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Review Article On: Mouth Ulcer Gel

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ABSTRACT.
According to studies, the herb Glycyrrhizaglabra Linn has qualities that include antibacterial, antioxidant, antimalarial, antispasmodic, anti-inflammatory, anti-ulcer, antiviral, antihepatotoxic, antifungal, and anti-hyperglycemic.
As the mouth ulcer is healing, it frequently causes pain and discomfort and may change the person's eating preferences. The two most frequent causes of oral ulceration are aphthous stomatitis and local trauma. Little, painful ulcers with a red border and a yellow-graycenter are known as mouth ulcers. Topical antihistamines, antacids, and corticosteroids can all be used to treat mouth ulcers. There is also a natural remedy for mouth ulcers that uses the licorice plant in herbal medicine. The goal of this study is to manufacture licorice as a gel and determine whether or not it is useful in treating mouth ulcers.
The physical evaluation of liquorice powder, including color, smell, and look, is observed in this project job.
The appropriate solvent is used to extract glycyrrhizic acid from licorice. For 10 grams of the extraction, a 3:7 ratio of ethanol to water was used. It is harvested from the dry extract.
The gel's major active component, liquorice extract, is created utilizing excipients such as propylene glycol, carbopol 934, methyl paraben, propyl paraben, triethanolamine, and water.
Keywords: - Liquorice extract, antiulcer, maceration, gel.

I. INTRODUCTION.

Topical gel formulations, which are homogenous, semisolid preparations made of solutions or dispersions of one or more medications in appropriate hydrophilic or hydrophobic bases, serve as an effective drug delivery mechanism since they are less oily and are simple to remove from the skin. For medicinal, preventative, or defensive purposes, they are applied to the skin or specific mucous membranes. [5]

Gastric ulcers, arthritis, allergies, inflammation, leukemia, cancer, psoriasis, atopic dermatitis, and hepatotoxicity have all been successfully treated with liquorice. Licorice essentially has two parts, glycine, and aglycone, which are what give it its therapeutic qualities. Of them, the glycone portion, or glycyrrhizic acid (GA), is a significant component responsible for the pharmacological and biological effects of licorice. Aglycone is glycyrrhetinic acid. GA is a triterpenoid disaccharide glycoside that has been shown to possess anti-inflammatory, anti-diabetic, and several other effects. [10]

Maceration was used to extract the glycyrrhizic acid. The examination of licorice powder and roots is done on a physical and phytochemical level. The best extraction solvent for glebridin and glycyrrhizic acid from licorice was chosen. Simple maceration was used to carry out the extraction. For the creation of gel, oral-administerable excipients are selected.

Excipients utilized in the production of gels include carbopol 934, propylparaben, triethanolamine, methylparaben, and propylene glycol. Three batches of the gel formulation were created, each using a different concentration of the gelling ingredient carbopol 934. On the basis of appearance, one batch is chosen that has the majority of gel-like qualities. [5]

MOUTH ULCER:-

Oral ulcers:-

A molecular necrosis-induced rupture in the integrity of the epithelium is known as an ulcer.

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The oral area is where ulcers are most frequently found, and patients typically seek medical or dental attention for these conditions. Common symptoms include discomfort, a burning feeling, and/or redness. They can appear anywhere in the oral cavity, but if they do so in the moveable area, they could be uncomfortable.[5]

An ulcer that develops on the mucous membrane of the oral cavity is known as a mouth ulcer, also known as an oral ulcer or a mucosal ulcer. Usually, on the inside of the cheeks or lips, these are painful round or oval sores that develop in the mouth.

Mouth ulcers are fairly frequent and can be brought on by a variety of diseases and procedures, although most of the time they have no major underlying causes.

Nutritional deficiencies, such as iron deficiency, vitamin deficiencies, particularly B12 and C, poor dental hygiene, infections, stress, indigestion, mechanical damage, food allergies, hormonal imbalance, skin conditions, etc. are common causes of mouth ulcers. Mouth ulcers often referred to as aphthousulcers, might hurt when drinking, eating, or cleaning your teeth. [24]

Types of Mouth Ulcers

On the basis of ulcer size and number, mouth ulcers can be classified as minor, major, and herpetiform. The main types of mouth ulcers are:

Minor ulcers: These are around 2-8mm in diameter and they usually clear up in 10 days to 2 weeks.

Major ulcers: These are bigger and deeper, often with a raised or irregular border. This type of ulcer can take several weeks to heal and may leave a scar in the mouth.

Herpetiform ulcers: This type of ulcer is a cluster of dozens of smaller sores about the size of pinheads[24].

Factors responsible for the mouth ulcers

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

fig. 1 – mouth ulcer

A mouth ulcer is a sore that appears on the inner cheeks, tongue, gums, lips, or palate's soft tissue lining. They may be very painful and are often yellow or red. Aphthous ulcers and canker sores are other names for mouth ulcers.

Mouth ulcers are simple to identify. On your lips, gums, tongue, inner cheeks, or roof of mouth, they typically manifest as sores. Mouth ulcers are often white, yellow, or grey in the middle, with red around the margins. You could just get one ulcer, or you might get several. Other symptoms could include:

- Swelling around the ulcer.
- Increased soreness when brushing your teeth.
- Pain that worsens when eating spicy, salty or sour foods.[4]

CAUSES:-

There is no recognized etiology for mouth ulcers. Yet, a number of reasons can result in the formation of these sores:

- Minor tissue injury from dental work, such as having a cavity filled.
- Accidentally biting your cheek or tongue.
- Allergic reaction to certain bacteria.
- Wearing orthodontic braces or retainers.
- Vitamin deficiencies.
- Using harsh or abrasive toothpaste.
- Eating a lot of acidic foods, such as oranges, pineapples, and strawberries.
- Hormonal changes during your period.
- Stress.
- Lack of sleep.[4]

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GEL:-

Gels are homogenous, semisolid preparations, according to the I.P., that are often made up of solutions or dispersions of one or more medications in appropriate hydrophilic or hydrophobic bases. (2013) Singh Vijay Kumar et al.

According to the U.S.P. definition, a gel is a semisolid system made comprised of a dispersion made up of either big organic molecules or small inorganic particles that are enclosed and contacted by liquid. A "house of cards"-like a three-dimensional structure is created by the inorganic particles. [13]

Fig.2 - gel

STRUCTURE OF GELS:-

The network of interconnected particles that makes up a gel's stiffness is created by the gelling agent. The sort of force causing the connections and the composition of the particles influence the network's structure and the gel's physical characteristics. The hydrophilic colloid's individual particles might be made up of single macromolecules, isometric or spherical aggregates of tiny molecules. Potential configurations of these particles in a gel network. In linear macromolecules, the network is made up of entangled molecules, whose points of interaction may be sparsely spaced apart or include a number of molecules arranged in a crystalline arrangement. Strong primary valencies, as those seen in silicic acid gels, to weaker hydrogen bonds and Vander Waals forces may be the driving factors for the coupling between gelling agent particles. The fact that gel frequently liquefies in response to a little temperature increase suggests that these latter forces are weaker. [21]

CLASSIFICATION OF GELS:-

Gels can be classified based on colloidal phases, nature of solvent used, physical nature and rheological properties, etc.(GaireArjun et al, 2021)

1)Based on colloidal phases:-

They are classified into:

a)Inorganic (Two phase system)

b) organic (Single phase system)

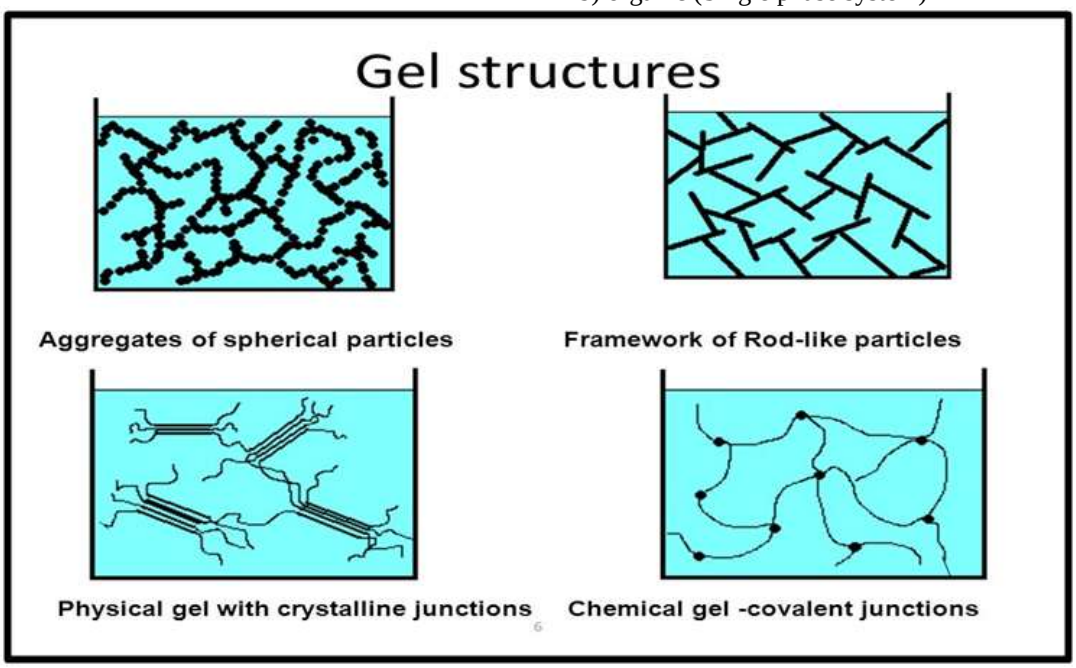

Fig.3 –a structure of gel

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a)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.

b)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, are referred to as gel formers because they have the propensity to entangle with one another randomly or are joined by van der Waals forces.

2)Based on the nature of solvent used:

a)Hydrogels (water based):-

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

b) 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.

c)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.

3)Based on rheological properties:

Usually, gels exhibit non-Newtonian flow. They are classified into:

a)Plastic gel:–

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

b)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, NaCMC, etc.

c)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 include kaolin, bentonite, and agar (Iyaz BB et al 4, 2011).

4) Based on physical nature:

a)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.

b) 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 are held by Si-O-Si-O bond to
give a polymer structure possessing a network of pores.

5) Bases or gel forming polymers:

It can be classified as follows:-

a)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.

b)Semi synthetic polymers:-

These polymers are often created via the chemical modification of natural polymers. As an illustration, consider cellulose derivatives such as carboxymethyl cellulose, methylcellulose, and hydroxyethyl cellulose.

c)Synthetic polymers:-

Synthetic polymers are those that are produced using in-vitro circumstances. For instance, polyacrylamide, polyvinyl alcohol, poloxamer, carbomercarbopol 940, and carbopol 934. (GaireArjun et al, 2021).

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Preparation of Gels:-

On a large scale, gels are often produced at room temperature. Nevertheless, before processing, some polymers need special treatment. Gels are manufactured by the given below methods:

a)Thermal changes:-

When lipophilic colloids (solvated polymers) are exposed to heat fluctuations, gelation results. Reduced hydration of lipophilic colloids, such as gelatin, agar sodium oleate, guar gummed, and cellulose derivatives, etc., results in gelation when the temperature is dropped.

b)Flocculation:-

When flocculation occurs, gelation is created by adding just the right amount of salt to cause an aging condition but not enough to completely precipitate. It is crucial and guarantees quick mixing to prevent locally excessive precipitation concentrations. For instance, ethyl cellulose and polystyrene solutions in benzene can be quickly mixed with the appropriate proportions of a non-solvent, such petroleum ether.

c)Chemical reaction:-

In this procedure, a chemical interaction between the solute and solvent creates the gel. For instance, the interaction between aluminum salt and sodium carbonate in an aqueous solution causes aluminum hydroxide gel to precipitate. A gel structure is created when the reactants are concentrated more. (Soni A et al, 2018)

Properties of Gels :

a) Ideally, the gelling agent must be inert, safe and cannot react with other
formulation constituents.
b) The gelling agent should produce a sensible solid-like nature at the time of storage which is easily broken when exposed to shear forces produced by squeezing the tube, trembling the bottle or at the time of topical application.
c) It should have suitable anti-microbial agent.
d) The topical gel must not be sticky.
e) The ophthalmic gel must be sterile f) Each component is continuous throughout the system.
(RathodHemendraSinh J et al, 2015)

Uses of Gels:-

a) As delivery systems for orally administered drugs.
b) For topical drugs applied directly to the skin, mucous membrane or the eye.
c) As long acting forms of drug injected intramuscularly or implanted into the body.
d) As binders in tablet granulation, protective colloids in suspensions, thickeners in oral liquid and suppository bases.
e) In Cosmetics Like Shampoos, Fragrance Products, dentifrices and skin and hair care preparations.
f) Lubricant for catheters[21]

II. MATERIAL AND METHOD.

Plant profile.

Liquorice:-

Fig. 4 – liquorice

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Taxonomy :

Kingdom : Plantae
Division : Magnoliophyta;
Class : Magnoliopsida;
Order : Fabales;
Family : Leguminosae;
Genus : Glycyrrhiza;
Species : Glycyrrhizaglabra.

Liquorice consists of dried, unpeeled roots and stolons of Glycyrrhizaglabra Linn. (Fam. Leguminosae). Glycyrrhizaglabra L. is a sweet, moist, soothing, flavoring herb commonly known as Liquorice. [5]

Cultivation and collection: -

Large-scale cultivation of Spanish licorice occurs in Italy and Spain. With the help of juvenile stolons, the plant is propagated. They are cut up into immature pieces, each of which should have two to three aerial shoot buds. The plant needs well-prepared, deep sandy soil that has been treated with farmyard manure. In March, the stolons fragments are planted at a spacing of 2 to 3 feet. When the green portions are growing, fertilizers should be applied. Weeds are kept out of the crop. After the roots have grown sufficiently after 3 to 4 years, they are harvested. In October, rhizomes and roots are pulled up. preferably from plants that haven't yet produced any fruit. The medication is cleaned and the buds and rootlets are taken out. Peeled and cut into smaller pieces are some of the parts. The medication is dried twice, once in the sun and once in the shade, losing around 50% of its weight each time.

Geographical source: -

Large-scale commercial cultivation of the substance is conducted in Spain, Sicily, and England. Russian liquorice, Glycyrrhizaglabra var. glandulifera, is grown in Russia, and Iranian liquorice, Glycyrrhizaglabra var. violacea.

Macroscopic Characteristics:-

Color:- Unpeeled liquorice has an exterior color of yellowish brown or dark brown, and an inside color of yellow.
Odour:- Faint & Characteristics
Taste:- Sweet
Size:- length - 10 to 50 cm Diameter - 2 cm
Shape:- Unpeeled drug straight and nearly cylindrical.

Microscopic Characteristics:-

A layer of phelloderm that is 1–3 cells thick and many yellow–brown cork layers are seen on the T.S. Phloem fibers are grouped together and surrounded by crystal cells that have thick but not fully lignified walls.
The xylem fibers that are present in the vessel are surrounded by xylem parenchyma and crystal cells. The parenchyma cells contain calcium oxalate single crystals and starch grains.

Chemical constituents:-

The roots of Glycyrrhizaglabra Linn contain glycyrrhizin, which is a saponin that is 60 times sweeter than cane sugar; Flavonoid rich fractions include liquirtin, isoliquertinliquiritigenin and rhamnoliquirilin and five new flavonoids-glucoliquiritinapioside, prenyllicoflavone A, shinflavanone, shinpterocarpin and 1-methoxyphaseolin (Rastogi RP and Mehrotra BN) isolated from dried roots.

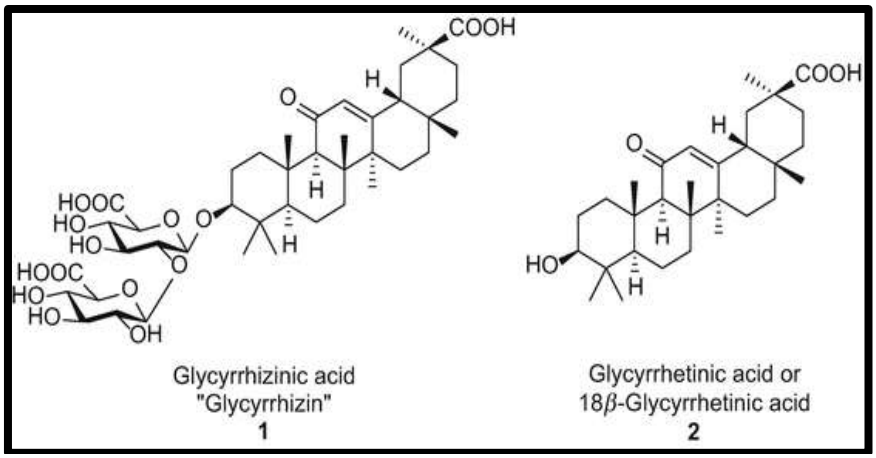

Figure 5- the structure of glycyrrhizin and glycyrrhetinic acid

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Licopyranocoumarin, licoarylcoumarin, isoflavone, and a novel coumarin-GU-12 were also isolated, and their structures were determined.

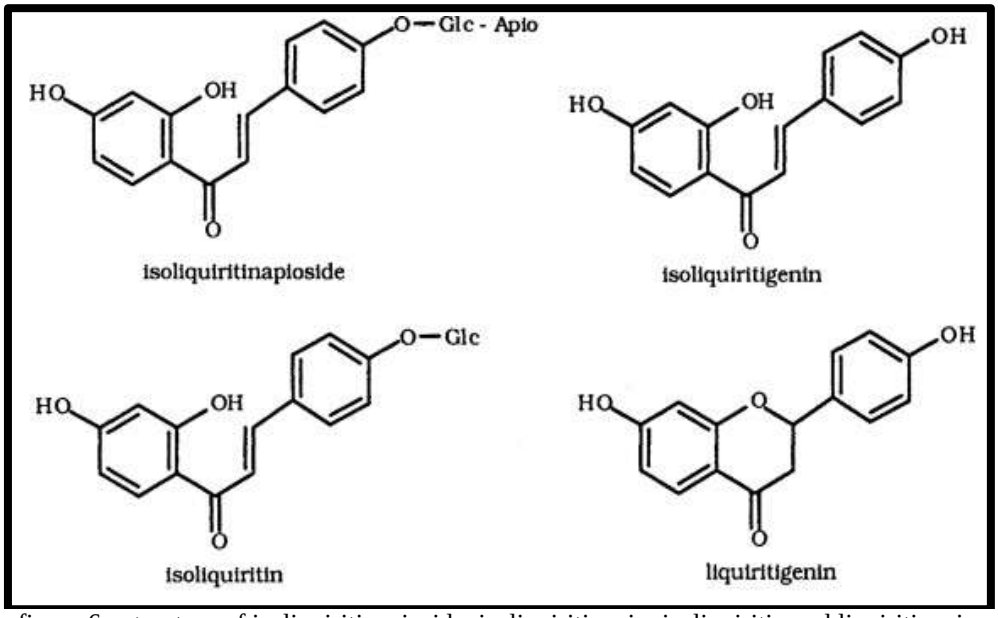

figure 6 - structure of isoliquiritinapioside, isoliquiritigenin, isoliquiritin and liquiritigenin

Semilicoisoflavone B, 1-methoxyficifolinol, isoangustone A, and licoriphenone, four novel isoprenoid-substituted phenolic components, were identified from roots. (RP Rastogi and BN Mehrotra) Kanzonol R, a brand-new prenylatedisoflavan derivative, was also discovered.

It is known that the roots contain a variety of volatile substances, including pentanol, hexanol, linalool oxides A and B, tetramethylpyrazine, terpinen-4-ol, -terpineol, geraniol, and others. The essential oil is also separated from the presence of propionic acid, benzoic acid, ethyl linoleate, methyl ethyl ketone, 2,3-butanediol, furfuraldehyde, furfurylformate, 1-methyl-2-formylpyrrole, trimethylpyrazide, maltol, and any other chemicals. The Indian roots include several 2-methylisoflavones as well as the uncommon coumarin 6-acetyl-5-hydroxy-4-methyl coumarin. There is also asparagine. Licorice root extract contains 10–25% glycyrrhizin, also known as glycyrrhizic acid or glycyrrhizinate, which is thought to be the main active component. A triterpenoidaglycone, glycyrrhetic acid (also known as glycyrrhetinic acid; enoxolone), is conjugated to a disaccharide of glucuronic acid to form glycyrrhizin (Figure 2). The 18 and 18 stereoisomers of glycyrrhizin and glycyrrhetic acid can both occur. [5]

Uses:-

- Expectorant, demulcent, flavoring agent, anti-inflammatory, anti- spasmodic, relaxing stress.
- Bronchial problem,cold, bronchitis, cough, anti- Pyretic.
- Used in peptic Ulcer and mouth ulcers.

Pharmacological properties:-

- Antioxidant activity
- Anti-inflammatory activity
- Anti-tussive and expectorant activity
- Anti-ulcerative activity
- Antimicrobial activity
- Antiviral activity
- Hepatoprotective activity
- Neuroprotective activity
- Sedative activity
- Antidepressive activity

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Holy basil:-

Fig.7 – holy basil

Taxonomy :

Kingdom : Plantae
Division : Magnoliophyta;
Class : Magnoliopsida;
Order : lamiales;
Family : Lamiaceae;
Genus : ocimum;
Species : ocimumtenuiflorum.

Cultivation of tulsi:-

Ocimums are significant subgroups of aromatic and medicinal plants that produce several essential oils and aroma compounds and have a wide range of applications in the perfume and cosmetics industry as well as in traditional medical practices. A significant variety of species, subspecies, variations, and strains have developed as a result of the species' high degree of polymorphism and high level of cross-pollination, which makes botanical classification quite challenging. Because to their considerable diversity, different species are divided into the basilica and sanctum groups based on their geographical origins, morphological and cytological characteristics, and chemical components. [13]

Geographical source: -

It is an annual herbaceous plant with several branches that may be found all throughout India and is revered by Hindus. The plant is frequently planted in gardens and is also found close to temples. It is spread by seeds. For its volatile oil, tulsi is now commercially grown. [12]

Chemical Constituents:-

Bright, yellow-colored, and pleasant volatile oil (0.1 to 0.9%) is present in tulsi leaves. According on the drug's kind, region of production, and time of collecting, the oil content varies. The oil is extracted from the leaves and blooming tops using the steam distillation process. There are around 70% eugenol, 3% carvacrol, and 20% eugenol-methyl-ether in it. Moreover, caryophyllene is present. Fixed oil with strong drying qualities is found in seeds. Alkaloids, glycosides, saponin, tannins, a significant quantity of vitamin C, and traces of maleic, citric, and tartaric acid are also said to be present in the plant. [12]

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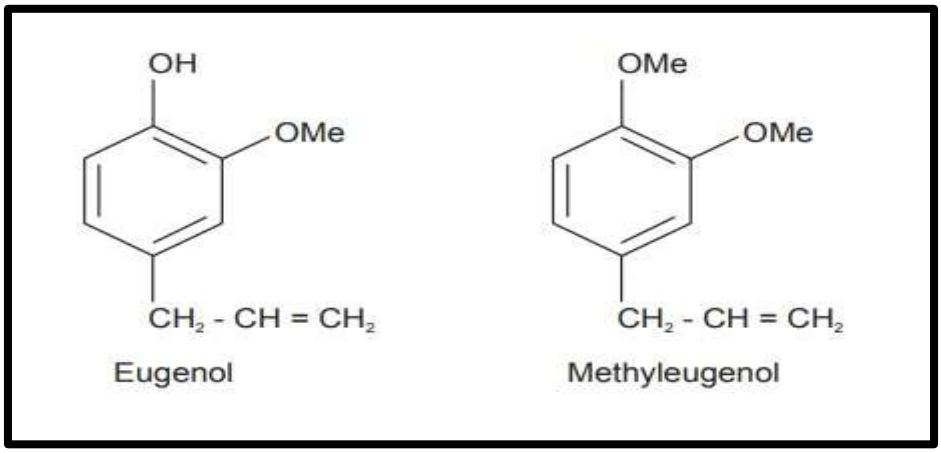


Fig. 8 – structure of eugenol and methyleugenol

Macroscopical characters:

1. Green type of Ocimum sanctum leaves:

1) Margin: Entire, irregularly undulated or bluntly state.
2) Apex: Acute or obtuse.
3) Adaxial surface: Bright green
4) Abaxial surface: pale green with prominent veins.
5) Odor: aromatic.
6) Taste: Pungent.

2. Purple type of Ocimum sanctum leaves:

1. Opposite, Exstipulate, petiolate.
2. Margin: Narrowly or distantly serrate.
3. Apex: acute or obtuse
4. Odor: aromatic.
5. Taste: pungent.[8]

Microscopical characters:

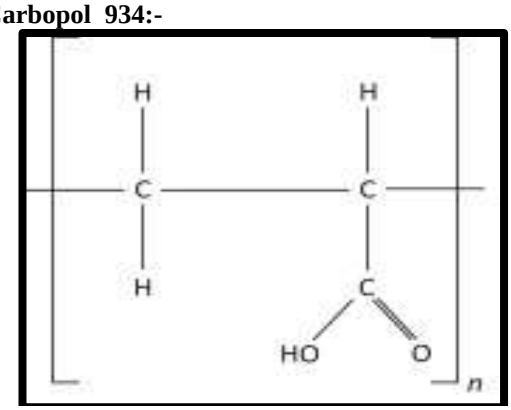
Dorsiventral is the tulsi leaf. Diacytic stomata are particularly prevalent on the bottom surface. The cuticle of epidermal cells is thin and has wavy walls. Under the top epidermis, there is a single layer of palisade cells, which are elongated. Four to six layers of spongy parenchymatous cells with intercellular gaps and oil glands make up the mesophyll. The covering trichomes of a leaf are both uniseriate, multicellular, and frequently quite long (100–400). The usual labiate type trichomes are sessile glandular trichomes with radiating heads made up of eight cells each and a shared cuticle creating a bladder. There are also a few glandular trichomes with a spherical unicellular head and a unicellular stalk. [8]

Pharmacological properties:-

1) Expectorant, bronchitis.
2) Stomachic
3) Carminative.
4) Stimulant
5) Flavoring agent
6) Antifertility agent.
7) Antibacterial.
8) Insecticide
9) Antiprotozoal.[8]

Drug profile.

Carbopol 934:-



Carbopol 934 polymer is a white powder, cross-linked polyacrylic acid polymer. It exhibits short flow properties and a creamy sensory profile, and is therefore well suited for use as a rheology modifier in lotions and creams.

1. Molecular Formula: C84H112O56
2. Density: 1.270 g/cm3
3. Melting Point: 95 °C
4. Boling Point: 116°C
5. Flash Point: 100°C
6. Water Solubility: Soluble in water.
7. Solubility: Swellable in water and glycerin and, after neutralization,in ethanol (95%). Carbomers do not dissolve but merelyswell to

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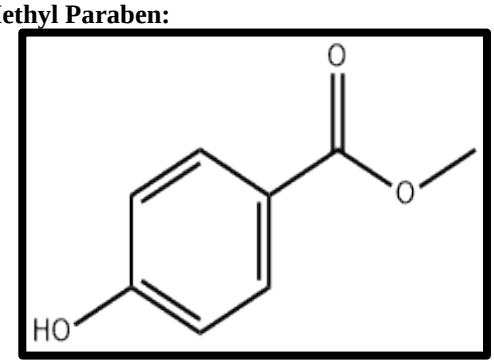
a remarkable extent, since they are three- 15 dimensionallycrosslinkedmicrogels.
8. Appearance: Powder
9. Color: White
10. Storage Condition: 2-8°C
11. Refractive Index: n20/D 1.442
12. Physical and Chemical Properties: This product is a light yellow liquid. Infinitely miscible with water.
13. Use: Used for the preparation of leather and some high-grade goods finishing agent, preparation of acrylic resin paint, etc.

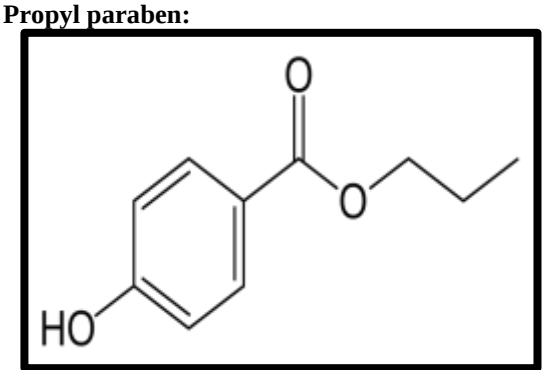
Methyl Paraben:



Methylparaben is a preservative. It is the methyl ester of p-hydroxybenzoic acid. It is an antifungal agent often used in a variety of cosmetics and personal care products. It is also used as a food preservative. It is commonly used as a fungicide in Drosophila food media. Usage of methylparaben is known to slow Drosophila growth rate in the larval and pupal stages.

1) Appearance: White crystalline powder
2) Boiling Point: 298.6 °C
3) Density: 1.209 g/cm3
4) IUPAC Name: Methyl 4-hydroxybenzoate
5) Melting Point: 125-128 °C
6) Molar Mass: 152.15 g/mol
7) Molecular Formula: C8H8O3
8) Synonyms: Methyl Paraben;Methylp-hydroxybenzoate;MethylParahydroxybenzoate; Nipagin M;Tegosept;Mycocten;4-Hydroxybenzoic Acid Methyl Ester;4-(Carbomethoxy)phenol;4-(Methoxycarbonyl)phenol

Propyl paraben:

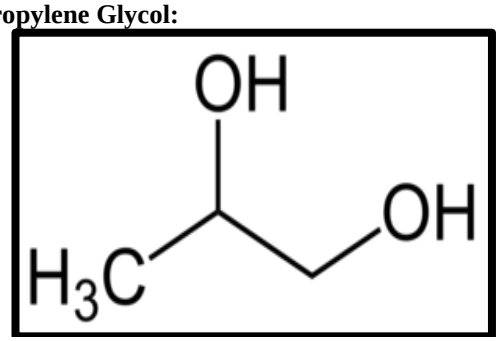


IUPAC Name: propyl 4-hydroxybenzoate

Physical Description: Propyl-4-hydroxybenzoate appears as colorless crystals or white powder or chunky white solid. Melting point 95-98 °C.Odorless or faint aromatic odor. Low toxicity, Tasteless (numbs the tongue).

1. pH: 6.5-7.0 (slightly acidic) in solution.
2. Color/Form: White crystals
3. Odor: Odorless or has faint odor
4. Boiling Point: 271 °F at 1 mmHg (NTP, 1992)
5. Melting Point: 203 to 208 °F (NTP, 1992)
6. Solubility : less than 1 mg/mL at 54 °F
7. Density: 1.28 at 77 °F
8. Uses: Propylparaben has antifungal and antimicrobial properties and is typically used in a variety of water-based cosmetics and personal-care products. It is also used as a food additive. Propylparaben is also a Standardized Chemical Allergen and is used in allergenic testing.

Propylene Glycol:



Chemical name: Propylene glycol

Synonyms and trade names: 1,2-Dihydroxypropane; 1,2-propanediol; 1,2-propylene glycol;2,3- propanediol; hydroxy-propanol; alpha-propylene glycol; methylglycol; methylethyl

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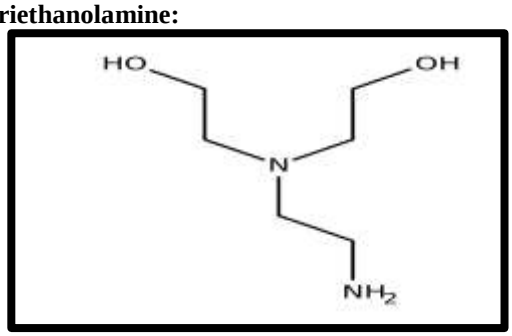
glycol; monopropylene glycol; trimethyl glycol. Registered trade name(s): PG-12; Sirlene

1) Chemical formula: C3H8O2
2) Molecular weight: 76.11b
3) Color: Colorlessd
4) Physical state: Liquid
5) Melting point: -60 °Ce,b (forms glass)
6) Boiling point: 187.6; 188.2 °Cb
7) Density: at 20 °C (g/cm3) 1.0361c 19
8) Odor: Odorless
9) Solubility: Water: at 20 °C Miscible with water
10) Organic solvent(s): Soluble in alcohol, ether, benzene, soluble in acetone, chloroform

Triethanolamine:



1) IUPAC Systematic Name: 2,2′,2″-Nitrilotriethanol
2) Boiling-point: 335.4 °C
3) Melting-point: 20.5 °
4) Density: 1.1242 g/cm3 at 20 °C
5) Solubility: Miscible with water, acetone, ethanol and methanol; soluble in chloroform;
6) Volatility: Vapour pressure, < 1.3 Pa at 20 °C
7) Synonyms: Alkanolamine 244; nitrilotriethanol; TEA; TEA

Collection and authentication of plant materials:-

The plant Liquorice consists of dried, unpeeled roots and stolons of Glycyrrhizaglabra Linn were collected from the ideal institute of pharmacy (wada). The Tulsi was also collected from ideal institute of pharmacy(wada).

Chemicals:

Ethanol, Methanol, Carbapol 934, Methyl paraben, Propyl paraben, Propylene glycol, Triethanolamine, Peppermint Oil all ingredients were available in the ideal institute of pharmacy (wada).

Preparation of plant extract:-

Liquorice and Tulsi leaves were washed under running water to eliminate dust particles, then shade dried for 3–4 weeks at room temperature. With the use of a mechanical grinder and a 40-mesh sieve, the dried plant components were ground into a coarse powder. To get their extracts, ethanol, methanol, and water were used to perform cold maceration extraction on the powder. In separate conical flasks, 500 ml of ethanol, methanol, and water were combined with 100 g of dried licorice root powder and 100 g of dried tulsi powder and macerated for 24 hours at room temperature. After 24 hours of intermittent shaking, the mixture was filtered using a straightforward filtration method, and the filters were collected in different vessels.By utilizing a rotating vacuum evaporator at 45–50°C under decreased pressure, the solvent was extracted from the filtrate to create the extract. [25]

Preparation of herbal gel:-

A precise quantity of carbopol 934 should be evenly distributed in 15 ml of distilled water by continuous stirring. Set the beaker aside for 30 minutes to let the carbopol 934 swell. Take 5 ml of distilled water and, in a separate beaker, add the necessary amounts of methyl and propyl parabens by heating in a water bath. Once the solution has cooled, add the propylene glycol. Additional extract was added as needed, and the mixture was thoroughly mixed with the carbopol 934 gel while being continuously stirred. Finally, the volume was increased to 30 ml by adding the remaining distilled water, and triethanolamine was added drop by drop to create or adjust the necessary mouth skin pH (6.8-7) and to obtain the gel at required consistency. In the end Peppermint oil is added. [26]

Formulation table

The method describes above and the formulae were tabulated in Table 1. Along with control sample gel were prepared by addition of required quantity of Liquorice extract and Holy basil extract to prepare 1%, 2% and mixed mouth ulcer gel respectively.[26]

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Ingredients	Quantity in % W/W
Liquorice extract	2%
Holy basil extract	1%
Carbapol 934	2%
Methyl paraben	0.0015%
Propyl paraben	0.01%
Propylene glycol	1.5%
triethanolamine	q. s + pH 6.5-7
Peppermint oil	0.45%
Distilled water	Up to 25ml

Table 1:- composition of mouth ulcer gel formulation [2]

III. RESULT AND DISCUSSION.

Physical evaluation:

Physical parameters such as color, odor and consistency were checked visually.

Color: The color of the formulation was checked by visual Inspection

Consistency: The consistency of formulation was checked by applying on skin.

Odor: The odor of the formulation was checked by mixing the gel in water and observing the smell.

Measurement of pH:

The pH of the formulation was then measured by fully submerging the glass electrode three times in the gel system, and the average results are given.[27]

Homogeneity:

All prepared gel formulation were tested for homogeneity by visual inspection After the gels have been set into the container. They were tested for their presence and appearance of any aggregates.[28]

Viscosity:

The Brookfield Viscometer was used to test the viscosity of the created gel at a temperature of 25°C. The dial reading for each speed was recorded as the gels spun at 0.3, 0.6, and 1.5 revolutions per minute. The produced gels' viscosity was then determined by multiplying the dial reading by a value listed in the Brookfield Viscometer catalogues[29].

Spreadability:

Spreadability is measured in terms of the number of seconds it takes for two slides to separate from gel that is positioned in their interstices when a specific stress is applied. Spreadability is improved if two slides can be separated in less time.[30]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

Clarity:

The clarity of the gel is determined by visual inspection.

Stability study:

Stability studies were performed to observe the effect of environmental conditions or

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storage conditions on formulation. The formulation was kept in accelerated stability condition at 25°C temperature 60 ± 5% Relative humidity, 30°C temperature 65 ± 5% relative humidity and 40°C temperature 75 ± 5% for a period of 3 months as per ICH guidelines.

IV. CONCLUSION.

In the perception that they are safer and have fewer adverse effects than synthetic medications, natural therapies are more accepted. The demand for herbal formulations is rising today on the global market. Creating a herbal gel using liquorice and holy basil extracts is a really nice attempt. The results of this investigation showed that the herbal gel formulation F had considerable therapeutic efficacy and was a good medium for drug delivery at a reasonable cost with great potential. The results indicated that a new herbal gel formulation with strong antifungal and anti-inflammatory action had been established owing to the combined dosage form, and as a consequence, it is safe, stable, and effective for treating mouth ulcers.

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Physical evaluation:

Physical parameters such as color, odor and consistency were checked visually.

Color: The color of the formulation was checked by visual Inspection

Consistency: The consistency of formulation was checked by applying on skin.

Odor: The odor of the formulation was checked by mixing the gel in water and observing the smell. Physical evaluations of gel formulation were reported in Table 2.

Measurement of pH:

The pH of the formulation was then measured by fully submerging the glass electrode three times in the gel system, and the average results are given.[27] The pH of gel formulation was reported in Table 3.