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A REVIEW ON HERBAL MOUTH ULCER GEL

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ABSTRACT

Mouth ulcers, also known as aphthous ulcers, are common oral lesions that cause significant discomfort and can interfere with eating, speaking, and overall oral health. Conventional treatments often involve topical corticosteroids and analgesics, which may lead to side effects with long-term use. Herbal formulations have emerged as a promising alternative due to their natural origin, biocompatibility, and minimal side effects. This review article focuses on the development and therapeutic potential of herbal mouth ulcer gels. It explores various medicinal plants with anti-inflammatory, antimicrobial, analgesic, and wound-healing properties commonly incorporated into gel formulations. The article also discusses the mechanisms of action, formulation strategies, clinical efficacy, and safety profiles of these herbal agents. The increasing interest in plant-based therapies highlights the need for further research and standardization to ensure consistent quality and therapeutic outcomes.

KEYWORDS: Herbal gel, Aphthous ulcer, Anti-inflammatory, Wound healing.

1. INTRODUCTION

Mouth ulcers are common, self-limiting lesions occurring on the oral mucosa, often caused by stress, nutritional deficiencies, hormonal imbalance, or infection. Recurrent aphthous stomatitis (RAS) affects about 20% of the population and can significantly impact quality of life. Long-term use of chemical formulations may lead to fungal infections or drug resistance, encouraging the exploration of herbal remedies.

1.1 FACTORS RESPONSIBLE FOR THE MOUTH ULCERS

- Toothpastes and mouthwashes that contain sodium lauryl sulphate
- Mechanical trauma
- Emotional stress / Psychic stress
- Nutritional deficiencies
- Allergies and sensitivities
- Hormonal changes
- Genetics
- Infectious agents (both bacterial and viral)
- Medical conditions
- Viral infection

- Mouth ulcer symptoms
- Symptoms of mouth ulcers may vary depending on their cause, but they typically include:
- Painful sores that may be yellow, white, or red.
- Sores on the inside of the mouth, such as on your tongue or the insides of your cheeks or lips.
- Areas of redness surrounding the sores.
- Pain that worsens when you eat, drink, or talk.

Mouth ulcers are not usually contagious unless they're caused by an infection such as hand, foot, and mouth disease.[1]

1.2 TYPES OF MOUTH ULCERS

Mouth ulcers are categorized as major, minor, or herpetiform based on the size and number of ulcers. The following are the most common forms of mouth ulcers.

Minor ulcers: Minor aphthous ulcers are the most frequent type, accounting for around 80% of occurrences. These are approximately 2-8 mm in diameter and usually clear up in 10 to 2 weeks. These ulcers are often superficial, small in size (less than 1.0 cm in size), few in number, occur alone or in clusters, and heal without scarring.

Fig1: Minor ulcer.

Major ulcer: they are a type of mouth ulcer, also called aphthous ulcer are the most frequent type, accounting for around 80% of occurrence. These are approximately 2-8 mm in diameter and usually clear up in 10-12 weeks.

Fig 2: Major ulcer.

Herpetiform ulcers: Herpetiform ulcers, is a term that refers to the clustered appearance of lesions. This ulcer consists of a cluster of dozens of tiny lesions the size of pinheads. It has nothing to do with the herpes virus. These appear in enormous numbers, ranging from 10 to100 at a time, and are made up of several tiny lesions that eventually join to form larger plaques.[2]

Fig 3: herpetiform ulcer.

1.3 HERBAL MEDICINE IN MOUTH ULCER TREATMENT

The World Health Organization (WHO) defines herbal medicine as a practice which includes herbs, herbal materials, herbal preparations and finished herbal products, that contains as

active ingredient parts of plants, or other plant materials, or combinations. These herbs are derived from plant parts such as leaves stems, flowers, roots, and seeds. Herbal drugs contain active ingredients, plant parts or plant material in the processed or crude state with certain excipients, i.e., dilutions, solvents or preservatives. Scientifically, they are known as phytochemicals which includes several classes such as saponins, flavonoids, glycosides, tannins, alkaloids.

Phytochemical have been scientifically validated over the years to provide health benefits for humans. For example, herbal remedies used as sedative and stomachic mixture contain mainly aromatic plant species which have therapeutic essential oils, possessing antibacterial, stomach soothing and antispasmodic properties. Plant species which have high tannin contents are used in mixtures for diarrhea and stomach ulcer; generally showing antimicrobials, astringents and anti-inflammatory activities.[3]

ADVANTAGES

Herbal medicines can treat minor conditions like scrapes, rashes and burns. They can also be used to treat migraines, arthritis and depression at a very low cost.

The cost of herbal medicines is very low compared to pharmaceutical drugs because they can be found in local supermarkets or grown at home.

Herbal medicine can also be found in everyday foods such as ginger, garlic and rhubarb.

DISADVANTAGES

Herbal Medicines may come with many advantages. But it also comes with a set of disadvantages as well. For one, herbal medicines take a longer time to work compared to pharmaceutical drugs. If an individual decides to take the herbal alternative to pharmaceuticals, he or she must be very patient.

Herbal medicines are often self-administered. As a result, there is no dosage or warnings specified. When Herbal medicines are consumed with pharmaceutical drugs, the two can interact with each other resulting in injuries to health.

It is also important to know that plants used as a herbal medicine may poison rather than cure someone. It may be the case where a certain part of a plant may be edible and another part may be poisonous. Take rhubarb for example. The roots of rhubarb are used as a laxative and the stem is edible.

Common Herbs Used.

• Aloe vera: Soothes inflammation and accelerates healing.

• Neem (Azadirachta indica): Antiseptic, antimicrobial, and immunomodulatory.

• Turmeric (Curcuma longa): Anti-inflammatory and antiseptic.

• Mint (Mentha): Provides a cooling and antibacterial effect.

Basella alba: Exhibits antiulcer and antiviral properties.[4]

2. GEL

The word "gel" is derived from "gelatin" and both "gel" and "jelly" can be drawn back to the, Latin gelu for frost and gel are meaning freeze or congeal. This source shows the essential idea of a liquid setting to a solid-like material that does not flow, but is elastic and retain some liquid characteristic. Use of term 'gel' as a classification originated during the late 1800s as chemist attempted to classify semisolid substances.

Fig 4: Gel.

Ideal Gel Properties

• Non-irritant, transparent, and stable.

• Uniform viscosity and good spreadability.

• Efficient drug release at the site of action.

TYPES OF GEL

Gels can be classified based on colloidal phases, nature of solvent used, physical nature and rheological properties, etc.

A. BASED ON COLLOIDAL PHASES: - They are classified into.

1. Inorganic (two phase system)

A system consists of floccules of small particles rather than bigger molecules and gel structure when the partition size of the dispersed phase is quite large and forms the three-dimensional structure throughout the gel. In this case, the system is not necessarily stable. They need to be thixotropic, generating a semisolid state while left unmoved and becoming liquid when stirred can be polymers made of natural or synthetic materials.

2. Organic (single phase system)

They are made up of sizable organic molecules that are dispersed in a continuous phase and are present on twisted strands. These bigger organic molecules, which can be polymers made of natural or synthetic materials.

B. BASED ON THE NATURE OF SOLVENT USED

1. Hydrogels (water based)

Water acts as a continuous liquid phase in hydrogels. For instance, poloxamer gel, gelatin, cellulose derivatives, and bentonite magma.

2. Organic gels (with a non-aqueous solvent)In their continuous phase, they have a non-aqueous solvent. Examples include metallic stearate dispersion in oils and low molecular weight polyethylene that has been dissolved in mineral oil and quickly cooled.

3. Xerogels

Solid gels with decreased solvent content are referred to as xerogels. They are created when the solvent evaporates, leaving the gel structure behind when it comes in touch with new fluid. Tragacanth ribbons, acacia tears, dry cellulose, and polystyrene are a few examples.

C. BASED ON RHEOLOGICAL PROPERTIES

Usually, gels exhibit non-newtonian flow.

1. Plastic gel

The yield value of the gels at which the elastic gel deforms and starts to flow is shown by the rhea gram plot. For instance, bingham bodies and flocculated aluminum hydroxide suspensions show a plastic flow.

2. Pseudo plastic gel

This sort of gel's viscosity decreases as the rate of shear increases without any yield value. E.g., pseudo-plastic flow is present in the liquid dispersion of tragacanth, sodium alginate etc.

3. Thixotropic gels

The connections separating the particles in this kind of gel are relatively flimsy and are easily destroyed by shaking. Due to the particle collision and subsequent re-linking (the reversible isothermal gel-sol-gel transformation), the resulting solution will reform as gel. Examples kaolin, bentonite, and agar.

D. BASED ON PHYSICAL NATURE

1. Elastic gels

At the junction, relatively weak interactions like hydrogen bonds and dipole attraction hold the fibrous molecules together. Alginates, guar gum, and agar gels are a few examples.

2. Rigid gels

These represent gel macromolecules in which the framework is bonded by a primary valance bond. E.g., in silica gel, silica acid molecules.

E. BASES OR GEL FORMING POLYMERS

It can be classified as follows.

1. Natural polymers

These polymers can be produced by living things and are present naturally. For instance, polysaccharides like agar, tragacanth, pectin, and gum as well as proteins like collagen, gelatin, etc.

2. Semi synthetic polymers

These polymers are often created via the chemical modification of natural polymers.

3. Synthetic polymers

Synthetic polymers are those that are produced using in-vitro circumstances. For Instance, polyacrylamide, Carbopol.[5]

3. POLYMER USED IN FORMULATION OF GEL

Carbopol

Synonym: Mucoadhesive polymer

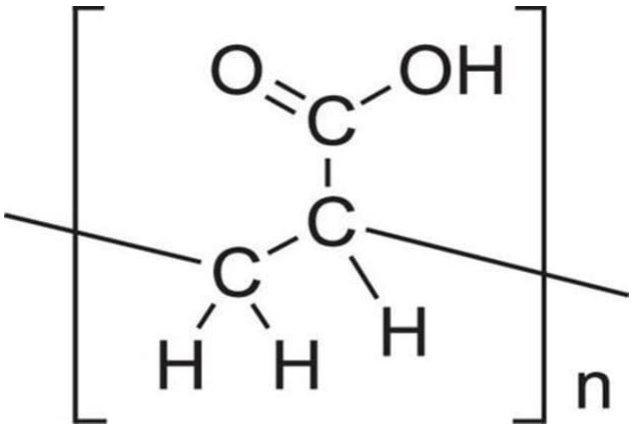

Fig 5: Carbopol.

Description: Carbopol 934 is a high molecular weight, cross linked acrylic polymer that is specifically polymerized in benzene and contains carboxylic acid group, making it effective as a binder and for controlling the release of active ingredients in pharmaceutical dosage forms.

Uses

Thickening agent

Gelling agent

Emulsifier agent[6]

4. METHOD OF PREPARATION OF GEL

There are three techniques for making gel.

4.1 Fusion technique: This technique involves blending of drug and excipients at a high temperature until a semi- firm texture is obtained.

4.2 Cold method: In this method, all the ingredients, except active ingredient, are heated and simultaneously. Mixed. The temperature of the mixture is then lowered, the drug is added, and the blending process is repeated until gel has formed.

4.3 Dispersion approach: This process involves mixing the gelling agent with water until it begins to swell, at which point the medicine is dissolved in medium and added to it. If necessary, add buffer solution to the gel to get required pH.[7]

5. EVALUATION OF GELS

The evaluation of gel formulation including assessments of visual appearance, pH, homogeneity, and spread ability.

5.1 Visual appearance: The color, clarity, texture, transparency and occurrence of any gritty particles.

5.2 Measurement of pH: 1 gm of gel should be taken and distributed in 10 ml of distilled water and keep it aside for 2 hours. The measurement of pH of formulation is carried out in 3 times and the average values are stated.

5.3 Homogeneity: Gel formulations is tested for homogeneity by visual appearance after the gels were poured into the container. The gel is examined for the presence and visual appearance of any aggregate's masses.

5.4 Spread ability: It is expressed in terms of time in seconds taken by 2 slides to slip off from gel that is placed in between the slides under the direction of certain weight. If the time taken for separation of 2 slides is fewer than well the spread ability.

Spread ability 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.

5.5 Viscosity: The viscosity is analyzed by using brooked fields viscometer with spindle number 64 at 10,20,30 rpm.

5.6 *In vitro* drug release study: Franz diffusion cell is used to conduct an in vitro drug release study of an in herbal gel. In the donor compartment, 1 ml of formulation (equal to 1 g of gel) is deposited, and in the receptor compartment, freshly produced phosphate buffer solution (pH 6.8) was poured. The egg membrane is fitted between the chambers. One cell as blank is filled with only filled phosphate buffer solution. The units should be then placed on a magnetic stirrer with thermostat. The medium is maintained at a constant temperature of 37 °C ± 0.5. After each 1 h interval, 1 ml of sample has to be withdrawn and same amount of phosphate buffer solution from blank should be transferred into the sample cell for maintaining sink condition. Then, withdrawal amount is diluted to 10 ml in PBS pH 6.8, and concentration is measured using a UV-visible spectrophotometer, and using phosphate buffer solution pH 6.8 as a blank. The calibration curve is plotted and used to determine the percent cumulative drug release.[8]

6. CONCLUSION

The review helps us realize that the naturally existing components of medicinal herbs may effectively treat mouth ulcers, regardless of the cause, and stop them from coming again. Naturally the plants possess biologically effective anti-inflammatory and antioxidant agent. This review provides the information of treatment of ulcer by different herbal medicinal plant and give information of its family, kingdom, chemical constituents, uses etc. This review also provides the herb has introduced a good protocol for treatment of various mouth ulcers. In present days the demand of herbal formulation in the market due to their cost effective and less side effect and the above experimental data, it is clear that the gel formulation with herbal ingredients such as aloe, neem, turmeric, mint, basella alba has good characteristic, viscosity and also possesses a good antimicrobial activity, anti-inflammatory which is necessary in the management of mouth ulcer.

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