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A Review: Formulation and Evaluation of Herbal Gel for the Treatment of Mouth Ulcers

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Abstract: ***Mouth ulcers are painful breaks in the oral mucosa, most commonly triggered by minor trauma or recurrent aphthous stomatitis. This review discusses their underlying causes and highlights the therapeutic role of gel formulations, with a focus on herbal alternatives. Plant-based medicines are increasingly preferred because they generally cause fewer adverse reactions, are economical, widely available, and fit well within cultural healthcare practices.***
Herbal remedies make use of bioactive plant constituents with anti-inflammatory, analgesic, antimicrobial, and wound-healing properties—key factors in the recovery of oral lesions. In this work, we summarize several herbs studied for managing mouth ulcers, including guava, aloe vera, neem, turmeric, tulsi, licorice, giloy stem, and betel leaf, all of which have demonstrated beneficial effects. Commercially available preparations, such as Smyle Gel and Tuliq Gel, illustrate how plant extracts can be combined to provide localized relief with minimal irritation to oral tissues. With the rising interest in natural therapies, herbal gels represent a promising alternative to conventional treatments. The main objective of this review is to explore the formulation of a guava-based herbal gel and its evaluation parameters for potential clinical application.
Keywords: Oral ulceration, Aphthous stomatitis, Herbal gel, Guava leaf, Nanogel formulation.

I. INTRODUCTION

Mouth ulcers are painful disruptions of the oral lining that may occur in different regions of the mouth, including the gums, tongue, palate, inner cheeks, or lips. They often appear as small round or irregular patches that vary in color from white to yellow with surrounding redness, and may present individually or in groups. Because of the pain and irritation they cause, such lesions commonly interfere with essential daily functions like eating, swallowing, and speaking.

The etiology of mouth ulcers is multifactorial, including local trauma, stress, hormonal changes, infections, food sensitivities, and deficiencies in vitamins such as B12, C, and folic acid. In some cases, oral ulcers may be associated with autoimmune disorders, gastrointestinal disease, or malignancy. Because of their diverse causes, effective management remains a clinical challenge. Conventional therapies include corticosteroid gels, analgesics, antiseptic mouth rinses, and systemic immunomodulators. Although these treatments provide symptomatic relief, their use is often limited by side effects such as mucosal irritation, candidiasis, or delayed healing. Moreover, recurrence is common, underscoring the need for safer, long-term solutions.This review aims to consolidate current evidence on the role of herbal gels in managing mouth ulcers, with a particular emphasis on guava leaf-based formulations.

II. TYPES OF MOUTH ULCERS

1) Aphthous Ulcers (Canker Sores): These are the most frequently observed oral ulcers and are non-infectious. They usually present as small, round or oval sores with a pale center and an inflamed red border
2) Oral Lichen Planus: An immune-related disorder that produces lace-like white streaks or painful reddish areas in the mouth, commonly affecting middle-aged and older adults.
3) Leukoplakia: A condition marked by persistent white plaques in the oral cavity, often arising due to chronic irritation such as smoking or tobacco chewing. While usually benign, some cases may progress to precancerous changes.
4) Erythroplakia: Bright red patches inside the mouth that carry a much higher potential for malignant transformation compared to leukoplakia.
5) Oral Thrush (Candidiasis): A fungal infection caused by the excessive growth of Candida albicans, which results in creamy white patches and redness, often seen in individuals with compromised immunity.
6) Oral Cancer: Persistent oral ulcers or growths that fail to heal for more than three weeks and appear red, white, or mixed in color should be considered suspicious and require immediate medical attention.

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III. PATHOPHYSIOLOGY, SYMPTOMS, AND CAUSES

Symptoms: Mouth ulcers are easily recognized due to their painful and distinct appearance. They generally occur on the gums, tongue, lips, inner cheeks, or palate. Typical features include a pale or yellow center with a surrounding red border, swelling of the affected tissue, pain when brushing, and a burning or stinging sensation when eating salty, spicy, or acidic food items. Causes: The onset of oral ulcers can be influenced by many factors. They may arise from minor trauma such as accidental cheek biting, irritation from orthodontic appliances, or abrasive toothpaste. Food allergies, intake of highly acidic fruits, hormonal fluctuations (e.g., during menstruation), mental stress, fatigue, and inadequate rest are also recognized as major contributors. Disease Profile: Oral ulcers represent a break in the lining of the oral mucosa due to underlying cellular injury. They tend to be more painful on movable parts of the mouth such as the tongue and cheeks. While many cases are idiopathic, ulcers can be associated with poor oral hygiene, digestive disturbances, stress, infections, food allergies, systemic disorders, or deficiencies of micronutrients such as iron and vitamins B12 and C.

IV. HERBAL APPROACHES FOR MOUTH ULCER TREATMENT

Herbal remedies are safe, affordable, and well-accepted in traditional medicine. Herbal gels combine extracts of guava, neem, turmeric, aloe vera, and tulsi.

Advantages: Pain relief, anti-inflammatory action, faster healing, fewer side effects, environmental sustainability, and cultural acceptance.Properties of Ideal Herbal Gel: Non-sticky, antimicrobial, sterile, stable viscosity, easy spreadability, biocompatibility.

V. PLANT PROFILE: PSIDIUM GUAJAVA (GUAVA LEAF)

Guava (Psidium guajava), belonging to the family Myrtaceae, contains a wide spectrum of bioactive constituents. Its leaves are particularly abundant in flavonoids such as quercetin, kaempferol, rutin, and myricetin, which provide strong antioxidant activity along with anti-inflammatory and antimicrobial benefits. Tannins including gallic acid and ellagic acid further enhance antimicrobial protection and promote wound healing. In addition, the essential oils (such as caryophyllene, eucalyptol, and terpinene) contribute antifungal and antibacterial activity while reducing inflammation.
The phenolic acids—ferulic and chlorogenic acid—help neutralize oxidative damage, while saponins strengthen immune response and aid in tissue recovery. Carotenoids like β-carotene act both as antioxidants and precursors of vitamin A, essential for cell repair. Moreover, triterpenoids including ursolic acid and oleanolic acid exhibit anti-inflammatory, anticancer, and cytoprotective properties. Together, these phytochemicals make guava leaves an excellent candidate for oral ulcer management.

VI. HERBAL GEL FORMULATION

Preparation of Guava Leaf Herbal Gel: To begin, Carbopol 934 was dispersed in distilled water and left overnight to allow complete hydration. The swollen polymer was stirred with a mechanical agitator until uniform. A separate solution of guava leaf extract with preservatives (methyl paraben and propyl paraben) and humectants (glycerine, propylene glycol) was prepared. This solution was gradually incorporated into the hydrated Carbopol. Triethanolamine was added dropwise until the pH stabilized within 6.5–7.5 and a clear gel consistency was achieved. The final formulation was homogenized and stored in sterile containers.

VII. EVALUATION OF GUAVA LEAF NANOGEL

1) Physical Examination: The formulation was checked for color, texture, odor, and homogeneity.
2) pH Measurement: One gram of the prepared gel was diluted in 10 mL of distilled water, and the pH was determined using a calibrated pH meter.
3) Spreadability: The gel's ability to spread was determined by placing it between two glass slides and applying a known weight, recording the time taken for the slides to separate. The spreadability (S) was calculated using the relation $S = (M \times L) / T$, where M is applied weight, L is the length of slide movement, and T is time.
4) Viscosity: Viscosity was measured using a Brookfield viscometer (model LVDVE, spindle 96 at 10 rpm).
5) Permeation Study: The diffusion of active constituents was tested by applying the gel over Whatman filter paper stretched across a beaker containing phosphate buffer (pH 5.7). Samples were monitored at set intervals while the system was maintained at 37°C to simulate body conditions.
6) Biological Activity: Anti-inflammatory potential was inferred from reduction in inflammatory markers, while antibacterial effect was confirmed by the ability of guava extract to inhibit common oral pathogens.

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VIII. DISCUSSION

Herbal gels provide a natural, safe, and effective treatment compared to synthetic products. Guava leaf nanogel enhances delivery of bioactive compounds, accelerates healing, and reduces recurrence. Their acceptance in both traditional and modern healthcare systems highlights their potential as reliable oral ulcer therapies.

IX. CONCLUSION

This review underscores the important role of medicinal plants in addressing oral ulceration, offering safer and more affordable alternatives to conventional therapies. The bioactive compounds found in many herbs, particularly flavonoids and tannins, exert multiple therapeutic actions including antioxidant, antimicrobial, and anti-inflammatory effects, which collectively support tissue healing. Among the plants studied, guava leaves (Psidium guajava) stand out due to their diverse phytochemical content and strong wound-healing potential. Recent advances in formulation science, such as the development of guava-based nanogels, have further improved the delivery and effectiveness of these plant extracts. Such approaches combine traditional knowledge with modern pharmaceutical techniques, making them promising candidates for future oral healthcare solutions. Continued research, including clinical validation, will be essential to establish standardized, safe, and effective herbal therapies for the management of mouth ulcers.

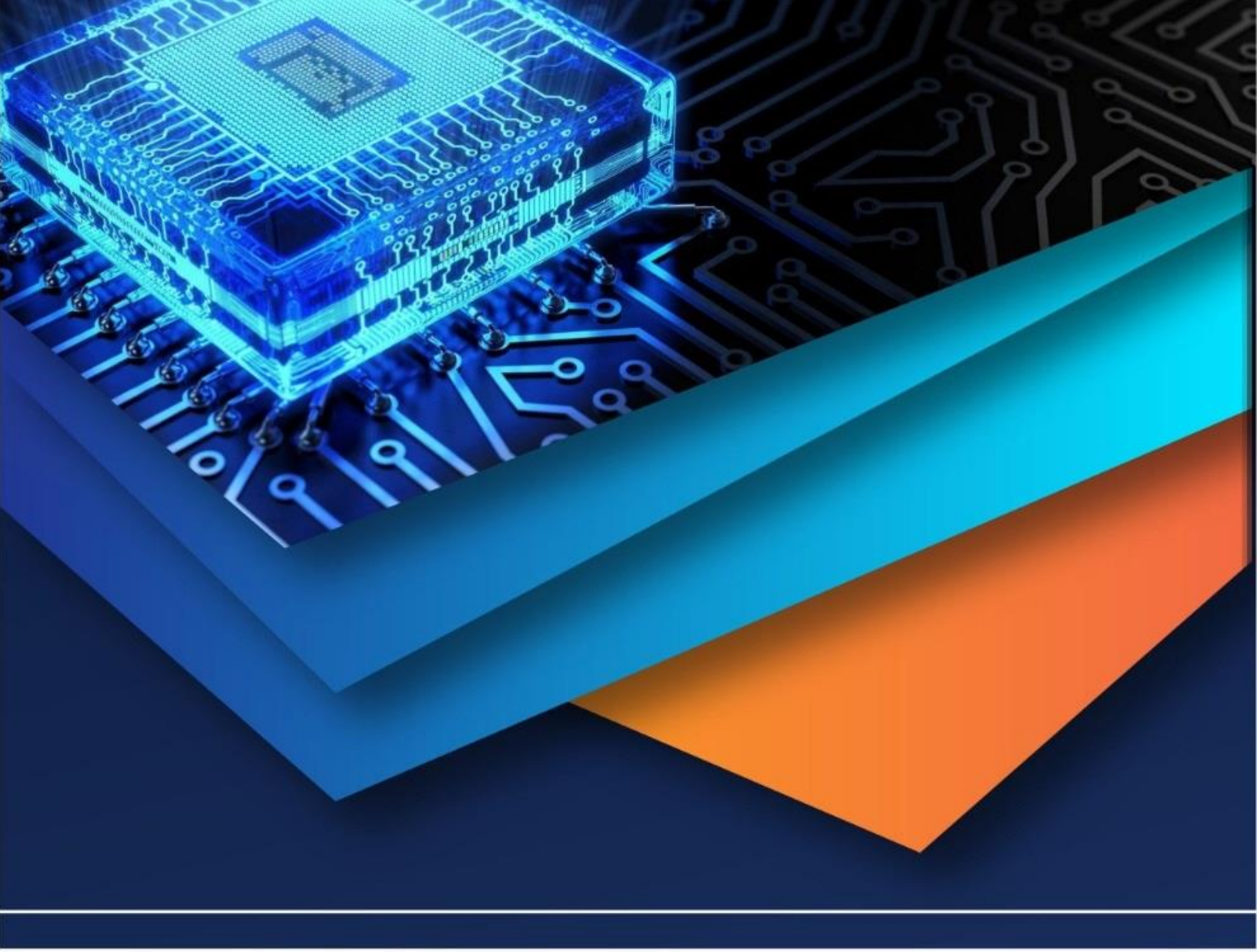
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REFERENCES

[1] R. B. Garad, A. A. Khose, A. Sangale, and M. T. Salve, “Formulation and Evaluation of Herbal Mouth Gel,” Unpublished manuscript.
[2] S. Mittal and U. Nautiyal, “A review: Herbal remedies used for the treatment of mouth ulcer,” Int. J. Health Clin. Res., vol. 2, no. 1, pp. 17–23, 2019.
[3] T. M. Dellinger and H. M. Livingston, “Aspirin burn of the oral cavity,” Ann. Pharmacother., vol. 32, no. 10, p. 1107, 1998, doi: 10.1345/aph.17370.
[4] J. Parry, S. Porter, C. Scully, S. Flint, and M. G. Parry, “Mucosal lesions due to oral cocaine use,” Br. Dent. J., vol. 180, no. 12, pp. 462–464, 1996, doi: 10.1038/sj.bdj.4809127.
[5] C. Scully and S. Porter, “Oral mucosal disease: Recurrent aphthous stomatitis,” Br. J. Oral Maxillofac. Surg., vol. 46, no. 3, pp. 198–206, 2008, doi: 10.1016/j.bjoms.2007.07.201.
[6] N. R. Edgar, D. Saleh, and R. A. Miller, “Recurrent aphthous stomatitis: A review,” J. Clin. Aesthet. Dermatol., vol. 10, no. 3, pp. 26–36, 2017.
[7] N. Swain, J. Pathak, L. S. Poonja, and Y. Penkar, “Etiological factors of recurrent aphthous stomatitis: A common perplexity,” J. Contemp. Dent., vol. 2, no. 3, pp. 96–100, 2012, doi: 10.5005/jpjournals-10031-1019.
[8] S. O. Akintoye and M. S. Greenberg, “Recurrent aphthous stomatitis,” Dent. Clin. N. Am., vol. 58, no. 2, pp. 281–297, 2014, doi: 10.1016/j.cden.2013.12.002.
[9] S. P. Sundaram, P. Sundararaman, and S. K. Kannan, “Oral ulcers – A review,” J. Dent. Oral Disord., vol. 4, no. 4, 2018.
[10] M. Chavan, H. Jain, N. Diwan, S. Khedkar, A. Shete, and S. Durkar, “Recurrent aphthous stomatitis: A review,” J. Oral Pathol. Med., vol. 41, no. 8, pp. 577–583, 2012, doi: 10.1111/j.1600-0714.2012.01134.x.
[11] B. Tarakji, G. Gazal, S. A. Al-Maweri, S. N. Azzeghaiby, and N. Alaizari, “Guidelines for the diagnosis and treatment of recurrent aphthous stomatitis for dental practitioners,” J. Int. Oral Health, vol. 7, no. 5, pp. 74–80, 2015.
[12] G. M. Parvez, U. Shakib, M. Khokon, and M. Sanzia, “A short review on a nutritional fruit: Guava,” Open Access Toxicol. Res., vol. 1, pp. 1–8, 2018.
[13] E. U. Uduak, J. A. Timbuak, S. A. Musa, D. T. Ikyembe, S. Abdurrashid, and W. O. Hamman, “Ulcer protective effect of methanol extract of Psidium guajava leaves on ethanol-induced gastric ulcer in adult Wistar rats,” Asian J. Med. Sci., vol. 4, no. 2, pp. 75–78, 2012.
[14] S. Puntawong, S. Okonogi, and K. Pringproa, “In vitro antibacterial activity of Psidium guajava Linn. leaf extracts against pathogenic bacteria in pigs,” Chiang Mai Univ. J. Nat. Sci., vol. 11, no. 2, pp. 127–134, 2012.
[15] H. Y. Chen and G. C. Yen, “Antioxidant activity and free radical-scavenging capacity of extracts from guava (Psidium guajava) leaves,” Food Chem., vol. 101, no. 2, pp. 686–694, 2007, doi: 10.1016/j.foodchem.2006.02.047.
[16] B. Parveen, A. Parveen, R. Parveen, S. Ahmad, M. Ahmad, and M. Iqbal, “Challenges and opportunities for traditional herbal medicine today, with special reference to its status in India,” Ann. Phytomed., vol. 9, no. 2, pp. 97–112, 2020, doi: 10.21276/ap.2020.9.2.8.
[17] A. M. Ratnayake and S. Metahuman, “A review on nutritional composition and pharmacological effects of guava (Psidium guajava),” Carpathian J. Food Sci. Technol., vol. 16, no. 1, 2022, doi: 10.34302/crpjfst/2024.16.1.12.
[18] I. M. Pathan, V. S. Madankar, and A. B. Panchal, “Formulation and Evaluation of Guava Leaf-Based Nanogel for Mouth Ulcer Treatment,” Unpublished manuscript.

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