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Comparative Evaluation of Inter-Incisal Mouth Opening in Patients with Oral Submucous Fibrosis with or without Impacted 3rd Molar as a Risk Factor- An observational study

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Research Article

Keywords: OSMF, impacted third molars, areca nut chewing habit, trismus, reduced mouth opening

Posted Date: November 9th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11166958/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

In rural settings, kharra chewing is highly prevalent among young individuals, leading to an increased incidence of oral submucous fibrosis (OSMF) at an early age. As impacted third molars (I3Ms) are also more common in this age group, they may further contribute to restricted mouth opening. However, evidence regarding the influence of I3Ms on inter-incisal mouth opening (IMO) in patients with OSMF is scarce. Third molar extraction has never been mentioned in the surgical or medical treatment of OSMF. Therefore, this study aimed to comparatively evaluate the IMO in OSMF patients with and without I3Ms and as a risk factor.

Methods

The status of I3Ms in OSMF patients with a chronic habit history of areca nut quid chewing was assessed in the age range of 18–35 years in Wardha district. A total of 100 OSMF patients who attended the dental outpatient clinic of the Department of Oral Medicine and Radiology (OMR) over a 6-month period were selected for the study. The absence or presence of I3Ms was evaluated on panoramic radiographs. The correlation between the OSMF and impacted third molars was explored using a chi-square test at a 5% level of significance ($P <= 0.05$).

Results

A total of 100 patients with OSMF (18–35 years; 84% males, 16% females) were included. Based on the Chandramani More et al. (2012) staging system, 40% were Grade II, 24% were Grade I, 22% were Grade III, and 14% were Grade IV. Impacted third molars (I3Ms) were present in 48% of patients, while retromolar fibrous bands were identified in 42%. Both I3Ms and retromolar fibrous bands were present in 27% of patients, whereas 15% had fibrous bands alone, 21% had I3Ms alone, and 37% had neither. A substantial correlation was observed between OSMF stage and the coexistence of retromolar fibrous bands with I3Ms, with the highest frequency noted in Grade II patients.

Conclusions

The co-existence of impacted third molars and OSMF may further restrict mouth opening, potentially leading to an overestimation or pseudo-grading of OSMF severity. This may result in inappropriate or over-treatment. Therefore, a thorough clinical and radiographic evaluation is essential to differentiate the contribution of impacted third molars from OSMF-related trismus, ensuring accurate disease grading and appropriate treatment planning.

Trial registration no.:

Not applicable

Background

Humans and disease have a relationship that begins at birth. Certain diseases are incurable and cannot be cured, and some ultimately lead to the patient's death. Diseases can be acquired or inherited. About 600 BC, Sushruta described a condition known as "VIDARI" in ancient Indian medical literature that resembled oral submucous fibrosis (OSMF). The symptoms of the condition are pain during eating, depigmentation of the oral mucosa, and a progressive reduction in mouth-opening (1). OSMF is a potentially premalignant condition that primarily affects individuals who are Asian in origin (2). The prevalence in Indian populations is 2% for men and 5% for women. Individuals under the age of 20 appear to be more typically affected by OSMF than those in other age groups (3). According to certain reports, people under 35 years old had up to an 85% higher prevalence of OSMF (4). According to a study done by Lohe VK and Kadu RP (2019), the correlation between the mean age of starting working and the mean age of starting adverse habit in 120 individuals revealed that the mean age of starting working was 18.37 ± 2.16 and the mean age of starting adverse habit was 22.99 ± 3.86 (5). From this study, it is evident that the age of earning is directly proportional to the practice of adverse habits. Moreover, nowadays, marketing products in the form of a sachet of smokeless tobacco is practiced more by the young generation as it gives a meager social stigma. This eventually leads to OSMF changes among young adults. Coincidentally in this age group, the incidence of third molar impactions is more prevalent. This is the time where identification of the cause of reduced mouth opening has to be recognized, whether the reduction is due to third molar impaction, OSMF, and/or a combination. This identification leads to formation of an appropriate treatment algorithm for such patients. The present study sought to determine whether impacted third molars contribute to reduced mouth opening in patients with OSMF, thereby influencing disease grading and treatment planning, and whether they can be considered a potential risk factor in the clinical assessment of OSMF.

Aim

To comparatively evaluate inter-incisal mouth opening in patients with oral submucous fibrosis with and without impacted 3rd molar as a risk factor.

Primary objective:

1. To evaluate patients with OSMF
2. To compare the IMO in OSMF patients with I3Ms
3. To compare the IMO in OSMF patients without I3Ms

Secondary objective:

1. To correlate IMO with 3rd molar impaction in OSMF patients.

Methods: This cross-sectional Observational study was conducted over 6 months, from September 2024 to February 2025, in the Department of OMR at Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Higher Education & Research (DMIHER) (Deemed to be University), Sawangi (M), Wardha, India after receiving consent from the Institutional Ethics Committee (IEC) [IEC ref. no. DMIHER(DU)/IEC/2024/295; Dated: 19/08/2024]. The study was carried out in compliance with the Declaration of Helsinki, and patients gave their informed consent.

Inclusion criteria:

- Patients with OSMF
- Patients between age range of 18–35 years
- Patients who agree to take part in the research.

Exclusion criteria:

- Age under 18 years and above 35 years
- Patients with notable pathology in the maxilla and mandible that had caused tooth migration, root resorption, severe bone resorption/destruction, and bone expansion, as well as those with developmental anomalies, congenital or systemic diseases, was not included in the study.
- Third molars with less than two-thirds of a root development on a radiological basis was determined to be underdeveloped and eliminated from consideration.

Study procedure:

The patient reporting to the Department of OMR and willing to participate in the study was taken for the study. Past Medical history of the patient was taken to rule out systemic disease. Past Dental History was taken to rule out a history of 3rd Molar extraction. Detailed habit history was taken from each patient, which included type, duration, and frequency of the habit. Thorough clinical examination was done to rule out OSMF, IMO, I3Ms, fibrous bands in 18 28 38 48 region (buccal mucosa) degree of fibrosis whether there is inflammation/erosion of buccal mucosa. Panoramic Radiographic examination of all the patients was done by using standard exposure parameters of 70 kVp, 18 mA, and 11 s. The magnification rate ranged from 0% to 50%. Evaluation of I3Ms (impacted/ not impacted) was done. After completion of a thorough history, clinical examination, and evaluation of the I3Ms status of the study population:

- A thorough clinical examination will be done to rule out
    - IMO in mm
    - Evaluation of clinical symptoms of OSMF like blanching, fibrous bands, burning sensation, recurrent ulcerations, altered taste sensation, restricted tongue movements, status of uvula,

and altered salivation.

- Classification of OSMF by Chandramani More et al. (2012) (6)
- Evaluation of I3Ms, (Impacted / not impacted)

Statistical analysis:

Statistical analysis was done using descriptive and inferential statistics using Chi-square test, Student's unpaired t-test, and one-way ANOVA, and the software used in the analysis was SPSS 27.0 and GraphPad Prism 7.0 version and $p < 0.05$ was considered the level of significance.

Results:

A total of 100 patients diagnosed with OSMF were included in the study. The participants were recruited from the Department of OMR and were aged between 18 and 35 years. Of the 100 participants, 84 (84%) were males, and 16 (16%) were females.

OSMF was graded according to the staging system proposed by Chandramani More et al. (2012), with 100 patients classified as Grade I, Grade II, Grade III, and Grade IV. Out of 100 OSMF patients, 40 (40%) were Grade II, followed by 24 (24%) patients were Grade I, 22 (22%) were Grade III, and 14 (14%) as Grade IV. I3Ms were present in 48 patients and absent in 52 patients.

On clinical examination, fibrous bands in the retromolar region were palpated in 42 (42%) patients, while they were absent in 58 (58%) patients. The association between the fibrous bands present in the retromolar region and I3Ms was assessed in the study population.

Table 1
Correlation of OSMF Grading with fibrous band in retromolar region and I3Ms.

No. OSMF of patients	Disease OSMF	Factor causing reduced mouth opening		OSMF Grading			
		Fibrous band in retromolar region	I3Ms	Grade I	Grade II	Grade III	Grade IV
37 ()	Present	Absent	Absent	14	17	05	01
27	Present	Present	Present	02	05	10	10
21	Present	Absent	Present	02	05	06	02
15	Present	Present	Absent	06	13	01	01

Among the 100 OSMF patients, 27 (27%) patients had both fibrous bands in the retromolar region and I3Ms, 15 (15%) patients had fibrous bands without I3Ms, 21 (21%) patients had I3Ms without fibrous bands, and 37 (37%) patients had neither fibrous bands nor I3Ms.

The association between OSMF stage and the presence of fibrous bands in the retromolar region with I3Ms was evaluated. Among the 100 OSMF patients, 2 (2%) were classified as Grade I, 5 (5%) as Grade II, 10 (10%) as Grade III, and 10 (10%) as Grade IV, in the group presenting with both fibrous bands in the retromolar region and I3Ms.

Discussion:

There is compelling evidence from numerous studies that areca nut consumption is the main cause of OSMF. The fruit of the Areca catechu tree yields alkaloids and tannins, especially arecoline, which is the most potent active component in areca nuts (7). The fourth most consumed substance is betel nut quid (BQ), which has psychedelic and mildly cholinergic effects (8). Around the world, an estimated 600 million people consume betel nut as a hallucinogenic substance or for cultural festivities, religious rites, and social customs (9). In 2004, the IARC updated its judgment that areca nuts alone and BQ, with or without tobacco, were known to cause cancer (7). OSMF is a chronic progressive debilitating disease of the oral mucosa involving the oropharynx. The classical features of this disease are stiffness and blanching of the oral mucosa, trismus, hypomobility of the soft palate and tongue with loss of gustatory sensation, and burning sensation in the mouth (10). I3Ms can lead to a variety of clinical issues, such as distal caries, pericoronitis, infections, periodontal disease, root resorption of adjacent teeth, bone loss, odontogenic cysts and tumors, and jaw fractures (11). Accurate grading of OSMF is essential, as the condition is irreversible and its management varies according to disease severity. OSMF is increasingly observed in younger individuals, who are also more likely to present with I3Ms. Pericoronitis associated with I3Ms may induce trismus, leading to additional restriction in mouth opening and potentially resulting in an overestimation (pseudo-grading) of OSMF severity. This may influence clinical decision-making and treatment planning.

In the current study, males were predominantly affected compared to females; similarly, the study conducted by Rai S. et al. and Gadbail et al. (10,12) showed male predominance. In the present study, the mean age of the OSMF patients was years range: 18–35), the mean age of the patients was 32.2 years (range: 19–65) in Rai S. et al. (10), and Gadbail et al. studied participants' age ranged from 13 to 54 years, with a mean of 32.34 (+ 8.63) years (12). In the current study, OSMF patients with grade I were 24 (24%), followed by grade II 40 (40%), grade III 22 (22%), and grade IV 14 (14%). Similarly, a study conducted by Gadbail et al. Grade I disease was seen in the majority of OSMF patients (32.27%) who visited an OPD, followed by grade III (27.84%), grade II (21.51%), and grade IV (18.35%) (12). In the present study, out of 100 OSMF patients, 48 patients presented with I3Ms. The most commonly reported chief complaint in OSMF patients was sudden difficulty in opening the mouth due to the mandibular I3Ms and associated pericoronitis (48; 30.37%)(12). Third molar extraction has never been emphasised in the medical or surgical management of OSMF. Third molars are frequently carious, impacted, or periodontally involved, resulting in pericoronal irritation caused by accumulated plaque. In the retromolar region and the surrounding buccal mucosa, which are also the most impacted in OSMF, this exacerbates the inflammatory process and the fibrosis that follows. After a month of having their third molars extraction, every patient experienced a notable subjective improvement (i.e., "felt better") (10). OSMF

may aggravate pericoronitis associated with mandibular I3Ms. Progressive reduction in mouth opening, along with reflex muscle spasm caused by pericoronitis, further limits oral hygiene and mastication. The fibrotic pericoronal tissues in OSMF may also hinder adequate cleaning, increasing the risk and severity of pericoronitis. As pericoronitis causes acute pain, unlike the relatively tolerable symptoms of OSMF, many patients seek treatment only after its onset. The coexistence of both conditions leads to greater functional impairment, adversely affecting oral health and quality of life, highlighting the importance of early management of I3Ms in OSMF patients. Oral ulcers resulting from persistent trauma caused by buccally situated third molars and sharp edges of attrited posterior teeth may be another source of malignant changes in OSMF (12).

In the present study, among the 100 patients diagnosed with OSMF, 37 (37%) presented with OSMF alone. The remaining patients demonstrated additional clinical findings: 27 (27%) had both impacted third molars (I3Ms) and fibrous bands in the retromolar region, 15 (15%) had fibrous bands without I3Ms, and 21 (21%) had I3Ms without fibrous bands. These findings suggest that the coexistence of impacted third molars and retromolar fibrous bands may contribute to a reduction in mouth opening, potentially resulting in an apparent increase in the clinical grading of OSMF. As treatment strategies for OSMF are largely determined by disease severity, careful assessment of impacted third molars should be incorporated into the clinical evaluation. Addressing the contribution of impacted third molars may prevent overestimation of disease severity and facilitate appropriate treatment planning, allowing conservative management in selected cases rather than unnecessary aggressive/ surgical intervention of OSMF.

Out of 100 subjects, one patient with I3Ms reported a traumatic ulcer, three patients reported malignancy (two of whom had grade II OSMF and one had grade IV OSMF), six patients reported leukoplakia, and one patient had habit-induced melanosis.

To the degree that certain issues can be somewhat foreseen before surgery, radiographs can assist the surgeon in taking precautions against them or in counseling the patient of their potential hazard. The panoramic radiograph is currently the recommended technique for I3Ms.

Conclusions

OSMF patients with mandibular I3Ms were more likely to present with advanced clinical grades than those without I3Ms, suggesting that I3Ms may contribute to increased disease severity. The co-existence of I3Ms and OSMF may further restrict mouth opening, potentially leading to an overestimation or pseudo-grading of OSMF severity. This may result in inappropriate or over-treatment. Therefore, a thorough clinical and radiographic evaluation is essential to differentiate the contribution of I3Ms from OSMF-related trismus in the young population (18–35 yrs), ensuring accurate disease grading and appropriate treatment planning.

Future multicentric studies across diverse populations are needed to validate these findings. Further studies incorporating cone-beam computed tomography (CBCT) are warranted to evaluate the

relationship between I3Ms and OSMF, and to validate their influence on clinical grading and treatment planning. Public awareness programs should be strengthened to improve knowledge of OSMF, its malignant potential, and the importance of early diagnosis and prevention.

Abbreviations

BQ
betel nut quid
I3Ms
impacted third molars
IARC
International Agency for Research on Cancer
IMO
interincisal mouth opening
OMR
Oral Medicine and Radiology
OPMDs
Oral Potentially Malignant Disorders
OSMF
oral submucous fibrosis

Declarations

Ethics approval and consent to participate

The Institutional Ethics Committee of Datta Meghe Institute of Higher Education and Research (Deemed to be University) as granted its approval to the required procedure for this investigation [DMIHER(DU)/IEC/2024/295; Dated: 19/08/2024]

Informed consent:

Written informed consent was acquired from all the patients for the use of their clinical data and archival tissue samples.

Consent for publication:

Not Applicable.

Competing interests:

The authors declare no competing interests.

Funding:

Open access funding provided by Datta Meghe Institute of Higher Education and Research.

Author Contribution

Study concept and design: Dr. Rutumbara Dhone and Dr. Vidya Lohe; Conduction of the study and gathering the data: Dr. Rutumbara Dhone, Dr. Komal Zungre, and Dr. Gauri Lande; Data analysis and interpretation: Dr. Rutumbara Dhone and Dr. Vidya Lohe; Drafting the manuscript: Dr. Ravindra Kadu.

Acknowledgement

NA

Data availability:

The datasets used and/or analysed in the current study are available from the corresponding author upon reasonable request.

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