



ISSN (E): 2320-3862  
ISSN (P): 2394-0530  
[www.plantsjournal.com](http://www.plantsjournal.com)  
JMPS 2021; 9(4): 51-59  
© 2021 JMPS  
Received: 20-05-2020  
Accepted: 22-06-2021

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# Journal of Medicinal Plants Studies

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## Medicinal plants for treatment of ulcer: A review

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DOI: <https://doi.org/10.22271/plants.2021.v9.i4a.1312>

### Abstract

A mouth ulcer (also termed an oral ulcer, or a mucosal ulcer) is an ulcer that happens on the membrane of the oral cavity. It is defined as “a break within the mucosal surface of the oral cavity”. Ulcers are an open sore of the skin or mucus membrane characterized by removing of inflamed dead tissue. The mouth ulcer often caused pain and discomfort and can alter the person choice of food while healing occurs. The foremost common oral ulceration is Aphthous stomatitis. This review focuses on the causes of mouth ulcer and factors in charge of the mouth ulcer. There are various synthetic drugs which are available to treat mouth ulcer. As we all know herbal medicine is that the most stay of primary healthcare thanks to better culture acceptability, better computability with natural object and lesser side effects. And the literature also revealed that there are various medicinal plants which can be utilized within the treatment of mouth ulcers. Therefore, this review summarises about the medicinal plants which could be used for the treatment of mouth ulcer as drug.

**Keywords:** Mouth ulcer, aphthous stomatitis, herbal plants, chemical constituents.

### 1. Introduction

A mouth ulcer (also termed an oral ulcer, or a mucosal ulcer) is an ulcer that happens on the mucous membrane of the oral cavity<sup>[1]</sup>. It is defined as “a break within the mucosal surface of the oral cavity”<sup>[2]</sup>. Ulcers are an open sore of the skin or mucus membrane characterized by removing of inflamed dead tissue<sup>[3]</sup>. Ulcers are commonest on the skin of the lower extremities and within the alimentary tract, although they will be encountered at almost any site. There are many sorts of ulcer like mouth ulcer, esophagus ulcer, ulcer, and genital ulcer.<sup>[4]</sup> They are common and can be due to local factors like trauma from dentures or fractured dentition or a limit less number of systemic diseases can manifest as ulcerations within the oral cavity<sup>[5]</sup>. They are painful round or oval sores that form within the mouth, mainly on the within of the cheeks or lips. As they're quite common, and occur in relation to many diseases and by different mechanisms, but usually there is no serious basic cause<sup>[6]</sup>.

Oral trauma is one of the foremost common causes of recurrent oral ulcers. This results in mechanical, chemical, or thermal irritation of the mucosa. These are generally acute short-lived events producing painful ulcers, which heal easily within some weeks without scar. The ulcers could even be recurrent if the inciting stimulus isn't removed<sup>[7]</sup>. Mouth ulcer causes pain during eating, drinking and thru brushing teeth<sup>[8]</sup>.

### Recurrent Aphthous Stomatitis

Mouth ulcers are also known as “aphthous ulcers”<sup>[9]</sup>. Recurrent aphthous stomatitis, is additionally observed as aphthous ulcers or canker sores, which is the most typical oral mucosal disease in humans and it typically occurs first in childhood or adolescence<sup>[10]</sup>. As “Aphthous” comes from the Greek word “aphtha,” which suggests ulcer. But the medical literature continues to refer to these oral lesions as aphthous ulcers<sup>[11]</sup>.

Aphthous stomatitis has been used interchangeably with “aphthous ulcers” and can be more accurate terminology<sup>[12]</sup>. Aphthous ulcers appears in round or oval shape, with a grayish yellow, which shaped form of a bowl surrounded by inflamed mucosa<sup>[13]</sup>.

The ulcer usually occurs inside the mouth on the non-keratinized oral mucosa, including the lips, the buccal mucosa, the bottom of the mouth, and thus the ventral surface of the tongue. And so the regions of keratinized oral mucosa, just like the surface, the gums, and so the dorsal surface of the tongue, are common location.

### Types of Mouth Ulcer

On the basis of ulcer size and number, mouth ulcer can be classified as minor, major and herpetiform <sup>[14]</sup>. The main types of mouth ulcer are:

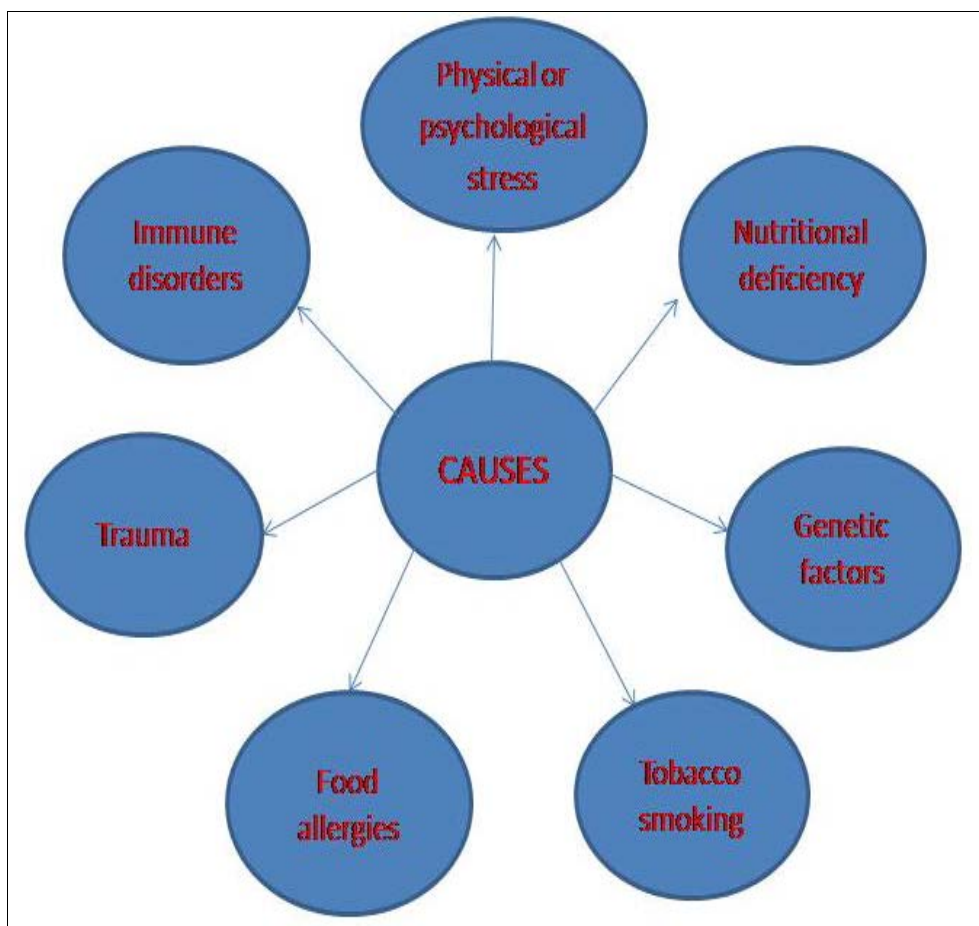
- **Minor ulcers:** Minor aphthous ulcers are the foremost common form considering for about 80% of cases. These are around 2-8mm in diameter which they typically clear up in 10 days to 2 weeks. Typically, these ulcers are superficial in nature, small in size, usually but 1 cm in diameter, few in number, occurring singularly or in groups, and heal without scarring <sup>[15]</sup>.
- **Major ulcers:** The second type is major aphthous ulcers, it occurs in about 10% of patients. These are bigger and deeper in shape often over 1cm in diameter, with a raised or irregular border <sup>[16]</sup>. And they occur either singly or as multiple lesions. This type of ulcer can take several weeks to heal and can leave a scar within the mouth because of the extent of necrosis <sup>[17]</sup>.
- **Herpetiform ulcers:** The third type is known as herpetiform ulcers, is a descriptor referring to the clustered morphology of lesions <sup>[18]</sup>. This type of ulcer is

a cluster of dozens of smaller sores about the size of pinheads <sup>[19]</sup>. 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 ulcer they may heal with scar in 7 to 30 days <sup>[20]</sup>

- **Ulcerative Conditions:** Mouth ulcers are very common and are mainly due to trauma such as from ill-fitting dentures, fractured teeth, or fillings. However, biopsy or other investigation should be done for patients with an ulcer of over three week's duration to exclude malignancy or other serious conditions such as chronic infections <sup>[21]</sup>.

### Causes

There is no definite etiology and pathology known for mouth ulcer; although some factors are considered important which include nutritional deficiencies such as iron, vitamins especially B12 and C, poor oral hygiene, infections, stress, indigestion, mechanical injury, skin disease etc. <sup>[22]</sup> Some other factor include such as:



1. **Genetic factors:** There is a genetic component in patients with aphthous ulcers, with about 30%-40% of patients having a family history <sup>[23]</sup>. A family history of recurrent aphthous ulcers is obvious in some patients. A familiar connection includes a young age of onset and symptoms of increased severity. Recurrent aphthous ulcers are highly correlated in identical twins <sup>[24]</sup>.
2. **Physical or Psychological Stress:** There is a strong

connection of aphthous ulcer occurrences with stressful life <sup>[25]</sup>. Psychological stress may play a role in the appearance of recurrent aphthous stomatitis as a trigger or a modifying factor. No studies have convincingly proved stress as a causative or precipitating factor for recurrent aphthous stomatitis <sup>[26]</sup>.

3. **Nutritional deficiency:** Various nutritional deficiencies have been implicated in a subset of aphthous ulcer

patients, which involving of iron, folic acid, vitamin B12, B1,B2 and B6. The contribution of nutritional deficiencies to aphthous ulcers are likely to vary across different regions based on diet and food supplementation [27].

4. **Trauma:** The most likely factors which bring about aphthous ulcers are local trauma and stress. Injury to the oral mucosa may give result from accidental self-biting, dental procedures, tooth brush bristles, and sharp-edged foods (e.g., potato chips), anesthetic injection. Apart from this environmental and emotional stress also result into aphthous ulcer [28].
5. **Food allergies:** There are various food which is able to cause allergies. Antibodies to cow's milk and wheat protein (celiac disease) are demonstrated in patients with recurrent aphthous stomatitis. Therefore, many foods that are commonly allergenic (e.g., strawberries, tomatoes, and nuts) haven't been causally associated with recurrent aphthous stomatitis [29]. Foods like chocolate, coffee, peanuts, cereals, almonds, strawberries, cheese, tomatoes (even the skin of the tomatoes) and flour (containing gluten) could even be implicated in some patients [30].
6. **Immune disorders:** Aphthous ulcers are more common and more severe in patients with immune disorders, including cyclic neutropenia, inflammatory bowel disease, Behçet's disease, and HIV disease [31].
7. **Tobacco smoking:** The patients suffering from recurrent

aphthous stomatitis usually are non-smokers, but there is a lower prevalence and severity of recurrent aphthous stomatitis among heavy smokers as critical moderate smokers. Some patients report an onset of recurrent aphthous stomatitis after smoking cessation, while others report control on re-initiation of smoking. the use of smokeless tobacco is expounded to a significantly lower prevalence of recurrent aphthous stomatitis. Nicotine-containing tablets also appear to control the frequency of recurrent aphthous stomatitis [32].

Some other factors which causes mouth ulcers are:

- Toothpastes and mouthwashes that contain sodium lauryl sulfate
- Hormonal changes
- Viral infections
- Allergies and sensitivities
- Infectious agents (both bacterial and viral)
- Medical conditions [33]

Plants are a rich resource used for centuries to cure various diseases. There are many herbal plants which are useful in medicinal purposes. Plants various parts are used for treating various diseases. Therefore there are some plant which will be useful in treating mouth ulcer. Following is the list of all plants which are helpful in treating mouth ulcers

**Table 1:** List of plants with their parts and vitamin present in it.

Sr.no	Plants	Parts use	Vitamin present
1	<i>Adansonia Digitata</i>	Leaves, bark	Vit C, vit B6
2	<i>Allium Sativa</i>	Bulb	Vit B, vit C
3	<i>Annova Squamosa</i>	Leaves	Vit C
4	<i>Aloe Vera</i>	Whole plant	Vit A, vit C
5	<i>Azadirachta Indica</i>	Bark, leaves, flowers	Vit C
6	<i>Aegle Marmelos</i>	Fruit	Vit C, vit A
7	<i>Berberies Aristata</i>	Root, bark	Vit C
8	<i>Beta Vulgaris</i>	Fruit	Vit C, vit B9
9	<i>Bauhinia Variegata</i>	Root, bark, leaves	Vit C
10	<i>Carica Papaya</i>	Seed	Vit A, vit B, vit C
11	<i>Chamomile</i>	Flower	Vit C
12	<i>Curcuma Longa</i>	Rhizome	Vit C
13	<i>Hibiscus Rosa Sinesis</i>	Root	Vit C
14	<i>Jasminum grandiflorum linn</i>	Leaves, flowers, roots	Vit C
15	<i>Mangifera Indica</i>	All parts	Vit C, vit A
16	<i>Momordica Charantia</i>	Fruit	Vit C,A,E,B1,B2,B3
17	<i>Moringa Oleifera</i>	Leaves, stem	Vit A,C,B1,B2,B3,B4,B7,D,E
18	<i>Morinda Citrifolia</i>	Leaves	Vit C, vit B
19	<i>Ocinum Sanctum</i>	Whole plant	Vit A, vit C
20	<i>Psidium Guava</i>	Leaves, bark, root	Vit A, B1,B2,B3
21	<i>Punica Granatum</i>	Fruit	Vit C, vit K
22	<i>Glycyrrhiza Glabra</i>	Stem, root	Vit B, vit E, vit c
23	<i>Termiualia Chebula</i>	Fruit	Vit C
24	<i>Tamarindus Indica</i>	Seed	Vit B1,vit B3
25	<i>Zingiber officinalis</i>	Root	Vit C

#### Description of the given plants with their chemical constituents -

**1. *Adansonia Digitata*** - *Adansonia digitata* belonging to the family *Malvaceae* is commonly known as "boabab or monkey-bread tree of Africa." Chemical constituents in this

Plant are pulp that contains phobaphenes, mucilage and gum, glucose, tartrate and acetate of potash, and other salts. A leaf contains wax, glucose, salts, gum, and albuminoids. Bark contains wax, soluble and insoluble tannin, acid gum, albuminous carbonate and chloride of sodium and potassium, and a glucoside adansonin [34].



**Fig 1:** *Adansonia Digitata*

**2. *Allium Sativa*** - *Allium sativum* belonging to the family *Liliaceae* is commonly known as “garlic”. Chemical constituents in this plant are an acrid volatile oil which is the active principle, starch, mucilage, albumen, and sugar. Seeds yield aromatic oil and complementary substances containing vitamins [35].



**Fig 2:** *Allium sativum*

**3. *Annona Squamosa*** - *Annona squamosa* belonging to the family *Annonaceae* is commonly known as “custard apple.” It is locally called as “sitapalam.” Chemical constituents in this plant are alkaloids, flavonoids, saponins, and tannins. Seeds yield oil and resin; seeds, leaves, and immature fruit contain an acrid principle [36].



**Fig 3:** *Annona squamosa*

**4. *Aloe Vera*** - *Aloe vera* belonging to the family *Liliaceae* is commonly known as “aloe gel.” Chemical constituents in this plant are aloin, isobarbaloin, and emodin [37].



**Fig 4:** *Aloe vera*

**5. *Azadirachta Indica*** - *Azadirachta indica* belonging to the

family *Meliaceae*. It is commonly known as “neem”. Chemical constituents reported in this plant are nimbidin, phenolic compounds, saponin, and flavonoids. It contains a bitter alkaloid named Margosine. Seeds contain about 10–31% of a yellow bitter fixed oil. The oil contains free and volatile fatty acids [38].



**Fig 5:** *Azadirachta indica*

**6. *Aegle Marmelos*** - *Aegle marmelos* belonging to the family *Rutaceae* which is commonly known as a “baeltree”. It is locally called as “vilvam.” Chemical constituents in this plant are flavonoids, tannins, and saponins [39].



**Fig 6:** *Aegle marmelos*

**7. *Berberis Arista*** - *Berberis aristata* belonging to the family *Berberidaceae*. It is commonly known as “Indian or Nepal barberry” and locally called “kasturimanjal.” Chemical constituents reported in this plant are roots and wood which are rich in a yellow alkaloid “berberine” bitter substance, which dissolves in acids and forms salts of the alkaloid; root contains two more alkaloids [40].



**Fig 7:** *Berberis aristata*

**8. *Beta Vulgaris*** - *Beta vulgaris* belonging to the family *Chenopodiaceae* is commonly known as “beetroot.” It is also known as sugar-beet. It is also cultivated in gardens in many parts of India for the sake of its flesh roots and leaves. There are two kinds: white and red. Chemical constituents in this plant are an active principle “betin” [41].



**Fig 8:** *Bauhinia variegata*

**9. *Bauhinia Variiegta*** - *Bauhinia variegata* belonging to the family *Caesalpiniaceae*. It is commonly known as “orchid tree” and locally called “shemmandarai.” Chemical constituents reported in this plant are quercetin, rutin, apigenin, and apigenin, glucoside. Bark contains tannin (tannic acid), glucose, and a brownish gum [42].



**Fig 9:** *Bauhinia variegata*

**10. *Carica Papaya***- *Carica papaya* belonging to the family *Caricaceae* is commonly known as “papaya.” It is locally called “papali-pazham.” Chemical constituents in this plant are Papain, chymopapain, pectin, carposide, carpaine, carotenoids, and antheraxanthin [43].



**Fig 10:** *Carica papaya*

**11. *Chamomile*** - *Chamomile* belonging to the family *asteraceae* is commonly known as babuna. It contains a large group of therapeutically interesting and active compound classes. Sesquiterpenes, flavonoids, coumarins, and polyacetylenes are considered the most important constituents of the chamomile drug [44].



**Fig 11:** *Chamomile*

**12. *Curcuma Longa*** - *Curcuma Longa* belonging to the family *Zingiberaceae*. Chemical constituents in this plant are Curcumin, demethoxycurcumin and bisdemethoxycurcumin collectively known as curcuminoids (3-6%) are major polyphenolic compounds in turmeric rhizomes. The main colouring principle of turmeric rhizome is known as ‘Curcumin’ [45].



**Fig 12:** *Curcuma Longa*

**13. *Hibiscus Rosa Sinesis*** - *Hibiscus rosa sinensis* belonging to the family *Malvaceae* is commonly known as “changing rose.” Chemical constituents in this plant are flavonoids, anthocyanins, quercetin, cyaniding, kaempferol, and hydrocitric acid [46].



**Fig 13:** *Hibiscus rosa sinensis*

**14. *Jasminum grandiflorum*** - *Jasminum grandiflorum linn* belonging to the family *Oleaceae*. Chemical constituents in this plant contain the major compounds identified were benzyl acetate, benzyl benzoate, phytol, linalool, isophytol, geranyl linalool, methyl linoleate and eugenol [47].



Fig 14: *Jasmines grandiflora linn*

**15. *Mangifera Indica*** - *Mangifera indica* belonging to the family *Anacardiaceae* is commonly known as “mango tree.” It is locally called “mangaai.” Chemical constituents in this plant are alkaloids, sterols, saponins, tannins, and flavonoids [48].



Fig 15: *Mangifera indica*

**16. *Momordica Charantia*** - *Momordica charantia* belonging to the family *Cucurbitaceae* is commonly known as “bitter gourd.” Chemical constituents in this plant are bitter glucoside soluble in water and insoluble in ether, a yellow acid, resin, and ash. Fresh vegetable contains albuminoids, soluble carbohydrates, woody fiber [49].



Fig 15: *Momordica charantia*

**17. *Moringa Oleifera*** - *Moringa oleifera* belonging to the family *Moringaceae* is commonly known as “drum-stick, horse radish tree.” It is locally called “murungai.” Chemical constituents in this plant are alkaloids, flavonoids, saponin, tannins, zeatin, quercetin, kaempferom, and terpenoids [50].



Fig 17: *Morinda citrifolia*

**18. *Morinda Citrifolia*** - *Morinda citrifolia* belonging to family *Rubiaceae*. It is commonly known as “noni fruit”. Chemical constituents in this plants are amino acids, anthraquinones, coumarins, fatty acids, flavonoids, iridoids, lignans and phenolics. Oligo-and polysaccharides, glycosides, alkaloids components, octoanoic acid, potassium, vitamin C, terpenoids, carotene, vitamin A, flavones glycosides, linoleic acid, alizarin, amino acids, acubin, L-asperuloside, caproic acid, caprylic acid, ursolic acid, rutin, a putative proxeronine are also present [51].



Fig 18: *Morinda citrifolia*

**19. *Ocimum Sanctum*** - *Ocimum sanctum* belonging to the family *Lamiaceae* is commonly known as “holy basil.” It is locally called “tulsi.” The name Tulsi means “the incomparable one.” It is one of the sacred herbs for Hindus in the Indian subcontinent. Chemical constituents in this plant are alkaloids, tannins, saponins, flavonoids, and sterols [52].



Fig 19: *Ocimum sanctum*

**20. *Psidium Guava*** - *Psidium guava* belonging to the family *Myrtaceae*. It is commonly known as “guava.” Chemical constituents in this plant are bark that contains tannin, resin, and crystals of calcium oxalate. Leaves contain resin, fat, cellulose, tannin, volatile oil, chlorophyll, and mineral salt [53].



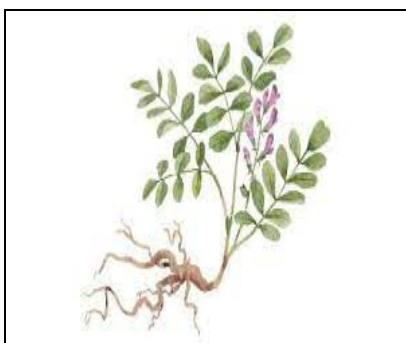
**Fig 20:** *Psidium guava*

**21. *Punica Granatum*** - *Punica granatum* belonging to the family *Punicaceae*. It is commonly known as “pomegranate”. They hold various types of ingredients including flavonoids, ellagitannins and proanthocyanidin. Pomegranate fruit arils contain organic acids, sugars such as glucose, fructose, minerals, vitamins, and polyphenols. It also contain pectin, organic acids including citric, malic, tartaric, succinic, fumaric and ascorbic acid [54].



**Fig 21:** *Punica granum*

**22. *Glycyrrhiza Glabra*** - *Glycyrrhiza glabra* belonging to the family *Fabaceae*. The roots of *Glycyrrhizag labra* Linn contain glycyrrhizin, which is a saponin that is 60 times sweeter than cane sugar, flavonoid rich fractions include liquiritin, isoliquirtin liquiritigenin and rhamnoliqurilin, gluco liquirtin apioside, prenyllicoflavone A, shinflavanone, shinpterocarpin and 1-metho-xyphaseolin isolated from dried roots [55].



**Fig 22:** *Glycyrrhizin glabra*

**23. *Terminalia Chebula*** - *Terminalia chebula* belonging to family *Combretaceae*. It is commonly known as “myrobalan; Ink-nut; gullnut.” It is locally called “kaduk-kai.” Chemical constituents in this plant are tannin (tannic acid) and a large amount of gallic acid, lucilage [56].



**Fig 23:** *Terminalia chebula*

**24. *Tamarindus Indica*** - *Tamarindus indica* belonging to family *Caesalpiniaceae* is commonly known as “tamarind tree.” It is locally called “Imli”. Chemical constituents in this plant are pulp that contains tartaric acid, citric acid, malic and acetic acids, tartaric of potassium, invert sugar, gum and pectin. Seeds contain albuminoids, fat, carbohydrates, fibre, and ash containing phosphorus and nitrogen. Fruit contains traces of oxalic acid [57].



**Fig 24:** *Tamarindus indica*

**25. *Zingiber Officinalis*** - *Zingiber officinalis* belonging to family *Zingiberaceae*. It is commonly known as “Ginger”. Chemical constituents in this rhizome are carbohydrates, lipids, terpenes, and phenolic compounds [59]. Terpene components of ginger include zingiberene,  $\beta$ -bisabolene zingerone while phenolic compounds include gingerol, paradols, and shogaol [58-59].



**Fig 25:** *Zingiber officinalis*

### Conclusion

From this review it's clear that medicinal plants play a significant role within the treatment of mouth ulcer. The anti-ulcer activities probably due to the presence of flavanoids in herbal plants because of their better computability with form and lesser side effects. The herbal medicine is that the most suitable option for the treatment of mouth ulcer due to the presence of chemical constituents which are naturally

Available and with their great uses and healing effects. As Ayurveda is the oldest medicinal system within the world, which provides ends up in find therapeutically useful compounds from plants. Therefore, ayurvedic knowledge supported by modern science is important to isolate, characterize, and standardize the active constituents from herbal sources for antiulcer activity. The combination of traditional and modern knowledge can produce better drugs for the treatment of mouth ulcer with fewer side effects.

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