

Review Article

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“MUKHAPAKA AND ORAL SUBMUCOUS FIBROSIS: AYURVEDIC UNDERSTANDING AND THE EVIDENCE FOR HERBAL MANAGEMENT”

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ABSTRACT

Background: Oral submucous fibrosis is a chronic, progressive, potentially malignant disorder of the oral mucosa, strongly associated with areca nut chewing and highly prevalent in South Asia. It causes burning sensation, intolerance to spicy food, and progressive limitation of mouth opening. Ayurvedic scholars correlate it with Sarvasara Mukharoga, particularly Mukhapaka (inflammation and ulceration of the whole oral cavity), and treat it with Gandusha, Kavala, Pratisarana (local application) and oral herbal preparations. **Objective:** To review the modern understanding of oral submucous fibrosis and recurrent oral ulceration, their Ayurvedic interpretation, and the evidence for herbal interventions, especially turmeric, aloe vera, lycopene and liquorice. **Methods:** Narrative review of classical texts, systematic reviews and randomised trials of medical and herbal treatments. **Results:** Areca nut cessation is the essential first step in oral submucous fibrosis. No medical treatment has strong evidence; a systematic review found most trials small and at high risk of bias. A 2023 meta-analysis of 13 randomised trials of curcumin found no statistically significant improvement in mouth opening, burning or tongue protrusion compared with controls, though individual trials reported benefit. Aloe vera and lycopene have shown benefits in small trials. Licorice patches have shown benefit in recurrent aphthous ulcers. Ayurvedic evidence consists mainly of reviews and case reports. **Conclusion:** Herbal treatments may relieve symptoms of oral submucous fibrosis and Mukhapaka, but evidence is limited. Areca nut cessation, regular surveillance for malignant change and referral for biopsy of suspicious lesions are essential parts of any Ayurvedic management.

KEYWORDS: oral submucous fibrosis; Mukhapaka; Sarvasara Mukharoga; areca nut; curcumin; turmeric; aloe vera; Gandusha

INTRODUCTION

Oral submucous fibrosis (OSMF) is a chronic, insidious disease of the oral mucosa characterised by inflammation and progressive fibrosis of the submucosal tissues, leading to stiffness, blanching and limited mouth opening^[1]. It is a potentially malignant disorder, with a risk of transformation to oral squamous cell carcinoma^[2]. Areca nut, chewed alone or in betel quid, gutka or pan masala, is the main cause, and is classified as a human carcinogen^[3]. OSMF is highly prevalent in India and other parts of South and Southeast Asia, and increasingly affects young people because of commercial areca nut products.

Patients with OSMF often present with burning sensation, intolerance to spicy food, recurrent vesicles or ulcers, dryness and difficulty opening the mouth. Many seek Ayurvedic treatment. Ayurveda describes 65 or more oral diseases (Mukharoga), and Ayurvedic scholars have correlated OSMF with Sarvasara Mukharoga, diseases affecting the whole oral cavity, including Mukhapaka^[4,5].

This review summarises the modern understanding and management of OSMF and recurrent oral ulceration, their Ayurvedic interpretation, and the evidence for herbal interventions.

METHODS

Classical sources were Sushruta Samhita Nidana Sthana 16 and Chikitsa Sthana 22 and Ashtanga Hridaya Uttara Sthana 21 and 22^[4,5]. Modern literature included systematic reviews and randomised trials of OSMF and recurrent aphthous stomatitis treatments identified through PubMed, Google Scholar and dental and Ayurveda journals.

Medical and surgical management

Table 1: Medical and surgical management of oral submucous fibrosis

Treatment	Notes
Areca nut and tobacco cessation	Essential; may halt progression
Intralesional corticosteroids and hyaluronidase	Widely used; evidence limited
Antioxidants (lycopene, vitamins)	Some trial evidence ^[8]
Pentoxifylline	Improves microcirculation; some trial evidence
Physiotherapy and mouth-opening exercises	Recommended to maintain mouth opening
Surgery (band release, flaps, coronoidectomy)	For advanced disease

AYURVEDIC INTERPRETATION

Mukharoga

Sushruta describes Mukharoga at seven sites: lips,

This is a narrative review.

MODERN UNDERSTANDING OF OSMF

Pathogenesis

Areca nut alkaloids, particularly arecoline, stimulate fibroblast proliferation and collagen synthesis, while flavonoids such as tannins and catechins inhibit collagen breakdown^[1]. Chronic inflammation, cytokines such as transforming growth factor-beta, and reduced vascularity contribute to fibrosis. Copper in areca nut may increase collagen cross-linking.

Clinical features and staging

Early features include burning sensation, vesicles, ulcers and intolerance to spicy food. Later, blanching and palpable fibrous bands develop in the buccal mucosa, soft palate and lips, with progressive reduction in mouth opening, depapillation of the tongue and restricted tongue movement. Several clinical classifications grade OSMF by mouth opening and clinical features; one widely used system classifies it into stages based on interincisal distance and the presence of bands^[6].

Malignant transformation

OSMF carries a risk of malignant transformation. A systematic review and meta-analysis estimated a pooled malignant transformation rate of several percent^[2]. Patients therefore require long-term surveillance and biopsy of suspicious lesions such as leukoplakia, erythroplakia, non-healing ulcers or growths.

A systematic review of medical interventions for OSMF found that most studies were small and at high risk of bias, and no intervention could be recommended with confidence^[7]. Commonly used treatments include:

gums, teeth, tongue, palate, throat and the whole oral cavity (Sarvasara)^[4].

Correlation with OSMF

Table 2: Features of oral submucous fibrosis and their Ayurvedic interpretation

OSMF feature	Ayurvedic interpretation
Burning sensation, intolerance to spicy food, vesicles	Pittaja Mukhapaka
Dryness, stiffness, pain, cracking	Vataja Mukhapaka
Blanching, thickening, fibrous bands	Kapha and Vata, with Mamsa and Rakta Dhatu involvement
Limited mouth opening	Vata obstruction and Kapha accumulation
Malignant change	Arbuda (growth)

Areca nut (Puga) is described in Ayurvedic texts as astringent and heavy, and excessive use as harmful; its role as the cause of OSMF is consistent with the Ayurvedic principle of Nidana Parivarjana (avoiding the cause).

Recurrent aphthous stomatitis

Recurrent aphthous stomatitis (RAS), common recurrent painful oral ulcers, is also often correlated with Mukhapaka, particularly the Pittaja type^[9]. Although OSMF and RAS are different diseases, both present as burning and ulceration of the mouth and are treated with similar Ayurvedic measures.

Principles of Ayurvedic management

Classical management of Mukhapaka includes^[4,5]:

1. **Nidana Parivarjana:** stopping areca nut, tobacco, spicy and hot foods.
2. **Gandusha and Kavala:** with decoctions of astringent and healing herbs such as Triphala, Khadira, Yashtimadhu and Panchavalka, or with ghee, milk or honey.
3. **Pratisarana:** application of powders, pastes or honey to the lesions.
4. **Oral medicines:** such as Khadiradi Vati, Triphala and turmeric preparations.
5. **Virechana and Raktamokshana:** in suitable patients.
6. **Rasayana:** to promote healing.

EVIDENCE FOR HERBAL INTERVENTIONS

Turmeric and curcumin in OSMF

Turmeric (Haridra) is used widely in Ayurveda for oral diseases and has anti-inflammatory, antioxidant and antifibrotic properties. Several randomised trials, mostly from India, have reported improvements in mouth opening and burning sensation with curcumin^[10]. However, a 2023 meta-analysis of 13 randomised trials with 865 patients found no statistically significant improvement in mouth opening, burning sensation or tongue protrusion with curcumin compared with controls at

one to six months, with concerns about risk of bias, heterogeneity and variable formulations^[11]. The authors concluded that curcumin may have potential but that larger, multicentre trials are needed.

Aloe vera

Aloe vera gel applied topically, together with mouth-opening exercises, was compared with intralesional hydrocortisone and hyaluronidase in a preliminary study and appeared to improve burning sensation and mouth opening^[12].

Lycopene

In a randomised trial, oral lycopene, alone or with intralesional steroids and hyaluronidase, improved mouth opening compared with placebo^[8]. Lycopene is not an Ayurvedic herb but is found in tomatoes and other foods, and it illustrates the potential of dietary antioxidants.

Liquorice in recurrent aphthous ulcers

Yashtimadhu (liquorice, *Glycyrrhiza glabra*) is a classical healing herb for oral ulcers. In randomised trials, bioadhesive patches containing liquorice extract reduced ulcer size and pain in recurrent aphthous stomatitis^[13,14].

Ayurvedic studies

Ayurvedic literature on OSMF consists mainly of conceptual reviews correlating it with Sarvasara Mukharoga and case reports describing improvement with Gandusha, Pratisarana and oral medicines. No randomised controlled trials of classical Ayurvedic regimens in OSMF have been published in indexed journals. Combining Abhyanga or warm oil Gandusha with structured mouth-opening exercises, such as graded stretching with tongue depressors or devices, is a practical integrative approach that could be evaluated in trials. Mouth-opening exercises alone help maintain function in OSMF, so any added Ayurvedic measure should be compared with exercises alone.

Table 3: Summary of evidence for interventions in oral submucous fibrosis

Intervention	Condition	Evidence	Finding	Certainty
Curcumin ^[10,11]	OSMF	Meta-analysis of 13 RCTs	No significant pooled benefit; individual trials positive	Low
Aloe vera ^[12]	OSMF	Preliminary comparative study	Improved burning and mouth opening	Very low
Lycopene ^[8]	OSMF	RCT	Improved mouth opening	Low
Liquorice patches ^[13,14]	RAS	RCTs	Reduced ulcer size and pain	Low
Classical Ayurvedic regimens	OSMF, Mukhapaka	Case reports	Improvement reported	Very low

LOCAL AYURVEDIC PROCEDURES IN PRACTICE**Table 4: Local Ayurvedic procedures in practice**

Procedure	Typical preparations	Intended effect	Practical cautions
Gandusha with ghee or milk	Plain or medicated ghee (e.g. Yashtimadhu Ghrita), cow's milk	Soothing burning and dryness (Pitta and Vata)	Not to be swallowed in large amounts; aspiration risk in vulnerable patients
Kavala with decoctions	Triphala, Khadira, Panchavalka, Yashtimadhu decoctions	Astringent, healing, cleansing	Freshly prepared, lukewarm, filtered
Pratisarana	Honey, turmeric with honey, Khadira powder	Local healing and astringent effect	Avoid irritant or caustic powders on fibrotic or ulcerated mucosa
Mukha Lepa and Abhyanga	Oils applied to the face and cheeks with massage	Softening and relaxation of perioral tissues	May be combined with mouth-opening exercises
Dhumapana	Medicated smoke	Kapha reduction	Not recommended in OSMF; smoke is an irritant and a carcinogen exposure

Combining Abhyanga or warm oil Gandusha with structured mouth-opening exercises, such as graded stretching with tongue depressors or devices, is a practical integrative approach that could be evaluated in trials. Mouth-opening exercises alone help maintain function in OSMF, so any added Ayurvedic measure should be compared with exercises alone.

RESEARCH PRIORITIES

- Randomised trials of Ayurvedic regimens in OSMF with areca nut cessation and mouth-opening exercises in all arms, and with a defined clinical stage at entry^[6].
- Standardised outcomes: interincisal mouth opening in millimetres, burning on a visual

analogue scale, tongue protrusion, cheek flexibility and quality of life.

- Standardised, quality-tested herbal formulations with reported marker compounds, such as curcuminoid content for turmeric products.
- Follow-up of at least six months, with surveillance for malignant transformation.
- Trials in early-stage OSMF, where reversal or stabilisation is most plausible.
- Studies of Ayurvedic counselling as a support for areca nut cessation, which could have the greatest public health benefit.

SAFETY AND SURVEILLANCE

- **Malignancy:** every patient with OSMF should have a baseline examination by a dental or oral

medicine specialist and regular follow-up. White or red patches, non-healing ulcers, induration, growths or rapid worsening require urgent biopsy.

- **Areca nut cessation:** Ayurvedic treatment without cessation is unlikely to help; counselling and support for quitting are central.
- **Local applications:** irritant powders or caustic preparations may worsen mucosal damage.
- **Liquorice:** prolonged systemic use can cause hypertension and hypokalaemia; topical and short-term use is generally safe.
- **Product quality:** herbal and Rasa Shastra preparations should be quality-tested for heavy metals^[15].

AN INTEGRATED APPROACH

1. **Diagnosis and staging** by a dental or oral medicine specialist, with biopsy of suspicious lesions.
2. **Areca nut and tobacco cessation** with counselling and follow-up.
3. **Mouth-opening exercises** and physiotherapy.
4. **Symptomatic relief:** Ayurvedic Gandusha with ghee, milk or soothing decoctions, Yashtimadhu or turmeric preparations for burning and ulcers.
5. **Medical treatment** such as antioxidants or intralesional therapy as advised by the specialist.
6. **Regular surveillance** for malignant change, at least every 6 to 12 months.

DISCUSSION

OSMF is a serious, potentially malignant disease in which the Ayurvedic principle of Nidana Parivarjana, removal of the cause, is the single most important intervention. Ayurvedic correlations with Mukhapaka and Sarvasara Mukharoga provide a framework for symptomatic treatment, and herbs such as turmeric, aloe vera and liquorice have some supporting evidence. However, the evidence for any medical treatment of OSMF, conventional or herbal, is limited, and curcumin's pooled effect remains uncertain. Ayurvedic practitioners should ensure that patients are examined for malignant change and supported to stop areca nut use.

CONCLUSION

Oral submucous fibrosis can be interpreted in Ayurveda as a form of Sarvasara Mukharoga with features of Mukhapaka. Areca nut cessation,

surveillance for malignancy and mouth-opening exercises are essential. Turmeric, aloe vera and liquorice may relieve symptoms, but the evidence is of low certainty. Ayurvedic Gandusha and herbal preparations may be used as adjuncts within an integrated model of care, and rigorous trials are needed.

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