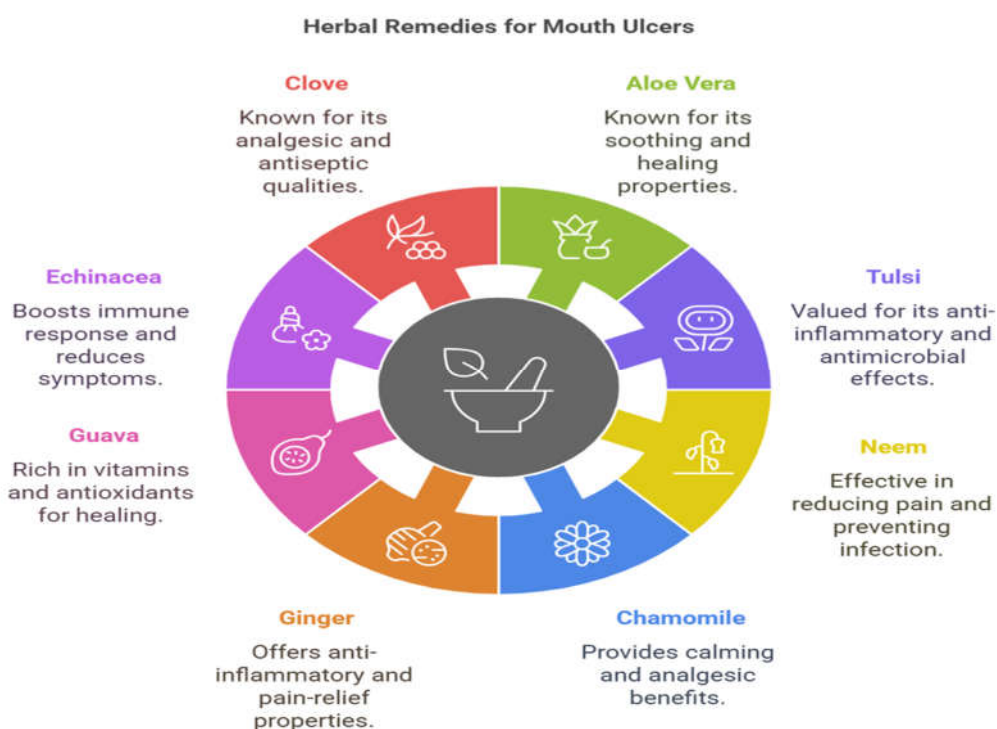


## Herbal Remedies: A Natural Approach to Managing Mouth Ulcers

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### Graphical Abstract

Mouth ulcers, a common oral affliction, often cause discomfort and hinder daily activities. While conventional treatments are available, many individuals seek natural alternatives with fewer side effects. Herbal remedies have been used for centuries to alleviate various ailments, including mouth ulcers. This review explores the efficacy of various herbs in treating mouth ulcers, their active constituents, and potential formulations for optimal delivery. Herbs such as *aloe vera*, *tulsi*, *neem*, and *licorice* have been extensively studied for their anti-inflammatory, antimicrobial, and analgesic properties. By understanding the mechanisms of action of these herbs, researchers can develop effective herbal formulations, including gels, mouthwashes, and lozenges, to provide relief from mouth ulcer symptoms. This review aims to highlight the potential of herbal remedies as a safe and effective approach for the management of mouth ulcers.



**Fig.1 herbal remedies for mouth ulcer**

**Keywords:** Mouth Ulcers, Herbal remedies, Medicinal plants, Aphthous Stomatitis.

## Introduction

The oral cavity is covered by epithelial tissue that extends from the inner surface of the lips to the oropharynx. The keratinized mucosa comprises the dorsal surface of the tongue, the gingiva, and the hard palate, whereas the non-keratinized mucosa includes the labial mucosa, buccal mucosa, ventral surface of the tongue, floor of the mouth, and soft palate. Abnormalities observed in the oral mucosa may indicate systemic diseases and can serve as early signs of an undiagnosed underlying condition. Consequently, a comprehensive evaluation of the oral cavity is a crucial component of the overall physical examination.



**Fig 2. Mouth Ulcer**

An oral ulcer is defined as a sore that forms on the lining of the mouth. These are a common condition that can occur in the oral cavity, presenting as painful lesions that can significantly impact an individual's quality of life. These ulcers can arise from a variety of underlying causes, each with its pathophysiology and implications for treatment<sup>2</sup>.

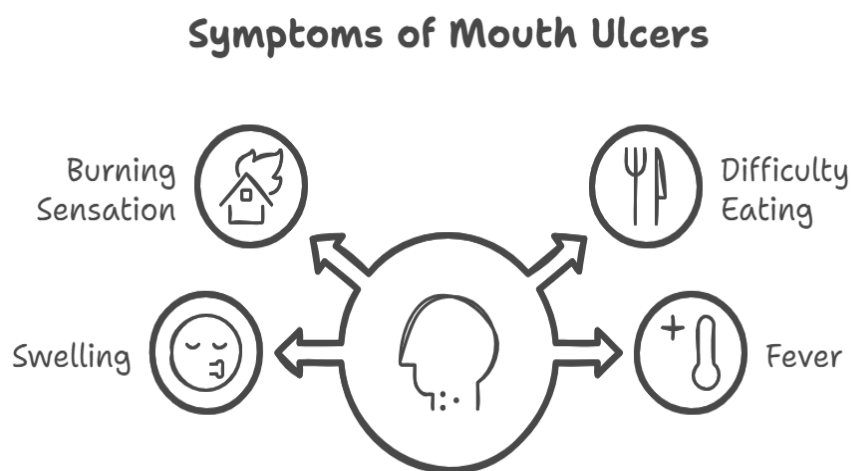
One of the primary causes of oral ulcers is trauma, which can result from accidental biting of the cheek, aggressive brushing of the teeth, or irritation from dental appliances such as braces or ill-fitting dentures. Infections, both viral and bacterial, can also lead to the development of oral ulcers. For instance, herpes simplex virus can cause recurrent painful sores, while certain bacterial infections may result in ulcerative lesions<sup>2</sup>.

Aphthous ulcers, also known as canker sores, are among the most common types of oral ulcers. These lesions are often associated with systemic conditions, including stress, nutritional deficiencies (such as vitamin B12, folate, or iron deficiency), and certain autoimmune disorders<sup>3</sup>. Aphthous ulcers typically manifest as small, round, or oval lesions that are covered with a greyish-white pseudo membrane and are surrounded by a distinct red halo. They are usually found on non-keratinizing epithelial tissues, such as the inner cheeks, lips, and tongue. One of the notable characteristics of aphthous ulcers is their tendency to resolve spontaneously within 10 to 14 days, often without the need for medical intervention<sup>3</sup>.

In addition to trauma and infections, drug-induced ulceration can occur as a side effect of certain medications, which may indicate underlying systemic conditions. For example, nonsteroidal anti-inflammatory drugs (NSAIDs) and some chemotherapeutic agents can lead to the development of oral ulcers as a result of their effects on the mucosal lining of the mouth<sup>3</sup>. Furthermore, malignant lesions, such as oral cancers, can also present as ulcers within the oral cavity. These lesions may be more concerning and require prompt evaluation and management, as they can signify serious underlying health issues<sup>4</sup>.

The management of mouth ulcers primarily aims to alleviate discomfort and facilitate healing. Oral formulations play a crucial role in oral care and the administration of medication<sup>4</sup>. Familiarity with their ingredients and applications can assist in choosing the most suitable product for personal requirements, thereby enhancing oral health and effectively addressing various conditions. Products such as mouthwash, gargles, lozenges, chewable tablets, and medicated chewing gum are essential for delivering medication and supporting overall oral hygiene<sup>4</sup>.

Oral ulcers are a multifaceted condition with various etiologies, including trauma, infections, systemic diseases, and malignancies. While aphthous ulcers are the most common type and typically resolve on their own, it is essential for individuals experiencing persistent or recurrent oral ulcers to seek medical advice to determine the underlying cause and appropriate treatment options<sup>5</sup>.



**Fig 3. Symptoms of Mouth Ulcers**

The primary symptom of mouth ulcers is the presence of painful sores in the mouth. Other symptoms may include:

- Burning or tingling sensation before the ulcer appears
- Difficulty eating, drinking, or speaking
- Swelling in the affected area
- Fever or swollen lymph nodes in severe cases<sup>6</sup>

## Factors leading to mouth ulcers



**Fig 4. Causes of Mouth Ulcer**

### 1. Injury or Trauma

Accidental biting of the cheek, excessive brushing, or dental procedures can result in the formation of ulcers.

### 2. Stress

Emotional stress may act as a catalyst for the development of mouth ulcers in certain individuals.

### 3. Nutritional Deficiencies

Insufficient intake of vital vitamins and minerals, especially vitamin B12, folic acid, and iron, can contribute to the emergence of ulcers.

### 4. Hormonal Changes

Some women may notice the onset of mouth ulcers coinciding with their menstrual cycle.

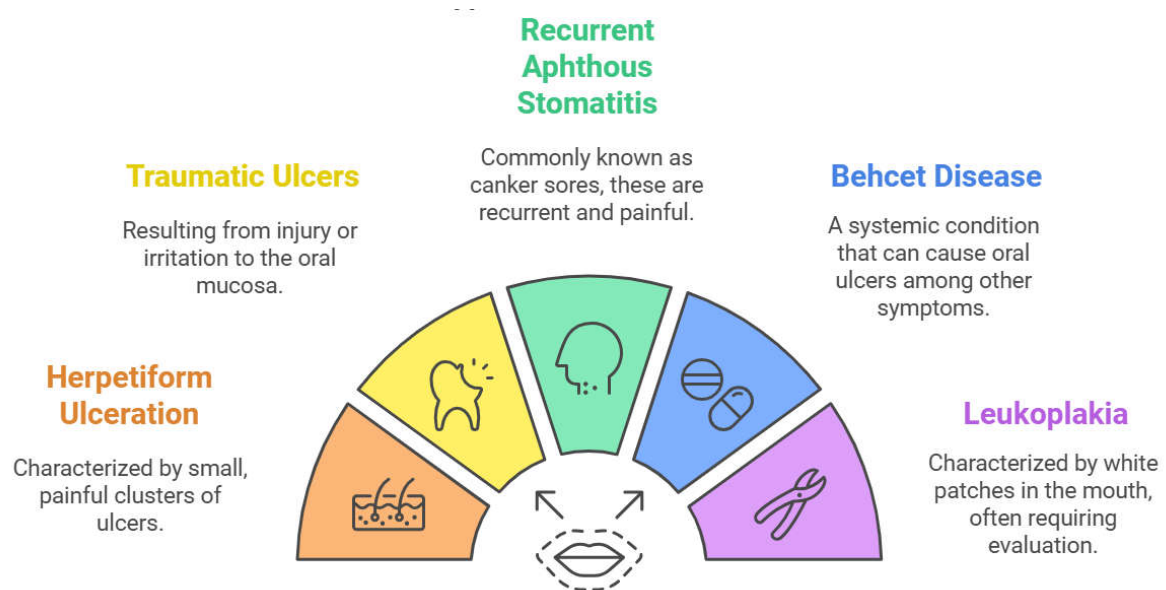
### 5. Medical Conditions

Specific health issues, such as celiac disease, inflammatory bowel disease, and autoimmune disorders, can heighten the risk of ulcer formation.

### 6. Allergic Reactions

Sensitivities to particular foods or dental care products may also lead to the development of mouth ulcers<sup>1,7</sup>

## Types of Mouth Ulcers



**Fig 5. Types of Ulcers**

### 1. Recurrent Aphthous Stomatitis (Canker Sores)

Canker sores are the most prevalent type of oral ulceration. The etiology of these lesions can be linked to minor traumas, such as cheek biting, the intake of acidic foods, and psychological stressors. Generally, canker sores manifest as white or yellow lesions encircled by red margins. They are categorized into three primary types:

- Minor aphthous ulcers (which are less than 5 mm in diameter and typically resolve within 7 to 14 days).
- Major aphthous ulcers (which are larger, take several weeks or months to heal, and may lead to scarring).

### 2. Leukoplakia

Leukoplakia is characterized by the formation of white patches within the oral cavity. These patches are typically asymptomatic and do not resolve upon friction. The condition may arise due to chronic irritation of the oral mucosa. Given its potential to progress to oral cancer, it is advisable for individuals with leukoplakia to seek evaluation and management from a specialist, as recommended by their dentist. As leukoplakia advances, white patches may develop on various oral surfaces, including the gums, inner cheeks, floor of the mouth, and occasionally the tongue. These lesions are generally noncancerous; however, some may exhibit precancerous changes. Notably, cancers can emerge in the vicinity of leukoplakic lesions, particularly on the floor of the mouth.

### 3. Herpetiform ulceration

Herpetiform Ulcers refers to the clustered morphology of lesions. This type of ulcer is a cluster of dozens of smaller sores about the size of pinheads. It is not related to herpesvirus infection. These are large in number, ranging from 10 to 100 at a time, and consist of multiple small lesions that basically unite to become confluent into larger plaques. Due to the size and depth of the ulcer, they may heal with scar in 7 to 30 days.



#### 4. Traumatic ulcers

A traumatic ulcer represents the most prevalent form of ulceration, characterized by its acute onset. The etiology of these ulcers typically involves physical, thermal, or chemical injury to the oral mucosa. Physical trauma may arise from routine activities, including tooth brushing or flossing, as well as from sharp dental appliances or teeth. Additionally, patients may inadvertently inflict trauma upon themselves while under local anesthesia during dental interventions. Thermal injuries are frequently attributed to the consumption of hot foods or beverages, such as pizza, coffee, or tea, or may result from the use of heated dental instruments during procedures.







#### 5. Behcet disease







Behcet's disease (BD) is a complex inflammatory condition that affects multiple systems within the body. It is primarily characterized by the occurrence of recurrent oral aphthous ulcers, genital ulcers, various skin lesions, and ocular manifestations. Although the etiology of BD remains unclear, it is believed to be linked to autoimmune processes. The disease can manifest in individuals of any age; however, it is relatively rare in those under puberty and over the age of 60. Oral ulcerations are the most prevalent symptom, typically presenting as recurrent and painful, and they are clinically and histologically similar to recurrent aphthous stomatitis (RAS). The severity of these ulcers can vary, with some being mild and recurrent, while others may be extensive, deep, and lead to scarring. A diagnosis of Bechet's disease is established when recurrent aphthous ulcers are present alongside at least two of the following types of lesions: oral ulcers, genital ulcers, ocular lesions, or skin lesions.

#### Herbs for mouth ulcers treatment


Sr. No	Herb	Properties	Active Constituents	Part Used	References
1.	<b>Chamomile</b> <i>Matricaria Chamomilla</i> 	Anti-inflammatory, Antibacterial, Antifungal, Antiviral, Analgesic, Antispasmodic, Smooth muscle relaxing action	Chamazulene, $\alpha$ bisabolol, $\alpha$ bisabolol oxide A, $\alpha$ -bisabolol oxide B, $\alpha$ -bisabolone oxide A, $\beta$ -bisabolene, $\beta$ -farnesene, $\alpha$ -farnesene.	Fluid extract	1,2,3
2.	<b>Ginger</b> <i>Zingiber officinale</i> 	Anti-inflammatory Antinausea Digestion aid Antioxidant Metabolism	$\alpha$ -zingiberene, $\beta$ - bisabolene, gingerols and shogaols	Ginger's Alcoholic Extract	4,5,6,7
3.	<b>Guava</b> <i>Psidium guajava</i>	Antifungal, Antimicrobial, Antitumor, Antiallergic, Antioxidant, Antibacterial, Anti-inflammatory, Anticancer,	Flavonoids such as quercetin, morin-3-oxylxoside, and morin-3-ox-arabinoside	Leaves	9,10,11,12



		Antihyperglycemic,			
4.	<b>Neem</b> <i>Azadirachta indica</i> 	Anti-inflammatory, Antiulcer, Antifungal, Antibacterial, Antiviral, Antioxidant, Antimutagenic	Nimbidin, Azadirachtin, and nimbinin.	Seeds	13,14,15
5.	<b>Tulsi</b> <i>Ocimum sanctum</i> 	Anti-inflammatory, Antioxidant, Antibacterial, Analgesic, Antiasthmatic, Antidiabetic,	Methyl eugenol, cyclooctene, Eugenol, bornyl acetate, camphor, Methyl eugenol, beta caryophyllene.	Extract	16,17,18,19
6.	<b>Echinace</b> <i>Echinacea purpurea</i> 	Anti-inflammatory Common cold Respiratory tract Infection, Ulcers Abscesses ulcers, Swelling of the tonsils	Echinococside, 6-o-caffeoyl echinococside	Echinacea	20,21
7.	<b>Liquorice</b> <i>Glycyrrhiza glabra</i> 	Antithrombotic, Anti-inflammatory, Antioxidative, Antiallergenic, Antimicrobial, Antidiabetic.	Saponin, flavonoid, liquirtin, isoliquertin, liquiritigenin	Root extract	22,23
8.	<b>Aloevera</b> <i>Aloe barbadensis</i> 	Wound healing, Anti-inflammatory, Antibacterial, Antifungal, Antioxidant, Antitumor, Immune boosting	Amino acids, anthraquinones, enzymes, minerals, vitamins, lignins, monosaccharide, polysaccharides	Freshly purified leaf juice extract	24,25
10.	<b>Myrrh</b> <i>Commiphora Myrrha</i>	Anti-inflammatory, Antioxidant, Antiseptic, Immune boosting	Anti-inflammatory, Antioxidant, Antiseptic, Immune	Extract	27,28

			boosting Terpenoids diterpenoids, and steroids		
11.	<b>Clove</b> <i>Eugenia caryophyllus</i> 	Anti-inflammatory, anti-bacterial, and anti-oxidant.	Eugenol	flower bud	29,30
12.	<b>Catechu</b> <i>Acacia Catechu</i> 	Anti-inflammatory, astringent, Anti-microbial, Antioxidant	Catechin, Flavonoids, Tannin.	Heart wood	31,32,33
13.	<b>Coconut</b> <i>Cocos nucifera</i> 	analgesic, anti-inflammatory, and antiseptic	Lauric acid, Capric acid, Caprylic acid	Coconut oil	34,35
14.	<b>Papaya</b> <i>Carica papaya</i> 	Anti-inflammatory, antibacterial, antifungal, antimicrobial	Papain, cysteine proteinase	Fruit	36,37
15.	<b>Garlic</b> <i>Allium sativum L.</i> 	anti-inflammatory, antibacterial and antimicrobial, antioxidant	Allin, allicin, 2 mercapto-Lcysteins, anthocyanins, glycosides of kaempferol, quercetin, polysaccharides, allinase, sterols, hydrocarbons, sativin I & II,	Fresh or dried bulbs	38



			scordinines A & B		
16.	<b>Turmeric</b> <i>Curcuma longa</i> 	Anti-inflammatory, Analgesic, Antiseptic, Anticarcinogenic, Antioxidant, Antibacterial, Immunomodulatory	Diarylheptanoid , curcumin, dimethoxy curcumin, and bisdemethoxy curcumin	Portion Dried rhizome	39,40

## Formulations for mouth ulcers

### 1. Mouthwash

Mouthwash is a liquid formulation designed for rinsing the oral cavity. Its main functions include minimizing oral bacteria, refreshing breath, and occasionally providing therapeutic ingredients to address issues such as gingivitis, ulcers, and dry mouth<sup>43</sup>. Mouthwashes may contain alcohol or be alcohol-free, with the latter option being milder on the tissues of the mouth. It is suitable for daily use as an integral component of oral hygiene practices. Nevertheless, users are advised against swallowing the product and should follow the suggested usage guidelines to avoid potential negative effects<sup>44</sup>.

Accurately measure each active ingredient extract and combine it thoroughly with water. Gradually incorporate all remaining ingredients while ensuring proper mixing. Introduce 1% w/v salt in sterile water and subsequently adjust the volume with water<sup>44,45</sup>.

#### Advantages of mouthwash<sup>44,45,46</sup>

- Mouthwash serves as an effective solution for combating bad breath and imparting a refreshing sensation in the oral cavity.
- Numerous mouthwash formulations include antibacterial components that assist in minimizing plaque accumulation on teeth, thereby enhancing oral hygiene.
- Consistent use of mouthwash can aid in the prevention of gingivitis and various gum diseases by diminishing bacterial presence in the mouth.
- Additionally, mouthwash can access spaces between teeth and along the gum line that a toothbrush may overlook, ensuring a more comprehensive cleaning.

#### Limitations of mouthwash<sup>44,46</sup>

- Mouthwash is intended to enhance, rather than substitute for, the routine practices of brushing and flossing.
- It is ineffective in eliminating food debris or plaque in the same manner as a toothbrush.
- Although mouthwash can provide a temporary improvement in breath freshness, it does not tackle the root causes of halitosis.
- Additionally, some users may encounter allergic reactions or sensitivities to specific components found in mouthwash.
- Furthermore, the cumulative expense of regularly purchasing mouthwash can exceed that of fundamental oral hygiene methods such as brushing and flossing.

### 2. Gargles

Gargles are formulations intended for oral use, specifically to be swished in the mouth and then gargled, aimed at alleviating throat infections, irritations, and ulcers. These solutions

frequently incorporate antiseptic components such as chlorhexidine or saline. The act of gargling serves to soothe the throat, diminish inflammation, and eliminate bacteria. Adhering to the suggested dilution and usage frequency is crucial for achieving optimal results<sup>47</sup>.

Gargles are primarily utilized as antiseptic, antibacterial, and antiviral solutions. They consist of extracts from various ingredients combined with salt water, which aids in alleviating sore throat discomfort and minimizing inflammation<sup>48,49,50</sup>.

#### **Advantages of gargles<sup>47,48,49</sup>**

- Gargling can alleviate discomfort associated with a sore throat by diminishing inflammation and irritation.
- It aids in the removal of food debris and bacteria, thereby enhancing oral hygiene.
- Similar to mouthwash, gargling can temporarily improve breath freshness.
- Using salt water for gargling can assist in thinning mucus, facilitating easier expulsion.
- The act of gargling is straightforward and does not necessitate any specialized equipment.

#### **Limitations of gargles<sup>47,50</sup>**

- Gargling may offer only short-term alleviation for sore throats and does not address the root causes of the condition.
- It should not be considered a substitute for regular brushing and flossing in maintaining oral hygiene.
- Certain individuals might find the flavour of specific gargles to be unpalatable.
- Additionally, gargles may not effectively reach all regions of the throat.
- Excessive use of particular gargles, particularly those containing alcohol, can lead to throat irritation.

### **3. Fillers**

Oral fillers, commonly known as oral gels or pastes, serve the purpose of delivering targeted treatment within the oral cavity. These formulations are effective in addressing oral ulcers, lesions, and discomfort. Typically, they include active components that facilitate healing, such as aloe vera or benzocaine, and are designed to adhere to mucosal surfaces for extended efficacy. Such products are especially beneficial for managing ulcers, lesions, or pain following surgical procedures in the mouth<sup>51,52</sup>.

Carefully dry and grind the herbs. Incorporate additional ingredients, including sweeteners and essential oils. Take a small amount and filter it to achieve the desired shape. Subsequently, fill the sachets with the mixture. Ensure that the contents are completely dry before preservation. This preparation can be utilized by chewing or by adding it to warm water for rinsing the mouth<sup>51,52,53</sup>.

#### **Advantages of oral fillers<sup>52,53</sup>**

- One of the key advantages of oral fillers is their ability to deliver immediate results, enabling patients to observe the effects immediately following the procedure.

- The treatment is typically swift and involves minimal recovery time in comparison to surgical alternatives, making it a favoured option for individuals seeking cosmetic improvements without a lengthy recuperation period.
- Oral fillers serve multiple purposes, such as enhancing the lips, augmenting the cheeks, and diminishing the visibility of fine lines and wrinkles.
- When applied by a qualified professional, oral fillers can yield natural-looking outcomes that enhance an individual's features without an exaggerated appearance.
- Furthermore, the treatment can be customized to meet the specific needs and desired results of each patient, facilitating a tailored approach.

#### **Limitations of oral fillers<sup>52,53</sup>**

- The majority of oral fillers are not designed to be permanent, generally providing results that last from a few months to a few years, which requires patients to undergo repeat treatments to sustain the desired effects.
- As with any cosmetic intervention, there exists a possibility of side effects, including swelling, bruising, or allergic reactions at the site of injection.
- The final results are significantly influenced by the practitioner's skill and experience; inadequate technique may result in unsatisfactory outcomes or complications.

#### **4. Chewable Tablets**

Chewable tablets represent a solid dosage form of medication designed to be chewed before swallowing. These tablets are particularly tailored for children or individuals who have difficulty swallowing conventional pills. The active ingredients are released in the oral cavity, promoting quicker absorption through the mucous membranes of the mouth, thereby enhancing their efficacy for conditions like gingivitis and mouth ulcers<sup>54</sup>.

The preparation of chewable tablets is accomplished through two primary methods: direct compression and wet granulation. In the direct compression method, all extracts and excipients are blended for a duration of 10 minutes. Subsequently, a lubricant is incorporated, and the mixture is blended for an additional 2 minutes. Tablets are then formed via direct compression, following an assessment of the powder's flow properties. Conversely, the wet granulation method involves blending all components for 10 minutes, after which a sucrose solution is added and the mixture is passed through a 16-mesh sieve at a temperature of 40°C. Once dried, the granules are further processed through a 30-mesh sieve before the tablets are formed using direct compression<sup>54,55,56</sup>.

#### **Advantages of chewable tablets<sup>55,57</sup>**

- Chewable tablets offer a convenient option for individuals who struggle with swallowing pills, including children and the elderly.
- Many of these tablets come in various flavours, enhancing their taste and making them more enjoyable than standard tablets or capsules.
- The act of chewing facilitates faster absorption of the active ingredients, as they are more readily broken down in the mouth.
- Additionally, these tablets are portable and ideal for use while traveling, allowing for medication intake without the need for water.
- Users may also have the flexibility to modify their dosage by consuming a greater or lesser number of tablets, although such adjustments should always be made with professional advice.

**Limitations of chewable tablets<sup>56,57</sup>**

- Not all pharmaceuticals are offered in a chewable format, potentially restricting choices for patients who favour this delivery method.
- Numerous chewable tablets include sugar or artificial sweeteners, raising concerns regarding dental health and for individuals who are vigilant about their sugar consumption.
- Additionally, some patients may find the flavour of chewable tablets unappealing, which can hinder their compliance with prescribed medication.
- There is also a possibility of exceeding the recommended dosage if users consume multiple tablets without careful consideration of the dosage guidelines.
- Furthermore, certain active ingredients may lack stability in chewable formulations, which could compromise the medication's efficacy.

**5. Medicated Chewing Gum**

Medicated chewing gum merges the advantages of traditional chewing gum with therapeutic properties. It is capable of administering active compounds, such as nicotine for aiding in smoking cessation or fluoride for promoting dental health. Chewing stimulates saliva production, which facilitates the absorption of the medication via the oral mucosa, making it beneficial for conditions like mouth ulcers. The formulation must guarantee that the active ingredients remain stable and effective throughout the chewing duration<sup>58</sup>.

At the outset of the procedure, precise quantities of four distinct gum bases were measured and heated to 70°C in a water bath, followed by thorough mixing and softening. Subsequently, exact amounts of liquid glucose, glycerin, and various sweeteners, including sugar, xylitol, aspartame, and maltitol, were first triturated and then incorporated into the gum base mixture. After thorough mixing, the temperature was adjusted to 40°C. If necessary, concentrated extract and flavouring agents were added. The resulting homogeneous mixture was then cut into uniform pieces of appropriate size and shape on a clean glass surface<sup>58,59,60</sup>.

**Advantages of chewing gum<sup>58,59,60</sup>**

- Herbal chewing gums are composed of natural components, ensuring the absence of chemical additives, which typically renders them safer and more beneficial for health.
- Their convenient form allows for easy consumption, making them ideal for travel or for individuals with hectic schedules.
- Certain medicated herbal gums possess antibacterial qualities that can enhance oral hygiene and mitigate bad breath.
- Additionally, chewing gum may assist in alleviating stress and anxiety, fostering a sense of relaxation.
- Furthermore, herbal gums are frequently available in delightful flavours, enhancing the overall chewing experience.

**Limitations of chewing gum<sup>58,59</sup>**

- The efficacy of herbal chewing gums may be restricted, and they might not address significant health concerns.

- If these gums contain sugar, they could pose risks to dental health; therefore, it is crucial to seek sugar-free alternatives.
- Certain individuals may experience allergic reactions to herbal components, making it prudent to conduct a patch test beforehand.
- These gums should not substitute for prescribed medications; thus, it is vital to consult a healthcare professional regarding health matters.
- Additionally, medicated herbal chewing gum may not be easily accessible in all locations, which can complicate availability.

## 6. Oral Ointments

Oral ointments are semi-solid formulations intended for application on the skin or mucous membranes. They generally consist of active medicinal components combined with a base that may be oily or fatty in nature. These ointments serve multiple functions, such as addressing skin disorders, alleviating pain, and offering anti-inflammatory benefits. Their viscous texture enables them to adhere effectively to the skin, creating a protective layer and ensuring extended contact with the targeted area<sup>61</sup>.

The ointment was primarily utilized for its antibacterial and antimicrobial properties, as well as for the treatment of mouth ulcers. The base of the ointment was prepared using the fusion method, where the components were combined and melted at a temperature of 70°C. Following the melting process, the ingredients were stirred and maintained at 70°C before being allowed to cool. The formulation of the ointment involved the incorporation of all active ingredients into the base with continuous blending. The final ointment was then transferred into the appropriate containers<sup>61,62,63</sup>.

### Advantages of oral ointment<sup>62,63</sup>

- Topical ointments for oral use are beneficial for localized issues, including oral ulcers or sores, as they deliver direct treatment to the specific area of concern.
- Their application is straightforward, enabling targeted relief without the necessity for systemic medications.
- Numerous oral ointments include emollients that assist in calming and hydrating dry or irritated oral tissues.
- Due to their localized application, these ointments typically exhibit lower systemic absorption than oral medications, potentially minimizing the likelihood of systemic side effects.

### Limitations of oral ointment<sup>[62,63]</sup>

- Oral ointments are typically utilized for particular conditions and may not be appropriate for every oral health concern.
- The application of these ointments can be cumbersome, and they may struggle to adhere effectively to mucosal surfaces, resulting in challenges in maintaining contact with the targeted area.
- Additionally, some patients might find the flavor or consistency of oral ointments unpalatable, potentially impacting their willingness to use them.
- Furthermore, certain components within the ointments may provoke irritation or allergic reactions in some individuals, causing discomfort.
- Lastly, the duration of effectiveness of oral ointments may be shorter compared to other medication forms, necessitating more frequent applications.

## 7. Oral gels

Oral gels represent a category of semi-solid formulations characterized by a consistency that is more fluid than that of ointments. Typically, water-based, these gels incorporate gelling agents that contribute to their structural integrity. Due to their soothing and cooling effects, oral gels are frequently employed in the treatment of burns, rashes, ulcers, and various other skin irritations. They are rapidly absorbed by the skin, delivering active ingredients while imparting a refreshing sensation that can significantly improve user comfort<sup>64,65</sup>.

A sufficient quantity of Carbopol 934 was immersed in distilled water for an overnight period. Following this, it was combined with additional distilled water while being continuously stirred using a mechanical stirrer. The necessary extracts, along with the specified amounts of methyl paraben and propyl paraben, were incorporated into the mixture with ongoing stirring. Propylene glycol was subsequently added to the solution. The total volume was adjusted to 30 ml with water, resulting in the preparation of the herbal gel<sup>64,65,66,67</sup>.

### Advantages of oral gel<sup>64,66,67</sup>

- Oral gels are frequently simpler to apply compared to ointments.
- Their formulation allows for a more uniform distribution over the affected area and improved adherence to mucosal surfaces.
- Due to their thinner consistency, gels facilitate quicker absorption into the tissues, potentially resulting in faster symptom relief.
- Similar to ointments, oral gels offer targeted treatment for particular issues such as ulcers, sores, or inflammation within the oral cavity.
- Additionally, oral gels tend to be less messy than ointments, enhancing their convenience for application.

### Limitations of oral gel<sup>64,67</sup>

- The duration of the effects produced by oral gels may be shorter compared to other medication forms, necessitating more frequent applications.
- Some patients might find the flavour or consistency of oral gels to be unpalatable, potentially impacting their compliance with usage.
- Additionally, specific components in these gels may provoke irritation or allergic responses in certain individuals, resulting in discomfort.
- Oral gels are mainly intended for particular oral health concerns and may not be suitable for addressing all types of conditions.

## Conclusion

A comprehensive management strategy is necessary because mouth ulcers can have a major negative influence on a person's quality of life. The effectiveness of herbal therapies in reducing mouth ulcer symptoms is highlighted in this review, along with the significance of combining these natural remedies with conventional medical procedures. By integrating the benefits of both techniques, healthcare providers can deliver more complete and patient-centric care, thereby improving outcomes for those suffering from mouth ulcers.

## Conflict of interest

The authors declare no conflict of interest.

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Pharmaceutics.2024

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