

## ORIGINAL RESEARCH

### Prevalence of oral submucous fibrosis in patients visiting dental college: A cross-sectional study

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#### ABSTRACT

**Background:** Oral submucous fibrosis (OSF) is the oral premalignant lesion with the highest malignant potential. Oral submucous fibrosis (OSMF) is increasingly recognised as an Indian illness worldwide. It has one of the highest rates of malignant transformation among potentially malignant oral lesions and diseases, making it a source of concern for dental specialists. Understanding the precise involvement of alkaloids and other etiological factors in pathogenesis would aid in the management and treatment of the disease. The purpose of this study is to determine the prevalence of OSMF in betel nut chewers of various ages who visit the Dental College and Hospital.

**Materials and Methods:** The study included 798 OSF patients who visited the Department of Oral Medicine and Radiology dental outpatient clinic over the course of 18 months. In the presence of visible light, a thorough case history and clinical examination were conducted. OSMF was diagnosed based on difficulties in opening the mouth and the presence of blanched oral mucosa with palpable fibrous bands. Burning sensations, salivation, tongue protrusion, tobacco intake habits, and related malignant alterations were among the other diagnostic symptoms. The research looked at age groups, habit length, habit frequency, and habit type. A basic correlation analysis was carried out.

**Results:** Of the 798 patients of OSF studied, maximum subjects were of stage II (48.24%), followed by 30.82% subjects of stage III, 12.78% patients of stage I, and only 8.14% subjects belong to stage IV. Based upon age group, OSMF was most prevalent in age group III (31--40 years). When compared to other etiological factors, areca nut (gutkha) was a substantial etiological factor (58.14 percent).

**Conclusion:** The high frequency of OSMF necessitates widespread public knowledge and management of these lesions. The etiopathogenesis, clinical appearance, diagnosis, and therapy of these lesions should be known and understood by primary healthcare physicians and dentists.

**Key words:** Oral submucous fibrosis, Prevalence, Gutkha, Habit.

#### INTRODUCTION

Shushrutha defined a disorder called "vidari" under mouth and throat ailments in ancient medicine. He noticed a constriction of the mouth, depigmentation of the oral mucosa, and pain when eating. These characteristics are quite similar to the symptoms of oral submucous

fibrosis.<sup>1</sup> Oral submucous fibrosis (OSMF) is a chronic, scarring condition that primarily affects people of Southeast Asian descent. This condition was originally described by Schwartz (1952) while investigating five Indian ladies from Kenya, to which he gave the name 'atrophiaidiopathica (tropica) mucosa oris'.<sup>2</sup> This syndrome was first described in India by Lal and Joshi (1953). The term "oral submucous fibrosis" was created by Joshi.<sup>3</sup> Sirsat and Pindborg (1966) described four histological phases of OSMF.<sup>4</sup> Seedat and Van Wyk (1988) claimed that the disease was irreversible, meaning that once OSMF was induced by the practise of chewing betel nut, the sickness could not be reversed when the habit was stopped.<sup>5</sup> The WHO definition for an oral precancerous condition 'A generalized pathological state of the oral mucosa associated with a significantly increased risk of oral cancer', accords well with the characteristics of oral submucous fibrosis.<sup>6</sup> For many years, this ailment was exclusive to countries such as India, Pakistan, and Bangladesh, but due to increased immigration, it is increasingly being recorded in Western countries as well.<sup>7-9</sup>

The gravity of the crisis can be gauged by the fact that India ranks first among all registries in the world for oral cancer incidence, with 75,000 to 80,000 cases recorded each year, according to a 2004 review. The rapid spread of the condition is attributed to a rise in the popularity of commercially manufactured arecanut preparations (gutkha, pan masala) in India, as well as an increasing adoption of this habit by young people owing to addiction.<sup>10,11</sup> The government has taken few major actions to address this critical health issue, owing to concerns about harming the livelihoods of farmers and others involved in the sector. Despite the fact that Karnataka produces roughly 65 percent of the entire areca nut production in India, gutkha was recently outlawed after several other states did so under the Food Safety and Standards Act. Farmers must be educated about the negative consequences and encouraged to plant other profitable crops.<sup>7,12-15</sup>

According to the World Health Organization, India's tobacco-related mortality could reach 1.5 million per year by 2020. Oral cancer develops after tobacco exposure exposes normal oral mucosa to potentially malignant lesions, which eventually turn into carcinoma. OSMF is now recognised worldwide as an Indian disease. Among potentially malignant oral lesions, it has one of the highest rates of malignant transformation.<sup>16,17</sup>

Given the progressive nature of OSMF, primary care physicians can play a critical role in early diagnosis. It's a mouth-restricting disorder with a complex origin, the most prevalent of which is chewing areca nuts. Because the prevalence of this harmful habit is increasing in India, this disease, which was once uncommon, has become increasingly frequent. Therefore, increasing awareness of clinical features, diagnosis, and care is the most effective way to combat this threat. As a result, the primary healthcare physician's position as the initial point of contact for the general public becomes critical. The purpose of this study was to determine the prevalence of OSMF in betel nut chewers of various ages in the north Indian community.

## MATERIALS AND METHODS

A 18-month cross-sectional study was undertaken in the Oral Medicine and Radiology Outpatient Department. The Institute's Ethical Committee gave their approval, and the subjects gave their informed consent. Patients with OSMF were separated by gender. A total of 798 OSMF individuals were eliminated from the study. Specialist examiners who were knowledgeable with oral mucosal lesions in the local community performed all oral examinations. Retraction of tissues was done with a sterile mouth mirror, and inspection of the oral cavity was done with examination gloves. According to their clinical stage, the patients were separated into four groups:

**Stage I:** Interincisal mouth opening up to or greater than 35 mm, stomatitis, and blanching of oral mucosa.

**Stage II:** Interincisal mouth opening between 25 and 35 mm, presence of palpable fibrous band in buccal mucosa and/or oropharynx, with/without stomatitis.

**Stage III:** Interincisal mouth opening between 15 and 25 mm; presence of palpable fibrous bands in buccal mucosa and/or oropharynx, and in any other parts of the oral cavity.

**Stage IV:** Interincisal mouth opening less than 15 mm.

A. Any other stage along with other potentially malignant disorders, for example, oral leukoplakia, oral erythroplakia, etc.

B. Any other stage along with oral carcinoma.

The OSMF patients were divided in five categories on the basis of age groups:

- Group I: 10–20 years
- Group II: 21–30 years
- Group III: 31–40 years
- Group IV: 41–50 years
- Group V: 51 years and above

Prevalence of OSMF was also recorded on the basis of habit duration and divided in three groups:

- Group A: 2–5 years
- Group B: 6–10 years
- Group C: More than 11 years.

This study also recorded the frequency of habit per day:

- Group A: 2-5 times/day
- Group B: 6-10 times/day
- Group C: more than 11 times/day

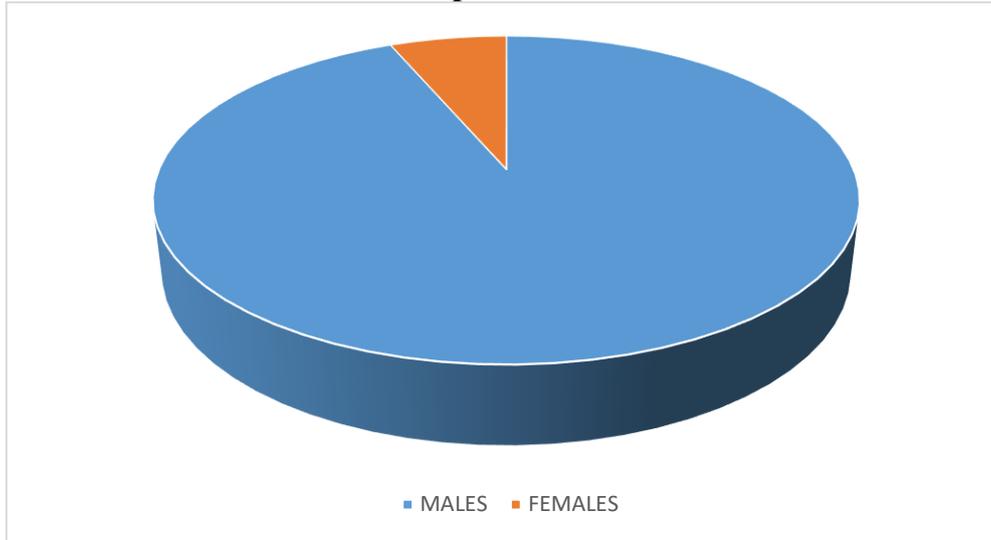
This study was conducted on the basis of the type of habit and divided into three groups:

- Group 1: Guthka, pan masala.
- Group 2: Betel quid.
- Group 3: Tobacco, smoking

This study excluded patients with any systemic disorders as well as children under the age of ten. The statistical analysis was done with SPSS software version 11.5. Descriptive statistics included calculation of means and standard deviation. Data distribution was assessed for normality using Shapiro-Wilk test. Chi-square test was used for comparing the categorical data. All values were considered statistically significant for a value of  $P < 0.05$ .

## RESULTS

There were 25,756 subjects in total being screened up, 798 subjects were found to be suffering from OSMF. Figure 1 shows out of 798 subjects, 747 were males (93.60%) and 51 were females (6.39%). According to mouth opening, OSMF was divided in four stages. There were maximum subjects of stage II 385 (48.24%), followed by stage III 246 (30.82%), stage I 102 (12.78%), and least subjects were of stage IV 65 (8.14%) (Table 1).

**Figure 1: Gender distribution in OSMF patients****Table 1: Prevalence of OSMF on the basis of clinical staging**

OSMF stage	Number	Percentage
Stage I	102	12.78%
Stage II	385	48.24%
Stage III	246	30.82%
Stage IV	65	8.14%

Table 2 shows the prevalence on the basis of age groups, maximum prevalence of OSMF was found in age group 31-40 years i.e., group III (36.21%), followed by group II (33.20%), group IV (17.29%), group V (8.02%), and least subjects were in group I (5.26%). In Group I, maximum subjects were in Stage I (52.38%). In Group II, maximum subjects belong to stage III (36.98%). In Group III, most no. of subjects were found in stage II (53.28%). In Group IV, maximum prevalence was found in stage II (85.50%). In group V, almost all subjects belong to stage IV (85.93%). ( $P < 0.001$ ).

**Table 2: Prevalence of OSMF on the basis of age group**

Age group (in years)	Total	Percentage	Stage	Number	Percentage	Mean±SD
<b>Group I: 10–20 years</b>	42	5.26%	Stage I	22	52.38%	11±0.133
			Stage II	20	47.61%	
			Stage III	0	-	
			Stage IV	0	-	
<b>Group II: 21–30 years</b>	265	33.20%	Stage I	78	29.43%	65±7.65
			Stage II	89	33.58%	
			Stage III	98	36.98%	
			Stage IV	0	-	
<b>Group III: 31–40 years</b>	289	36.21%	Stage I	2	0.69%	77±10.52
			Stage II	154	53.28%	
			Stage III	133	46.02%	
			Stage IV	0	-	
<b>Group IV: 41–50 years</b>	138	17.29%	Stage I	0	-	61±5.45
			Stage II	118	85.50%	
			Stage III	10	7.24%	
			Stage IV	10	7.24%	

<b>Group V: 51 years and above</b>	64	8.02%	Stage I	0	-	4±0.23
			Stage II	4	6.25%	
			Stage III	5	7.81%	
			Stage IV	55	85.93%	

Table 3 shows the prevalence of OSMF on the basis of duration of habit. Group A include subject with a habit duration of 2–5 years. Group B have patients with a habit duration of 6–10 years, and Group C consist of people with habit duration of more than 11 years. Maximum subjects belong to Group C (50.75%) followed by Group B (45.73%) and least subjects were prevalent in Group A (3.50%). This prevalence was statically significant ( $P < 0.001$ ).

**Table 3: Prevalence of OSMF on the basis of duration of habits**

Duration of habit	Total	Percentage	Stage	Number	Percentage	Mean±SD
<b>Group A: 2–5 years</b>	28	3.50%	Stage I	28	100%	7.7±0.24
			Stage II	0	-	
			Stage III	0	-	
			Stage IV	0	-	
<b>Group B: 6–10 years</b>	365	45.73%	Stage I	70	19.17%	103.4±12.96
			Stage II	155	42.46%	
			Stage III	120	32.87%	
			Stage IV	20	5.47%	
<b>Group C: More than 11 years</b>	405	50.75%	Stage I	4	0.98%	106±16.21
			Stage II	230	56.79%	
			Stage III	126	31.11%	
			Stage IV	45	11.11%	

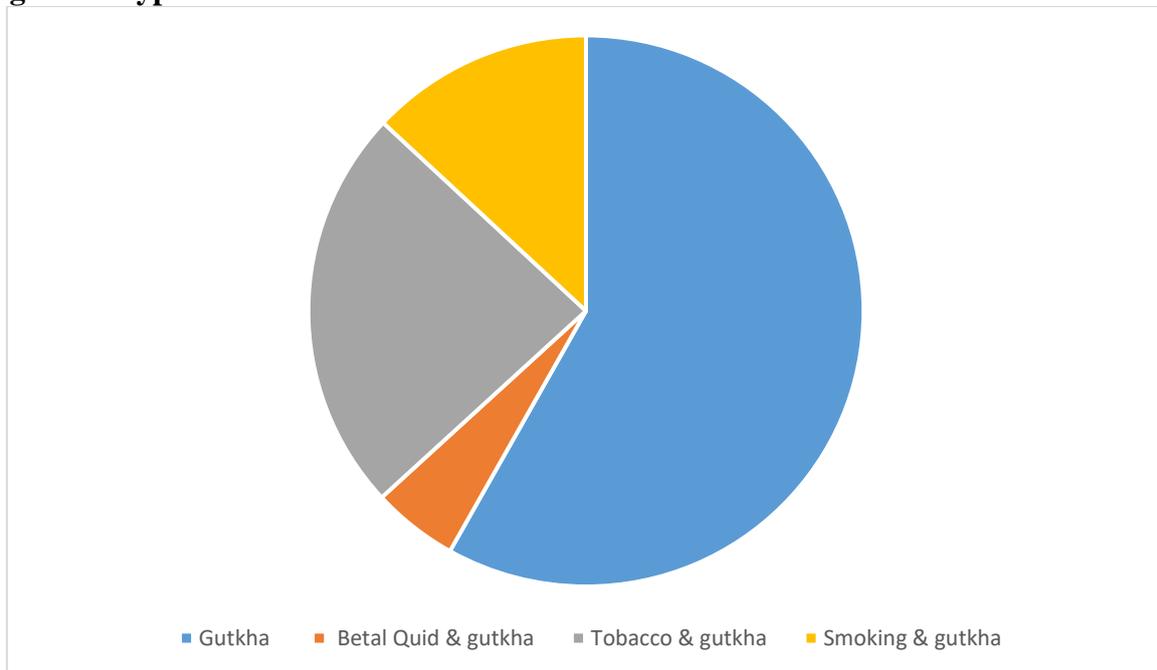
Table 4 shows the frequency of the habit (per day), it was divided into three groups. Group A had a habit frequency of 2–5 times/ day; Group B had a habit frequency of 6–10 times/day, and Group C had a habit frequency of more than 11 times/day. Prevalence was maximum in Group C (49.04%) followed by Group B (39.92%) and least no. of subjects belong to Group A (12.16%). The prevalence was statistically significant ( $P < 0.001$ ).

**Table 4: Prevalence of OSMF on basis of frequency of habit/ day**

Frequency habit/day	Total	Percentage	Stage	Number	Percentage	Mean±SD
<b>Group A: 2–5 times/day</b>	96	12.16%	Stage I	70	72.91%	25.9±3.52
			Stage II	26	27.08%	
			Stage III	0	-	
			Stage IV	0	-	
<b>Group B: 6–10 times/day</b>	315	39.92%	Stage I	32	10.15%	89.5±19.94
			Stage II	204	64.76%	
			Stage III	79	25.07%	
			Stage IV	10	3.17%	
<b>Group C: More than 11 times/day</b>	387	49.04%	Stage I	0	-	99.1±20.99
			Stage II	155	40.05%	
			Stage III	167	43.15%	
			Stage IV	55	14.21%	

Figure 2 shows type of habits subject included in study has. Out of 798 subjects, 464 (58.14%) had habit of gutkha chewing, 40 (5.01%) subjects had habit of taking betel quid and gutkha both, 190 (23.80%) subjects had habit of taking tobacco along with gutkha, 104 (13.03%) patients were habitual of smoking and gutkha chewing.

**Figure 2: Type of habit**



## DISCUSSION

Burning sensations, trismus, ulceration, and xerostomia are all symptoms of OSF, and it significantly reduces a person's quality of life.<sup>18</sup> As a result, it is critical that these patients see a dental institution when illness symptoms arise. Yang examined the number of OSF patients in Taiwan, their gender distribution, age, income, and urbanisation status. The patients were diagnosed with OSMF between January 1, 1996 and December 31, 2013. OSMF was found to have increased significantly from 8.3 (per 10 (5)) in 1996 to 16.2 (per 10 (5)) in 2013 ( $P < 0.0001$ ). Prevalence rate of OSMF was high in male when compared to females.<sup>19</sup> In India, Sinor et al. discovered a male predominance in OSMF cases.<sup>20</sup> Male preponderance in this study could be owing to males' easier access to areca nut and its products, which they utilise more frequently than females. Male patients had a higher prevalence of OSMF than females, with 93.60 percent compared to 6.39 percent in females. The rising incidence could be ascribed to a rising tendency in the intake of addictive and psychotropic arecanut and arecanut-based products.<sup>21-23</sup>

All 798 OSMF patients had their clinical staging evaluated. The majority of patients were found in stage II (48.24%), followed by stage III (30.82%), stage I (12.78%), and stage IV (12.78%). (8.14 percent). In Kumar's research of 1,006 OSMF patients, 422 (41.94%) were classified as stage II. Two hundred and twenty-six (22.29%) were in stage IV, 184 (18.29%) in stage III, and 174 (17.29%) in stage I, which differs from the current study.<sup>24</sup> This could be due to the fact that in the early stages, substantial changes, such as limited mouth opening, are not visible, and unless there is a considerable change in the functioning of the patient's body, patients will not seek medical help, as well as a lack of knowledge about the illness.

From 1990 to 2001, Mehrotra conducted a study in Allahabad, North India, to assess the prevalence rates of oral mucosal lesions. Yearly data on age, sex, the site involved, and histological findings were obtained. It revealed that patients attending the hospital in this area had a high rate of possibly malignant and malignant oral lesions.<sup>25</sup> Patients who consume pan

masala had an increased chance of acquiring OSMF, according to a population-based case control study conducted in rural and urban Lucknow.<sup>26</sup>

Babu et al. discovered that gutkha was more addictive than other comparable areca nut and tobacco items like pan, pan masala, and raw areca nut among OSF patients in Hyderabad. They discovered a robust link between gutkha chewing and OSMF, concluding that gutkha consumption caused OSMF.<sup>27</sup> In Moradabad, India, Nigam et al. investigated the prevalence and severity of OSMF among habitual gutkha, areca nut, and pan chewers. Gutkha chewing was the most common abusive behaviour among OSF patients in the study, with a prevalence of 6.3 percent.<sup>28</sup> Similarly, habitual gutkha chewing was more common in this study than gutkha with tobacco.

The age range of the 798 patients in this study was 14–65 years, with a highest incidence of OSMF in 31–40 years (36.21 percent) followed by 21–30 years (33.20 percent). As a result, it can be stated that the most common age group for OSMF is 31–40 years, followed by 21–30 years. The eldest patient was 65 years old, while the youngest was of 14 years. The findings of this study were comparable to those of Nigam, who found that the age range 36–40 years had the highest number of OSMF cases.<sup>28</sup> This could be due to the enhanced social opportunities and economic freedom people have at this age in a developing country like India. As a result, kids engage in numerous chewing habits such as betel nut, gutkha, pan masala, smoking, drinking, and so on during this age, either to relieve tension, as a fashion statement, or as a result of peer pressure.

Shah discovered a link between OSMF and different chewing and smoking habits. Chewing areca nut/quid or pan masala (a commercial concoction of areca nuts, lime, catechu, and unidentified colouring, flavouring, and sweetening chemicals) was found to be directly connected to OSMF, with frequency of chewing being more important than total duration of the practise.<sup>29</sup> Ali et al. looked examined the impact of areca nut products' frequency, duration, and kind on the incidence and severity of OSMF. It was discovered that the length and frequency of use, as well as the type of areca nut product used, have an impact on the occurrence and severity of OSMF. The effects of gutkha and pan masala on the oral mucosa are more harmful and faster. The rate of onset, incidence, and severity of the OSMF are not affected by the gutkha chewing behaviour or any of the other habits.<sup>30</sup> The duration and frequency of areca nut product consumption had a significant impact on the incidence and severity of OSMF in the present study.

The conversion rate from premalignant to malignant disease ranges from 3% to 19%. According to a recent study from India, 25.77 percent of OSF patients progressed to oral squamous cell carcinoma (OSCC), indicating OSMF's frightening malignant potential.<sup>31</sup>

The current study had the limitation of being a single-center study that was completed in a short period of time. More research with a bigger sample size and several hospitals and colleges should be undertaken to track the occurrence of oral submucous fibrosis in diverse places where arecanut and its products consumption is common. Future investigations on the prevalence of OSMF in the general population can use dental patients as a baseline.

## CONCLUSION

The widespread availability and promotion of areca nut products, particularly gutkha and pan masala, has influenced the general population in India, leading to a rise in the prevalence of OSMF, a premalignant condition. When compared to other types of areca nut products chewers, the occurrence of OSMF in gutkha chewers is much faster and more severe. The frequency of the habit was statistically significant, indicating that as the frequency of the habit grew, so did the severity of the condition. The high frequency of OSMF necessitates widespread public knowledge and management of these lesions. The etiopathogenesis,

clinical appearance, diagnosis, and therapy of these lesions should be known and understood by primary healthcare practitioners, including dentists.

Rural residents are the most vulnerable, with a larger likelihood of areca nut addiction than urban residents. Regular dental and oral health exams at dental clinics or hospitals are uncommon in India due to a lack of dental and oral health awareness among the populace. Individuals do not visit dentists unless and until they have a considerable impairment of functioning capability. Severe pain linked with tooth caries and pulpitis is the most common cause of functional impairment. In addition, regardless of the patient's primary complaint, complete clinical evaluations are required, and all hospitals must retain follow-up records. Above all, stringent government policy barring areca nuts may be the most beneficial measure that can be taken.

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