose; and free amino acids like alanine, asparagine, tyrosine, glutamine, and cysteine, research has shown that jamun pulp is a very nutrient-dense^[7].

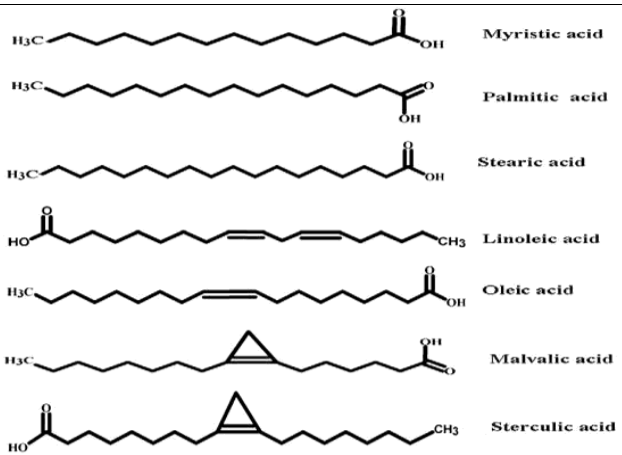
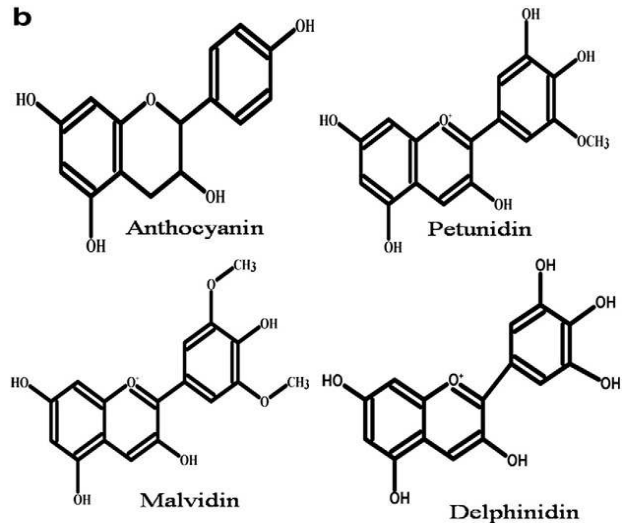
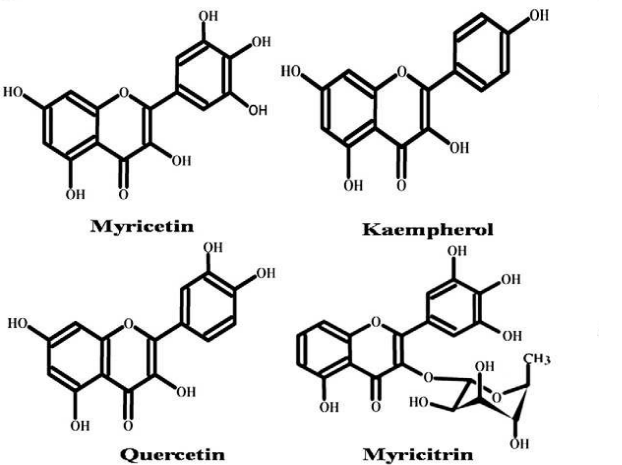
Phytochemistry of Jamun: Studies have shown that the pulp of jamun contains anthocyanins, delphinidin, petunidin, and malvidin-diglucosides, which are responsible for the fruit's distinctive purple pigment. The plant's seeds, which have been studied the most, are thought to contain quercetin, β -sitosterol, jambosine, gallic acid, ellagic acid, corilagin, 3,6-hexahydroxy diphenoylglucose, 4,6-hexahydroxydiphenoylglucose, 1-galloylglucose, and 3-galloylglucose ^{[8],[9],[11],[12]}.

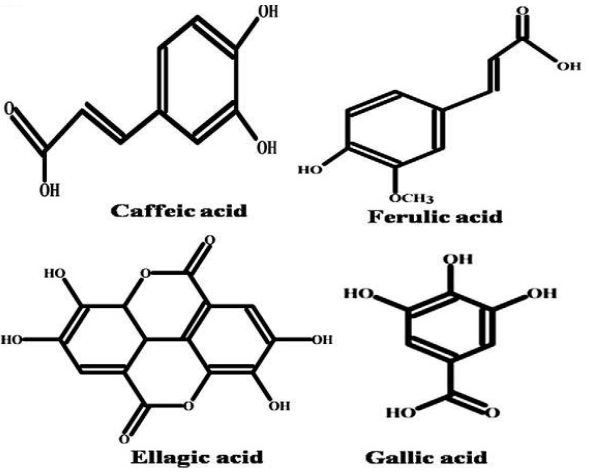
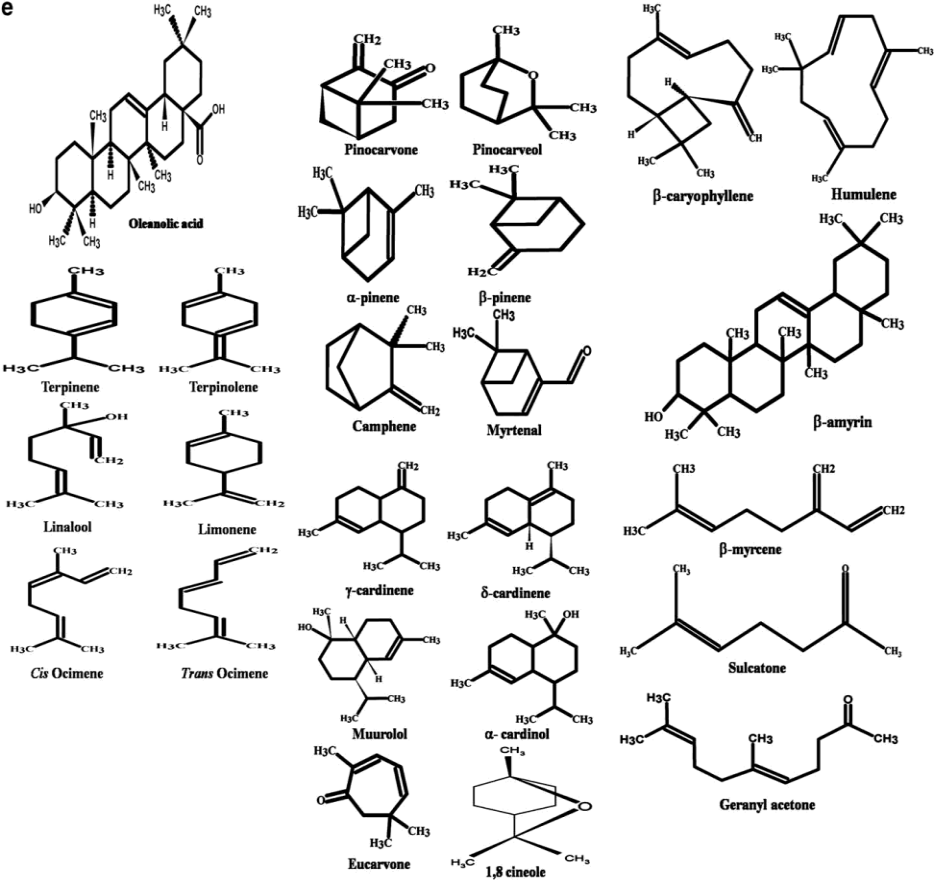


Figure no.3 *Eugenia jambolana* Lam.

Table no.1 Phytoconstituents of Jamun seed powder

Aliphatic acids present in Jamun.	
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	 Myristic acid Palmitic acid Stearic acid Linoleic acid Oleic acid Malvalic acid Sterculic acid
Anthocyanins presents in Jamun	b  Anthocyanin Petunidin Malvidin Delphinidin
Flavonoids present in Jamun	 Myricetin Kaempferol Quercetin Myricitrin

Important phenolics in Jamun.	 Caffeic acid Ferulic acid Ellagic acid Gallic acid
Phytosterols and Terpenes present in Jamun,	e  Oleonolic acid Pinocarvone Pinocarveol β-caryophyllene Humulene Terpinene Terpinolene α-pinene β-pinene Camphene Myrtenal β-amyrin Linalool Limonene γ-cardinene δ-cardinene β-myrcene Cis Ocimene Trans Ocimene Muurolol α-cardinol Sulcatone Eucarvone 1,8 cineole Geranyl acetone

MATERIALS AND METHODS

Collection of Materials:

The seed powder of jamun is collected and authenticated from Wagdole Vanaushadhi Bhandar, 642, Shanivar Peth, Satara. Maharashtra, India. Carbopol 934 was procured from Pharmaceutics lab, Satara college of



pharmacy, Satara. All the other excipients were of analytical grade.

Preparation of Extract:

The extraction was done using the Soxhlet extractor using hydro-alcohol as a solvent. The Soxhlet Extractor was set up by placing the thimble in the main chamber, adding a suitable hydroalcoholic solvent mixture (ethanol : water 50:50 v/v) in the round-bottom flask, and

condenser was connected. By heating the solvent mixture in the round-bottom flask with a heating mantle, the solvent vapors were forced to condense and fall into the thimble that held the plant material. After the extraction was completed, the Round-bottom flask containing the extracted compounds was removed and the solvent was evaporated using a water bath to obtain the crude extract and was collected in an air tight container [14].



Figure no.4 Extraction of Jamun seed powder using Soxhlet Extractor

Phytochemical screening:

The extract that was prepared above underwent initial phytochemical screening tests to determine the presence of different components, utilizing various tests and reagents. The necessary phytoconstituents for anti-ulcer activity in oral ulcers include Flavonoids (Quercetin, Kaempferol, Myricetin, Myricitrin), Terpenes, Anthocyanin, and Triterpenoids (Lupeol). To identify their presence in our extract, various kinds of chemical tests were conducted.

Detection of flavonoids

- **Alkaline Reagent Test:** A few drops of sodium hydroxide solution were added to the extracts. Flavonoids are indicated by the appearance of a deep yellow color that turns colorless when diluted acid is added.
- **Lead acetate Test:** A few drops of lead acetate solution were added to the extracts. A yellow precipitate's development suggests the presence of flavonoids [13].
- **Shinoda Test:** Introduce several pieces of magnesium ribbon into the extract, then gradually add concentrated hydrochloric acid drop by drop. The emergence of a red, orange,

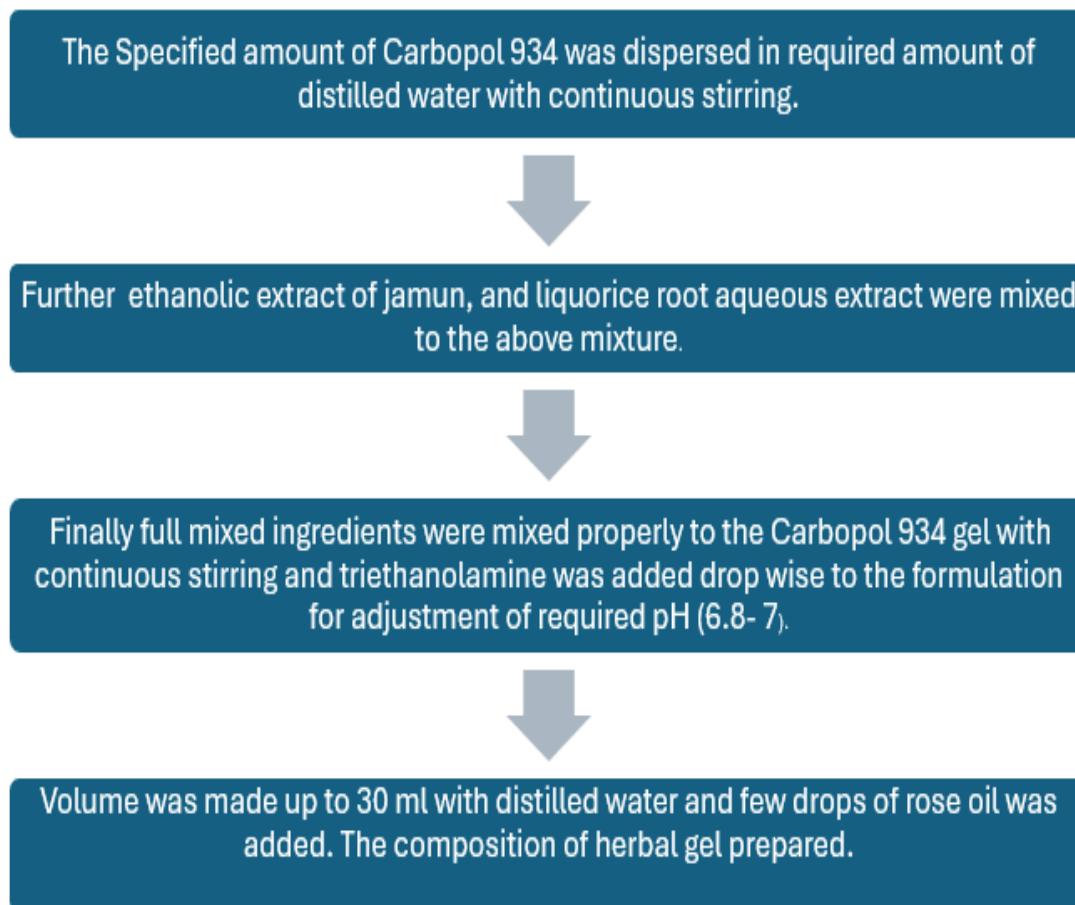
or pink hue suggests the existence of flavonoids.

chloroform. The presence of triterpenoids is suggested by the reddish-brown tint that develops at the boundary^[14].

For Triterpenoids :

- **Salkowski Test:** Add a few drops of strong sulfuric acid after dissolving the extract in

Procedure:^[3]



Assessment of Herbal gel:

- **Visual Appearance:**

The created gel color, transparency, texture, clarity, and presence of any gritty particles were all examined.

- **Measurement of pH:**

A digital pH meter was used to measure the herbal gel compositions pH. Ten milliliters of distilled water were used to dissolve 1 gram of gel, which was then left for two hours. Three measurements

of the formulation pH were made, and the average results are given. It noted the gel formulation pH.

- **Homogeneity:**

When the gel were placed in the beaker , the homogeneity of each generated gel formulation was examined visually. The presence and appearance of any aggregates is examined.

- **Spreadability:**

When a particular stress is applied, spreadability is defined as the number of seconds it takes for two

slides to separate from the gel that is placed between them. Better spreadability results from a shorter time required to separate 2 slides.

Spreadability is calculated by using the formula.

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

Where,

- M = weight tied to upper slide
- L = length of glass slides
- T = time taken to separate the slides

Spreadability of gel formulation were reported.

• Viscosity:

The Brookefield viscometer was used to measure the viscosity of prepared gel ^[16].

RESULT AND DISCUSSION:

Collection and authentication:

The seed powder of jamun is collected and authenticated from Wagdole Vanaushadhi

Bhandar, 642, Shanivar Peth, Satara. Maharashtra, India.

Phytochemical screening:

The extract was examined for phytoconstituents as terpenes, triterpenoids (Lupeol) and flavonoids (Quercetin, Kaempferol). For each phytoconstituent, the results were noted as acceptable.

Table no.2 Phytochemical screening of Jamun seed extract

Name of test	Observations	Inference
Shinoda test (Flavonoid)	Pink color appeared	Flavanoids are present
Alkaline Reagent Test(Flavonoid)	Deep yellow color turns to colorless	Flavanoids are present
Lead acetate test (Flavonoid)	Yellow color precipitate observed	Flavanoids are present
Salkowski test (Triterpenoid)	Reddish - brown color appeared	Triterpenoids are present

Formulation of herbal gel:



Figure No.5 Herbal Gel

Evaluation of Herbal gel:

The prepared gel compositions were evaluated in terms of their viscosity, homogeneity, spreadability, pH, and physical appearance. The

observation demonstrates that the herbal gel had a smooth texture and an elegant look. The pH of the resulting gel ranged from 6.5 to 7.0. Good spreadability was demonstrated by the gel. The produced gel was lump-free and showed good

homogeneity. The plans that were created were much clearer and easier to comprehend. Excellent viscosities within the range were exhibited by the herbal gel.

Table no.3 Evaluation of herbal gel

Physical appearance	Pink, clear, smooth
pH	6.8-7.1
Homogeneity	Homogenous
Spreadability (cm)	6.8
Viscosity (cp)	275

CONCLUSION:

Using the plant's natural anti-inflammatory and wound-healing qualities, the creation and testing of an anti-ulcer gel formulation including flavonoids and triterpenoids from jamun seed extracts has produced extremely encouraging outcomes. Developing a five-herbal oral mouth ulcer gel that reduces pain, inflammation, and side effects while healing mouth ulcers is the main objective. The industry is currently seeing a high demand for herbal formulations because of their affordability and lack of adverse effects. The experimental data above makes it evident that a gel formulation containing herbal substances like Jamun seed extract, liquorice root extract and honey has good properties, including viscosity and antibacterial activity all of which are important for the treatment of mouth ulcers.

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