

## Hearing Efficiency in Oral Submucous Fibrosis: A Clinical Study

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### Abstract

**Background:** OSMF, or oral submucous fibrosis, is a chronic, progressive disease of the oral mucosa brought on by things like areca-nut chewing, chili consumption, autoimmunity, and hereditary predisposition. The disorder, caused by fibrosis of the oral mucosa, first manifests as a burning sensation and an aversion for spicy foods, and then progresses to a gradual reduction in mouth opening. When fibrosis progresses to the nasopharynx, it interferes with speech and hearing. This study was started since there wasn't enough evidence showing how common hearing loss is among OSMF patients. **Materials and methods:** Study participants with varied degrees of Oral Submucous Fibrosis will have their hearing abilities evaluated. 50 persons with OSMF of varied severity who underwent audiometric testing are shown. The effects of different OSMF levels on hearing were analyzed. **Results:** The recent study demonstrated a significant link between OSMF and hearing impairment. Because of the involvement of the palate muscles, OSMF has the potential to reduce the patency of the Eustachian tube, leading to conductive hearing loss. **Conclusion:** Therefore, ENT assessment and therapy for hearing loss should be part of the protocol for treating OSMF patients in order to improve treatment outcomes.

**Keywords:** Palatal, Paratubal muscles, Eustachian tube, Audiometry

### Introduction:

Oral submucous fibrosis (OSMF) is a chronic, progressive disease that may affect any part of the mouth and, in rare cases, the throat. A juxta-epithelial inflammatory response is usually present, and this is followed by fibroelastic alterations of the lamina propria, epithelial atrophy, and stiffness of the oral mucosa, leading to trismus and a difficulty to chew.[1, 2].

The oral mucosa may have a burning sensation, develop ulcers and soreness, the tongue may become less mobile and depapillated, the oral mucosa may blanch and become leathery in texture, the oral mucosa may lose its pigmentation, and the patient's mouth opening may gradually narrow as the condition progresses. Hearing loss from blocked eustachian tubes and esophageal fibrosis-

related swallowing problems are symptoms of advanced disease. [1].

The eustachian tube (pharyngotympanic tube) links the middle ear cavity to the nasopharynx and is one of the structures connecting with the oral cavity. The eustachian tube's ability to open and close plays a crucial role in the body's health. [1]. The eustachian tube has two purposes: while open, it allows air pressure in the middle ear to equalize, and when closed, it shields the middle ear from damaging pressure changes and noise. The middle ear may develop pathological alterations if the eustachian tube doesn't work normally. As a result, this might cause a loss of hearing. The eustachian tube's normal ability to control air pressure may be impaired in those with OSMF. When the eustachian tube isn't working properly, air pressure in the middle ear decreases, making sounds in the ear seem muffled. [1, 3].

“However, there is a lack of studies examining the connection between eustachian tube dysfunction and the different clinical stages of OSMF, the progression or improvement of the disease, and the involvement of fibrosis in the areas surrounding the oral cavity, such as the ear (Eustachian tube), the oro-pharynx, and the pharynx. The goal of this study was to evaluate eustachian tube function in individuals with OSMF and to correlate that function with several disease stages in order” to better inform overall prognosis and guide the development of more effective treatment modalities. [3, 4].

### Material and Methods:

“After receiving approval from the Institutional Ethical Committee, this study including 50 patients with OSMF was carried out at the Department of Oral Medicine and Radiology. Patients' medical records were collected through in-depth case history and clinical examination after the collection of signed informed permission.” OSMF was diagnosed based on patient history and observable symptoms upon completion of a thorough physical examination. Cases were categorized as grade I, II, or III based on the observed clinical manifestations. (Early, Moderate, Severe grade.)

### Clinical Criteria for Grading of OSMF:

#### Grade I (Early OSMF)

Heat intolerance, facial flushing while eating spicy meals, visible fibrosis of the buccal mucosa, faucial pillars, pterygomandibular raphes, and soft palate, and an oral aperture of 25-35 millimeters are all symptoms.

#### Grade II (Moderate OSMF)

suffering brought on by consuming hot or very spicy foods; The buccal mucosa, faucial pillars, pterygomandibular raphae, and soft palate have all developed palpable fibrosis, and this condition has now progressed anteriorly to include the labial mucosa, the floor of the mouth, and the tongue. The flexibility of the buccal mucosa decreases, limiting the range of motion of the tongue. The mouth width ranges from 15-25 mm.

#### Grade III (Severe OSMF)

lack of stimulation leading to a burning sensation; Tongue immobility, decreased buccal mucosal pliability, and systemic fibrosis in the oral cavity all point to a problem. Mouth and lip scarring (fibrotic rim); Soft-palate fibrosis causes difficulties with swallowing, deglutition, and communication, as well as a nasal voice. A narrow mouth opening of fewer than 15 millimeters.

A comprehensive examination of the ear by the ENT Department ruled out tympanic membrane perforation, cholesteatoma, previous surgery, and ear infections. Each patient underwent a pure tone audiometry (PTA). A total of 60 ears were tested for hearing impairment, with both the right and left ears being examined. The decibels over the average hearing level are shown. FIGURE 1a, b, and c In most cases, the frequency examined was in the range of 125 Hz to 8000 Hz. The degree of hearing loss at a certain frequency is quantified by the amount by which the volume must be amplified over the usual level. Hearing loss was statistically classified into three groups based on AC-BC Gap values. [1, 4, 5]

1. “10–15 dB—Normal Hearing.
2. 16–25 dB—Minimal Hearing Loss.
3. 26–40 dB—Mild.
4. 41–55 dB—Moderate.
5. 56–70 dB—Moderate to Severe.
6. 71–90 dB—Severe.
7. Above 90 dB is profound deafness.”

Hearing impairment was measured in each participant and collated according to age and OSMF grades.

### Result and Discussion:

To a large extent, the mouth and throat are affected by OSMF. As the condition progresses, it causes fibrosis to form in the buccal mucosa, soft palate, lip mucosa, and anterior pillars of the mouth. Extremely rarely does it impact the pharyngeal box or vocal cord membrane, although it may spread to the eustachian tube [2, 5-7]. In South and Southeast Asia, where arecanut and its flavored formulations, as well as its inclusion in the betel quid, are commonly consumed, the disease affects between 0.2% and 1.2% of the population. This includes India, Bangladesh, Sri Lanka, Pakistan, Taiwan,

Southern China, and other countries in the region. [8, 9]. Oral submucous fibrosis has a malignant transformation rate of 4-12% globally and 7.6% in the Indian population. [5, 10, 11].

Most people who get OSMF do so in their 30s and 40s, with men being more likely to be affected than women [2, 5, 7]. The level of OSMF and the age-related risk of hearing loss are both shown in Table 1. The age of the participants in the current research was noted to be between 16 and 60.

Students in OSMF Grade I were, on average, 15–30 years old. The vast majority of Grade II OSMF participants were middle-aged adults (31 to 45 years old). The vast majority of the Grade III OSMF individuals fell within the age ranges of 31–45 and 46–60. Differences in OSMF Grades were statistically significant across age ranges. ( $P \leq 0.005$ ) Patients between the ages of 15 and 45 accounted for the vast majority of these cases. This is in accordance with the studies by Gupta et al. and Shah et al. [6, 7].

**Table 1: Correlation of grade of OSMF with loss of hearing according to age group**

Age (In Year)	Grade I (Total = 10)		Grade II (Total = 20)		Grade III (Total = 20)	
	Normal (Total = 10)	Loss of Hearing (Total = 0)	Normal (Total = 10)	Loss of Hearing (Total = 10)	Normal (Total = 10)	Loss of Hearing (Total = 10)
15–30	8	0	4	4	2	0
31–45	2	0	6	6	6	4
46–60	0	0	0	0	2	6

The following table compares the various degrees of OSMF to the various types of hearing loss. The present study employed pure tone audiometry to evaluate the hearing of 100 ears belonging to 50 persons with OSMF; the findings indicated that major of those ears had normal hearing while 10 percent had mild hearing loss, 12 percent had moderate hearing loss, and 5 percent had severe hearing loss. It was found that 79.2% of ears had

normal hearing, 18.0% had medium to severe hearing loss, and 2.8% had hearing loss, all of which are in line with the results of the study by Gupta et al. (10). Out of 54 ears evaluated, 67% were classified as having normal hearing, 22% as having mild impairment, and 11% as having significantly mixed results (Shah et al. The OSMF Grades were not correlated with the degree of hearing loss. ( $P > 0.05$ ).

**Table 2: Categories of hearing loss association with grades of OSMF**

OSMF Grade (Total Ears = 100) [100%]	Normal H (Total = 72)	Minimal HL (Total = 10)	Mild HL (Total = 12)	Moderate HL (Total = 6)
Early OSMF	23%	0	0	0
Moderate OSMF	40%	80%	33%	42%
Severe OSMF	35%	20%	66%	58%

Hearing loss was shown to be significantly different between groups 1 and 3 (early OSMF and severe OSMF) in the current investigation. When comparing all groups, Group 3 had the highest

correlation with moderate hearing loss in both ears. The results are consistent with those of Chaudhary et al. Palate muscle fibrosis may have a role in eustachian tube dysfunction in occupational noise-

induced hearing loss (OSMF), according to some research.

More than half of those with faucial pillar fibrosis also have palatal involvement. "The palatal and paratubal muscles (the tensor veli palatini, tensor veli tympani, and the salpingopharyngeus) control the patency and function of the pharyngeal aperture." With OSMF, the eustachian tube's pharyngeal aperture becomes even narrower than usual, making it less able to control air pressure in the middle of the throat, causing earache and hearing loss [1, 4, 7]. This suggests that the degree to which the palate muscles have become fibrotic is associated to hearing loss through decreasing the patency of the eustachian tube. "Alterations in the patency of the Eustachian tube, which may develop owing to increasing fibrosis of the palatal muscles, are seen in late-stage OSMF due to the fibrosis of the oropharynx, which alters the perception of sound."

Three out of four people in the 15–30 age range have some degree of hearing loss, with mild loss in two ears and moderate loss in the third. Between the ages of 46 and 60, significant hearing loss is evident in 6 out of 8 ears. In four of the six ears, the hearing loss is severe, whereas the remaining two ears only show modest impairment. No correlation could be found between age and any of the other types of hearing loss. ( $P > 0.05$ ). The ability to hear clearly declines with aging. Therefore, it might be an additional component.

### Conclusion:

When the palate muscles are involved in OSMF, the Eustachian tube patency may decrease, resulting in conductive hearing loss. For this reason, the test is often used for instructing the patient, who may benefit from scanning the monotony and identifying the big picture in order to discover more effective remedial mediations for hearing deficiencies and speed up the treatment process.

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