

### **Tympanometric study of eustachian tube function in oral submucous fibrosis**

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#### **Abstract**

Oral Submucous Fibrosis (OSMF) is a chronic disorder characterized by fibrosis of the lining mucosa of the upper digestive tract. Incidence of Oral Submucous Fibrosis (OSMF) varies from 0.2 to 0.5% in India, with a higher percentage being found in the southern areas as well as in Saurashtra region. This study comprised of 60 subjects (120 ears), study group of 30 patients diagnosed with Oral submucous fibrosis and control group of 30 normal patients with no deleterious habits and without any ear disorders at Department of Oto – rhino - laryngology and Head & Neck Surgery, Sardar Patel Medical College &A.G. of Hospitals, Bikaner, Raj (India).

**Keywords:** conductive Hearing Loss, Oral Submucous Fibrosis, Pure Tone Audio metry, Eustachian Tube function Test.

#### **Introduction**

It is generally recognized that submucous fibrosis of the oral cavity is a collagen disease with a great resemblance to morphea or localized scleroderma<sup>1</sup>. The exact

aetiology is still obscure, but many factors such as chewing betel nut, tobacco and pan masala, smoking and consuming chillies have been thought to be contributory<sup>2,3,4</sup>. Extension of fibrosis into nasopharynx involving the pharyngeal orifice of eustachian tube and in the muscles, affects the functions of eustachian tube<sup>5</sup>. Abnormal or impaired eustachian tube functions may cause pathological changes in the middle ear<sup>6</sup>. This in turn can lead to hearing impairment which can be evaluated by audiometry and tympanometry<sup>7,8</sup>. The process may also be influenced by increased secretion of inflammatory cytokines, growth factors and decreased production of anti-fibrotic cytokines<sup>9</sup>. Advanced cases show signs of loss of hearing due to blockage of eustachian tubes and difficulty swallowing because of oesophageal fibrosis<sup>10</sup>. Histological changes include appearance of excessive collagen fibres, constricted blood vessels, oedema and excessive deposition of fibroblast and infiltration of inflammatory cells<sup>11</sup>. In severe cases along with mucosa and sub mucosa, degenerative changes have been

reported in deeper tissues as well including muscle fibres<sup>12, 13</sup>. Palatal and par tubal muscles showed degenerative changes in the form of atrophy, loss of cross striations and oedema of myo epithelium<sup>14</sup>. Changes in these muscles which are attached to eustachian tube and soft palate may lead to eustachian tube dysfunction and hearing impairment<sup>15</sup>.

### Methods and material

The study comprised of 60 subjects (120 ears).

Group I: 30 patients diagnosed with Oral submucous fibrosis constituted the study group.

Group II: 30 normal patients with no deleterious habits and without any ear disorders constituted the control group.

### Inclusion criteria

- Patients clinically diagnosed with OSMF within the age limit of 10-60 yrs.
- Patients approved after ENT examination by the specialist in both control and study group.

### Exclusion criteria

- Patients with previous history of middle ear infection/ otitis media, ear disorders or surgery.

Collection of data: After examination, clinical and functional staging had been done according to Haideret al<sup>16</sup>.

- Stage I- Buccal bands only
- Stage II- Faucial and buccal bands only
- Stage III- Faucial, buccal and labial bands.

Functional staging had been done as follows:

GRADE 1	GRADE 2	GRADE 3
mouth opening	mouth opening	mouth opening.
21-30 mm	11-20 mm	≤ 10mm



Figure 1:

By charting the compliance peaks of tympano-ossicular system against various pressure changes, different tympanograms recorded.

### Observations and results

30 cases and 30 controls belonging to age group of 10-60 years. Mean age was 27.5 and SD 2.5 of the case group, mean age was 26.3 and SD 3.5 of the control group. 21 males and 9 females participated in the study as case while in control, there were 22 males and 8 females.

The incidence of OSMF was 1.4%. Among then the incidence of disease was more common in males with male to female ratio 2.3:1. The majority of patients included in the study were muslims in which 14 males and 7 females belonged to this religion. Among Hindus, 7 were males and 2 were females. The risk of OSMF was higher in adolescent and young adult due to more consumption of chewing areca nut with tobacco followed by gutkha chewing. In this study, abnormal tympanogram curve (type B+C) was noted in 43.3% ears, which was significant. Laterality of tympanogram was not significant. ET dysfunction was noted in 15 patients in which hearing loss was noted in grade 2 and 3 OSMF. Among 60 ears, 51.6% had normal hearing while 48.4% had hearing loss. In ears with hearing loss, 11.6% had minimal CHL, 20% had mild and 16.6% had moderate CHL.

**Tables**

Table 1: correlation of osmf grading and hearing loss with age group

Age	Control		Grade – I OSMF		Grade – II OSMF		Grade – III OSMF	
	Nor mal	CH L	Norm al	CH L	Norm al	CH L	Norm al	CHL
10-20	9	0	6	0	1	1	0	0
21-30	14	0	5	0	0	6	1	1
31-40	4	0	1	1	0	2	0	1
41-50	2	0	1	0	0	0	0	1
51-60	1	0	0	0	0	0	0	2

Table 2: Comparision of type of tympanogram curve between osmf group and normal group

Type of Tympanogrm	OSMF Group	%	Normal Group	%
A	34	56.6%	56	93.3%
B	8	13.3%	2	3.33%
C	18	30%	2	3.33%
TOTAL	60	100%	60	100%

Table 3: Com parision of eustachian tube function between osmf group and normal group.

Group	ET dysfunction on ETFT (No. of ears)	%	ET normal function on ETFT (No. of ears)	%
OSMF	29	48.3%	31	51.66%
Control	4	6.66%	56	93.33%

Table 4: laterality of degree of hearing loss of osmf group

Grade	Min. Chl		Mild chl		Moderate chl	
	U/L	B/L	U/L	B/L	U/L	B/L
I	1	0	0	0	0	0
II	0	2	0	4	0	3
III	0	1	0	2	0	2

**Discussion**

In our study, statistical comparison of the tympanogram results there is a strong correlation between eustachian tube dysfunction and OSMF. In the study of S.C. Gupta et al<sup>15</sup>, out of 106 ears examined, normal tympanogram

type-A curve was recorded in 80 ears, while type-B curve in 17 ears and type-C curve in 9 ears.

In our study, we divided the patients into three categories according to the degree of mouth opening as grade I, grade II and grade III. 46.66% subjects had grade I OSMF, 33.3% subjects had grade II and 20% subjects had grade III OSMF. In the study of J. S. Shah et al<sup>17</sup>, among Grade I OSMF, majority of the subjects were of the age group of 15 to 30 years. In Grade II OSMF, majority of the subjects were from 31 to 45 years. In Grade III OSMF, majority of the subjects were from 31 to 45 and 46 to 60 years.

In the study of Maulik Shah et al<sup>18</sup>, on pure tone audiometry (PTA), hearing was found to be normal in 36 ears, mild sensorineural hearing loss was found in 12 ears and moderate mixed hearing loss was present in 6 ears. In the study by J. S. Shah et al<sup>17</sup>, pure tone audiometry of 60 ears in 30 OSMF patients revealed that hearing was normal in 51.6%, minimal in 11.66%, mild in 20% and moderate hearing loss was evident in 16.66%. There was significant difference noticed in hearing loss for group 1 and group 3 (early OSMF and severe OSMF). Group 3 was significantly associated with moderate hearing loss as compared with any other group in both the right and left ears. In the present study, pure tone audiometry of 60 ears in 30 OSMF patients revealed that hearing was normal in 31 ears, minimal conductive hearing loss was present in 7 ears, mild conductive hearing loss was present in 12 ears and moderate conductive hearing loss was evident in 10 ears. These results were in accordance with the study conducted by Gupta et al<sup>14</sup>, where hearing was found to be normal in 79.2% of ears, mild to moderate hearing loss was evident in 18% and moderate hearing loss was evident in 2.8%. Shah et al<sup>18</sup> reported that out of 54 ears in their OSMF group, hearing was normal in 67%, mild in 22% and moderate mixed hearing

loss was present in 11%. Statistically, no significant difference was present between OSMF Grades and grade of hearing loss ( $p < 0.05$ ). Parvathi Devi et al<sup>19</sup> conducted a study in which mean quantitative hearing loss in decibels in the right ear was  $22.06 \pm 9.19$  dB and that in the left ear was  $22.06 \pm 7.09$  dB. Among the 80 ears in the 40 OSMF cases, hearing was normal in 56%, mild conductive hearing loss was found in 39%, mild sensorineural hearing loss in 1% and moderate sensorineural hearing loss was present in 4%.

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