

A study on oral mucosal changes among tobacco users

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Abstract

Introduction: Oral malignancies account for about 4% in males and 2% in females among all malignant tumors. Tobacco use in the oral cavity can cause potentially malignant disorders such as oral submucous fibrosis (OSMF), leukoplakia and oral squamous cell carcinoma (OSCC). Factors such as lifestyle changes, habits and limited access to health care increase cancer development and morbidity.

Aim and objectives: This study aimed at studying and correlating the oral mucosal changes among the tobacco users with the different forms of tobacco used.

Materials and Methods: Four thousand and five hundred individuals were examined and patients with habits were categorized as Group A: only chewing, Group B: only smoking and Group C: smoking and chewing. A preformed case sheet with a detailed recording of the patient's habits was used for each individual. The suspected oral lesions were examined with care and a biopsy was taken (if needed) with patient consent. The collected data were compiled and statistical analysis was done.

Results: Among the three groups OSMF, chewer's mucositis, smoker's palate and OSCC were more compared to other lesions.

Conclusion: OSCC, OSMF and chewer's mucositis were seen more among A and C Group individuals. Smoker's palate was more in Group B. All the lesions showed a strong correlation with increased usage of tobacco. Lesions were more among males compared to females as there were no females with smoking habits in the study. A future study with larger sample size and equal gender distribution in different population among various locations is to be carried out to get accurate details about the lesions associated with tobacco habits and to correlate between the types, frequency and duration of the habit with the tobacco usage.

Keywords: Chewer's mucositis, leukoplakia, median rhomboid glossitis, oral cavity, oral squamous cell carcinoma, oral submucous fibrosis

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INTRODUCTION

Oral cavity is lined by both keratinized and nonkeratinized mucosa, which acts as a physical barrier and has many functions such as protective, secretory and sensory.^[1,2] Health of the oral cavity and its ability will be

compromised among the people with oral habits such as chewing and smoking. When oral mucosa gets affected it will show increased epithelial thickness and increased keratinisation.^[3]

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Depending on the frequency, duration and type of tobacco used, epithelial cells will undergo dysplastic changes which may lead to the development of potentially malignant disorders and oral cancer when the habit is not discontinued by the individuals.^[3] Among all the malignancies, oral malignancies account for 4% in males and 2% among females.^[4] Lifestyle changes, poverty, lack of education and deleterious habits along with limited access to health care result in an increased rate of cancer development and morbidity.^[5]

In India, chewing tobacco is the dominant form used among the smokeless tobacco which causes potentially malignant disorders such as oral submucous fibrosis (OSMF), erythroplakia, leukoplakia, tobacco pouch keratosis and malignancies including oropharyngeal cancers.^[6,7] Other forms of smokeless tobacco include pan masala, paan (betel quid), gutkha, khaini, mawa, snuff and Swedish snus.^[6,7]

Tobacco smoke and unburned tobacco used in chewing or snuff dipping also contain several potent nitrosamines. These chemicals may play a key role in the initiation and promotion of specific types of cancers such as oral squamous cell carcinoma (OSCC), verrucous carcinoma and many pathological conditions.^[8] The risk of developing OSCC increases with age, tobacco usage and alcohol consumption. HPV also plays a role in carcinogenesis.^[1] The poor outcome of this condition is primarily due to the advanced stage of the disease at the time of diagnosis. This is caused either by the patient not seeking the medical advice from doctor for unusual often asymptomatic, oral lesions or by the health-care workers not thoroughly investigating suspicious mucosal lesions (potentially malignant disorders).^[1,2]

Cigarettes and bidis are the most common forms of tobacco smoked in south India.^[9] About 20 million children of age 10–14 years are estimated to be tobacco addicts according to a survey done by the National Sample Survey Organization of the Indian government.^[7,10]

Taking all these adverse effects of tobacco into considerations, this study was conducted to evaluate the oral mucosal changes which may occur in the patients due to the usage of tobacco in various forms and also to record the detailed history about the type of tobacco used, duration, frequency and site of placement from the patients.

MATERIALS AND METHODS

Four thousand five hundred individuals were examined over a period of 6 months (February 2017–August 2017) who attending Meenakshi Ammal Dental College, Maduravoyal,

Chennai, and camps in the rural areas of Chennai. The patients with a history of tobacco usage were selected for the study. Patients were explained orally about the study and those who were willing to reveal their personal habits and were willing to undergo oral examination were taken as study subjects. From the patient detailed history of tobacco usage regarding the type, method of usage, duration, frequency, placement of the tobacco (if chewable) were recorded and other deleterious habits were also recorded in the same manner.

Patients with tobacco habits were categorized into three groups based on the inclusion and exclusion criteria, namely as Group A: only chewing, Group B: only smoking, Group C: smoking and chewing (mixed group). Alcohol consumption history was also recorded.

Inclusion criteria

- Both male and female individuals in the age of 10 years and above
- Individuals who consent to reveal the tobacco and alcoholic habits and consent to subject themselves for the oral examination
- Patients who practiced the habit minimum for a period of 1 year and still actively continuing the habit
- Patients who were willing to undergo biopsy procedures if necessary.

Exclusion criteria

- Both male and female individuals below the age of 10 years
- Individuals who were not willing to reveal the habits and/or subjects themselves for oral examination
- Patients with systemic diseases and under medication for the same
- Individuals who gave up the habit completely during the past 1 year
- Patients not willing for biopsy procedures if warranted.

A preformed case sheet which included a detailed recording of the patient habits was used for each individual. The oral habits section included questions about the use of tobacco smoking, tobacco chewing and alcohol consumption. All the patients were examined using mouth mirrors and explorers under proper illumination in dental chairs. The oral lesions were attained special attention and proper examination of the lesion was done and photographed with patient consent. Biopsy was done in appropriate cases with patient consent. The collected data were compiled and statistical analysis was done using SPSS software.

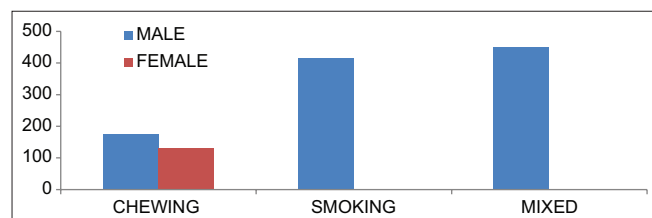
RESULTS

Out of 4500 individuals, 1175 have tobacco-related habits and were divided into three groups, namely chewing Group A, smoking Group B and smoking and chewing Group C. Among this study population, 1043 (88.8%) of them were male and 132 (11.2%) of them were female. Group B and C had only male patients.

Age ranges from 15 to 85 years with a mean value of 46.6%. Fourth, fifth and sixth decade people were shown a higher incidence of tobacco usage than others [Table 1]. Out of 1175 individuals with tobacco habits, 182 of them had different types of lesions. Chewing group patients had more lesions compared to the other two groups [Table 2].

Chewing group (A) consists of 309 out of which 177 (57.3%) were male and 132 (42.7%) were female [Graph 1]. Among this group, 88 individuals were presented with lesions, out of which 46 of them were male and 42 of them were female [Table 2]. OSMF and chewer's mucositis were found to be more compared to other lesions. Male patients had a higher incidence of lesions than females. Fifty-five patients were presented with OSMF; among this, 27 were male and 28 of them were female. 10 patients with chewer's mucositis was found among this group; which was next predominant lesion in this group among this, 3 of them were male and 7 of them were female. Tobacco pouch keratosis was seen among 7 individuals, out of which 6 of them were male and one was female. Lichenoid reaction was seen among 7 patients among which 5 of them were males and 2 were females. OSCC was seen among 6 individuals; among them, 5 of them were male and one was female. Lichen planus and candidiasis were found among one patient, respectively.

Among the smoking group (B), smoker's palate (17) and smoker's melanosis (13) were found to be the most predominant lesions evident among this group, followed by leukoplakia (6) and combined lesion of leukoplakia with smoker's melanosis (6) were seen. Central papillary atrophy of the tongue (2), candidiasis (1) and leukoedema (1) were also seen with lesser incidence.



Graph 1: Gender comparison among the study groups

Among the mixed habit C Group, OSMF (10) had a higher incidence and other individual lesion like smoker's melanosis (6), carcinoma (5), tobacco pouch keratosis (1), leukoplakia (4) and lichen planus (1) were also seen. Combined lesions like smoker's melanosis with leukoplakia (6), OSMF with leukoplakia (5), smoker's melanosis and leukoplakia along with OSMF (5) smoker's melanosis with OSMF (1) were also seen.

Among all the groups, 12 individual lesions and 4 combined forms of lesions were found among 182 individuals and those were categorized as respectively under the three groups. Males were more compared to females. The incidence of oral mucosal lesions had a strong correlation with study individual's age, duration and frequency of the habit. Data analysis was performed on the SPSS 16.0 software platform (SPSS, IBM Chicago, IL, USA) and results were significantly positive [Table 3].

DISCUSSION

The WHO states that nearly 6 million deaths occur every year due to tobacco use, which may escalate to 8 million deaths a year by 2030.^[11] India is alone one of the fewer countries in the world where the prevalence of smoking and smokeless tobacco use is high.^[7]

Among the study group, patient's frequency, duration and different forms of tobacco used were recorded and correlated with the lesions founded among them, which showed a strong positive correlation with the statistically significant positive value [Table 3]. Lesions were found among the fourth- and fifth-decade patients as there were more people among this age group and a history

Table 1: Age distribution among study group

Decades	Group A, chewing	Group B, smoking	Group C, mixed	Total
Second decade	3	19	14	36
Third decade	16	75	20	111
Fourth decade	99	83	103	285
Fifth decade	87	72	113	272
Sixth decade	50	99	140	289
Seventh decade	48	63	54	165
Eighth decade	4	3	5	12
Ninth decade	2	1	2	5
Total	309	415	451	1175

Table 2: Study population with and without lesion

Groups	Number of patients	With lesion			Without lesion		
		Male	Female	Total	Male	Female	Total
Chewing	309	46	42	88	131	90	221
Smoking	415	46	0	46	369	0	369
Mixed habit	451	48	0	48	403	0	403
Total	1175	140	42	182	903	90	993

Table 3: Comparison of age, duration and frequency of habits with study groups

Parameters	Groups	Mean	P
Age of the patient	Chewing	46.31	0.004
	Smoking	44.93	
	Mixed habit	47.42	
	Total	46.44	
Smoking duration	Smoking	17.90	0.000
	Mixed habit	17.05	
	Total	12.87	
Smoking frequency	Smoking	6.43	0.000
	Mixed habit	7.64	
	Total	5.21	
Chewing duration	Chewing	13.04	0.000
	Mixed habit	12.19	
	Total	8.10	

$P < 0.05$ is significant

of longer duration of tobacco usage could be the reason for the occurrence of lesions among these age group patients [Table 1].

Various lesions were found more among the males compared to female tobacco users as the usage of tobacco was more among the male patients and the study group had more male patients. Groups B and C had no female patients as there was no positive smoking history revealed by female patients. Although smoking is prevalent among women in certain parts of India including Chennai to some extent, among both affluent and lower socioeconomic strata, no female smokers were reported in this study. A plausible reason for this observation might be that most of the females may not reveal their personal histories like smoking and alcohol consumption [Table 1].

Comparison of individuals with lesions among the three groups showed that lesions were more among Group A (88) and Group C (48) followed by Group B (46), it could be due to tobacco chewing habit that causes more deleterious effects when used individually as well as when used along with smoking.

Comparing all three study group males with lesions, Group C males had relatively more lesions compare to other groups because of the combined ill effects of smoking, chewing and alcohol consumption to certain extent results in individual lesions and combined lesions among this group, people depend on the duration and frequency of tobacco used by them [Table 2].

Among the males OSMF (37), smoker's melanosis (19), smoker's palate (17), leukoplakia (13), smoker's melanosis with leukoplakia (12) and OSCC (10) had more prevalence than other lesions as the male patients had the habit of both chewing and smoking individually as well as on

combination of both. Chewer's mucositis [Figure 1] followed by OSMF [Figure 2] was found to be more among the female tobacco users compares to males, as they had the habit of chewing tobacco along with betel quid.

Smoker's melanosis [Figure 3] and smoker's palate [Figure 4] were found to be more followed by leukoplakia [Figure 5] and leukoplakia combined with smoker's melanosis [Figure 6] among the individuals in smoking group (B) caused by increased habit of smoking bidi and cigarettes among the males.

OSMF cases were more among mixed habit group followed by OSCC [Figure 7] and smoker's melanosis. Individual and combined lesions were also seen which resulted by the combined effects of tobacco chewing, smoking even alcohol consumptions.

Among the various lesions, OSMF was found to be more, while comparing all three group patients, which caused by the presence of areca nut in the chewing tobacco which causes the initial changes in the epithelium resulting in epithelial pathology at the earlier stage and get transformed into connective tissue pathology later.^[12]

Smoker's melanosis was found to be more among the patients with increased smoking habits resulting in more amount of oral surface pigmentation which will get reduced and may disappear on reduction and cessation of the smoking habit.^[13,14] Smoker palate cases were also found to be more among the individuals with increased smoking habits which ending up in the inflammation of minor salivary gland ducts present in the palatal mucosa. The reason for the inflammation was the heat produced by the cigarettes and bidis while smoking, rather than the chemicals present in the smoke.^[3]

Leukoplakia was found among the people with habit of smoking results from the oral mucosal response to the stimuli like tobacco resulting in an excessive amount of keratin at the site of contact by the tobacco which may be presented individually or else combined with other lesions such as smoker's melanosis that depends on the frequency and duration of the habit practised by the individuals.^[1,3]

OSCC cases were more among the Group A and Group C individuals. It was strongly associated with the duration of tobacco usage practised by the patients and the combined

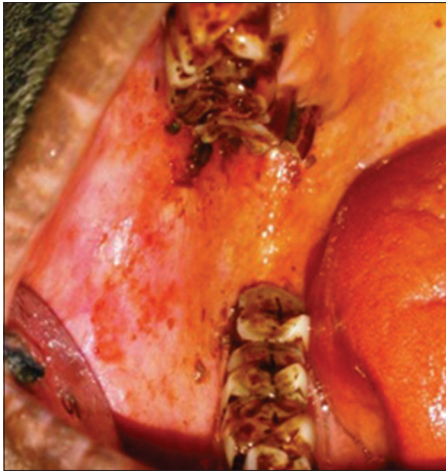


Figure 1: Clinical image shows chever's mucositis



Figure 2: Clinical image shows oral submucous fibrosis



Figure 3: Clinical image shows smoker's melanosis



Figure 4: Clinical image shows smoker's palate



Figure 5: Clinical image shows leukoplakia



Figure 6: Clinical image shows leukoplakia with smoker's melanosis

effects of the smoking, chewing and alcohol consumption may result in the development of cancer. Among our study groups, OSCC patients had more than 10 years of tobacco usage.

Chever's mucositis usually occurs where the individual keeps the betel quid or chewing tobacco and chews, which causes the epithelial changes in the mucosa. In this study, it was found only among the chever's group specifically among the females.^[15]

Tobacco pouch keratosis [Figure 8] cases showed thick brownish-black encrustations of the mucosa on the site of placement of betel quid caused by the chemicals from the quid, mucosa will revert to a normal state within 2–6 weeks on complete cessation of the habit.^[3,16]

Lichenoid reaction [Figure 9] was found among the tobacco chewers in the buccal mucosa and mandibular groove areas where the tobacco (betel quid) comes in contact with mucosa while the patient chewing due to the chemical contents in the chewing tobacco causes the reaction in the mucosa.^[3]

The present study showed the presence of Candidiasis [Figure 10] and central papillary atrophy of tongue [Figure 11] among the smokers.^[17] Leukoedema [Figure 12] and lichen planus [Figure 13] were found to be very lesser incidence among the study population while comparing other individual lesions and combined lesions. Leukoedema is a common developmental alteration of the mucosa, which may develop as a result of repeated subclinical insults by the low-grade irritants to the mucosa. It usually shows severe forms among the smokers and less pronounced with cessation of smoking.^[3] Lichen planus is a chronic inflammatory autoimmune type of mucocutaneous disease, which was found among the chewing and mixed habit group patients, but the association between tobacco and lichen planus is still not clear.^[18]

Combined lesions such as smoker's melanosis with OSMF [Figure 14], leukoplakia with OSMF [Figure 15], smoker's palate combined with OSMF and smoker melanosis [Figure 16] were also seen among this study with relatively lesser incidence.

Biopsy was done in appropriate cases on histopathological examination all cases of OSMF showed atrophic epithelium with underlying dense fibrosis of the connective tissue and leukoplakia cases showed epithelial dysplasia ranges from mild to severe. OSCC cases showed numerous infiltrated malignant epithelial islands that contain epithelial cells with dysplastic features in the connective tissue with numerous keratin pearl formation.

Many potentially malignant lesions may present without any clinical symptoms; hence, it is of extreme importance that such lesions are diagnosed in a timely manner. Therefore, early intervention program to enforce cessation of the habits and oral health education program to create awareness about the lesions related to these harmful tobacco habits are needed to control oral cancer in our country. Detailed



Figure 7: Clinical image shows oral squamous cell carcinoma



Figure 8: Clinical image shows tobacco pouch keratosis

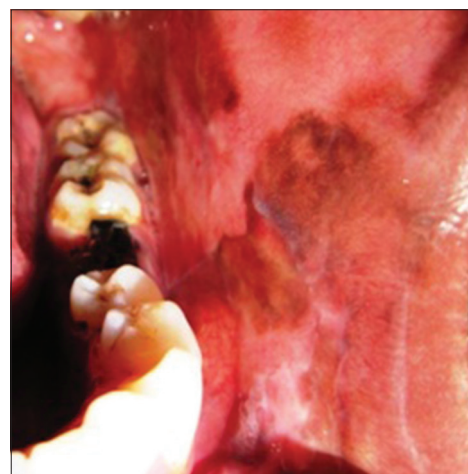


Figure 9: Clinical image shows lichenoid reaction

study of oral mucosal changes among the tobacco users will help the dental health professionals to diagnose and provide community-based health education and tobacco awareness/cessation programs more effectively.



Figure 10: Clinical image shows candidiasis



Figure 11: Clinical image shows central papillary atrophy of tongue



Figure 12: Clinical image shows leukoedema



Figure 13: Clinical image shows lichen planus



Figure 14: Clinical image shows smoker's melanosis with oral submucous fibrosis



Figure 15: Clinical image shows leukoplakia with oral submucous fibrosis

This particular study had few limitations such as smoking and mixed habit group had no female patients, and the

study was conducted and had only the people from Chennai.



Figure 16: Clinical image shows smoker's palate combined with oral submucous fibrosis and smoker melanosis

SUMMARY AND CONCLUSION

The present study was conducted to assess the oral mucosal lesions among the tobacco users. People with the habit of tobacco presented with different types of individual and combined lesions strongly associated with the frequency and duration of tobacco usage. Potentially malignant disorders such as OSMF, leukoplakia with higher incidence followed by chewer's mucositis and smoker's melanosis were found among individual lesions among the tobacco users, importantly OSCC was found to be more among the chewers as well as mixed habit group with a strong correlation of tobacco usage.

Future studies should be conducted with a larger sample size among the tobacco users with equal gender distribution within the groups, in different population and in various locations, which will help to get more accurate details regarding the association of lesions and usage. The tobacco awareness/cessation programs and counseling will help the tobacco users to come out of the habit. It also reduces the morbidity rate by reducing the malignant transformation and improving their quality of life.

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Conflicts of interest

There are no conflicts of interest.

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