

HERBAL MEDICINES IN THE TREATMENT OF MOUTH ULCER: A REVIEW**^{1*}Anitha Roselin S., ²Abhitha Shree S., ³Dr. N. Narmatha MDS and ⁴Dr. G. S. Asokan MDS,**^{1,2}Undergraduate, Tagore Dental College and Hospital, Rathinamangalam, Chennai, India.³Assistant Professor, Department of Oral Medicine and Radiology, Tagore Dental College and Hospital, Rathinamangalam, Chennai 600127.⁴Professor and Head of the Dept., Department of Oral Medicine and Radiology, Tagore Dental College and Hospital, Rathinamangalam, Chennai 6001273.***Corresponding Author: Anitha Roselin S.**

Undergraduate, Tagore Dental College and Hospital, Rathinamangalam, Chennai, India.

Article Received on 25/08/2023

Article Revised on 14/08/2023

Article Accepted on 03/09/2023

ABSTRACT

Apthous ulcer heals but it frequently causes pain and discomfort and may change the eating preferences. The two most frequent causes of oral ulceration are apthous stomatitis and local trauma. This review focuses on the mouth ulcers causes and contributing factors. Unless linked to some underlying systemic condition, this ulcer resolves in a week to 10 days with the potential for a quick recurrence. Analgesics, antibiotics, and topical steroid application are the only medications used to treat symptoms in most cases. The medications used to cure mouth ulcers Aloe vera, Guava, capsicum annuum, turmeric. Botanical components with antiulcer activity include flavonoids (e.g. quercetin, naringin, silymarin, anthocyanosides, soforadin derivatives) were used so far. The aim of the study is to investigate the effects of herbal medicines in oral ulcer treatments.

I. INTRODUCTION

A mouth ulcer also known as oral ulcer or mucosal ulcer occurs in the mucosal membrane of the oral cavity which are present mainly on the inside of cheeks or lips. The mechanism of ulcer and its association with many diseases varies for different types of ulcers.^[1,2,3] It is the most common oral disease with a prevalence of 25%.^[4] There is no definitive cure for ulcers and the treatment plan depends on the frequency and severity of the disease symptoms.^[5] The conventional treatment is to reduce the pain and lessen lesion duration.^[9] Current treatment for ulcer includes topical analgesic and analgesic agents, antibiotics, multivitamins, systemic corticosteroids and varieties of combined therapies.^[5-8] Medicinal plants are used as an alternative for chemical medicines nowadays for the treatment of ulcers as they have anti-bacterial, anti-fungal, anti-inflammatory and anti-oxidant activities.^[8,10] Recent reports also suggest that medicinal plants can be used as an alternative for treatment of lesions and some of the reports have proved the efficacy of these medicinal plants.^[11]

II. TYPES OF MOUTH ULCERS

Mouth ulcers are classified into 3 types based on their size and number as minor, major and herpetiform mouth ulcer.^[12,13]

MINOR ULCERS

Size : Small, 2 to 8 mm in diameter
Healing : 10 to 14 days

MAJOR ULCERS

Size : Big, 1 cm or more
Healing : Weeks to months
May leave a scar in the mouth

HERPETIFORM ULCERS

Size : Small, pinhead
Found in small clusters

III. FACTORS RESPONSIBLE FOR MOUTH ULCER**GENETIC FACTOR**

Upto 30 to 40% of people have a hereditary history of mouth ulcers.^[14]

PHYSICAL OR PSYCHOLOGICAL STRESS

In a survey it has been said that 50 to 60% of students and military personnel were affected by daily stressful tasks like exams.^[15]

NUTRITIONAL DEFICIENCY

Unbalance in the intake of essential nutrients like iron, folic acid or vitamin B12 might result in mouth ulcers and can be prevented by taking a balanced diet.^[16]

TRAUMA

Trauma caused due to a sharp tooth or over hanging restoration, aggressive tooth brushing, local application of aspirin, self biting and dental treatments will lead to the formation of mouth ulcers.^[17]

FOOD ALLERGENS

There are several foods which will cause ulcers some of them are coffee, chocolate, peanuts, cereals, almonds, cheese, strawberries, tomatoes, wheat flour and gluten containing meals.^[18]

DRUGS

Some of the medications such as Nicorandil, NSAIDS, Ibuprofen and nicotine replacement therapy may induce mouth ulcers.^[19]

OTHERS

- Toothpastes and mouthwashes containing sodium lauryl sulfate
- Hormonal changes
- Viral infections
- Infectious agents
- Medical conditions.^[20,21]

IV. IMPORTANCE OF HERBAL MEDICINE

Herbal medicines are easy to use, needs no processing and has very minimal side effects compared to chemical medications.^[22] Most of the under developed countries still use herbal medicine as their primary health care. Traditional medicine has been in use around hundred years before the modern medicine was developed. Traditional medicine is considered as the most expensive form of indigenous medicine practiced by the doctors. Traditional medicine has also been mentioned in the literature of various countries and is made up of organic material, minerals and medicinal plants.^[23] Herbs are biosynthetic chemical factories that create a variety of chemical substances. They are made from fragments of plants or unpurified plant extracts which adds more synergistic value.^[24] People prefer herbal treatments over the allopathic medication because of their low adverse effects and because of this people also rely more on the traditional treatments to cure a variety of illnesses. As the traditional medicines are bio-degradable and environmentally friendly plant based products to treat various ailments they are practiced in majority of the world populations.^[25] Phyto-genic agents are used for the prevention and treatment of ulcer. This article gives a detailed review on the anti-ulcer properties of certain herbs and their identified active constituents.^[26,27]

V. ADVANTAGES OF HERBAL MEDICINE

- Cost efficient
- Easily available
- Used for a long time
- Eco-friendly
- Prolonged use is also safe and efficient
- Some herbal plants have also shown anti-ulcer activity.^[28]

VI. HERBAL PLANTS USED IN THE TREATMENT OF MOUTH ULCER

1. PSIDIUM GUAJAVA

Other names : Peru, Guava, Ambrud

Components: Flavonoids, triterpenoids, steroids, carbohydrates, oils, lipids, glycosides, alkaloids, tannins and saponins.

Properties: Anti-oxidant, anti-bacterial, anti-inflammatory and anti-cancer.

Used for: Mouth ulcers, rheumatism, diarrhea, diabetes mellitus, sore throat and coughs.^[29]

Part used : Leaves, roots, fruits

Form : Gel, mouthwash

Dosage : Mucoadhesive gel – QID for 5 days.^[37-47]

2. CURCUMIN

Other name : Turmeric

Components : Diarylheptanoids, desomethoxycurcumin, bisdemethoxycurcumin

Properties: Analgesic, anti-oxidant, anti-septic, anti-bacterial, anti-inflammatory and immunomodulatory

Used for : Mouth ulcers

Part used : Dried rhizome and stem.^[29]

Form : Mouthwash, oil, gel

Dosage : Topical application of gel TDS for 10 days.^[37-47]

3. LICORICE

Other names : Glycyrrhizaglabra

Components: Triterpenesaponins, flavonoids, polysaccharides, pectin, simple sugars, amino acids, mineral salts.

Properties: Expectorant, demulcent, anti-oxidant, anti-ulcer, estrogen like, anti-asthmatic, anti-diuretic, anti-hepatotoxic

Used for : Mouth ulcers.^[30]

Part used : Root extract

Form : Disc patches, Mucoadhesive gel

Dosage : Gel TDS for 7 days.^[37-47]

4. ALOE VERA

Other names: Aloe barbedensis

Components: Amino acids, anthraquinones, enzymes, hormones, lignin, minerals, salicylic acid, saponins, sterols, sugars, vitamins.

Properties: Anti-oxidant, anti-inflammatory, mucus-secreting, cyto-protective, immunomodulatory, anti-fungal, hepatoprotective

Used for: Mouth ulcers, skincare, wound healing, hypoglycemic, hypolipidemic.^[31]

Part used: Leaves, flowers, stems, roots, fruits, seed.

Form: Gel

Dosage: 0.5% Acemannan in carbopol TDS for 7 days.^[37-47]

5. MINT

Other name : Menth

Components : Vitamin A, C, iron, calcium, magnesium

Properties : Anti-bacterial, anti-microbial, cooling effect

Used for : Mouth ulcers, Provide fresh breaths.^[32]

Part used : Leaves

Form : Oil, Gel, Mouthwash

6. TULSI

Other names : Ocimum sanctum linn, Holy basil

Components : Essential oils, eugenol, methyl, beta-caryophyllene, methyl chavicol, linalool and 1,8-cineole

Properties : Anti-helminthic, anti-pyretic, immune stimulant, anti-ulcer, anti-microbial, anti-inflammatory, anti-ulcer

Used for : Peptic ulcer, mouth ulcer.^[33]

Part used : Leaves

Form : Honey and tulsi ice chips

Dosage : Swish honey tulsi ice chips 5 mins before each dose of methotrexate, Replenish chips before previous ice has melted x 30 mins.^[37-47]

7. GINGER

Other names : Zingiber officinalis

Components : Gingerol, shogaol, zingerone

Properties : Anti-cancer, anti-inflammatory, anti-oxidant

Used for : Mouth ulcer.^[33]

Part used : Ginger's alcoholic extract

Form : Mucoadhesive base

Dosage : Topical application TDS 7 days^[37-47]

8. JASMINE

Other names : Jasmine grandiflorum

Components : Ascorbic acid, salicylic acid, glucoside

Properties : Anti-oxidant, anti-ulcer

Used for : Mouth ulcers, Wound healing

Part used : Leaves.^[34]

9. AMLA

Other names : Emblica, Indiangooseberry, emblica officinalis

Components: Vitamin C, tannins, alkaloids, phenolic substance, amino acids, carbohydrates, gallic acid, elagic acid, chebulinic acid, quercetin

Properties : Anti-oxidant, boosts immunity

Used for : Mouth ulcer

Part used : Fruits.^[35]

10. GREEN TEA

Other names: Camellia sinensis

Components: polyphenols, flavonoids, catechins, enzymes, amino acids, phytochemicals, sterols, minerals

Properties: Anti-oxidant, anti-inflammatory, anti-viral, anti-allergic, anti-cancer

Used for: Mouth ulcer, oral cancer

Part used: Leaves

Form: Dried leaves.^[36]

VII. DISCUSSION

Mouth ulcers, medically referred to as aphthous ulcers or canker sores, are a common oral condition that can cause significant discomfort and interfere with daily activities such as eating, speaking, and even smiling. While conventional treatments are available, herbal medicines have been utilized for centuries as alternative remedies for managing mouth ulcers. This discussion delves into the diverse array of herbal medicines employed to

alleviate the symptoms and promote the healing of these pesky ulcers.^[41]

Aloe vera, a succulent plant with a long history of medicinal use, offers a natural remedy for mouth ulcers. The inner gel of the aloe leaf contains bioactive compounds, including polysaccharides and glycoproteins, that possess anti-inflammatory, analgesic, and wound-healing properties. When applied topically, aloe vera gel forms a protective barrier over the ulcer, soothing irritation and facilitating tissue repair. Its anti-inflammatory effects reduce redness, swelling, and pain, contributing to overall relief.^[42]

Licorice root, derived from the Glycyrrhiza species, has been utilized in traditional medicine systems across cultures. Its active compound, glycyrrhizin, exhibits antimicrobial and anti-inflammatory properties. When used as a mouthwash or gel, licorice root can help combat microbial infections, reduce inflammation, and accelerate the healing process. The demulcent nature of licorice provides a soothing coating over the ulcer, easing discomfort and supporting the body's natural healing mechanisms.^[43]

Chamomile, renowned for its calming and anti-inflammatory effects, has been employed as a herbal remedy for mouth ulcers. The essential oil extracted from chamomile flowers contains bisabolol and chamazulene, compounds known for their analgesic and wound-healing properties. Chamomile's anti-inflammatory actions reduce pain and swelling, while its calming nature promotes relaxation. Using chamomile tea as a mouthwash or applying chamomile oil directly to the ulcers can offer relief and accelerate healing.^[44]

Sage, a fragrant herb often used in culinary dishes, has a rich history as a medicinal plant. Its potent antimicrobial and anti-inflammatory properties make it a valuable herbal medicine for managing mouth ulcers. Sage mouthwashes or gargles can help control bacterial growth, reduce inflammation, and alleviate pain. The active compounds in sage, such as thujone and rosmarinic acid, work synergistically to combat infections and promote a healing environment.^[45]

Myrrh, a resin obtained from the Commiphora myrrha tree, has been utilized in traditional healing practices for centuries. Its antimicrobial, anti-inflammatory, and astringent properties make myrrh an attractive option for treating mouth ulcers. A paste created by mixing myrrh powder with water can be applied directly to the ulcers, aiding in pain relief and accelerating the healing process. Myrrh's ability to promote tissue repair and reduce inflammation contributes to its efficacy in managing ulcers.^[46]

Honey, a natural sweetener and antimicrobial agent, has been employed for its wound-healing properties. Raw honey contains enzymes that produce hydrogen peroxide,

which helps combat bacterial infections. Additionally, honey's viscosity creates a protective barrier over the ulcer, shielding it from further irritation and promoting healing. Applying a small amount of honey directly to the ulcer can provide relief, reduce pain, and expedite the recovery process.^[47]

Coconut oil, revered for its versatile health benefits, has gained attention as a potential remedy for mouth ulcers. The oil's anti-inflammatory and antimicrobial properties contribute to its effectiveness in managing oral conditions. Oil pulling, a practice involving swishing coconut oil in the mouth, can help alleviate discomfort, reduce inflammation, and promote healing. Coconut oil's soothing nature provides relief and supports the body's natural healing mechanisms.^[41]

While herbal medicines offer promising benefits for managing mouth ulcers, several precautions and considerations should be noted. First and foremost, it is important to consult a healthcare professional before using herbal remedies, especially if you have underlying medical conditions, allergies, or are taking medications. While herbal treatments are generally considered safe, individual reactions can vary. Secondly, the quality and source of the herbal products matter. Choosing high-quality, standardized herbal preparations ensures consistency in dosage and potency. Always follow recommended dosages and application methods to prevent adverse effects. Lastly, if mouth ulcers persist, worsen, or are accompanied by other concerning symptoms, seeking medical attention is crucial. Persistent ulcers may indicate underlying health issues that require proper diagnosis and treatment.^[43]

In the realm of herbal medicines, a rich tapestry of natural remedies offers a complementary approach to managing mouth ulcers. From aloe vera's soothing embrace to licorice root's antimicrobial prowess, these herbs exemplify the intricate synergy between traditional wisdom and modern science. While conventional treatments remain essential, herbal medicines provide an alternative avenue for relief and healing. As we continue to explore the intricate nuances of nature's pharmacopoeia, the utilization of herbal medicines for mouth ulcers underscores the timeless quest for holistic well-being.^[45]

Incorporating herbal remedies into a comprehensive oral care routine can enhance comfort and promote the healing of mouth ulcers. However, informed decisions, professional guidance, and an understanding of each herb's mechanisms of action are imperative for a safe and effective experience. As we journey forward, the fusion of traditional knowledge and contemporary research will undoubtedly shed further light on the potential of herbal medicines in oral health management.^[46]

VIII. CONCLUSION

From this review article we can understand the anti-ulcer properties of some herbal medicines which can be used as an alternative for allopathic medicine as they are cost efficient, easily available and does not have much of adverse effects. Some of the herbal medicines not only can be used for ulcer treatment for also various other health conditions like diabetes mellitus, rheumatoid arthritis or even cancer therapies. In the near future herbal medicines can be used in combination with allopathic medicine for synergistic effects with greater treatment success rates.

VIII. REFERENCES

1. Yogesh S. Thorat, Asha M. Sarvagod, Shital V. Kulkarni, Avinash H. Hosmani. Treatment of Mouth ulcer by Curcumin loaded Thermoreversible Mucoadhesive gel. *International Journal of Pharmacy and Pharmaceutical sciences*, 2015; 7(10): 399-402.
2. Arati N. Ranade, Nisharani S. Ranpise, Chakrapani Ramesh. Enrichment of anti-ulcer activity of monoammoniumglycerrhizin and Aloe vera gel powder through a novel drug delivery system. *Asian Journal of Pharmaceutics*, 2014; 222-229.
3. Divyesh yogi, Ghanshyampatel, BhavinBhimani, Sunita Chaudhary, UpendraPatel. Formulation and Evaluation of Gel containing Amlexanox for Mouth Ulcer. *International Journal of Pharmaceutical Research and Bio-Science*, 2015; 4(2): 356-364.
4. ScullyC, PorterS. Oralmucosaldisease: recurrentaphthousstomatitis. *Br J Oral Maxillofac Surg.*, 2008; 46(3): 198-206.
5. Akintoye SO, Greenberg MS. Recurrent aphthous stomatitis. *Dent Clin.*, 2014; 58: 281-97.
6. Hamdy AA, Ibrahem MA. Management of aphthous ulceration with topical quercetin:A randomized clinical trial. *J Contemp Dent Pract*, 2010; 11: E009-16.
7. Mansour G, Ouda S, Shaker A, Abdallah HM. Clinical efficacy of new Aloe vera- and myrrh-based oral mucoadhesive gels in the management of minor recurrent aphthous stomatitis: A randomized, double-blind, vehicle-controlled study. *J Oral Pathol Med.*, 2014; 43: 405-9.
8. Ghalayani P, Zolfaghary B, Farhad AR, Tavangar A, Soleymani B. The efficacy of Punicagranatum extract in the management of recurrent aphthous stomatitis. *J Res Pharm Pract*, 2013; 2: 88-92.
9. Porter SR, Hegarty A, Kaliakatsou F, Hodgson TA, Scully C. Recurrent aphthous stomatitis. *Clin Dermatol*, 2000; 18: 569-78.
10. Amanlou M, Farsam H, Babaei N, Saheb JM, Tohi DA, Salehnia A. Efficacy of Saturejkhuzistanica extract and its essential oil preparations in the management of recurrent aphthous stomatitis. *Daru*, 2007; 15: 231-5.
11. Liu X, Guan X, Chen R, Hua H, Liu Y, Yan Z, et al. Repurposing of Yunnan baiyao as an alternative therapy for minor recurrent aphthous stomatitis.

- Evid Based Complement Alternat Med., 2012; 2012: 284620.
12. HeidarKhademi, PedramIranmanesh, Alimoeini, AtefehTavangar. Evaluation of the Effectiveness of the Iralvex gel on the Recurrent Aphthous Stomatitis Management. International Scholarly Research Notices, 2014; 1-5.
 13. Sumitra Singh, Bhagwati Devi Rohilla Formulation and evaluation of herbal gel from different parts of *Cyamopsis Tetragonoloba* (L) TAUB. For wound healing. World Journal of Pharmacy and Pharmaceutical Sciences, 2015; 5(3): 740-752.
 14. Vaishnavi Burley, D., Biyani, D., Umekar, M. and Naidu, N., Medicinal plants for treatment of ulcer: A review. Journal of Medicinal Plants, 2021; 9(4): 51-59.
 15. Aslani, A., Zolfaghari, B. and Davoodvandi, F., Design, formulation and evaluation of an oral gel from *Punicagranatum* flower extract for the treatment of recurrent aphthous stomatitis. Advanced Pharmaceutical Bulletin, 2016; 6(3): 391.
 16. Scully C, Porter S. Oral mucosal disease: recurrent aphthous stomatitis. British Journal of Oral and Maxillofacial Surgery. Apr 1, 2008; 46(3): 198-206.
 17. Natah SS, Konttinen YT, Enattah NS, Ashammakhi N, Sharkey KA, Häyrynen-Immonen R. Recurrent aphthous ulcers today: a review of the growing knowledge. International journal of oral and maxillofacial surgery, Apr 1, 2004; 33(3): 221-34.
 18. Scully, C., Gorsky, M. and Lozada-Nur, F., The diagnosis and management of recurrent aphthous stomatitis: a consensus approach. The Journal of the American Dental Association, 2003; 134(2): 200-207.
 19. Subiksha, P.S., Various remedies for recurrent aphthous ulcer-a review. Journal of Pharmaceutical Sciences and Research, 2014; 6(6): 251.
 20. Anjali Teresa, K.Krishna Kumar, Dinesh Kumar B, Anish john. Herbal Remedies for Mouth Ulcer. Journal of Bio Innovation, 2017; 6(4): 521-527.
 21. Dhere MD, Kumbhar RB, HolamMR. Extraction, Phytochemical study, Formulation and Evaluation of Antiulcer activity of *Jasminum Grandifloram* L. International Journal for Pharmaceutical Research Scholars, 2017; 6(2): 111-119.
 22. Tyler, V.E., Phytomedicines: back to the future. Journal of Natural Products, 1999; 62(11): 1589-1592.
 23. Pal SK, Shukla Y. Herbal medicine: current status and the future. Asian pacific journal of cancer prevention, Aug 20, 2003; 4(4): 281-8.
 24. Oluyemisi, F., Henry, O. and Peter, O., Standardization of herbal medicines-A review. International journal of biodiversity and conservation, 2012; 4(3): 101-112.
 25. Thombre, K.P., Sharma, D. and Lanjewar, A., Formulation and evaluation pharmaceutical aqueous gel of powdered *Cordiadietotoma* leaves with guava leaves. Am. J. PharmTech Res, 2018; 8: 268-277.
 26. Sabir Shaikh, Amol Shete. Studies on Inorganic materials based Anticancer Pharmaceutical Gel for Oral Cavity Formulation and Evaluation. Acta Scientific Pharmaceutical Sciences, 2018; 2(7): 38-44.
 27. M Anushri, R Yashoda, Manjunath, P Puranik. Herbs A Good Alternatives to Current Treatments for Oral Health Problems. International Journal of Advanced Health Sciences, 2015; 1(12): 26-32.
 28. Mishra, P., Banweer, J., Tahilani, P., Samundre, P. and Shrivastava, S., Herbal chewing Gum to Treat Mouth Ulcer using Guava Leaf and Turmeric Rhizomes. IJCMCR, 2022; 21(5): 1.
 29. Kumar, P. and Gupta, R.K., Formulation and Characterization of Mouth Dissolving Films of Amlodipine using Natural Polymer. Research Journal of Pharmacy and Technology, 2022; 15(8): 3651-3655.
 30. Upadhye, K., Charde, K., Dixit, G. and Bakhle, S., Formulation and evaluation of herbal gel for management of mouth ulcers.
 31. Madaan, M.V., Manjula, M.T. and Soni, M.N., herbal mouth ulcer gel: a review.
 32. Gandhi, S., Deoghare, A., Fating, C., Jha, S., Biranjan, R. and Fuladi, T., ayurvedic preparations for the management of the ras-a review.
 33. Agnihotri, A., Kaur, A. and Arora, R., Oral Ulceration and Indian Herbs: A Scoping Review. Dental Journal of Advance Studies, 2020; 8(03): 071-079.
 34. Mortazavi, H., Mashhadiabbas, F., Mortazavi, S.A.R., Rezaeifar, K. and Farhangi, M., Formulation of a Jasmine *Grandiflorum* containing mucoadhesive and evaluation of its healing effect on oral biopsy ulcers. Clinical Oral Investigations, 2020; 24: 1591-1597.
 35. Talreja, S., Kumari, S., Srivastava, P. and Pandey, S., A complete pharmacognostic review on amla. World Journal of Pharmacy and Pharmaceutical Sciences, 2019; 12.
 36. Benhur, V., Sudhakar, S., Ramaswamy, P., Smitha, B. and Kiran, C.S., Natural pharmacocons in the treatment of oral mucosal lesions. World journal of pharmaceutical research, 2015; 4(11): 327-337.
 37. Borrelli F, Izzo AA. The plant kingdom as a source of anti-ulcer remedies. Phytoter Res., 2000; 14(8): 581-591.
 38. Ship JA. Recurrent aphthous stomatitis. An update. Oral Surg Oral Med Oral Pathol Oral RadiolEndod, 1996; 81(2): 141-147.
 39. Gavanji S, Larki B, Bakhtari A. The effect of extract of *Punicagranatum* var. *pleniflora* for treatment of minor recurrent aph-thous stomatitis. Integr Med Res., 2014; 3(2): 83-90.
 40. Jiang XW, Zhang Y, Zhu YL, et al. Effects of berberinegelatin on recurrent aphthous stomatitis: a randomized, placebo-con-trolled, double-blind trial in a Chinese cohort. Oral Surg Oral Med Oral Pathol Oral Radiol, 2013; 115(2): 212-217.

41. Dosani MA, Sakarkar DM, Kosalge SB, Shafiq S. Formulation development and evaluation of unit moulded herbal semisolid jelly useful in treatment. Chun-Lei Li, He-Long Huang, Wan-Chun Wang, Hong Hua, Efficacy and safety of topical herbal medicine treatment on recurrent aphthous stomatitis: DrugDesign, Development and Therapy., 2016; 10: 107-115.
42. Bhalang K, Thunyakitpibal P, Rungsirisatean N. Acemannan, a polysaccharide extracted from Aloe vera, is effective in the treatment of oral aphthous ulceration. J Altern Complement Med, 2013; 19(5): 429-43420.
43. Babae N, Zabihi E, Mohseni S, Moghadamnia AA. Evaluation of the therapeutic effects of Aloe vera gel on minor recurrent aphthous stomatitis. Dent Res J (Isfahan), 2012; 9(4): 381-385.
44. Giroh VR, Hebbale M, Mhapuskar A, Hiremutt D, Agarwal P. Efficacy of aloe vera and triamcinolone acetonide 0.1% in recurrent aphthous stomatitis: a preliminary comparative study. J Indian Acad Oral Med Radiol, 2019; 31: 45-5022.
45. Mansour G, Ouda S, Shaker A, Abdallah HM. Clinical efficacy of new aloe vera- and myrrh-based oral mucoadhesive gels in the management of minor recurrent aphthous stomatitis: a randomized, double-blind, vehicle-controlled study. J Oral Pathol Med., 2014; 43(6): 405-40923.
46. Pandharipande R, Chandak R, Sathawane R, Lanjekar A, Gaikwad R, Khandelwal V, Kurawar K. To evaluate efficiency of curcumin and honey in patients with recurrent aphthous stomatitis: a randomized clinical controlled trial. Int J Res Rev., 2019; 6(12): 449-45515.