

ORAL MUCOSAL LESIONS – PREVALENCE STUDY AMONG DIFFERENT PATTERNS AND FREQUENCY OF TOBACCO USAGE

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ABSTRACT

Oral habits such as chewing, smoking compromises the oral health. Tobacco, alcohol and areca nut [betel quid] use are among leading causes of oral cancer. Various chemical constituents such as nicotine, picoline, pyridine etc are leached when tobacco is chewed which leads to local irritation and causes alterations in mucosa. Nearly 267 million adults (15 years and above) in India (29% of all adults) are users of tobacco, according to the Global Adult Tobacco Survey India. In Karnataka 35.2% of men, 10.3% of women and 22.8% of all adults either smoke tobacco and/or use smokeless tobacco.

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). Tobacco is one of the cause for various lesions such as leukoplakia, candidiasis, erythroplakia, oral submucosal fibrosis, oral cancer and many more. If not diagnosed early the oral mucosal lesions which only require conservative management can potentially transform into malignant form. Aim and objectives: To evaluate the distribution and prevalence of oral mucosal lesions and risk factor associated with tobacco. 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: A total sample size of 5000 people was considered who are visiting M R Ambedkar dental college and hospital for routine dental checkup. Study details were explained to the patient orally and a written consent form was taken. A detailed case history with good clinical examination was done. Questionnaire was recorded along with the oral examination of the patient. Oral examination was done on dental chairs with proper illumination and using mouth mirrors and explorers. The questionnaire included information such as name, age, sex, occupation, address, medical history, and also about the usage of tobacco like type (smokeless tobacco or smoking tobacco), duration of use, frequency, placement in oral cavity. 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. 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: Tobacco, smoking, leukoplakia, OSMF

INTRODUCTION

Oral lesions can significantly disrupt daily activities by causing discomfort or pain that impairs essential functions such as mastication, swallowing, and speech.^[1] Epidemiological studies are useful for assessing the prevalence, incidence, and severity of a disease. The oral cavity is lined with both keratinized and nonkeratinized mucosal tissues, which function as essential physical barriers and play protective, secretory, and sensory roles^[2]. Among individuals with harmful oral habits—particularly tobacco use—these tissues are frequently compromised, leading to histopathological alterations such as increased epithelial thickness and hyperkeratinization^[3]. The extent of these changes is influenced by the type, frequency, and duration of tobacco exposure, and may lead to epithelial dysplasia with a risk of progression to potentially malignant disorders (PMDs) or invasive oral cancer^[3].

Oral malignancies constitute approximately 4% of all cancers in men and 2% in women in India^[4]. Contributing factors include low socioeconomic status, inadequate health education, limited access to care and persistent engagement in deleterious habits, which collectively elevate disease incidence and morbidity^[5]. Both smoked and smokeless tobacco varieties contain potent carcinogens, including tobacco-specific nitrosamines, which play a

pivotal role in the initiation and progression of oral squamous cell carcinoma (OSCC), verrucous carcinoma, and other neoplastic conditions [6]. Smokeless tobacco is the predominant form consumed in India, particularly in the form of gutkha, paan (betel quid), pan masala, khaini, mawa, snuff [8,9]. These products are strongly associated with PMDs such as oral submucous fibrosis (OSMF), leukoplakia, erythroplakia, tobacco pouch keratosis, and various oropharyngeal malignancies.

. Cigarettes and bidis remain the most commonly smoked forms of tobacco in South India [9]. Alarming, an estimated 20 million children aged 10–14 years are reported to be addicted to tobacco, according to data from the National Sample Survey Organization [9,10]. Risk factors compound with age, chronic alcohol intake, and co-infection with human papillomavirus (HPV), which is also implicated in oral carcinogenesis [11]. Poor prognoses are often due to late-stage diagnoses, attributable to asymptomatic lesions going unnoticed by patients or insufficient clinical evaluation by health professionals [12].

In light of these alarming trends and health consequences, this study aims to evaluate tobacco-induced alterations in the oral mucosa. Detailed patient histories were recorded, including the type of tobacco used, duration, frequency, and placement site, to gain a comprehensive understanding of its pathological impact.

MATERIALS AND METHODS

Four thousand five hundred individuals were examined over a period of 6 months who were attending dental college, and camps in the rural areas of banglore. 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

: Individuals of age above 15 years, Patient who are willing to participate and give written concern will be included in the study, Patient with the history of habits (smoking and smokeless). 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

Individuals with age below 15 years, Patient who are not willing to reveal their habits, patients who doesn't give written consent, patient with systemic diseases and mental illness.

Group 1 : smokeless tobacco, Group 2: smoking tobacco, Group 3: dual users, Group 4: none, and frequency of usage was noted.

Further oral cavity was examined for various mucosal lesions such as leucoplakia, OSMF, smokers melanosis, candidiasis, lichen planus etc. the color, consistency, size and location of the lesion is recorded.

The prevalence of the oral lesions was then evaluated statistically.

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

Table 1. Prevalence of tobacco related habits

	N	%
Tobacco related habits	1252	25.04
No habits	3748	74.96
Total screened	5000	100

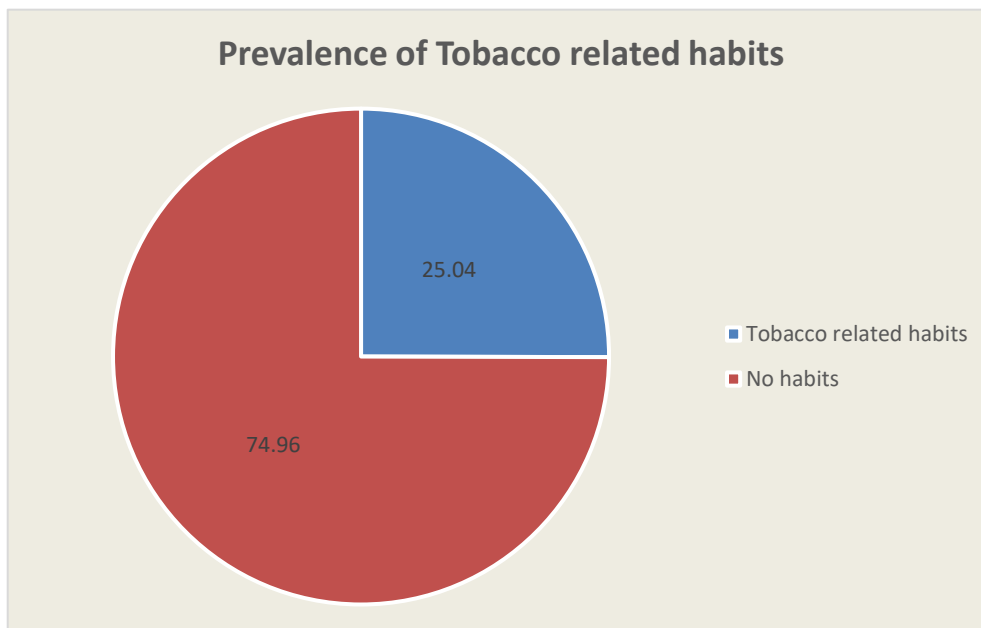


Table 2. Distribution of Tobacco related habits among study population.

Habits of tobacco	N	%
Smoking	573	45.8%
Chewing	542	43.3%
Smoking + Chewing	137	10.9%

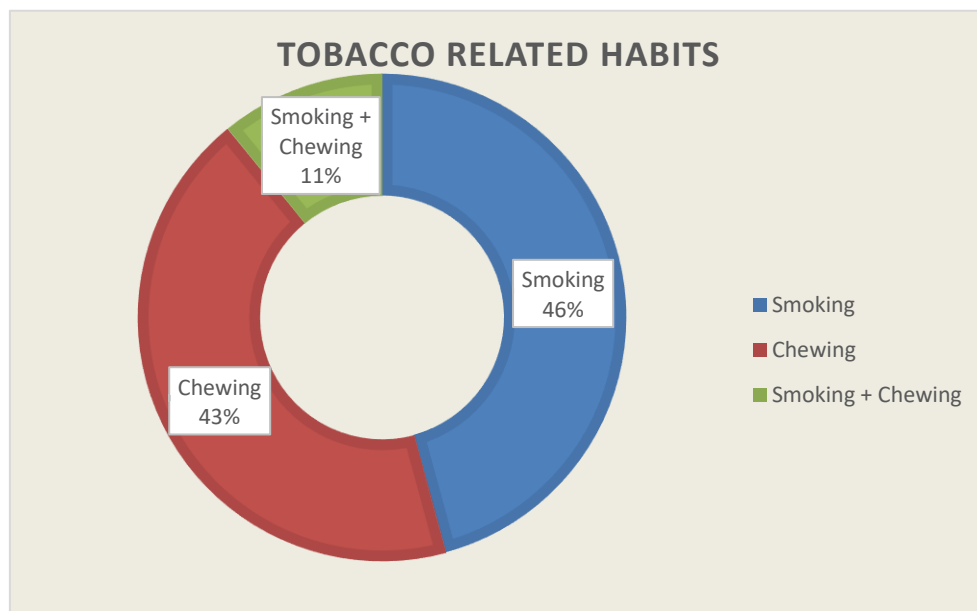


Table 3. Distribution of Gender

Gender	N=1252	%
Males	1146	91.53 %
Females	106	8.47 %

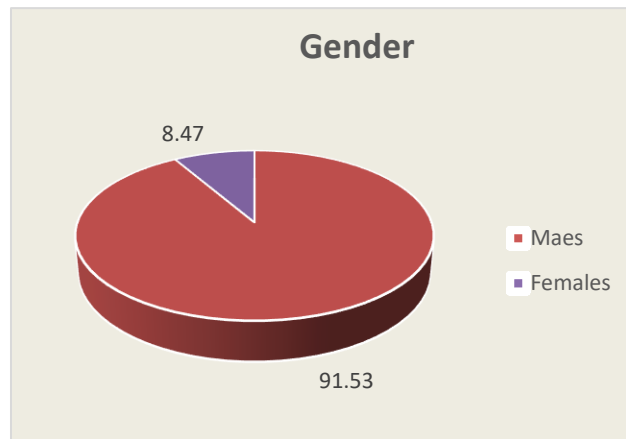


Table 4. Association of habits with gender

Habits of tobacco	N	Males	Females	P value
Smoking	573	551 (96.16%)	22 (3.84%)	<0.001
Chewing	542	458 (84.5%)	84 (15.5%)	
Smoking + Chewing	137	-	-	

There is highly significant association ($p < 0.001$) of females with chewing .

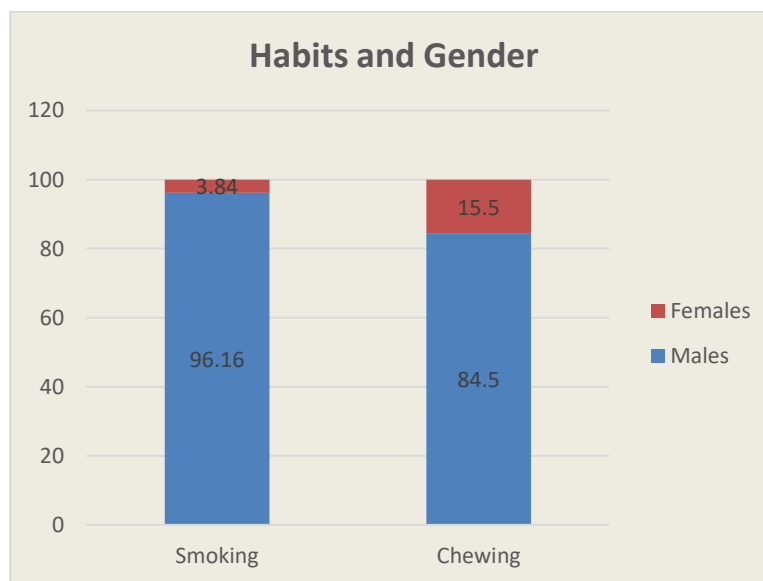


Table 5. Lesion among Smokers (N =573)

Lesions among Smokers	N=573	%
Oral Leukoplakia	73	12.75
Smoking Melanosis	102	17.8
OSMF	0	0
No Lesion	398	69.45

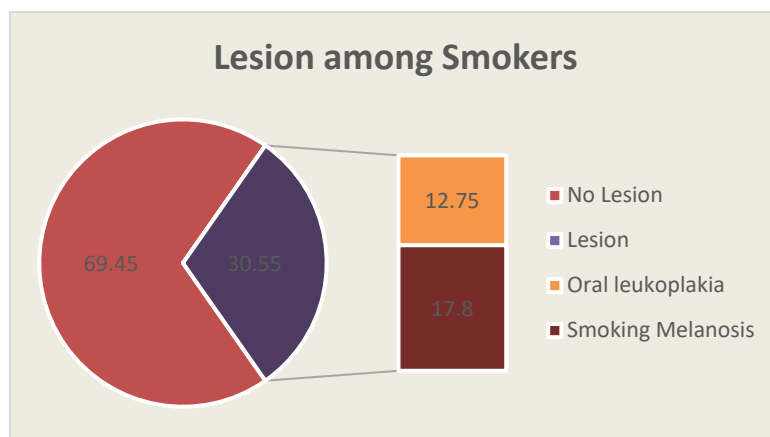


Table 6. Distribution of lesions related to smoking in males and females

Gender	Total Smokers	Oral Leukoplakia	Smoking Melanosis	OSMF	No Lesion
	N=573	N=73	N=102	N =0	N=398
Male	551	72	99	0	380
Female	22	1	3	0	18

Table 7. Lesion among Chewers (N =542)

Lesions among Chewers	N=542	%
Oral Leukoplakia	65	12.0
Smoking Melanosis	0	0
OSMF	71	13.0
No Lesion	406	75.0

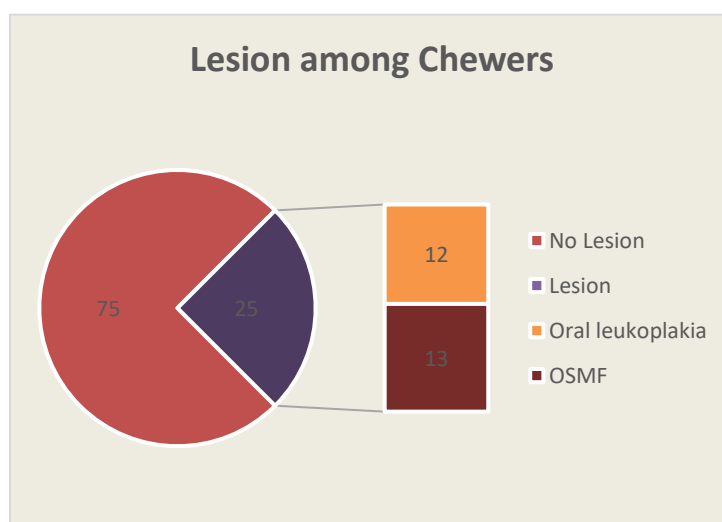


Table 8. Distribution of lesions related to chewing in males and females

Gender	Total Chewers	Oral Leukoplakia	Smoking Melanosis	OSMF	No Lesion
	N=542	N=65	N=0	N =71	N=406
Male	458	59	0	56	343
Female	84	6	0	15	63

Table 9. Lesion among Smokers and Chewers (N =542)

Smoking +Chewing	N=137	%
Oral Leukoplakia	13	9.5
SmokingMelanosis	27	19.7
OSMF	21	15.3
No Lesion	76	55.5

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.

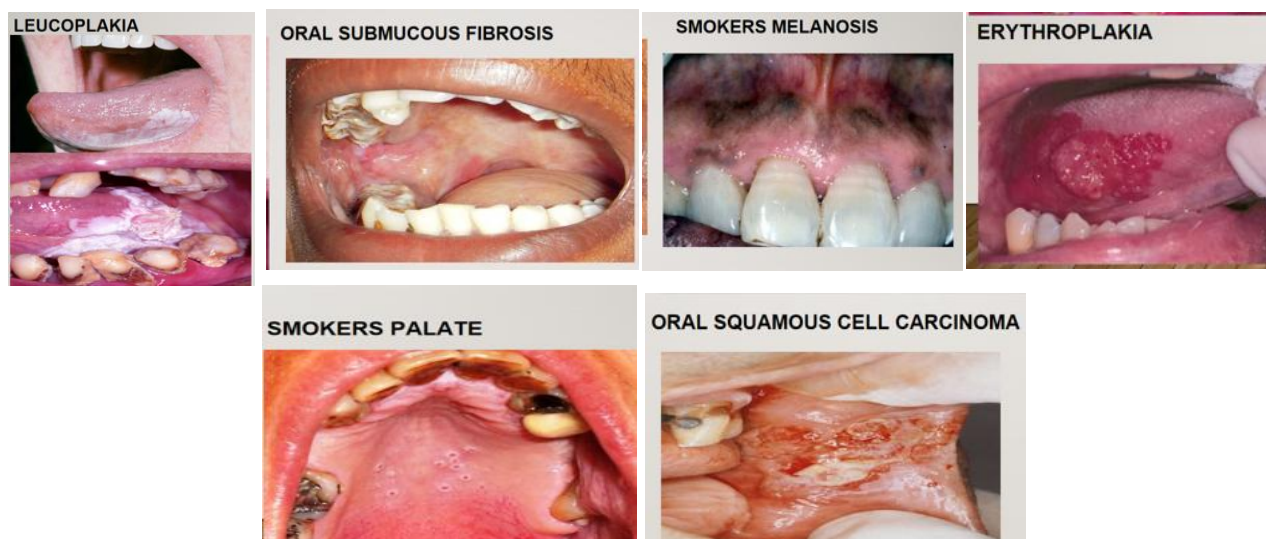
Age ranges from 15 to 85 years with a mean value of 46.6%. Fourth, fifth and sixth decade people were shown a higher incidence of tobacco usage than others [Table 1]. Out of 1175 individuals with tobacco habits, 182 of them had different types of lesions. Chewing group patients had more lesions compared 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 (8) were seen. Central papillary atrophy of the tongue (2), candidiasis (1) and leukoedema (1) were also seen with lesser incidence.

Among the mixed habit C Group, OSMF (10) had a higher incidence and other individual lesion like smoker's melanosis (8), carcinoma (5), tobacco pouch keratosis (1), leukoplakia (4) and lichen planus (1) were also seen. Combined lesions like smoker's melanosis with leukoplakia (8), 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 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 since 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 to some extent, among both affluent and lower socioeconomic strata, no female smokers were reported in this study. A possible 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 followed by OSMF 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.

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.^[13]

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 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.

Chewer'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 chewer's group specifically among the females.^[15]

Tobacco pouch keratosis 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.^[16]

The present study showed the presence of Candidiasis and central papillary atrophy of tongue among the smokers.^[17] Leukoedema and lichen planus 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, leukoplakia with OSMF, smoker's palate combined with OSMF and smoker melanosis 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 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.

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 banglore.

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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