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Review Article

Guava Leaf Extract as a Natural Therapeutic Agent in Aphthous Ulcer Management: A Comprehensive Review

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ABSTRACT

Aphthous ulcers, or canker sores, are painful, recurrent lesions that significantly affect quality of life. Despite being self-limiting, the condition often demands therapeutic management due to pain, interference with daily functions, and recurrence. Conventional treatments such as topical corticosteroids, antiseptics, and immunomodulators come with side effects or cost limitations. Guava (*Psidium guajava*) leaves, traditionally used in herbal medicine, offer a natural and effective alternative with antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties. This review evaluates the scientific basis and therapeutic potential of guava leaf extract in managing aphthous ulcers, emphasizing its advantages over conventional treatments, pharmacological mechanisms, and future prospects.

INTRODUCTION

Aphthous ulcers are among the most common oral mucosal lesions encountered in clinical practice. Also termed recurrent aphthous stomatitis (RAS), these ulcers affect approximately 20% of the population at some point in their lives [9]. They typically present as round or oval painful ulcers on non-keratinized oral mucosa. While often benign and self-resolving, recurrent episodes can impair nutritional intake, speech, and overall well-being. Traditional treatment regimens include analgesics, antiseptics, corticosteroids, and systemic agents

such as immunosuppressants in severe cases [10,19]. However, long-term use of synthetic drugs can lead to adverse effects like mucosal irritation, systemic toxicity, taste alterations, and development of resistance. There is an increasing interest in exploring natural and plant-based treatments, especially those used in folk and traditional medicine. One such plant is *Psidium guajava* (guava), extensively used in tropical regions for a range of ailments including gastrointestinal, dermatological, and oral infections [7].

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2. Aphthous Ulcers: Etiology and Classification

The exact etiology of aphthous ulcers is not fully understood but is believed to involve genetic predisposition and a combination of local and systemic factors. Proposed triggers include:

- Nutritional deficiencies (iron, folate, vitamin B12)
- Stress and anxiety
- Hormonal fluctuations
- Food allergies (citrus, chocolate, gluten)
- Local trauma (brushing, biting, dental appliances)
- Immunologic dysregulation [9,19]

Aphthous ulcers are typically categorized into three types:

- **Minor RAS:** Most common; ulcers <10 mm; heal in 7–10 days without scarring.
- **Major RAS:** Larger and deeper; healing may take 2–6 weeks and leave scars.
- **Herpetiform ulcers:** Multiple pinpoint ulcers that coalesce; despite the name, not related to herpes virus [10].

Chronic and recurrent cases warrant management beyond symptom relief. The aim is to reduce frequency, intensity, and duration of episodes while minimizing drug-related adverse effects.

3. *Psidium guajava* in Traditional Medicine:

Guava is a tropical evergreen plant belonging to the Myrtaceae family. It is indigenous to Central America but widely cultivated across tropical and subtropical regions. Different parts of the plant—leaves, fruit, bark, and roots—have been used medicinally [13].

Traditional uses include:

- Treatment of diarrhoea and dysentery

- Anti-inflammatory and wound-healing purposes
- Management of diabetes
- Respiratory conditions
- Oral hygiene and ulcer treatment [7,13,14]

These uses have prompted extensive scientific interest in guava's bioactive constituents.

4. Phytochemical Composition of Guava Leaves

Guava leaves are rich in polyphenols, flavonoids, tannins, triterpenoids, carotenoids, essential oils, and vitamins. Key compounds include:

- **Quercetin:** Antioxidant, anti-inflammatory, antimicrobial [11,12]
- **Tannins:** Astringent and antimicrobial properties
- **Saponins:** Disrupt microbial membranes
- **Vitamins A and C:** Enhance immunity and epithelial repair
- **Beta-caryophyllene and alpha-pinene:** Volatile oils with analgesic effects [11,13]

According to Díaz-de-Cerio et al. (2017), guava leaves exhibit high antioxidant capacity due to polyphenolic content, making them suitable for inflammatory conditions such as aphthous ulcers [11].

5. Guava Leaf Extract for Oral Applications

Oral diseases such as gingivitis, periodontitis, and ulcers are largely associated with microbial imbalance, inflammation, and compromised mucosal immunity. Guava leaves address these through multiple mechanisms:

- **Antibacterial:** Inhibit *Streptococcus mutans*, *Candida albicans*, and other pathogens [4,12]

- **Anti-inflammatory:** Reduce pro-inflammatory cytokines and prostaglandins [8]
- **Antioxidant:** Prevent tissue damage by scavenging free radicals
- **Wound Healing:** Promote collagen formation and epithelial regeneration [13]

Clinical trials and in vitro studies have confirmed guava's efficacy in oral hygiene formulations:

- Nayak et al. (2019) showed that guava mouthwash significantly reduced plaque and gingivitis scores [2].
- Mohamed et al. (2022) demonstrated that guava and pomegranate peel mouthwash reduced *S. mutans* levels in schoolchildren [4].

6. Review of Your Formulation and Evaluation Study

In your own study, three guava leaf-based mouthwash formulations (F1, F2, F3) were developed and evaluated for:

- Physical parameters (color, taste, odour)
- pH
- Antimicrobial activity (zone of inhibition test)
- Stability and palatability

Among them, F3 showed the best overall profile: stable color and odour over 1 month, highest antimicrobial zone of inhibition (0.14 mm), and “very good” palatability score. This indicates not only efficacy but also acceptability and safety—key features for pediatric and elderly patients.

7. Mechanisms of Action in Aphthous Ulcer Management

Guava's active compounds act synergistically:

- **Quercetin** inhibits lipopolysaccharide (LPS)-induced nitric oxide and prostaglandin E2 production [8]
- **Tannins** form a protective protein film over ulcer surface
- **Vitamins** support mucosal immunity and epithelial repair
- **Essential oils** relieve pain and enhance user experience with pleasant taste [12,13]

8. Advantages Over Conventional Treatments

- **Fewer side effects:** No tooth staining, dry mouth, or mucosal irritation
- **Cost-effective:** Uses widely available natural resources
- **Culturally acceptable:** Especially in India, Africa, and Southeast Asia
- **Pediatric-friendly:** Non-toxic and palatable

By comparison, chlorhexidine mouthwash—commonly used in clinics—can cause taste disturbances, staining, and even hypersensitivity reactions [18].

9. Limitations and Future Directions

Despite promising data, the following aspects must be addressed:

- Standardization of extract concentration
- Long-term clinical trials with larger populations
- Study of pharmacokinetics and bioavailability
- Integration into clinical practice guidelines [6,20]

Future innovation may include nano-formulated guava extracts or multi-herb formulations with synergistic agents like neem, aloe vera, or turmeric.



10. CONCLUSION

Guava leaf extract demonstrates significant potential as a natural remedy for aphthous ulcers. Its multi-dimensional actions—antibacterial, anti-inflammatory, antioxidant, and wound-healing—make it superior to many synthetic agents. The growing body of evidence, including your experimental work, supports its incorporation into everyday oral care, especially in resource-limited settings.

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