Original Research Article

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Prevalence of Oral Mucosal Lesions in Dental Patients with Tobacco Smoking and Chewing, Areca Nut Consumption and Mixed Habits: A Cross-sectional Study in Ahmedabad

Abstract:

Background: The oral mucosa plays a crucial role in protecting overall patient health. Studies have shown that patients with harmful oral habits such as tobacco and areca nut use are more likely to develop oral mucosal lesions. This underscores the importance of regular oral cavity examinations for early detection and timely treatment. It highlights the vital role of dentists in educating patients about maintaining oral health.

Materials and Method: 1400 participants were included in the study, after following the inclusion and exclusion criteria and were further divided into two groups and evaluated using the modified WHO guidelines-based Oral Health Assessment Form for Adults, 2013 as a questionnaire and the clinical assessment form. The participants of the present study were evaluated for the presence of oral mucosal lesions associated with the usage of harmful oral habits.

Results: Maximum number of participants with harmful oral habits belonged to the age group of 45-54 years (21.71%), with smokeless tobacco being the most prevalent harmful oral habit (47.86%), Tobacco pouch keratosis being the most common oral mucosal lesion (20.37%) and buccal mucosa being the most common site for oral mucosal lesions (41%).

Conclusion: The data from this study can serve as valuable material for oral health education programs in primary health initiatives nationwide. It is essential to make tobacco cessation training mandatory in the education and training of healthcare professionals so they can effectively provide tobacco cessation advice in their daily practice.

Key-words: Oral mucosal lesions, Prevalence, Habit-index, Tobacco, Areca-nut, Ahmedabad.

Introduction:

Tobacco was introduced in India by the Portuguese about 400 years ago and ever since then it has become part and parcel of socio-cultural milieu.[1] In India, tobacco is a vailablein various forms of smoking such as cigarettes, beed is, cigars, hookahs, pipes, chillums, and chewing tobacco such as khaini, dry snuff, mawa, paan, etc.[2]

Various triggers exist for the use of tobacco such as stress, advertisements, peer-pressure and so on.[3] The International Agency for Research on Cancer (IARC) has listed 45 carcinogenic agents which are present in tobacco smoke, along with ten polycyclic aromatic hydrocarbons (PAH) and eight tobacco specific nitrosamines (TSNA).[4]

Based on culture and geographic locations, the practice of tobacco consumption varies from one state to another state and within each state, which makes it necessary to gather information about the prevalence of tobacco habits among the local population, in order to assess the epidemiological and

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behavioral patterns among the habitual users.[3,5] No recent studies have been conducted in Gujarat, after the study of **Joshi M. et al.(2016).[6]** Furthermore, no such study has been reported among the population of Ahmedabad, Gujarat, to obtain the data regarding tobacco habits, for planning precise oral health care and prevention programs. Therefore, the present study was conducted to fill this research gap and assess the prevalence of oral mucosal lesions in dental patients with tobacco smoking and chewing, areca nut consumption and mixed habits in Ahmedabad.

Materials and Method:

The present study was conducted in Department of Oral Medicine and Radiology, after obtaining ethical clearance (CDSRC/IEC/20210703/21) from the Institutional Ethical Committee and an informed consent from the participants,

according to the guidelines of **Helsinki Declaration (2000).**

Sample size of 700 was calculated based on formula given by **Charan J, Biswas T (2013)[7]** where

$$N=Z_{1-\alpha/2}^{2}\frac{p(1-p)}{d^{2}}$$

Where in the present study,

P = Proportion of the event in the population = 0.70 {**Aljabab M et al. (2015)[8]**

Z 1- α/2 = value at a specified confidence level (95%) = 1.96 and

d = acceptable margin of error in estimating the true population proportion= 5%

Subjects aged ≥ 15 years, both male and female, who had harmful oral habits like smoking and chewing areca nut/tobacco in any form or combination of these habits, for a minimum of 6 months or more were included in the present study; along with the subjects who did not have any deleterious oral habits such as smoking or tobacco chewing and betel nut or combination of habits, for control group. **However,** subjects aged < 15 years, who had occasional tobacco habits and/or less than 6 months duration of habit, or had habit of alcohol consumption, or subjects with oral lesions with known pathogenesis, not associated with tobacco, e.g.: Lichen planus, Pemphigus etc. and who were unwilling to give the complete habit details and participate in the study were excluded.

1400 participants were included in the study, after following the inclusion and exclusion criteria, and were further divided in two groups of 700 participants each, where Group 1 was the study group, which consisted of participants with history of harmful oral habits - tobacco smokers, tobacco chewers, areca nut consumption, mixed habit), whereas Group 2 was the control group, which consisted of participants with no history of harmful oral habits and age and gender matched with group 1.

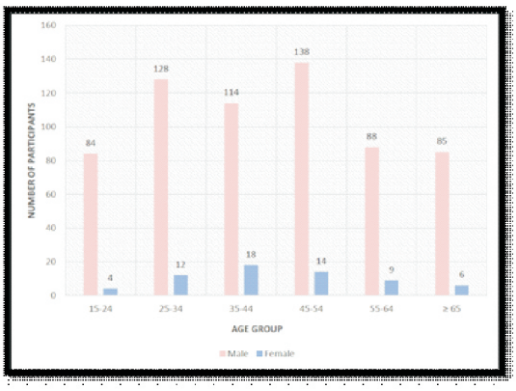
The modified **WHO guidelines-based Oral Health Assessment Form for Adults, 2013[9]** was used as a questionnaire and the clinical assessment form. The participants of the present study were evaluated for the presence of OMLs associated with the usage of harmful oral habits and the lesions such as smoker's palate, smoker's melanosis, leukoplakia, erythroplakia, oral submucous fibrosis, tobacco pouch keratosis, quid induced lichenoid reaction and oral cancer and were diagnosed and classified based on classification provided by **Shafer's 9th edition (2020)[10], Sarode S. C. et al. (2011)[11], and Burket's 13th edition (2021)[12].** If a lesion was clinically judged as suspicious for malignancy, the patient was referred appropriately.

A master chart of the data was prepared and it was subjected to statistical analysis.

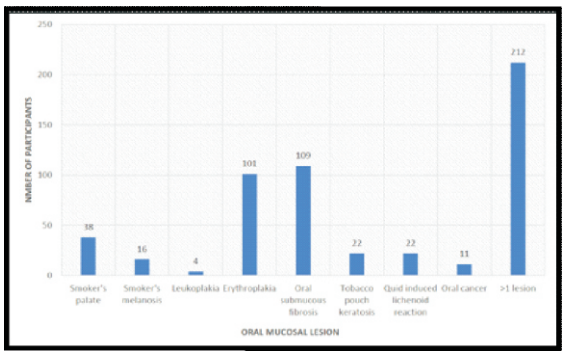
Results:

The data represented in the results is only of the participants who had harmful oral habits i.e. Group 1, since we did not find any oral mucosal lesions associated with tobacco smoking and chewing, areca nut consumption and mixed habits in the control group, i.e. Group 2. In the tables, NS=Non-significant, *p<0.05=Significant and **p<0.01=highly significant.

Graph 1 represents the age and gender-wise distribution of the participants.



Graph 2 represents the prevalence of various oral mucosal lesions



Graph 3 represents the distribution of more than 1 OMLs

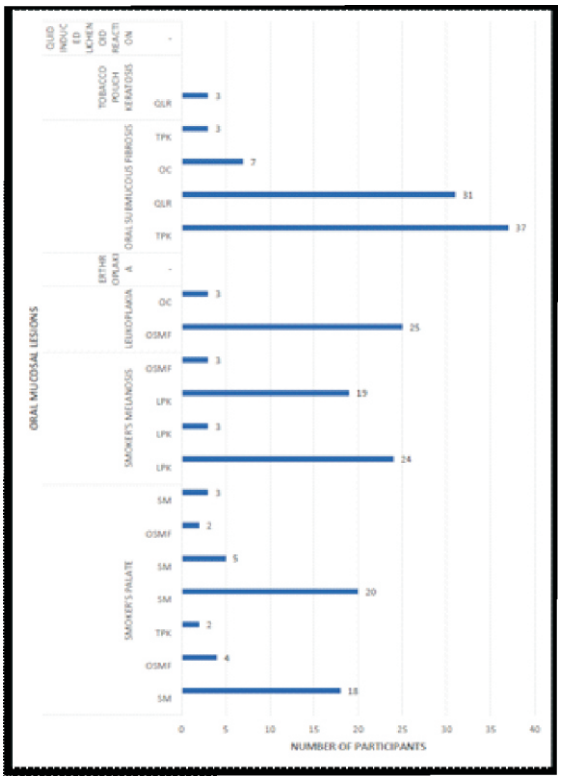


Table 1 represents the gender-wise distribution of OMLs.

LESIONS	GENDERGROUP		GRANDTOTAL n (%)	p-VALUE
	Male n (%)	Female n (%)		
Smoker'spalate	38 (100.00%)	0 (0.00%)	38 (100%)	<0.001**
Smoker'smelanosis	11 (100.00%)	0 (0.00%)	11 (100%)	<0.001**
Leukoplakia	16 (100.00%)	0 (0.00%)	16 (100%)	<0.001**
Erythroplakia	4 (100.00%)	0 (0.00%)	4 (100%)	<0.001**
Oralsubmucousfibrosis	78 (77.23%)	23 (22.77%)	101 (100%)	0.002*
Tobaccopouchkeratosis	103 (94.50%)	6 (5.50%)	109 (100%)	<0.001**
Quidinducedlichenoid reaction	20 (90.91%)	2 (9.09%)	22 (100%)	<0.001**
Oralcancer	19 (86.36%)	3 (13.64%)	22 (100%)	<0.001**
>1lesion	205 (96.70%)	7 (3.30%)	212 (100%)	<0.001**
GRANDTOTAL	**494 (92.34%)**	**41 (7.66%)**	**535 (100%)**	<0.001**

Table 2 represents the age-wise distribution of OMLs

LESIONS	AGEGROUPS						GRAND TOTAL n(%)	p – VALUE
	15-24 n(%)	25-34 n(%)	35-44 n(%)	45-54 n(%)	55-64 n(%)	≥ 65 n(%)		
Smoker'spalate	4 (10.53%)	13 (34.21%)	5 (13.16%)	4 (10.53%)	6 (15.79%)	6 (15.79%)	38 (100%)	0.013*
Smoker's melanosis	0 (0.00%)	1 (9.09%)	1 (9.09%)	6 (54.55%)	3 (27.27%)	0 (0.00%)	11 (100%)	0.007*
Leukoplakia	0 (0.00%)	1 (6.25%)	7 (43.75%)	4 (25.00%)	3 (18.75%)	1 (6.25%)	16 (100%)	0.024*
Erythroplakia	0 (0.00%)	0 (0.00%)	0 (0.00%)	2 (50.00%)	2 (50.00%)	0 (0.00%)	4 (100%)	<0.001**
Oralsubmucous fibrosis	16 (15.84%)	25 (24.75%)	28 (27.72%)	15 (14.85%)	10 (9.90%)	7 (6.93%)	101 (100%)	0.048*
Tobaccopouch keratosis	18 (16.51%)	24 (22.02%)	24 (22.02%)	18 (16.51%)	19 (17.43%)	6 (5.50%)	109 (100%)	0.261(NS)
Quidinduced lichenoidreaction	2 (9.09%)	4 (18.18%)	5 (22.73%)	6 (27.27%)	3 (13.64%)	2 (9.09%)	22 (100%)	0.135(NS)
Oralcancer	1 (4.55%)	3 (13.64%)	5 (22.73%)	8 (36.36%)	5 (22.73%)	0 (0.00%)	22 (100%)	0.062(NS)
>1lesion	25 (11.79%)	34 (16.04%)	30 (14.15%)	47 (22.17%)	41 (19.34%)	35 (16.51%)	212 (100%)	0.485(NS)
GRAND TOTAL	**66 (12.34%)**	**105 (19.63%)**	**105 (19.63%)**	**110 (20.56%)**	**92 (17.20%)**	**57 (10.64%)**	**535 (100%)**	**0.145(NS)**

Table 3 represents the habit-wise distribution of OMLs.

LESIONS	HABITGROUP				GRAND TOTAL n (%)	p-VALUE
	Smoking tobacco n (%)	Smokeless tobacco n (%)	Areca nut n (%)	Mixed n(%)		
Smoker'spalate	29 (76.32%)	0 (0.00%)	0 (0.00%)	9 (23.68%)	38 (100%)	0.004*
Smoker's melanosis	11 (100.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	11 (100%)	< 0.001**
Leukoplakia	13 (81.25%)	0 (0.00%)	0 (0.00%)	3 (18.75%)	16 (100%)	< 0.001**
Erythroplakia	3 (75.00%)	0 (0.00%)	0 (0.00%)	1 (25.00%)	4 (100%)	0.001*
Oralsubmucous fibrosis	0 (0.00%)	62 (61.39%)	26 (25.74%)	13 (12.87%)	101 (100%)	0.032*
Tobaccopouch keratosis	0 (0.00%)	98 (89.91%)	0 (0.00%)	11 (10.09%)	109 (100%)	0.001**
Quidinduced lichenoidreaction	0 (0.00%)	18 (81.82%)	1 (4.55%)	3 (13.64%)	22 (100%)	< 0.001**
Oralcancer	1 (4.55%)	13 (59.09%)	1 (4.55%)	7 (31.82%)	22 (100%)	0.038*
>1lesion	46 (21.70%)	47 (22.17%)	3 (1.42%)	116 (54.72%)	212 (100%)	0.023*
GRANDTOTAL	**103 (19.25%)**	**238 (44.49%)**	**31 (5.79%)**	**163 (30.47%)**	**535 (100%)**	**0.041***

Table 4 represents the frequency-wise distribution of OMLs.

LESIONS	FREQUENCY(TIMES/DAY)				GRANDTOTAL n (%)	p-VALUE
	≤5 n(%)	6-10 n (%)	11-15 n (%)	>15 n (%)		
Smoker'spalate	28 (73.68%)	9 (23.68%)	0 (0.00%)	1 (2.63%)	38 (100%)	< 0.001**
Smoker's melanosis	2 (18.18%)	8 (72.73%)	0 (0.00%)	1 (9.09%)	11 (100%)	< 0.001**
Leukoplakia	2 (12.50%)	14 (87.50%)	0 (0.00%)	0 (0.00%)	16 (100%)	< 0.001**
Erythroplakia	0 (0.00%)	3 (75.00%)	1 (25.00%)	0 (0.00%)	4 (100%)	< 0.001**
Oralsubmucous fibrosis	82 (81.19%)	15 (14.85%)	2 (1.98%)	2 (1.98%)	101 (100%)	< 0.001**
Tobaccopouch keratosis	88 (80.73%)	16 (14.68%)	3 (2.75%)	2 (1.83%)	109 (100%)	< 0.001**
Quidinduced lichenoidreaction	15 (68.18%)	7 (31.82%)	0 (0.00%)	0 (0.00%)	22 (100%)	< 0.001**
Oralcancer	8 (36.36%)	10 (45.45%)	4 (18.18%)	0 (0.00%)	22 (100%)	0.005*
>1lesion	116 (54.72%)	59 (27.83%)	9 (4.25%)	28 (13.21%)	212 (100%)	0.44*
GRAND TOTAL	**341 (63.74%)**	**141 (26.36%)**	**19 (3.55%)**	**34 (6.36%)**	**535 (100%)**	**0.008***

Table 5 represents the duration-wise distribution of OMLs

LESIONS	DURATION(INYEARS)				GRANDTOTALn (%)	P-VALUE
	≤5n(%)	6-10n(%)	11-15n(%)	>15 n (%)		
Smoker'spalate	17 (44.74%)	8 (21.05%)	4 (10.53%)	9 (23.68%)	38 (100%)	0.043*
Smoker'smelanosis	2 (18.18%)	6 (54.55%)	2 (18.18%)	1 (9.09%)	11 (100%)	0.021*
Leukoplakia	0 (0.00%)	14 (87.50%)	1 (6.25%)	1 (6.25%)	16 (100%)	< 0.001**
Erythroplakia	0 (0.00%)	0 (0.00%)	4 (100.00%)	0 (0.00%)	4 (100%)	< 0.001**
Oralsubmucous fibrosis	49 (48.51%)	29 (28.71%)	13 (12.87%)	10 (9.90%)	101 (100%)	0.258(NS)
Tobaccopouch keratosis	51 (46.79%)	18 (16.51%)	11 (10.09%)	29 (26.61%)	109 (100%)	0.038*
Quidinduced lichenoidreaction	6 (27.27%)	5 (22.73%)	4 (18.18%)	7 (31.82%)	22 (100%)	0.248(NS)
Oralcancer	2 (9.09%)	14 (63.64%)	5 (22.73%)	1 (4.55%)	22 (100%)	< 0.001**
>1lesion	49 (23.11%)	51 (24.06%)	23 (10.85%)	89 (41.98%)	212 (100%)	0.178
GRANDTOTAL	**176 (32.90%)**	**145 (27.10%)**	**67 (12.52%)**	**147 (27.48%)**	**535 (100%)**	0.316 (NS)

Table 6 represents the site-wise distribution of OMLs

LESIONS	SITE							GRANDTOTALn(%)	p-VALUE
	Labialmucosa n(%)	Buccalmucosan(%)	Palate n(%)	Tongue and floorof mouthn(%)	Alveolarmucosan(%)	Retromolar pad arean(%)	Vestibule n(%)		
Smoker's palate	0 (0.00%)	0 (0.00%)	38 (100.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	38 (100%)	0.001**
Smoker's melanosi	0 (0.00%)	4 (36.00%)	0 (0.00%)	0 (0.00%)	7 (64.00%)	0 (0.00%)	0 (0.00%)	11 (100%)	0.001**
Leukoplakia	1 (6.25%)	13 (81.25%)	1 (6.25%)	1 (6.25%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	16 (100%)	0.001**
Erythroplakia	0 (0.00%)	4 (100.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	4 (100%)	0.001**
Oralsubmucous fibrosis	10 (4.46%)	101 (45.09%)	11 (4.92%)	15 (6.69%)	0 (0.00%)	80 (35.72%)	7 (3.12%)	224 (100%)	0.004*
Tobaccopouchkeratosis	13 (10.00%)	19 (14.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	100 (76.00%)	132 (100%)	0.001**
Quidinducedlichenoidreaction	0 (0.00%)	20 (91.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	2 (9.00%)	22 (100%)	0.001**
Oralcancer	0 (0.00%)	12 (54.55%)	1 (4.54%)	3 (13.64%)	1 (4.54%)	2 (9.09%)	3 (13.64%)	22 (100%)	0.038*
>1lesion	31 (7.78%)	183 (46.00%)	54 (13.57%)	48 (12.06%)	29 (7.28%)	19 (4.77%)	34 (8.54%)	398 (100%)	0.021*
GRAND TOTAL	**55 (6.00%)**	**356 (41.00%)**	**105 (12.11%)**	**67 (8.00%)**	**37 (4.00%)**	**101 (11.89%)**	**146 (17.00%)**	**867 (100%)**	**0.039***

Discussion:

The regional diversity in tobacco usage leads tosignificant differences in habit index and prevalence oral mucosal lesions. Indian data from the **National Oral Cancer Registry (NOCR) (2020)** emphasized the substantial impact of tobacco use on oral health in India, with an oral cancer prevalence of 11.28% among males and 4.3% among females.[13]

Understanding the distribution, aetiology, history and epidemiology of oral mucosal pathologies is essential to promote primary prevention, early diagnosis and prompt treatment.[14] Due to the restricted availability of alcohol and its legal consequences of illegal consumption in Gujarat, the data collected in relation to alcohol consumption was not reliable and was not included in the study.

In the present study, the prevalence of harmful oral habits based on age and gender was non-significant, with the most prevalent among male participants in age group of 45-54 years (21.66%) and least prevalent in the age group of 15-24 years (13.19%), whereas among females, the most commonage group was 35-44 years (28.57%) and the least prevalent age group was 15-24 years(6.35%). The results were in accordance with a previous study conducted by **Chaudhuri S etal. (2017)[15]**, who reported harmful oral habits were most prevalent among male participants, the most common age group was 45-54 years (22.1%), while among female, the most common age group was 35-44 years (26.9%).[15] How ever, the results of the present study were in contrast with the findings of the study conducted by **Priya K M et al.(2018)[16]**, who reported that the most common age group in males with harmful oral habits was 15-24 years, comprising 25.3% of the male population. They also showed the highest prevalence of harmful oral habits in females in the age group of 45-54 and 55-64 years, with a similar prevalence of 25%. These differences may be attributed to a smaller sample size of 300 participants only and the inclusion of patients with alcohol in the study conducted by **Priya K M et al. (2018)[16]**, as opposed to the present study. Moreover, their study was conducted in Guntur city in Andra Pradesh, India, which is a center for production, export and businesses of tobacco, which provides the people of that city to an easy access to various forms of tobacco.[16]

In the present study, the most common oral mucosal lesion was tobacco pouch keratosis (20.37%), closely followed by oral submucous fibrosis (18.88%) and the least prevalent oral mucosal lesion was erythroplakia (0.75%). The prevalence of oral mucosal lesions in the present study is similar to the findings of the study conducted by **Chaoudhary A et al. (2022)[17]**, who also reported that the most common oral mucosal lesion was tobacco pouch keratosis (46.1%), whereas a comparable lowest prevalence of erythroplakia (2.3%) and carcinoma (2%).[17] However, the results of the pre set study are in contrast to those reported by **Koothati R K et al. (2020)[18]** who found the commonest oral mucosal lesion to be oral submucous fibrosis (27.56%) and slightly lower prevalence of tobacco pouch keratosis (14.22%). This dissimilarity might be because the abovementioned study had

a sample size of 3200 participants, and was conducted in Mahabubnagar, which is one of the back ward districts of Telangana state with highest rural population and lowest literacy rate in the state, which may directly affect the socioeconomic, educational and behavioral aspects and in-turn influence the lifestyle and oral health status of these individuals.[18]

In the present study, the distribution of oral mucosal lesions among both the genders was highly significant ($p<0.001$**) for smoker's palate, smoker's melanosis, leukoplakia and erythroplakia, since these lesions were exclusively present in males. Nonetheless, the distribution of OSMF, tobacco pouch keratosis, quid induced lichenoid reaction, oral cancer and >1 lesions was also significantly distributed amongst genders, with male gender being the more common. The results of the present study are in accordance with the results of the study conducted by **Roy Det al. (2022)[19]**, who also reported that leukoplakia and smoker's palate were more common in male participants, however, they reported a higher prevalence of OSMF and erythroplakia in female participants, which contradicts the findings of the present study. This variance could be attributed to the difference in the sample size and the male: female ratios between the two studies, since, the present study had only 18% female participants, whereas their study had 35% females.[19]

Prevalence of oral mucosal lesions in various age groups in the present study, was highest in the age group of 45-54 (20.56%) and least common in the age group of ≥ 65 years (10.65%). The results of the present study are in agreement with the results of the study conducted by **Roy D et al. (2022)[19]**, who also reported the highest prevalence of oralmucosal lesions in the 41-50 years and 51-60 years age groups, i.e. the 4th and 5th decade.[19] How ever, the results of the present study vary from the findings reported by **Singh A K et al. (2021)[20]**, who reported the highest prevalence of oral mucosal lesions in the age group of 31-40 years and the least prevalence in the age group of 0-10 years. This variation could be attributed to the difference in the sample sizes and inclusion criteria, since their study only included participants with the history of harmful oral habits and there was no control group.[20]

Overall, in the present study, the most harmful oral habit was that of smokeless tobacco (44.49%) and the least common habit was that of areca nut (5.79%). These findings are similar to the study conducted by **Ramasamy J et al. (2021)[21],** where they found that the most common harmful oral habit associated with oral mucosal lesions was smokeless tobacco.[21]

In the present study, distribution of oral mucosal lesions associated with different frequencies of intake of harmful oral substances was significant, and it was noted that smoker's palate, OSMF, tobacco pouch keratosis and quid induced lichenoid reactions were most common in the participants with ≤ 5 times/day frequency of habit, whereas smoker's melanosis, leukoplakia, erythroplakia and oral cancer were more common in participants with 6-10 times/day frequency of habit. These results are similar to those reported by **Verma S et al. (2019)[**22] who reported the highest association of leukoplakia, erythroplakia and oral cancer with <10 times/day frequency of habit. However, their results vary marginally from those of the present study since they reported that smoker's palate and OSMF were also most commonly associated with habit frequency of <10 times/day.These minimal variations might be because of sample size, since in the present study, there were 1400 participants and whereas, in their study, there were only 872 participants.[22]

In the present study, the maximum number of participants had the habit duration of < 5 years (32.9%), whereas, the least number of participants had habit duration of 11-15 years (12.52%). These findings are similar to those reported by **Hallikeri K et al. (2018)[5]**, who also reported in their study that maximum number of participants had the habit duration of 1-5 years (26.89%) while the least number of participants had the habit duration of 11-15 years (10.72%).[5] However, the results of the present study are in contrast to those presented by **Aljabab M et al. (2015)[8]** who reported that smoker's palate, smokers melanosis, leukoplakia and tobacco induced keratosis were most commonly present in participants with habit duration of > 15 years, whereas, lichenoid lesions were more prevalent in participants with habit duration of 1-5 years. This difference could be due to a vast difference in the sample size and the type of population included in the study, since their study had a sample size of only 536 participants and they only included male subjects in their study.[8] The above-mentioned results help in establishing a dose-response relationship of harmful oral habits with potentially malignant disorders and malignancy. This information is necessary since it provides evidence to educate users about the deleterious effects of such habits and to reduce the quantity or completely quit the harmful oral habits.[23]

In the present study, predominant site for presence of a lesion was buccal mucosa (41%), followed by vestibule (17%) and

palate (12.11%), whereas the least common site for the presence of oral mucosal lesions was alveolar mucosa (4%). These results are similar to those reported by **Singh A K et al. (2021)[20]**, who also reported the highest prevalence of oral mucosal lesions on buccal mucosa and vestibule.[20] However, the results of the present study were slightly different from those reported by **ME D et al. (2022)**[1], who reported that the most common oral site for presence of a lesion was hard palate (50.9%) and the least common site for the presence of oral mucosal lesions was floor of mouth (0.9%). These variations could be due to the huge differences in the sample sizes and gender distributions between the two studies since the present study had a sample size of 1400 participants and the 18% population was comprised by females, whereas in their study, the sample size was of 216 participants, with only 7.4% of female participants.[1]

Conclusion:

Although detailed physical assessments were carried out, analysis of various factors like association of tobacco with psychological conditions and genetic constitutions of the subjects was not carried out. The study group consisted of population from various ethnicity and also from professions, economic strata. The occurrence of specific lesions in particular age, sex, nutritional status, and other systemic disease was not discussed.

The data from this study can serve as valuable material for oral health education programs in primary health initiatives nationwide. It is essential to make tobacco cessation training mandatory in the education and training of healthcare professionals so they can effectively provide tobacco cessation advice in their daily practice. In India, burden of tobacco-related cancer and cancer due to tobacco vary by sites and region. The proportion of cancers of different tobacco related sites that are actually due to tobacco are also needed to be known for micro level planning.

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