

Evaluation of the Prevalence of Oral Mucosal Lesions in a Population of Eastern Coast of South India

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ABSTRACT

Objective/Aim: The aim of this study is to measure the association between oral mucosal lesions (OMLs) and habit of tobacco and alcohol in the population of Guntur city, Andhra Pradesh, South India.

Material and Method: A cross-sectional study was conducted on 300 participants in Guntur city with the habit of tobacco and alcohol consumption in various forms who were selected by stratified cluster random sampling technique. Guntur city was divided into four zones, that is, North, East, South, and West; and two administrative wards were randomly selected from each zone as clusters. Information was obtained by interviewing the participant regarding various tobacco-related habits followed by standardized clinical examination in the field. Clinical data were collected using a modified 1980 WHO Pro forma where the basis for diagnosis was established as per the criteria provided by the epidemiology guide for the diagnosis of oral mucosal diseases (WHO). Statistical tests such as Pearson Chi-square were exercised to test the significance, using SPSS version 19.0 with 0.05 as cutoff level of significance.

Results: Overall oral soft-tissue lesions were found in 42.4% of the study participants including nicotinic stomatitis, tobacco pouch keratosis, smokers melanosis, mild keratosis of the palate, and chewer's mucosa. In this study, nicotinic stomatitis was found to be the most common soft-tissue lesion among men, while leukoplakia was found to be the most common premalignant lesion with the prevalence being 5.7%. While oral submucous fibrosis was found to be the most common premalignant condition among women. It was found that 13.2% of illiterates (53) were having leukoplakia. In the present study, the lower labial mucosa and buccal mucosa were found to be the most common sites of occurrence of leukoplakia and oral submucous fibrosis.

Conclusion: This study gives information on the association of OML in smokers, chewers, alcoholics, and those with mixed habits. This study highlighted six habit-related OML which included potentially malignant disorders such as leukoplakia and oral submucous fibrosis. Future case-control or cohort studies for individual lesions and with larger sample size are necessary to evaluate the risk for OML including potentially malignant conditions and oral cancer resulting from smoking and chewing habits.

KEYWORDS: Alcohol, chewing tobacco, leukoplakia, oral submucous fibrosis, smoking

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INTRODUCTION

Tobacco use is a major public health challenge in India with 275 million adults consuming different

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tobacco products. Mainly due to potpourri of different cultures in the country, tobacco rapidly became a part of the different sociocultural milieu in various communities, especially in the eastern, northeastern, and southern parts of the country.^[1] India is the second largest consumer of tobacco in the world, China being in the first position. The prevalence of tobacco use among adults where 15 years and above is 35%.^[2] The prevalence of tobacco use among males is 48% and that among females is 20%. Nearly, two in five (38%) adults in rural areas and one in four (25%) adults in urban areas use tobacco in some form.^[2]

Tobacco use and alcohol drinking are clear risk factors for oral cancer in India and elsewhere.^[3,4]

Smoking and drinking are positively associated with oral lesions such as oral submucous fibrosis (OSMF), leukoplakia, and oral lichen planus, which have the potential for malignant transformation. The prevalence of OSMF in India varies between 0.03% and 3.2% according to various studies.^[5,6] The higher incidence of leukoplakia and cancer is observed in OSMF patients and, hence, OSMF is believed to be an important risk factor for oral leukoplakia in India whose prevalence varies from 0.2% to 5.2%.^[7,8] Each year in India, an estimated total of 700,000–900,000 new cancers are diagnosed (NCRP, 2001).^[9]

Guntur district is center for production and export businesses such as tobacco, chilies, and cotton. Hence, the people have easy accessibility to various forms of tobacco products which positively affect their usage; hence, the need of the study is for investigating the prevalence of oral mucosal lesions (OML) in persons having adverse habits of smoking, chewing tobacco, and alcohol was that the tobacco habits in India are unique and vary in different regions. This cross-sectional study was first of its kind in Guntur city, Andhra Pradesh, India.

MATERIAL AND METHOD

Guntur city is the fifth largest city in Andhra Pradesh of South India, located on South East Coast of India,^[10] with an estimated population of 647,508 as per 2011 census.^[11] Guntur city region is a major commercial center in South India for cotton, tobacco, and chili. The Tobacco Board (Government of India) is headquartered in Guntur city of Andhra Pradesh state in India.

A pilot study was done priorly which helped in determining the feasibility and deriving the sample of the study, which in result had established a prevalence of 10% of OML in Guntur city. By applying the universally accepted standard formula for deriving sample, that

is, $(Z\alpha + Z\beta)^2 pq/d^2$ in which the established prevalence values were substituted, a sample of 282 was obtained which was further inclined to 300 considering the rate of refusal and other missing data which might make the sample under representative. Taking the derived sample, a cross-sectional study was conducted in Guntur city on 300 participants aged 15 years and above with smoking and chewing habits who were selected randomly from various zones of Guntur. The city was stratified into four zones, that is, North, East, South, and West where two-stage random sampling technique was performed in which at the initial stage two wards from each zone were selected where a total of 8 wards were allotted, and in later stage, 38 participants were recruited randomly from each ward to meet the prevailed sample size. Individuals of age 15 years and above who gave consent to participate with habits of smoking tobacco, chewing tobacco, and alcohol consumption in combination with any of the tobacco habits were only included in the study participants. Persons who smoke more than two cigarettes daily were considered as smokers and who chew tobacco in any form were considered as chewers and those who consume alcohol daily for at least 6 months were considered as alcohol consumers.

This proposed study was reviewed by the Ethical Committee of Sibar Institute of Dental Sciences, and clearance was obtained (Ethical approval letter no. SIDS/02032011). Before the start of the survey, training and calibration of examiners were done in the department of public health dentistry by selecting a group of 10 participants who possessed a full range of conditions which are expected to be assessed in the survey. Participants were reexamined on successive days using same diagnostic criteria and kappa statistics for interexaminer variability was 0.7 and for intra-examiner variability was 0.8 which was substantial.

Data were obtained by interviewing the participant regarding various tobacco-related habits followed by standardized clinical examination in the field. The study was carried out for a period of 3 months, that is, from September 6, 2011, to November 28, 2011. Interview and clinical examination of a single subject took about 15–20 min providing to examine 6–8 participants per day. The examination was carried out in each individual from a particular cluster under natural light in open areas. The participant was made to sit in the chair in an upright position; the examiner stood on the right side of the patient during examination. The person recording the data was seated close to the examiner so that the data recorder can easily hear the examiner's instructions, and the examiner was able to see the data being entered. Data were collected using a modified 1980 WHO Pro forma.

The clinical diagnosis was established based on the criteria as provided by the epidemiology guide for the diagnosis of oral mucosal diseases (WHO).^[12] Statistical tests such as Pearson Chi-square were exercised to test the significance, using Statistical Package for the Social Sciences (SPSS) version 19. (IBM Corp, Armonk, NY). 0 with 0.05 as cutoff level of significance.

RESULTS

Of the 300 study participants, 288 (96%) were male and 12 (4%) were female. Majority of the study participants were in the age group of 15–24 (25.3%) years among males and 50% of the female participants were comprised age groups of 45–54 and 55–64 years [Table 1].

Majority of the participants were in the age group of 15–24 years (40%) and had habit of smoking 10–20 cigarettes per day [Figure 1] and the habit of chewing >20 tobacco pouches was also observed maximum in this age group followed by the participants in the age group of 25–34 years (19%). In the present study, females were more likely to have the chewing habit when compared to the other two habits (this goes with the finding that chewer’s mucosa is the most prevalent soft-tissue lesion among them). The prevalence of alcohol consumption is high in the age group of 35–44 years.

Majority of the study population, that is, 46% had income of Rs. 6000–Rs. 10,000/month and only 11% of the total study participants were degree holders. Socioeconomic status is found to have a strong association with various adverse habits as participants with income <5000 had high prevalence of smoking and chewing tobacco. Alcohol consumption was much more in participants whose income was more than Rs. 6000/month. Lower socioeconomic status people were more in number (73 persons) and were having more OML in this study.

In the total population, 49% were smokers, 33.6% were tobacco chewers, and rest of the 17% were having alcohol along with the above two habits [Table 2]. In this study, nicotinic stomatitis was found to be the

most common soft-tissue lesion and leukoplakia was found to be the most common premalignant lesion with the prevalence being 5.7% among men. While oral submucous fibrosis was found to be the most common premalignant condition among women [Table 3].

The high prevalence of OML was seen with higher frequency of habits such as participants smoking >20 sticks per day, participants chewing >20 pouches per day, and participants consuming 5–10 times/weeks showing the prevalence of 42%, 80%, and 31%, respectively [Table 4].

The prevalence of leukoplakia was found more in nonskilled workers (18.75%). Skilled workers were having highest OSMF (14.55%) when compared to nonskilled workers (9.38%) which were statistically not significant.

When multiple regression analysis was conducted to know the influence of the predictor variables such as smoking, chewing tobacco, and alcohol on the prevalence of leukoplakia. Only the habit of smoking tobacco was found to be significantly associated with the prevalence of leukoplakia [Table 5].

DISCUSSION

In the present study, the number of female participants was 12 (4%) which was very less when compared to males, 288 (96%). This could be due to marked predominance of the habits among males than females.

Table 1: Distribution of the study subjects by age group and sex

Age groups	Male (%)	Female (%)	Total (%)
15-24	73 (25.3)	0 (0.0)	73 (24.3)
25-34	48 (16.7)	2 (16.7)	50 (16.7)
35-44	54 (18.8)	2 (16.7)	56 (18.7)
45-54	37 (12.8)	3 (25.0)	40 (13.3)
55-64	42 (14.6)	3 (25.0)	45 (15.0)
65 +	34 (11.8)	2 (16.7)	36 (12.0)
Total	288 (100.0)	12 (100.0)	300 (100.0)

Table 2: Distribution of the study subjects according to age group to various habits

Age groups	Smokers (%)	Chewers (%)	Alcoholics with combination of smoking/chewing (%)
15-24	39 (26.35)	27 (26.7)	7 (13.73)
25-34	25 (16.89)	19 (18.8)	6 (11.76)
35-44	23 (15.54)	17 (16.8)	16 (31.37)
45-54	19 (12.84)	15 (14.8)	6 (11.76)
55-64	24 (16.22)	13 (12.8)	8 (15.69)
65 +	18 (12.16)	10 (9.9)	8 (15.69)
Total	148	101	51

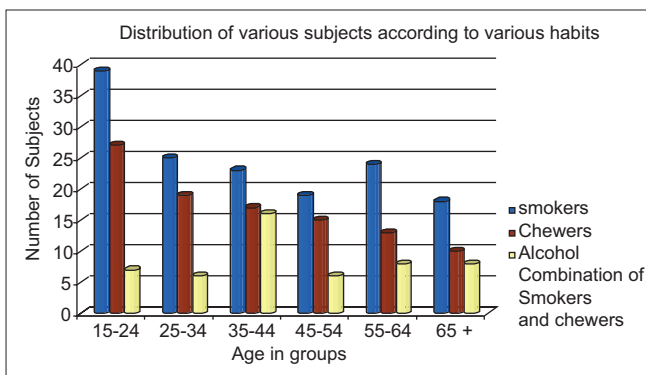


Figure 1: Subject versus habits

Table 3: The prevalence of leukoplakia, submucous fibrosis, and others (smokers melanosis and chewers muco) by various adverse habits

Lesions	With Leukoplakia		Submucous fibrosis		Others		Total (n)
	n (%)	P	n (%)	P	n (%)	P	
Habit							
Chewing	4 (5.3)	0.880	12 (15.8)	<0.001	60 (78.9)	<0.001*	76
Smoking	12 (30.8)	<0.001	0 (0)	-	27 (69.2)	<0.001*	39
Alcohol + combination of smoking/chewing	1 (8.3)	0.698	3 (25)	0.002*	8 (66.7)	0.009	12
Total	17 (5.7)	-	15 (5.0)	-	95 (31.7)		127

*n=Number

Table 4: Prevalence of oral mucosal lesions according to the frequency of various adverse habits

Characteristics	Lesions		Total	P
	absent, n (%)	present, n (%)		
Frequency of smoking (sticks/day)	109	39	148	
1-5	32 (78)	9 (22)	41	>0.05
6-10	28 (72)	11 (28)	39	
10-20	35 (80)	9 (20)	44	
>20	14 (58)	10 (42)	24	
Frequency of chewing tobacco (pouches/day)	25	76	101	
1-10	11 (31)	24 (69)	35	>0.05
10-20	6 (23)	20 (77)	26	
>20	8 (20)	32 (80)	40	
Frequency of alcohol (times/week) with combination of smoking/chewing (times)	39	12	51	
<5	28 (80)	7 (20)	35	>0.05
5-10	11 (69)	5 (31)	16	

Table 5: Effects of different predictor variable on the prevalence of leukoplakia

Characteristics	OR	95% CI
Smoking		
Smokers	0.104	0.029-0.3735
Alcohol drinking		
Alcohol drinker	2.697	0.707-10.276
Chewing		
Chewer	48.086	6.008, 384.83

OR=Odd ratio, CI=Confidence interval

It was similar to the studies done by Saraswathi *et al.*^[8] and Nagpal and Saha^[9] which were having males in the percentages of 63.75% and 86.9%. However, these findings were in contrast to Chilean institution study (2017), where females represented 70.7% of the sample.^[13]

SMOKING HABITS

Majority of the participants were in the age group of 15–24 years (40%) and had a habit of smoking 10–20 cigarettes per day, which was much similar to an Italian

study in teenagers by Amadori *et al.*^[14] whereby the age of 15 years, over 50% have already tried smoking and nearly 15% were daily smokers and a similar finding was also noted in Shearston *et al.* study^[15] where 20.1% of them reported ever using cigarettes. Most of the participants smoked 6–10 sticks per day in the present study which was less when compared to a study by Croucher *et al.*^[16] who reported that the majority of them smoked 10–19 sticks per day.

In the present study, 49% were smokers, 34% were chewers, and 17% were alcoholics which are in contrast to the study done by Wickholm *et al.*^[17] where 34% were smokers and 66% were alcoholics. A higher prevalence of smoking (71.2%) is seen in a study by Gambhir *et al.*^[18] The study also shows that smoking habit was more prevalent in men when compared to the other two habits [Figure 1]. Socioeconomic status is found to have strong association with various adverse habits as participants with income <5000 had high prevalence of smoking and chewing tobacco, which was much similar to the United States study (2017)^[19] wherein groups with economic or social disadvantage had higher prevalence of smoking (29.2%).

CHEWING HABITS

The overall prevalence (34%) of chewing habit in this study population was high when compared to studies done by Cancela Mde *et al.*^[20] and Oakley *et al.*^[21] and had a similar prevalence in the age groups of 15–24 years when compared to a study done by Ho *et al.* (30.1%)^[22] in Taiwan. However, these findings are in contrast to Abhishek *et al.* study^[23] where the prevalence of chewing habit was more in 30–40 years of age group. There may be the possibility that young individuals are now predisposed to these compounds.

ALCOHOL HABITS

The prevalence of alcohol consumption in combination with smoking/chewing is seen high (31.37%) among the age group of 35–44 years which is not top in the table with regard to chewing and smoking. OML was seen as high as 31% in heavy alcoholics (i.e., consumes

5–10 times/week) when compared to 20% of OML in light alcoholics (i.e., consumes <5 times a week).

ORAL MUCOSAL LESIONS

OML were predominantly seen in males attributing to the higher prevalence of smoking and/or chewing habit in men. In the present study, overall oral soft-tissue lesions were found in 42.4% of the study participants and a comparatively higher prevalence of 58.1% was found in a study by Ali *et al.*^[24] In this study, nicotinic stomatitis was found to be the most common soft-tissue lesion among men similar to Patil *et al.* study.^[25] However, this finding was in contrast to a study by Tortorici *et al.* study (2016)^[26] in Sicilian population where coated/hairy tongue was the most common lesion diagnosed. Tobacco-related white lesions (leukoplakia and smokers palate) were seen in men only. The prevalence was more than that observed in Slovenia, in a study by Bokor-Bratic *et al.*^[27]

In the present study, females were more likely to have the chewing habit when compared to the other two habits and this goes with the finding that chewer's mucosa was the most prevalent soft-tissue lesion among them.

In this present study, the prevalence of leukoplakia was 5.3%, similar to a study by Mehta *et al.* in a survey of 50,915 Indian villagers, who reported the prevalence of oral leukoplakia to be between 0.2% and 5.1%,^[5] Mehta and Hammer study (2.9 and 5%).^[28] Comparatively, the prevalence of leukoplakia was high (13.8%) in a previous study done on Italian population by Campisi and Margiotta^[29] and in Naveen-Kumar *et al.* study (61.2%) in Bhimavaram (2017).^[30] The prevalence was high in the present study compared to a Saraswathi *et al.* study (0.59%)^[8] in Chennai, a previous study in Slovenia (Ljubljana) population and Ikeda *et al.* study (1.4%)^[31] in Cambodian population. This finding can be attributed to increased usage of Khaini and Gutkha among the Guntur population.

Betel chewer's mucosa and OSMF were found in the majority of women similar to a study done by Oakley *et al.* in Northern Mariana Islands.^[21]

In the present study, the highly prevalent oral mucous lesions in skilled and nonskilled workers were oral submucous fibrosis (14.55%) and leukoplakia (18.75%), respectively. Among professionals, the prevalence of OML was 14.29% which was almost similar to a study done by Nagpal and Saha where the prevalence of OML among professionals was significantly low (20%). In this study, it also shows that the right commissure along with buccal mucosa was found to be the most common

sites of occurrence of leukoplakia which was similar to Gaphor and Sabri study.^[32]

CONCLUSION

This study gives information regarding the association of OML in smokers, chewers, alcoholics, and those with mixed habits. This study highlighted six habit-related OML which included potentially malignant disorders such as leukoplakia and oral submucous fibrosis. Overall prevalence of oral soft-tissue lesions was found in 42.4% of the study participants including nicotinic stomatitis, tobacco pouch keratosis, smokers melanosis, mild keratosis of the palate, and chewers mucosa. Future case-control or cohort studies for individual lesions and with larger sample size are necessary to evaluate the risk for OML including potentially malignant conditions and oral cancer resulting from smoking and chewing habits.

RECOMMENDATIONS

Regular screening programs should be arranged for the early diagnosis and prompt treatment of oral premalignant and malignant conditions.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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