Journal of Cardiovascular Disease Research
ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 11, 2024

Original Article

A Comprehensive Review on Canker Sores and Its Management by Harnessing the Herbal Approaches

Ayushi Chaudhary[1]*, Dr. Neha Tiwari[1], Dr. Pragnesh Patani[1]

[1]*Khyati College of Pharmacy, Ahmedabad

***Corresponding Author:** Ayushi Chaudhary
*Email: ayushichaudhary1693@gmail.com

ABSTRACT
Canker sore is one of the most frequent oral ulcerative disorders that is observed in many people around the world. They are white-reddish, inflamed spots that form on the mucous membrane of the oral cavity or throat. They are very powerful and affect people's daily activities like eating, speaking, and swallowing. This abstract focuses on the causes, symptoms, and treatments available for canker sores. Many anaesthetics, antibiotics, topical steroids, or OTC medications are on the market for their treatment, but they may possess some negative effects. An alternative to this commercial medication is an herbal approach that is safe, effective and offer a range of benefits for managing canker sores, including anti-inflammatory, healing, and pain-relieving properties. Many herbs, such as turmeric and chamomile, have significant anti-inflammatory properties that can help reduce the swelling and discomfort associated with these painful oral lesions. Aloe vera is particularly noted for its ability to promote mucosal healing, with its gel soothing the sore and aiding in tissue repair. Similarly, liquorice root supports healing through its anti-inflammatory and tissue-protective effects. Herbs like chamomile have natural analgesic properties that can ease the pain. By integrating natural treatments with conventional treatments can give a potential effect to overcome the painful symptoms of canker sores. The review begins by summarizing the pathophysiology of canker sores, to explore the beneficial herbal remedies in improvising strategies to combat ulcers by utilizing nature's pharmacy.

Keywords-Canker sores, Ulcers, Herbal approaches, Herbal remedies, Herbal treatment

1.INTRODUCTION
Canker Sore is one of the most prevalent oral ulcerative diseases [1]. Canker sores, also known as Aphthous Stomatitis or Recurrent Aphthous Stomatitis is an open sore that results from the breakage of the mucosal surface of the oral cavity [2]. It appears as a round and oval painful sore that forms in the mouth cavity largely on the tongue, lips, and within the cheeks [2,3]. The painful sore resolves within 10–14 days [4]. During the active disease phase, it may affect the quality of life by interfering with activities such as eating, speaking, drinking, and swallowing [4]. The exact cause of canker sore is not yet concealed, but some potential causes are mechanical injury, hormonal changes, vitamin deficiency, stress, drugs, microbial factors, food allergies, genetic predisposition[1]. The management of canker sore aims on the reduction of painful symptoms by the use of analgesics, antibiotics, and topical steroid application. However, prolonged use of these medicaments may give some side effects and also these conventional medicines are not suitable for every person[4,6]. A herbal alternative for these medicaments can be a game changer in today's world. It is astonishing that the majority of the world's population rely on traditional medicines[5]. Traditional herbal medicine research has been heavily funded by countries like India, China, Nigeria, the USA, and the WHO itself [5]. Traditional herbalists have employed phytogenic substances to prevent and treat ulcers [1].Today many studies and research going on for enhancing the efficacy and safety of herbal medicines.[7]Herbs as a medicine offer a safer, effective and economical benefit compared to conventional medicines[9] .Several novel

drug deliver systems having herbal medicament are formulated to enhance their efficacy such as nanoparticles, nanosuspensions ,dendrimers ,implants and hydrogels.[8]So there is a need to explore such beneficial herbal options that are employed in ulcer healing [5].

2.TYPES OF CANKER SORES

There canker sore is classified into three types on the basis of their size and number.

2.1. Minor Canker Sores-(As shown in figure-2.1)They are small in size typically of diameter 2-8 mm. They take 10-14 days to heal.[10]

Figure-2.1 (Minor canker sores)

2.2.Major Canker Sores-(As shown in figure-2.2)They are larger in size about 1 cm with wavy border. They take about weeks or months as healing time period.[11]

Figure-2.2 (Major canker sores)

2.3.Herpetiform Canker Sores-(As shown in figure-2.3)They are characterized by group of small ulcers of 2-3 mm diameter. They could be many irregular lesions fuse together in the number of around 100 . They go away within 7-10 days without leaving any scar.[12]

Figure-2.3 (Herpitiform canker sores)

3. ETIOLOGY[13,14,15]

The exact cause of canker sore is unexplained but there are several factors that may be responsible for their occurence.

3.1. Hormonal Fluctuations- Some women may experience bleeding gums or canker sore because of hormonal changes occuring during menstruation.

3.2. Stress- physiological instability and stress are associated with ulcers. It is observed that individual with high stress level are prone to develop canker sore.

3.3. Vitamin Deficiency- The canker sore occurs due to the low level of iron, folic acid, vitamin b12 or due to hematinic deficiency.
3.4. Mechanical injury- Any damage brought up by local anesthetic injections, dental procedures, biting of tongue or lips, bruises due to harsh brushing can cause canker sore.
3.5. Allergies and sensitivities- several food including chocolates, coffee, almond, tomatoes, strawberries may cause canker sore. Spicy or acidic food may also trigger the ulceration.
3.6. Immune system response-Abnormal T-cell mediated immunological response that may lead to destruction of healthy mouth cells may impact the generation of ulcers.
3.7. Genetic predisposition- Family history contributes to ulcers in about 40% of cases.
3.8. Others-bacterial or viral infections, digestion problem, dental braces.

4. SYMPTOMS

The symptoms of canker sore may vary according to their cause but they include:

- Pain and inflammation (due to isolation of foreign substance) at the site of ulcer. The affected are may feel rough, burning or tingling.[17,18]
- Swelling is observed around the sore.[19]
- Round and white or red patches confirms the presence of canker sore.[20]
- Salty, spicy or acidic food exacerbate the irritation which causes discomfort while talking, chewing.[17]

5.TREATMENT

In order to treat ulcers:
5.1.Mouth Rinses: To relieve discomfort, use mouthwash containing steroids, such as lidocaine or dexamethasone.[21]
5.2.Topical Products: Pastes, gels, and creams that are available over-the-counter and through prescription can help reduce discomfort and accelerate healing. Benzocaine, fluocinonide, and hydrogen peroxide are typical components.[22,23]
5.3.Oral Medications: Due to the possibility of severe adverse effects, oral steroids are often only used as a last resort when topical therapies have failed. However, they may be recommended in this situation. [24,25]
5.4.Nutritional Supplements: It may be advised to take supplements containing zinc, folic acid, vitamin B-6, and vitamin B-12. [26,27]

6.BENEFITS OF HERBAL APPROACHES.

6.1.Safety and Side Effects: Have no or less side effects when use for longer period of time hence assure the safety than synthetic drugs. [28]
6.2.Cost-Effectiveness: Provide a cost-effective option to manage health in increasing population. [29]
6.3.Environmental and Economic Benefits: Creates agricultural jobs results into enhancement of rural economic development in developing countries. It Also helps to preserves traditional knowledge and sustain environment. [30]

7.HERBAL DRUGS FOR CANKER SORES:

7.1.Guava (*Psidium guajava*)

Guava belongs to family *Myrtaceae*. It contains several phytochemicals such as Flavonoids, Triterpenoids, Steroids, Carbohydrates, Oils, Lipids, Glycosides, Alkaloids, Tannins and Saponins. It is used for its Antioxidant, Antibacterial activity, Anti-inflammatory activity, Anticancer activity [31].Guava leaves has been used as a herbal treatment for oral conditions, including toothaches, sore throats, inflamed gums, and ulcers[1,32]. Flavonoids present in Guava leaves have the ability to produce cellular antioxidants, inhibit the enzymes cyclooxygenase and xanthine oxidase, which generate

superoxide anion radicals (O2), and inhibit protein kinase.[33]It reduces the inflammation by inhibiting the prostaglandin synthesis.[33]

7.2.Aloe vera (*Aloe barbadensis)*

Aloe vera known as "the healing plant" belongs to the family *Liliaceae*[34,35].The two species of aloe vera commonly cultivated are *Aloe barbadensis Miller* and *Aloe aborescens*[36].Aloevera contains 98-99% water and other 1-2% are active chemical constituent such as anthraquinones, vitamins, choline, folic acid, amino acids, and minerals[37].Many research has shown that it has anti-inflammatory, antiviral, antitumor, antiseptic, moisturising, and healing properties. Aloe vera is useful in oral ulcerative diseases such as canker sores due to its anti-inflammatory activity. Application of 2% aloe gel 3 times a day for 10 days on the lesion of canker sores results in the reduction of inflammation zone diameter and wound size[38].

7.3.Liquorice *(Glycyrrhiza glabra)*

Liquorice belonging to the family *Leguminosae* is one of the most extensively used medicinal plant[39]. Liquorice is a perennial herb native to the Mediterranean region, central to southern Russia and Asia Minor to Iran[42].Chemical constituent such as glabridin, licoricidin , licorisoflavan A, licochalcone A,and glycyrrhizin present in liquorice have shown beneficial effects in preventing and treating oral diseases[40]. It is 60 times sweeter than cane sugar[41].It possess antibacterial, anti-inflammatory, antiviral, antioxidant activities[43].The extract of liquorice has been used for topical application for inflammatory skin disorders and canker sores[42].Liquorice extract helps to relax and soothe the damaged areas resulted by the ulcers because of its anti-inflammatory properties[1].

7.4.Clove (*Eugenia caryophyllus)*

Clove belongs to the family *Myrtaceae* [44]. Clove is a native of Indonesia and most valuable spice in the world [44,45]. The major constituents obtained from the oil extracted from clove contains includes 3-Allyl-6-methoxyphenol i.e. m-Eugenol (69.44%), Eugenol acetate (10.79%), Tyranton (7.78%),Caryophyllene (6.80%), 1,4,7-Cycloundecatriene, 1,5,9,9- tetramethyl. Eugenol is the main key ingredient present in clove about 69.43% [46].Clove can be a remedy for such diverse problems as coughs and colds, diarrhea, digestive disorders, diabetes, toothaches, memory loss, erectile dysfunction, and arthritis[47].Antimicrobial property of clove helps in the treatment of all oral problems .The application of clove oil treats pain and inflammation.[46]

7.5.Chamomile (*Chamomilla Recutita*)

Chamomile belongs to the *Asteraceae/Compositae* family and has two common varieties, German Chamomile *(Chamomilla recutita)* and Roman Chamomile *(Chamaemelum nobile)*.[48]It is one of the important medicinal herb native to southern and eastern Europe[49]. Chemical constituents of Chamomile are flavonoids, coumarins, volatile oils, terpenes, organic acids, polysaccharides, and others.[50]The Chamomile was even in modern modern era of healthcare[53].Chamomile compounds have antibacterial, anti-inflammatory, anti-allergic, anti-spasmodic, anti-bacterial, anti-pyretic, ulcer-protective, anti-fungal, sedative, analgesic and anti-oxidant properties ,antiviral, anti-inflammatory and accelerate epithelialization[51,52].It is being used to treat many oral diseases like minor canker sores and according to certain research inflammatory mechanism of flavonoids in chamomile plays an essential role in healing ulcers.[53]

7.6.Tulsi (*Ocimum sanctum)*

Tulsi is the member of basil family *Lamiaceae* and thought to have originated in north central India and today grows native throughout the eastern world tropics[54].Tulsi is sacred plant of Hindu mythology and also called the "Holy Basil".[55]The three varieties of tulsi or holy basil are as follows: *Rama* Tulsi, *Krishna* Tulsi, *Vana* Tulsi[56]. Fresh leaves and stem of tulsi extract yield some phenolic compounds (antioxidants) such as cirsilineol, circimaritin , isothymusin, apigenin and rosameric acid,

and appreciable quantities of eugenol and leaves of tulsi contain 0.7% volatile oil comprising about 71% eugenol and 20% methyl eugenol[57] .Basil has antispasmodic, appetizer, carminative, galactagogue, and stomachic property and it is used for stomach cramps, gastric catarrh, vomiting, intestinal catarrh, constipation, and enteritis[58].Its antibacterial potential helps to combat oral pathogen[59]. It prevents bad breath, plaque, tartar formation, and dental cavities.[60]

7.7.Papaya(*Carica papaya)*

Papaya is a herbaceous plant belonging to the family *Caricaceae*[61]. Main chemical components of papaya are papain, chymopapain, pectin, carposide, carpaine, pseudocarpaine, dehydrocarpines, carotenoids, crypto glavine, *cis*-violaxanthin and antheraxanthin[62].It helps in the treatment of a various infections such as dengue fever, warts, corns, sinuses, skin inflammation, against diabetic, glandular tumours, blood pressure, digestive disorders, constipation, antibacterial, antifertility, anti-HIV, expel worms, invigorate regenerative organs and it can be used as a nutraceutical also[63]. Papaya contains enzymes like papain which is a chief constituent of papaya can help with healing and inflammation of canker sores.[34]

7.8.Peppermint (*Mentha piperita*)

Peppermint (Mint family member) is a natural hybrid between spearmint belonging to the family *Lamiaceae* [64,66]. The peppermint typically has volatile oil containing menthol, menthone , menthyl acetate ,menthofuran and 1,8-cineol and peppermint oil also contains small amounts of many additional compounds including limonene, pulegone, caryophyllene and pinene[65].It has anti-inflammatory, antibacterial, antiviral, scolicidal, immunomodulatory, antitumor, neuroprotective, antifatigue and antioxidant activities[67]. It also has a variety of therapeutic properties and is used in aromatherapy, bath preparations, mouthwashes, toothpastes, and topical preparations because of its inflammatory properties and it also relieves irritation[68]

8.CONCLUSION

Treating canker sores, or aphthous ulcers, is notably difficult due to their discomfort and tendency to recur. treatments Herbal treatments such as ointments and corticosteroids often come with side effects and provide only limited relief, making the search for alternative methods reasonable. Herbal remedies is increasingly considered either as a complement to or replacement for conventional treatments, offering several potential benefits supported by both historical and contemporary research. Herbal remedies are particularly valued for their anti-inflammatory, analgesic, and healing properties. Herbal treatment not only help manage symptoms but also support the body's natural healing mechanisms. Herbal treatments are more natural and hence have a better safety profile. In comparison with synthetic drugs, herbal medicines not only have fewer side effects, as a result, they are less inclined to cause adverse reactions for those who have these complications, unlike synthetic drugs. Furthermore, herbal remedies are usually cheaper than conventional medications, thus they provide a cheaper alternative in the management of diseases. An individual's response to herbal treatment may vary. The factors, which can be the severity of the canker sore, the health of the individual in general, and sensitive individuals, can determine how the therapy will work. This variability shows the necessity of personalized treatment approaches. Herbal alternatives can be a great adjunct therapy to mainstream medicine in the treatment of canker sores. Their anti-inflammatory, pain-relieving, and healing attributes, tempered by their safety and cheapness, make them an alluring option for the controlled disease. Enhancing research studies and evaluating the herbal remedies' quality and safety will help to utilize them to the maximum. The inclusion of these natural treatments in a comprehensive care plan can be an integral part of the strategy for the prevention, treatment, and management of canker sores, thereby improving the patient's quality of life.

REFERENCES

1. Kumar J, Gupta L, Gupta M, Gond SP. "A review on: Herbal remedies for treatment of mouth ulcer". *World Journal Journal of pharmaceutical Research*, **2022**, 11 ,707-721.
2. Vaishnavi Burley D, Biyani D, Umekar M, Naidu N. "Medicinal plants for treatment of ulcer: A review". *Journal of Medicinal Pla*nts. **2021**, *9* ,51-59.
3. Mittal S, Nautiyal U. "A review: herbal remedies used for the treatment of mouth ulcer". *International Journal of Health and Clinical Research* ,**2019**, *8* ,17-23.
4. Agnihotri A, Kaur A, Arora R. "Oral ulceration and Indian herbs: A scoping review". *Dental Journal of Advance Studies*. **2020**, *8* ,71-79.
5. Shahare N, Chouhan S, Darwhekar GN. "Herbs used in treatment of mouth ulcer-a review". *International Journal of Pharmacognosy and Chemistry*. **2021**, *2* ,68-74.
6. Altenburg A, El-Haj N, Micheli C, Puttkammer M, Abdel-Naser MB, Zouboulis CC. "The treatment of chronic recurrent oral aphthous ulcers". *Deutsches Arzteblatt International*. **2014**, *111*, 665-673.
7. Ekor M. "The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety". *Frontiers in Pharmacology*. **2014**, *4* ,177.
8. Rathod U, Shah S, Tiwari N, Patani P. "Ocular Drug Delivery: An Overview". *Journal of Pharmaceutical Negative Results*. **2022**, 13 , 2363–2369.
9. Izzo AA, Ernst E. "Interactions between herbal medicines and prescribed drugs: an updated systematic review". *Drugs*. **2009**, *69* ,1777-1798.
10. Natah SS, Konttinen YT, Enattah NS, Ashammakhi N, Sharkey KA, Häyrinen-Immonen R. "Recurrent aphthous ulcers today: a review of the growing knowledge". *International Journal of Oral Maxillofacial Surgeon*. **2023**, *52*, 487-496.
11. Belenguer-Guallar I, Jiménez-Soriano Y, Claramunt-Lozano A. "Treatment of recurrent aphthous stomatitis. A literature review". *Journal of Clinical and Experimental Dentistry*. **2014**, *6* ,168-174.
12. Rivera C, Essentials O. "Essentials of recurrent aphthous stomatitis (RAS): An updated review on etiopathogeny, diagnosis, and treatment". *American Journal of Dermatopathology*. **2022**, *44* ,442-451.
13. Preeti L, Magesh KT, Rajkumar K, Karthik R. "Recurrent aphthous stomatitis". *Journal of Oral Maxillofacial Pathology*. **2011**, *15* ,252-256.
14. Siu A, Landon S. "Recurrent aphthous stomatitis: a review of potential causes and treatment modalities". *Journal of Clinical and Aesthetic Dermatology*. **2021**, *14* ,20-26.
15. Cully C, Porter S. "Recurrent aphthous stomatitis: current concepts of etiology, pathogenesis, and management". *Journal of Oral Pathology and Medicine*. **2022**, *51* ,641-648.
16. Tiwari N, Maheshwari M, Patani P. "A Well Known Compounds Beta Asarone and Forskolin and its in vivo activity against Stress". *Journal of Emerging Technologies and Innovative Research*. **2019**, *6* ,582-589.
17. Rogers H, Hegarty A, Porter S. "Management of aphthous ulcers in the oral cavity". *Australian Prescriber.* **2017**, *40* ,94-98.
18. Tiwari N, Patani P**. "**Isolation of β-asarone and Forskolin and their in vivo activity against stress". *Bulletin of Pharmaceutical Research*. **2019**, *9* ,161.
19. Femiano F, Lanza A, Buonaiuto C, et al. "Guidelines for diagnosis and management of aphthous stomatitis". *Pediatric Infectious Disease Journal*. **2007**, *26* ,728-732.
20. Edgar NR, Saleh D, Miller RA. "Recurrent aphthous stomatitis: a review". *The Journal of Clinical and Aesthetic Dermatology*. **2017**, *10* ,26-36.
21. Schemel-Suárez, M., López-López, J., & Chimenos-Küstner, E. "Oral ulcers: Differential diagnosis and treatment". *Medicina Clínica (English Edition)*.**2015**, *145* ,499–503.
22. Patil S, Reddy SN, Maheshwari S. "Advances in the management of recurrent aphthous stomatitis: a systematic review". *Journal of Oral Maxillofacial Pathology*. **2018**, *22* ,245-251.

23. Rogers RS 3rd. "Recurrent aphthous stomatitis: clinical characteristics and evidence for systemic treatments". *Journal of the European Academy of Dermatology and Venereology*. **2003**, *17* ,101-107.
24. Thornhill MH. "Oral ulceration: aetiopathogenesis, clinical diagnosis and management in the general dental practice setting". *British Dental Journal*. **2022**, *232* ,33-42.
25. Scully C, Porter SR. "Oral ulceration: aetiopathogenesis, clinical diagnosis and management in the general dental practice". *British Dental Journal*. **2008**, *204* ,294-297.
26. Nolan A, Lamey PJ, Milligan KA, Forsyth A. "Recurrent aphthous ulceration and food sensitivity". *Journal of Oral Pathology and Medicine*. **1991**, *20* ,473-475.
27. Ship JA, Chavez EM, Doerr PA, Henson BS, Sarmadi M. "Recurrent aphthous stomatitis". *Quintessence International.* **2000**, *31* ,95-112.
28. Ekor M. "The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety". *Frontier in Pharmacology*. **2014,** *4* ,177.
29. Tilburt JC, Kaptchuk TJ. "Herbal medicine research and global health: an ethical analysis". *Bulletin World Health Organization*. **2008**, *86* ,594-599.
30. Heinrich M, Ankli A, Frei B, Weimann C, Sticher O. "Medicinal plants in Mexico: Healers' consensus and cultural importance". *Social Science and Medicine*. **1998**, *47* ,1859-1871.
31. Shaikh S, Shete A, Doijad R. "Formulation and evaluation pharmaceutical aqueous gel of powdered guava leaves for mouth ulcer treatment". *PharmaTutor*. **2018**, *6* ,32-38.
32. Tiwari N, Chaudhary A, Mishra A,."Ethanopharmacological Aspect of Acorus calamus: A Review". *Pharmacologyonline*.**2010**, *2* ,435-445.
33. Gonçalves PF, Oliveira RL, Pinto DS, et al. "Phytochemical profile, antioxidant, antimicrobial and anticancer activities of *Psidium guajava* L. leaves". *Journal of Ethnopharmacology*. **2021**, *275* ,114130
34. Metwally AM, Omar AA, Harraz FM, El Sohafy SM. "*Phytochemical investigation and antimicrobial activity of Psidium guajava L. leaves*". Pharmacognosy Magazine. **2010**;6(23):212-218.
35. Hamman JH. "Composition and applications of Aloe vera leaf gel". *Molecules*. **2008**, *13* ,1599-1616..
36. Surjushe A, Vasani R, Saple DG. "Aloe vera: A short review". *Indian Journal of Dermatology*. **2008**, *53* ,163-166.
37. Nair, G.R., Naidu, G.S., Jain, S., Nagi, R., Makkad, R.S. and Jha, A. "Clinical effectiveness of aloe vera in the management of oral mucosal diseases-a systematic review". *Journal of Clinical and Diagnostic Research.* **2016**, *10* , ZE01-ZE07.
38. Rathod SR, Raj A, Sarda T, Maske S. "Aloe vera: A natural remedy". *SRM Journal of Research in Dental Sciences*. **2018**, *9* ,32-36.
39. Mazumdar S, Prabhakar B, Khairnar SI, Singh K. "Mucoadhesive Films of Liquorice and Chlorhexidine Gluconate for Treating Mouth Ulcers". *Indian Journal of Pharmaceutical Education and Research*. **2023**, *57* ,274-280.
40. Sidhu P, Shankargouda S, Rath A, Ramamurthy PH, Fernandes B, Singh AK. "Therapeutic benefits of liquorice in dentistry". *Journal of Ayurveda and Integrative Medicine*. **2020**, *11* ,82-88.
41. Gupta C, Prakash D, Gupta S, Yadav A. "The Power of Licorice *(Radix glycyrrhizae)* to Improve Oral Health: A Comprehensive Review of Its Pharmacological Properties and Clinical Implications". *Healthcare (Basel).* **2022**, *10* ,1222.
42. Liu, H.L., Hsu, P.Y., Chung, Y.C., Lin, C.H. and Lin, K.Y. "Effective licorice gargle juice for aphthous ulcer pain relief: A randomized double-blind placebo-controlled trial". *Pakistan Journal of Pharmaceutical Sciences*.**2022**, *35* ,1321-1326.
43. Dastagir G, Rizvi MA. "*Glycyrrhiza glabra L.*(Liquorice)". *Pakistan Journal of Pharmaceutical Sciences*. **2016**, *29* ,1727-1733.

44. Milind P, Deepa K. "Clove: a champion spice". *International Journal of Research Ayurveda and Pharmacy*. **2011**, *2* ,47-54.
45. Cortés-Rojas DF, de Souza CR, Oliveira WP. "Clove *(Syzygium aromaticum)*: a precious spice". *Asian Pacific Journal of Tropical Biomedicine*. **2014**, *4* ,90-96.
46. Uddin, M.A., Shahinuzzaman, M., Rana, M.S. and Yaakob, Z. "Study of chemical composition and medicinal properties of volatile oil from clove buds *(Eugenia caryophyllus)*". *International Journal of Pharmaceutical Sciences and Research*.**2017**, *8* ,95.
47. Singletary K. "Clove: overview of potential health benefits*". Nutrition Today*. **2014**, *49* ,207-224.
48. Srivastava JK, Shankar E, Gupta S. "Chamomile: A herbal medicine of the past with a bright future". *Molecular Medicine Reports*. **2010**, *3* ,895-901.
49. Singh O, Khanam Z, Misra N, Srivastava MK. "Chamomile *(Matricaria chamomilla L*.): an overview". *Pharmacognosy Reviews*. **2011**, *5* ,82.
50. Dai YL, Li Y, Wang Q, Niu FJ, Li KW, Wang YY, Wang J, Zhou CZ, Gao LN. "Chamomile: a review of its traditional uses, chemical constituents, pharmacological activities and quality control studies". *Molecules.* **2022**, *28* ,133.
51. Abbasi F, Khazaie S, Motamayel FA. "Evaluation of pharmaceutical use of chamomile in dentistry: A review". *Journal of Craniomaxillofacial Research*. **2022**, *9* ,110-117.
52. Tadbir, A.A., Pourshahidi, S., Ebrahimi, H., Hajipour, Z., Memarzade, M.R. and Shirazian, S. "The effect of *Matricaria chamomilla* (chamomile) extract in Orabase on minor aphthous stomatitis, a randomized clinical tri*al*". *Journal of Herbal Medicine*.**2015,** *5* ,71-76.
53. Kani, V.T., Bharathwaj, V.V., Nimmy, P., Sindhu, R., Dhamodhar, D., Sathiapriya, S., Prabu, D. and Mohan, M.R., "Therapeutic effects of Chamomilla extract in oral diseases-A Systematic Review". *Journal of Advanced Medical and Dental Sciences Research*.**2023**, *11* ,50-55
54. Cohen MM. "Tulsi-*Ocimum sanctum*: A herb for all reasons". *Journal of Ayurveda and Integrative Medicine.* **2014,** *5* ,251.
55. Gulhane NS, Ghode CD, Jadhao AG, Patil PA. "Study of medicinal uses of *Ocimum sanctum* (Tulsi)". *Journal of Pharmacognosy and Phytochemistry*. **2021**, *10* ,1427-1431.
56. Suthar V. "Benefit of Tulsi for General and Dental Medicine". *Journal of Pharmaceutical Research and Innovation*. **2022**, *2* ,29-35.
57. Verma S. "Chemical constituents and pharmacological action of *Ocimum sanctum* (Indian holy basil-Tulsi)". *Journal of Phytopharmacology*. **2016**, *5* ,205-207.
58. Bhadra P, Sethi L. "A review paper on the Tulsi plant *(Ocimum sanctum)*". *Indian Journal of Natural Sciences*. **2020**, *10* ,20854-20860.
59. Mahantesh P, Ahuja AV, Ahuja V. "Tulsi: Is it an Important Herb in Dentistry?-A Review". *Journal of PEARLDENT*. **2011**, *2* ,18-21.
60. Pandey S, Madhu K, Maurya AK, Singh VK. "Tulsi: A Medicinal Herb for Oral Health". *Galore International Journal of Health Sciences and Research*. **2021**, *6* ,45-50.
61. Sivarajah N. "Medicinal uses of *Carica papaya*". *International journal of scientific research*. **2017**, *6* ,2770-2772.
62. Gadekar R, Singour PK, Chaurasiya PK, Pawar RS, Patil UK. "A potential of some medicinal plants as an antiulcer agents". *Pharmacognosy Reviews*. **2010**, *4* ,136.
63. Anjana GV, Priya D, Srimathi R, Shantha KB. "A review on medical advantages and chemical constituents of *Carica papaya Linn*". *Asian Journal of Pharmaceutical Clinical Research*. **2018**, *11* ,53-57.
64. Kligler B, Chaudhary S. "Peppermint oil". *American Family Physician*. **2007**, *75* ,1027-1030.
65. Balakrishnan A. "Therapeutic uses of peppermint-a review". *Journal of Pharmaceutical Sciences and Research*. **2015**, *7* ,474.
66. Loolaie M, Moasefi N, Rasouli H, Adibi H. "Peppermint and its functionality: A review". *Archives of Clinical Microbiology*. **2017**, *8* ,54.

67. Zhao H, Ren S, Yang H, Tang S, Guo C, Liu M, Tao Q, Ming T, Xu H. *"*Peppermint essential oil: Its phytochemistry, biological activity, pharmacological effect and application*"*. *Biomedicine & Pharmacotherapy*. **2022**, *154* ,113559.
68. Herro E, Jacob SE. "*Mentha piperita* (peppermint)". *Dermatology*. **2010**, *21* ,327-329.