

Correlation of Length of Tobacco Abuse and Development of Oral Submucous Fibrosis (OSMF)

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ABSTRACT

Introduction: Oral Submucous Fibrosis (OSMF) is a chronic condition of the oral mucosa characterized by inflammation and progressive fibrosis of the submucosal tissue associated with excessive collagen production which causes epithelial atrophy of the oral mucosa and deeper tissues leading to stiffening and burning sensation in the oral cavity resulting in marked rigidity and trismus. Study aimed to find the incidence of OSMF and correlation between duration of tobacco and severity of OSMF.

Materials and methods: This 2 months study was carried out in the Department of Otorhinolaryngology and Head and Neck surgery, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh. All Cases of oral submucous fibrosis who expressed consent to participate in study were included.

Results: The study showed a significant relation between duration of tobacco abuse and severity of OSMF. The peak incidence of OSMF was seen in the age group 30-40 years, followed by 20-30 years showing that this crippling condition is much common in the younger age group as compared to the older ones.

Conclusion: This cross sectional study served as an important tool in knowing the prevalence of tobacco abuse among young people and in educating the patients about the deleterious effect of tobacco.

Keywords: Oral Submucous Fibrosis, Tobacco Abuse, Gutkha Chewing, Oral Precancerous Condition, Prevalence of Tobacco use in India

INTRODUCTION

Oral Submucous Fibrosis (OSMF) is a chronic precancerous condition of the oral mucosa primarily seen in the Indian and south East Asian population¹ It is now globally accepted as an Indian disease and has the highest rates of malignant transformation. This condition was first described by Schwartz in 1952² as "atrophica idiopathica tropica mucosae oris" and was classified as an idiopathic disorder. In 1964 Pindborg and Sirsat coined the term oral submucous fibrosis. This condition is characterized by vesicle formation³, associated with inflammation of the juxta-epithelium leading to the progressive hyalinization of the lamina propria⁴ due to excessive production of collagen resulting in epithelial atrophy of the oral mucosa and deeper tissues resulting in stiffening and burning sensation of the oral cavity. The condition causes submucosal fibrosis leading to secondary atrophic changes in the epithelium.

The oral mucosa appears pale, mottled marble like with board like hardness. The blanching may be localized, diffused or in the form of lace like network. In the buccal region the fibrous

bands are felt running in vertical direction and in the labial region the bands run in circular direction. There is restricted mouth opening and protrusion of the tongue causing difficult swallowing and phonation.⁵ Most patients have burning sensation in the mouth that is aggravated of having spicy food and the oral mucosa shows the presence petechiae.

The exact etiology of OSMF is not known. Researchers have found that OSMF has a multifactorial origin and the most common aetiological agent responsible for predisposing OSMF is areca nut or suparii chewing and tobacco products. Others such as excessive chili consumption, vitamin B-complex, zinc and iron deficiencies, autoimmunity, altered salivary constituents and genetic factors are also implicated.⁶ Both chewing and smoking tobacco are proved to be carcinogenic and is involved in the etiology and severity of OSMF.⁷

India is the largest producer and consumer of tobacco and tobacco products. Smokeless tobacco consumption in the form of paan and gutkha leads to oral submucous fibrosis (OSMF), which is a long-lasting and devastating condition of the oral cavity with the potential for malignancy. Gutkha, a tobacco product produced in India consists of slaked lime, areca nut, chewing tobacco, spices, and catechu.⁸ They are complex mixtures of chemical constituents which have many cytotoxic, genotoxic and mutagenic effects on the human oral epithelium.

Substances such as 3-(methylnitrosamino)-propionitrile, nitrosamines, and nicotine initiate the production of reactive oxygen species in smokeless tobacco, which leads to the damage of fibroblast, DNA, and RNA. The metabolic activation of nitrosamine in tobacco by cytochrome P450 enzymes leads to the formation of N-nitrosornicotine which is an indicator of genotoxicity. This changes lead to further DNA damage and eventually causes oral cancer. Nearly, 28 chemical constituents in smokeless tobacco products are carcinogenic in nature, nitrosamine being the most prominent.⁹ Nicotine and other constituents in tobacco

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products are absorbed in the lining of oral cavity. Studies have claimed that areca nut causes localized mucosal inflammation which causes the recruitment of activated T-cells and macrophages that lead to an increase in cytokines and tumour growth factor beta.¹⁰

Due to lack of awareness and education, people believe that tobacco products have beneficial effects of mouth freshening, digestion aid, deworming and mood enhancement and overlook the severe harmful effects of these products on human body. Smokeless tobacco and areca nut consumption have both genotoxic and clastogenic properties. Arecoline present in areca nut is responsible for predisposing OSMF by causing abnormal increase in collagen production.¹¹

According to surveys, oral cancer is the sixth most predominant cancer type in the world, affecting both genders equally.¹² Commercially available tobacco products have gained popularity among the younger generation in India due to its affordable price ranges and easy accessibility. These products consumed along with alcohol and smoking increases the risk of oral cancer. According to WHO, the tobacco deaths in India may exceed 1.5 million annually by 2020.

The criteria taken for mouth opening are as follows:

Grade I: Only symptoms, with no demonstrable restriction in mouth opening

Grade II: Limited mouth opening. 20 mm and above

Grade III: Mouth opening less than 20 mm.

Grade IV: OSMF advanced with limited mouth opening. Precancerous or cancerous changes seen throughout the mucosa.

METHODOLOGY

This cross sectional study was conducted in the Department of Otorhinolaryngology and Head and Neck surgery, Rohilkhand Medical College and Hospital, Bareilly, a tertiary care hospital in western Uttar Pradesh from 1st May 2019 to 30th June 2019 on 235 patients, according to the inclusion criteria of OSMF to evaluate the correlation of length of tobacco abuse and development of OSMF. All patients of OSMF, not diagnosed with any malignancy and willing to give their consent for the study were included. The medium of communication with the patient was vernacular language. A written informed consent from all the willing patients was taken after explaining the study, its procedure, aim and objectives. Excluded were those patients who were unwilling to participate in the study. 235 patients of both genders of age group 10-<60 years were evaluated based on the inclusion criteria.

Ethical clearance was obtained from the Institutional ethical committee. Under universal precautions, all the patients were thoroughly examined for clinical features of OSMF that included mucosal blanching, burning sensation, restricted mouth opening and presence of fibrous bands. Biopsy and histopathological examination were done for confirmation of the condition in patients with history of various chewing habits.

A detailed proforma was used to record the relation between

the type of tobacco habit, difficulty in mouth opening, difficulty in swallowing and formation of fibrous band over tongue, buccal mucosa and retromolar trigone in relation to the duration of tobacco abuse. Statistical analysis was then done using the Epi Info software, version 7.2.3.1. Chi-square test was done to find association among variables. Fisher exact test for categorical data was done. $P < 0.05$ was considered to be statistically significant in the present study.

OBSERVATION AND RESULTS

Among the total of 235 participants, the maximum number of patients were in the age group 30 -<40 years (29.79%), (figure 1). Men were more affected as compared to women. The data was statistically insignificant as $p > 0.05$. The distribution of cases in relation to duration of exposure showed that only 1 case developed OSMF within one year of tobacco abuse and 128 (54.46%) took 5.1 – 10 years showing that longer duration of tobacco abuse results in OSMF (figure 2).

Demographic distribution among the study subject showed that 176 (74.89%) belonged to rural area and 59 (25.10%) from urban area. The correlation of duration of exposure with demographic locality (table 1) showed 34 cases in the urban locality developed OSMF in a duration of 5.1 -10 years of tobacco abuse. In rural area 94 cases developed OSMF in 5.1-10 years. Since the probability in this study is 0.2, the demographic distribution of cases seem to be insignificant.

Distribution among the study subject in relation to mouth opening showed that out of a total of 235 participant 3 had mouth opening of 10 -<15mm, 17 had 15-<20mm, 38 had 20-<25mm, 48 had 25-<30mm, another 48 had 30 -<35mm and 81 of the study subjects had mouth opening of more than 35mm. When mouth opening was correlated with duration of exposure, it was found that maximum of cases i.e, 128 developed difficulty in mouth opening after 5.1 -10 years of tobacco abuse while only 51 cases developed difficulty in mouth opening after an exposure of 1.1- 5 years. The probability of decreased mouth opening in relation to duration of habit is 0.01 which shows a significant relation between the two.

Among the total of 235 study participants, it was observed that 85 (36.17%) developed fibrous band over tongue. When duration of exposure was correlated with development of fibrous band over the tongue, it was seen that only 12 cases developed fibrous band over the tongue within 1.1 -5 years while 45 took 5.1 –10 years and 28 took more than 10 years to develop fibrous band over the tongue. The probability of formation of fibrous band over the tongue in relation to duration of habit is 0.02 which shows a significant relation between the two.

The development of fibrous band in retromolar trigone was observed in 178 cases (75.74%). When the duration of exposure was correlated with development of fibrous band in the retromolar trigone it was seen that only 29 cases developed fibrous band in retromolar trigone within 1.1- 5 years while 102 cases developed it in 5.1 –10 years and 47 cases took more than 10 years to develop the fibrous band in the retromolar trigone (table 2). The probability here is 0.00

which is significant.

When the distribution of cases in relation to fibrous band in buccal mucosa was done, it was seen that among the total 235 cases, 222 (94.46%) developed fibrous band in buccal mucosa. On correlating the development of fibrous band in buccal mucosa with duration of exposure, it was seen that only 1 case developed the complain within 1 year of tobacco abuse, 47 took 1.1-5 years, 123 took 5.1-10 years and 51 took more than 10 years (table 3). The probability of formation of fibrous band in buccal mucosa in relation to

Duration of exposure (years)	Demographic locality	
	Rural	Urban
<1 Year	0	1
1.1-5 Years	41	10
5.1-10Years	94	34
>10 Years	41	14

Table-1: correlation of duration of exposure with demographic locality

Duration of exposure (years)	Fibrous band in retromolar trigone	
	Present	Absent
<1 Year	0	1
1.1 -5 Years	29	22
5.1 -10 Years	102	26
>10 Years	47	8

Table-2: correlation of duration of exposure with fibrous band in retromolar trigone

Duration of exposure (years)	Fibrous band in buccal mucosa	
	Present	Absent
<1 Year	1	0
1.1 -5 Years	47	4
5.1 -10 Years	123	5
>10 Years	51	4

Table-3: correlation of duration of exposure with fibrous band in buccal mucosa

Duration of exposure (years)	Difficulty in swallowing	
	Present	Absent
<1 Year	0	1
1.1 -5 Years	16	35
5.1 -10 Years	60	68
>10 Years	33	22
Total	109	126

Table-4: Correlation of duration of exposure with difficulty in swallowing

Duration of exposure (years)	Chewable	Smoking	Both
<1 Years	1	0	0
1.1 -5 Years	28	13	10
5.1 -10 Years	49	15	64
>10 Years	18	11	26

Table-5: Correlation of duration of exposure with type of habit

duration of tobacco abuse is 0.6 which proves the relation to be insignificant.

109 participants (46.38%) showed difficulty in swallowing. When the duration of exposure was correlated with difficulty in mouth opening it was seen that 16 cases developed difficulty in mouth opening within 1.1- 5 years while 60 cases developed it in 5.1 –10 years and 33 cases took more than 10 years (table 4). The probability here is 0.02 which shows a significant relation between the development of difficult swallowing and duration of tobacco abuse.

On analysing the presence of other symptoms associated with oral sub mucous fibrosis, it was observed that out of a total of 235 study subjects, 210 (89.36%) had difficulty in eating hot and spicy food due to burning sensation in the mouth. The probability of developing burning sensation in relation to duration of habit is 0.06 which shows an insignificant relation between the two.

On evaluating the substance addiction pattern among the study subjects, it was observed that out of a total of 235 participants, the habit of smoking was seen among 39 (16.59%), chewing among 96 (40.85%) and both smoking & chewing habit in 100 (42.55%). When the type of habit was correlated with duration of tobacco abuse, it was found that maximum cases that used chewable, smoking and both forms of tobacco developed OSMF after 5.1- 10 years of

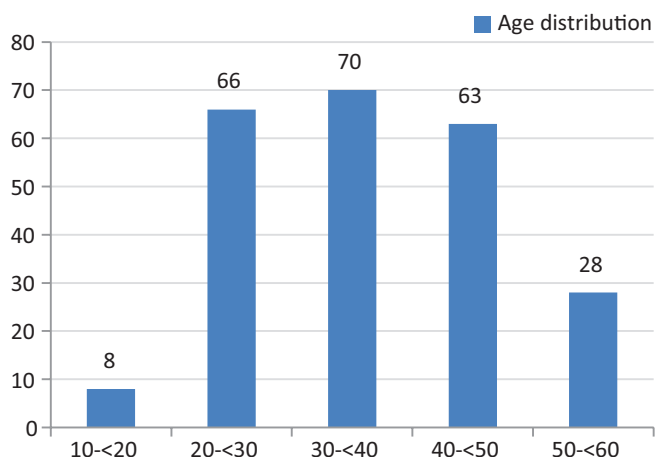


Figure-1: Age distribution of cases

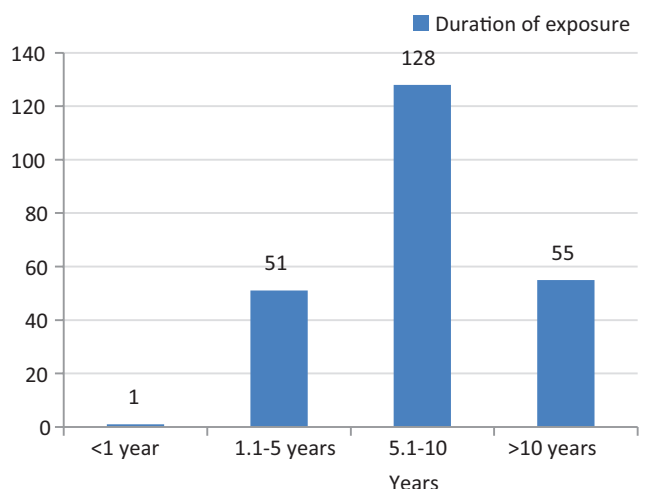


Figure-2: distribution of cases in relation to duration of exposure

substance use. Only 1 case with the history of consumption of chewable tobacco showed the development of OSMF within 1 year of substance use (table 5). The probability here is 0.006 which shows a significant relation between the type of habit and the duration for which it is consumed.

DISCUSSION

Tobacco consumption in various forms has emerged to be a significant and growing threat to human health. Researchers have found that there are more than 7000 different chemicals in tobacco and tobacco smoke among which, more than 60 are considered to be potentially carcinogenic and genotoxic such as nitrosamines and polycyclic aromatic hydrocarbons. In India the consumption of smokeless form of tobacco is practiced more than smoking as it is commercially available in attractive sachets which are becoming common, especially among the younger adults as compared to the older age group. A definite association has been recorded between tobacco habit and OMLs such as PMD and oral cancer.²⁰

We studied parameters such as demographic location, age and gender, type of tobacco habit, duration of tobacco abuse, development of fibrous band over the tongue, buccal mucosa and retromolar trigone, development of burning sensation and decreased mouth opening in patients that provides more meaningful information regarding the prevalence and deleterious effect of tobacco consumption.

Yang SF et al in a study claimed that men had a significantly higher OSMF prevalence than women²¹ and Sinor *et al.* in India found a male predominance in OSMF cases.²² This study showed a higher prevalence of the deleterious oral habit among males affecting 73.19% as compared to females (26.80%). This male predominance may be due to easy accessibility of the tobacco products for males than females. The habit of tobacco consumption was seen to be much higher in the rural area with 74.89% as compared to the urban areas where only 25.10% showed involvement. This shows that illiteracy or less education causes lack of awareness of the harmful effects of tobacco products and due to lack of income the rural people compromise on healthy and nutritious diet, thus becoming more prone for developing mucosal lesions. Similar findings have been recorded by Choudary et al. and Keluskar and Kale.^{23,24} Ahmad et al¹¹ found that out of 157 patients, 152 used gutkha and other areca nut products. In our study we found that tobacco was strongly associated with OSMF and that the risk of OSMF at each exposure level of tobacco was strong.

In this study, the 235 cases were in the age range of 10–60 years, with a peak incidence in age group of 30–40 years, followed by 20–30 years. The observation of the present study was similar to the study conducted by Nigam, who reported that maximum number of OSMF cases were in the age group of 36–40 years.²⁵ This could be because of increased social and peer pressure. These findings are similar to earlier studies reported by Mehrotra et al., Shivakumar et al.^{26,27} Betel nut mainly used in the form of gutkha and pan masala is one of the major causes for the development of OMLs, particularly OSMF. Studies show that habitual

gutkha users develop OSMF at earlier ages.

Shah N et al, found the relationship between OSMF to various chewing and smoking habits. It was found that chewing of areca nut or pan masala was directly related to OSMF and the frequency of chewing was directly correlated to OSMF rather than the total duration of the habit¹⁵ Ali *et al.* studied the effect of frequency, duration, and type of areca nut products on the incidence and severity of OSMF showing the effect of duration and frequency of different types of areca nut product on the incidence and severity of OSMF. Gutkha and pan masala have more deleterious and faster effects on oral mucosa. The gutkha-chewing habit along with the other habits does not have any significant effect on the rate of occurrence and incidence and severity of the OSMF.²⁸ This study showed a significant effect of duration and type of tobacco habit on the incidence and severity of OSMF.

CONCLUSION

This study established the prevalence of OSMF in patients attending the institution. The study data can also serve as a useful tool in educating patients about the deleterious habit of chewing and smoking form of tobacco. OSMF is an emerging disease among the youngsters and creating awareness regarding the deleterious effect of tobacco is essential.

Increased prevalence of smoking and chewing tobacco in India has increased and the disease which was once rare has become very common, hence the awareness of the clinical features, diagnosis, and management is important to control this crippling condition.

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