Prevalence of most commonly reported tobacco-associated lesions in central Gujarat: A hospital-based cross-sectional study

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ABSTRACT

Background: Oral cancer is a major health problem in tobacco users worldwide and is one of the ten most common cancers. India alone accounts for 1/3rd of the world’s oral cancer and has a high rate of potentially malignant disorders (PMDs). The most common predisposing factors are smoking, smokeless tobacco, betel nut in quid form (pan), alcohol, spicy food, and sharp broken tooth. There are various tobacco-associated lesions (TALs) which can be diagnosed at very early stage. This study was conducted to rule out association of smoking and smokeless tobacco with occurrence of TALs and its dose-response relationship.

Materials and Methods: Total of 60,018 patients attending the Department of Oral Medicine and Radiology from January 2013 to December 2014 with different oral and dental symptoms were screened. Of these, 4795 patients satisfying inclusion and exclusion criteria formed the cohort of the present study. All the patients were informed regarding the study and an informed verbal consent was obtained, following which they were interviewed for tobacco-related habits and examined by the trained dental professionals for the presence of any lesion. Along with patients’ demographic details, information regarding the type of habit, duration, and frequency was recorded.

Statistical Analysis: Statistical analysis was performed using STATA 13.1 software (STATA 13.1 software by Stata Corp Ltd India Continent) by applying Pearson’s Chi-square test with Fisher’s exact test, Independent t-test, and ANOVA test.

Results: The overall study population showed maximum cases having habit of smokeless tobacco (37.9%) and smoking tobacco (36.5%). The overall prevalence of TALs was found to be 7.98%. Our study found strong relation of duration and frequency of habit with respect to occurrence of the lesions.

Conclusion: TALs are often subtle and asymptomatic. Therefore, it is important for the clinician to maintain a high index of suspicion, especially if risk factors such as tobacco habits are present.

Key words: Duration, frequency, smokeless tobacco and smoking tobacco, tobacco-associated lesions

Oral cancer is the 6th most common cancer in the world which accounts for 350,000 new cases and 128,000 deaths annually. Two-third cases of oral cancer are contributed by the developing countries. Oral cancer is almost always preceded by some potentially malignant disorders (PMDs). These PMDs can be detected for up to 15 years before their change to an invasive carcinoma. It usually affects between the ages of 15 and 40 years. India alone accounts for 1/3rd of the world’s oral cancer and has a high rate of PMD.[1,2] It has been estimated that around 43% of cancer deaths are due to predisposing factors such as smoking,
smokeless tobacco, betel nut in quid form (pan), alcohol, spicy food, and sharp broken tooth. The most common oral PMDs are oral leukoplakia, erythroplakia, nicotina palati, and oral submucous fibrosis. Tobacco use is common in India and is estimated that 150 million men and 44 million women here use tobacco in various forms. Tobacco has been established as a risk factor for the development of PMDs of oral mucosa. Their overall prevalence among patients attending hospital in certain places of India ranges between 2.5% and 8.4%. It has shown a rate of progression to cancer up to 17% within a mean period of 7 years after diagnosis. The prevalence of oral leukoplakia in India varies from 0.2% to 5.2%. According to various studies, the prevalence of oral submucous fibrosis (OSMF) in India varies between 0.03% and 3.2%. The most important consideration is the relation between the use of tobacco and related products and the development of lesions. The present study is conducted to evaluate the prevalence of tobacco-associated lesions (TALs) among tobacco users and their association with frequency and duration of the said habits.

MATERIALS AND METHODS

Study population
Total of 60,018 patients attending the Department of Oral Medicine and Radiology from January 2013 to December 2014 with different oral and dental symptoms were screened. Of these, 4795 cases satisfying inclusion and exclusion criteria formed the cohort of the present study. Inclusion criteria were all individuals who had the habit of using smokeless and smoking form of tobacco and had TAL.

Exclusion criteria were patients who were unwilling to give the complete habit details, with no habits, with different oral and dental complaints other than TAL.

Screening program
All the patients were informed regarding the study and an informed verbal consent was obtained, following which they were interviewed for tobacco-related habits and examined by the trained dental professionals for the presence of any TAL. Along with patient’s demographic details, information regarding the type of habit, duration, and frequency was recorded. All the patients were clinically examined using diagnostic instruments with an artificial illumination under aseptic precautions. An ethics clearance was obtained from the institutional ethics and research committee.

Statistical analysis
Statistical analysis was performed using STATA 13.1 software by applying Pearson’s Chi-square test with Fisher’s exact test, Independent t-test, and ANOVA test.

RESULTS

Demographic profile of the study population
Age- and gender-wise distribution of total study population showed that 4176 cases were males and 619 were females. A maximum number of study cases fall in the age group of 31–50 years [Graph 1].

Prevalence of tobacco habits in the study population
Overall study population showed maximum cases having habit of smokeless tobacco 1819 (37.9%), smoking tobacco 1748 (36.5%), followed by padiki chewing 1087 (22.7%) and rest of the other habits [Graph 2]. Smokeless tobacco includes tobacco quid, snuff, pan, and pan masala. Padiki is a mixture of smokeless tobacco and betel nut.

Prevalence of tobacco-associated lesions in males and females in the study population
The overall prevalence of TALs was found to be 7.98% whereas prevalence levels of tobacco pouch keratoses, smokers palate, OSMF, leukoplakia, leukoedema, and oral lichen planus were found to be 2.40%, 2.7%, 1.79%, 0.03%, 0.81%, and 0.16%, respectively. Most commonly found TALs in total study population were smokers palate 1648 (34.4%), followed by tobacco pouch keratoses 1444 (30.1%) and OSMF 1078 (22.5%) whereas it was OSMF 248 (40.1%) and tobacco pouch keratoses 242 (39.1%) in females and smokers palate 1608 (38.5%), tobacco pouch keratoses 1202 (28.8%), and OSMF 830 (19.9%) in males [Table 1].

Association of tobacco habits and occurrence of tobacco-associated lesions in study population
OSMF 458 (42.1%) and tobacco pouch keratoses 445 (40.9%) were the most common lesions found in cases with habit of padiki chewing. In the cases with habit of smokeless tobacco, lesions most commonly found were tobacco pouch keratoses 965 (53.1%), OSMF 574 (31.6%), and leukoedema 227 (12.5%). Smokers palate 1581 (90.4%) and leukoedema 114 (6.4%) were the lesions found in cases having habit of smoking tobacco. Smoking tobacco includes bidi, cigarette smoking, and hookah. There were cases in the present study
having combination of one or the other above-mentioned habits. Among them, most common lesions we found were smokers palate 45 (36%), oral submucous fibrosis 29 (23.2%), tobacco pouch keratoses 25 (20%), and leukoedema 18 (14.4%). There were also few cases in the study population who were giving vague habit history. In this group, oral lichen planus was the most common lesion 8 (50%), followed by smokers palate 3 (18.8%), OSMF 2 (12.5%), and leukoedema 2 (12.5%). All the results were statistically significant as compared to association of habit and occurrence of lesion [Table 2].

### DISCUSSION

Oral cancer is a major health problem in tobacco users worldwide. It is one of the ten most common cancers in the world. Despite advances in surgery, radiation, and chemotherapy, the 5-year survival rate for oral cancer has not improved significantly over the past several decades and it remains at about 50–55%. Tobacco and other related habits such as alcohol, betel nut, and poor oral hygiene may contribute to precede oral precancer. Smokeless tobacco has been in use for as long as other forms of tobacco consumption and its use has dramatically increased. In India and Southeast Asia, the chronic use of betel quid (paan) in the mouth has been strongly associated with an increased risk for oral cancer. The quid typically consists of a betel leaf that is wrapped around a mixture of areca nut and slaked lime, usually with tobacco and sometimes with sweeteners and condiments. The slaked lime results in the release of an alkaloid from the areca nut, which produces a feeling of euphoria and well-being in the user. Betel quid chewing often results in a progressive, scarring PMD of the mouth known as OSMF. In India, one study showed a malignant transformation rate of 7.6% for OSMF. Habitual betel quid chewing is commonly practiced by men and women in Bangladesh, India, Pakistan, and Sri Lanka.

| Table 2: Association of tobacco habits and occurrence of tobacco-associated lesions in the study population |
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| Association of habits and lesions |
| Habits | Smokeless tobacco | Smoking tobacco | Padiki | Combination | Vague history | Total |
| --- | --- | --- | --- | --- | --- | --- |
| Lesion | OSMF | 574 (31.6) | 15 (0.9) | 458 (42.1) | 29 (23.2) | 2 (12.5) | 1078 (22.5) |
| Smokers palate | 5 (0.3) | 1581 (90.4) | 14 (1.3) | 45 (36.0) | 3 (18.8) | 1648 (34.4) |
| Tobacco pouch keratosis | 965 (53.1) | 8 (0.5) | 445 (40.9) | 25 (20) | 1 (6.2) | 1444 (30.1) |
| Leukoplakia | 0 (0.0) | 9 (0.5) | 3 (0.3) | 0 (0.0) | 0 (0) | 12 (0.3) |
| Leukoedema | 227 (12.5) | 114 (6.5) | 129 (11.9) | 18 (14.4) | 2 (12.5) | 490 (10.2) |
| Oral lichen planus | 44 (2.4) | 11 (0.6) | 30 (3.0) | 5 (4) | 8 (50) | 101 (2.1) |
| Erythroleukoplakia | 2 (0.1) | 4 (0.2) | 2 (0.2) | 0 (0) | 0 (0) | 8 (0.2) |
| Miscellaneous | 2 (0.1) | 6 (0.3) | 3 (0.3) | 3 (2.4) | 0 (0) | 14 (0.3) |
| Total | 1819 (100) | 1748 (100) | 1087 (100) | 125 (100) | 16 (100) | 4795 (100) |

Values in parenthesis are in percentage. OSMF=Oral submucous fibrosis
while tobacco smoking is much more common among men in these countries compared to women, except for certain small geographic areas.[10]

In the present study, age- and gender-wise distribution of total study population showed that 87.09% (4176) were males and 12.90% (619) were females. This was in accordance with Gupta et al.,[10] Mahawar et al.,[11] Sujatha et al.,[12] and Keluskar and Kale.[13] The reason behind male predominance with precancerous lesions attributes to its association with tobacco and related habits as compared to females. Maximum number of study cases fall in the age group of 31–50 years, which was in accordance with the study conducted by Sujatha et al.[12]

The present study showed that maximum cases had habit of smokeless tobacco (37.9%) or padiki chewing (22.7%) which was in accordance with a study conducted in rural Maharashtra by Kasat et al.[14] The overall prevalence of TALs was found to be 7.98% which was in accordance with the study by Kawatra et al.[14] In the present study, the overall prevalence of various TALs found was as tobacco pouch keratoses (2.40%), smokers palate (2.71%), OSMF (1.79%), leukoplakia (0.03%), leukoedema (0.81%), and oral lichen planus (0.16%) which was slightly higher than in the study by Saraswathi et al.,[15] except leukoedema and oral lichen planus.

In the present study, maximum cases had habit of smokeless tobacco (37.9%) followed by smoking tobacco (36.5%) and padiki chewing (22.7%). The findings of our study were in accordance with Saraswathi et al.[15] and Hashibe et al.[16]

We also found strong association between padiki chewing, smokeless tobacco chewing and OSMF, smoking tobacco and occurrence of smokers palate and leukoedema [Table 2]. In the present study, female population was mostly affected with OSMF (40.1%) and tobacco pouch keratoses (39.1%) as compared to males who were more commonly affected by smokers palate (38.5%), tobacco pouch keratoses (28.8%), and OSMF (19.9%). The findings were slightly different from the earlier studies and may be attributed to the fact that in Gujarat, females equally consume chewing tobacco in various forms as compared to males.

Epidemiological studies show that the risk of developing oral cancer is 5–9 times greater for smokers than for nonsmokers, and this risk may increase to as much as 17 times greater for extremely heavy smokers of 80 or more cigarettes per day.[17–19] The present study also found strong association between duration and frequency of habit and occurrence of the various precancerous lesions. The mean of 12.77 years for duration of habit and mean of 6.37 for frequency per day were found in the present study. The findings of the present study were statistically significant when compared within the group (P < 0.05). Therefore, it suggests strong association of occurrence of precancerous lesions and tobacco and other related habits with respect to their duration and frequency. These observations were in accordance with the studies by Dayal et al.[20] and Gupta et al.[21]

**CONCLUSION**

Early precancerous lesion and oral cancers are often subtle and asymptomatic. Therefore, it is important for the clinician to maintain a high index of suspicion, especially if risk factors such as tobacco use or alcohol abuse are present. There is a strong association of these habits with respect to duration and frequency and occurrence of the precancerous lesions. We as diagnostician could be the first one to diagnose these lesions and conditions and can prevent them from malignant transformation.

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**Table 3: Dose-response relationship of habit and occurrence of lesion in the study population**

| Group statistics | Gender | n  | Mean | SD  | SEM  |
|------------------|--------|----|------|-----|------|
| Duration         | Male   | 4162 | 13.268000 | 10.9889705 | 0.1641356 |
|                  | Female | 609  | 9.389984 | 8.6853000 | 0.3519960 |
| Frequency        | Male   | 4165 | 6.6988  | 5.81715  | 0.10659  |
|                  | Female | 608  | 4.2072  | 4.12648  | 0.1510961 |

n=Total number, SD=Standard deviation, SEM=Standard error mean

**Table 4: One-way ANOVA**

| Duration in years | n  | Mean | SD  | SE   | 95% CI for mean | Minimum | Maximum |
|-------------------|----|------|-----|------|-----------------|---------|---------|
|                   |    | Lower bound | Upper bound |
| ≤20               | 117 | 3.485043 | 2.5152698 | 0.2325368 | 3.024474 | 3.945611 | 0.2500 | 12.0000 |
| 21-40             | 1932 | 7.981151 | 6.0597154 | 0.1379663 | 7.710774 | 8.251527 | 0.0833 | 80.0000 |
| 41-60             | 2044 | 15.184075 | 9.9554717 | 0.2202021 | 14.752231 | 15.615919 | 0.0000 | 60.0000 |
| >60               | 673  | 20.731650 | 14.1936339 | 0.5471244 | 19.657271 | 21.805829 | 0.3333 | 70.0000 |
| Total             | 4766 | 12.760369 | 10.4311013 | 0.1510961 | 12.464151 | 13.058587 | 0.0000 | 80.0000 |

n=Total number, CI=Confidence interval, SD=Standard deviation, SE=Standard error mean
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Conflicts of interest
There are no conflicts of interest.

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