

Oro-mucosal Lesion and Nicotine Dependency among Adult Tribal Population in Dhar District - A Cross-Sectional Study

Atham Jonwal, Prashant Mishra, Sandesh Nagrajappa, Dhaman Gupta, Shantanu Sontakke, Binti Rani

Department of Public Health Dentistry, Sri Aurobindo College of Dentistry, Indore, Madhya Pradesh, India.

Abstract

Background: The use of tobacco is quite common in India. The consumption of tobacco is higher in the rural population. There is still a paucity of data of tobacco consumption among the tribal population. There are no data available on tobacco consumption pattern and prevalence of Oro-mucosal lesion in the tribal belt of Madhya Pradesh. **Materials and Methods:** A descriptive cross-sectional study was conducted among 296 participants of the tribal population of Dhar district, M.P. The study subject was selected randomly from 13 blocks. A preformed structured pro forma was used to collect the demographic details and tobacco use. Fagerstrom scale (smoking) and modified Fagerstrom scale (smokeless) were used to determine the nicotine dependency. Type III clinical examination was done to determine the Oro-mucosal lesion. Chi-square Test was to compare the frequency of Oro-mucosal lesion. **Result:** 88 (48.6%) of the 296 study participants used smokeless tobacco, 66 (36.6%) smoked, and 28 (15.4%) used mixed tobacco. Of these, 181 (61.2%) used tobacco in various forms. Of those who smoked, 32 people (17.9%) had Oro-mucosal lesions. Keratosis was the most common condition, accounting for 20 cases (62.8%), followed by leukoplakia with 5 cases (15.8%). In the present study, 20 participants (11.1%) had very high nicotine dependency, while 132 participants (72.8%) had medium nicotine dependency. **Conclusion:** Tobacco usage was much greater among tribal populations, with keratosis being the most prevalent Oro-mucosal lesion, followed by leukoplakia.

Keywords: Habit, Nicotine dependence, Tobacco, Tribal.

INTRODUCTION

Oral health is an essential component of overall health, yet it often receives inadequate attention, particularly among underserved populations, such as tribal communities. Oro-mucosal lesions, which encompass a range of abnormalities affecting the mucous membranes within the oral cavity, are of special concern due to their potential to progress to malignancies if left untreated. Studies have consistently demonstrated a strong association between these lesions and tobacco use, including both smoking and smokeless forms, which is prevalent in several tribal regions across India.^[1]

The use of tobacco, both in smoked and smokeless forms, is widely recognized as a primary risk factor for developing Oro-mucosal lesions and related cancers. Nicotine and other carcinogens present in tobacco products cause cellular changes in the oral mucosa, leading to lesions that may eventually develop into malignant tumors.^[1] The National Cancer Registry Programme in India has documented a high prevalence of oral cancers in areas with high tobacco use, particularly in populations with limited access to healthcare and preventive education.^[2]

Nicotine dependency is a critical factor influencing both the intensity and frequency of tobacco use. High dependency levels often result in prolonged and frequent use, escalating the exposure to harmful chemicals in tobacco products and, consequently, the risk of developing oral lesions.^[3] The Fagerstrom test for nicotine dependence (FTND), a widely used tool for assessing nicotine dependency, has been applied in various populations to understand patterns of addiction and its impact on health outcomes. Studies indicate that higher FTND scores correlate with more severe nicotine dependency, increasing the likelihood of tobacco-related diseases, including oral lesions.^[4] In tribal populations, a high dependency level may be compounded by factors, such as limited health literacy,

Address for correspondence: Dr. Atham Jonwal,
Department of Public Health Dentistry, Sri Aurobindo College of
Dentistry, Indore, Madhya Pradesh, India.
Email: drathamphd2022@gmail.com

Received: Jun. 14, 2025; **Accepted:** Jul. 15, 2025; **Published:** Jul. 25, 2025

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

How to cite this article: Jonwal A, Mishra P, Nagrajappa S, Gupta D, Sontakke S, Rani B. Oro-mucosal Lesion and Nicotine Dependency among Adult Tribal Population in Dhar District - A Cross-Sectional Study. J Res Adv Dent 2025;16(5):1-4.

Access this article online

Website:
www.jrad.co.in

DOI:
<https://doi.org/10.53064/jrad.2024.16.5.707>

sociocultural acceptability of tobacco use, and lack of access to cessation resources.^[5]

Oro-mucosal lesions range from benign conditions, such as leukoplakia (white patches) and Erythroplakia (red patches) to more severe lesions, such as oral submucous fibrosis, which is a progressive disease linked to tobacco and areca nut use.^[6] Many of these lesions are considered precancerous conditions; for instance, leukoplakia has been found to have a malignant transformation rate of around 2–3%, while Erythroplakia has a higher risk, estimated between 14% and 50%.^[7] Early identification and intervention for these conditions are critical for preventing progression to oral cancers, a major public health concern in India and other low-resource settings.^[8]

India is home to a large tribal population, which constitutes around 8.6% of the total population. The Dhar District, located in Madhya Pradesh, is among the regions with a significant tribal demographic. Studies on tribal health in India suggest that this group faces substantial health disparities, including higher rates of communicable and non-communicable diseases, lower access to healthcare, and socioeconomic barriers.^[9] Oral health is often neglected in tribal populations due to a combination of limited resources, lack of awareness, and sociocultural factors that contribute to a high prevalence of tobacco use.^[10] These factors make the tribal populations particularly vulnerable to oral health issues, including nicotine-induced lesions and cancers, with limited means of detection and treatment.

Despite the known risks associated with tobacco use and nicotine dependency, there is limited research focusing on the specific oral health challenges faced by tribal communities. Few studies have assessed the prevalence and types of Oro-mucosal lesions in these populations, as well as the impact of nicotine dependency on these conditions. This study seeks to fill this gap by examining the prevalence of Oro-mucosal lesions and levels of nicotine dependency among the adult tribal population in Dhar District. Understanding the extent and nature of these associations is critical for developing targeted interventions to reduce tobacco use and prevent oral diseases in these communities. This study aims to investigate the prevalence of Oro-mucosal lesions and their association with nicotine dependency among the adult tribal population in Dhar District, India, a community with unique socioeconomic, cultural, and healthcare access challenges that may influence both tobacco use and oral health outcomes.

MATERIALS AND METHODS

A cross-sectional study was conducted from the month of April 2023 to September 2023. The study population consisted of tribals of the Dhar District. Two hundred and ninety-six participants were selected by Simple random sampling. We divided the Dhar district under 13 different blocks. The institutional Ethical Committee of Sri Aurobindo College of Medical Sciences approved the study protocol. The written

informed consent was obtained from the participants either in Hindi or English language. A permission for conduct the study was obtained from the Chief Medical Health Officer, Dhar.

Sample size estimation

The sample size is calculated on the basis of the study conducted by Paul *et al.*^[11] The prevalence of tobacco use among the tribal population was found to be 74%. Sample size

is calculated by using the formula
$$\frac{Z^2 (1 - \alpha/2) \times p (1 - p)}{d^2}$$
. The Estimated Sample size was 296.

Inclusion criteria

1. Both male and female individuals in the age of 18 years and above
2. Individuals who consent to participate in the study and consent for oral examination
3. Study participants who practiced the habit minimum for a period of 1 year and still actively continuing the habit.

Exclusion criteria

1. Study participants with systemic diseases and under medication for the same
2. Study participants in which oral examination is not feasible
3. Participants with any communication disability.

A preformed structured pro forma was developed, consisting of sociodemographic details, adverse oral habits and oral hygiene practices, and tobacco consumption of study participants. The World Health Organization (WHO) pro forma 2013^[12] and Fagerstrom scale for smoking^[13] and modified Fagerstrom scale^[13] for smokeless tobacco (SLT) users. A pro forma for the collection of data were included: The WHO Oral Health Assessment form 2013 and pre-validated, pre-tested questionnaire were attached. Demographic details, such as name, age, gender, marital status, occupation, duration and frequency of tobacco use, and contact details, were recorded.

Before starting the clinical examination, informed consent was obtained by the study participants, after that, the clinical examination was done using dental diagnostic instruments under natural light/good illumination (American Dental Association Type III Examination). The examination was carried out by a single trained examiner. All the study participants were given oral health education.

The collection of the data on demographic details and tobacco consumption was recorded only who were above 18 years of age. Oro-mucosal lesion was accessed using the WHO pro forma for adults 2013. Data on nicotine dependency were collected using the Fagerstrom and Modified Fagerstrom scale. The Fagerstrom scale was used for study participants who were using the smoking type of tobacco. Modified Fagerstrom scale was used for study participants who were using the smokeless type of tobacco. The training and calibration of the investigator were done at the department, under the guidance of experts.

RESULTS

Table 1 shows the distribution of key demographic and socioeconomic characteristics among the study participants. The majority of participants were male (76.2%), with females comprising only 23.8%. The most prevalent age group was 46–60 years, accounting for 60.2% of participants, followed by those aged 31–45 years (16%). Educational attainment among participants was generally low, with over half (51.3%) being illiterate. Most participants (62.9%) belonged to the upper-lower socioeconomic status, reflecting the tribal population's economic challenges. The data highlight the vulnerability of this group, given their limited educational background and socioeconomic constraints, which may influence tobacco use and health outcomes.

Table 2 categorizes participants based on tobacco usage, types of tobacco consumed, and the prevalence of oral mucosal lesions. Of the total participants, 61.2% reported using tobacco

in some form, with SLT being the most common 48.6%, followed by smoking (36.6%), and mixed forms (15.4%). Oro-mucosal lesions were observed among tobacco users, with keratosis (62.8%) being the most frequent lesion. Other conditions included leukoplakia (15.8%), smoker's palate (9.3%), oral submucous fibrosis (9.3%), and oral squamous cell carcinoma (3.1%). This data emphasizes the significant health risks associated with tobacco use in the tribal population.

Table 3 shows that the most common oral mucosal lesion observed was keratosis, affecting 62.8% of participants, followed by leukoplakia in 15.8%. Smokers' palate and oral submucous fibrosis were each noted in 9.3% of the individuals, while oral squamous cell carcinoma was identified in 3.1% of cases. A statistically significant association was found between tobacco use and the presence of these oral mucosal lesions ($P = 0.01$), as determined by the Chi-square test ($P < 0.05$).

Table 4 shows the relationship between nicotine dependency and the presence of oral mucosal lesions. The odds ratio (OR) indicates that participants with very high nicotine dependency were twice as likely (OR = 2.01) to develop oral lesions compared to those with medium or low dependency. A significant proportion of those with very high dependency

Table 1: Demographic details and socioeconomic status in the study population

Variables	n (%)
Gender	
Male	138 (76.2)
Female	43 (23.76)
Age	
18–30 years (ref)	17 (9.3)
31–45 years	29 (16.0)
46–60 years	109 (60.2)
>60 years	26 (14.3)
Educational qualification	
Illiterate (ref)	93 (51.3)
Primary school	33 (18.2)
Middle school	14 (7.7)
High school	17 (9.3)
Intermediate or diploma	4 (2.2)
Graduate	18 (9.9)
Profession or honours	2 (1.1)
Occupation	
Unemployed (ref)	6 (3.3)
Elementary occupation	-
Plant and machine operators and assemblers	7 (3.86)
Craft and related trade workers	5 (2.76)
Skilled and related trade workers	31 (17.1)
Skilled agricultural and fishery workers	89 (49.1)
Skilled workers and shop and market sales workers	18 (9.9)
Clerks	6 (3.3)
Technicians and associate professionals	5 (2.76)
professionals	9 (4.9)
Legislators, senior officials, and managers	5 (2.7)
Socioeconomic status	
Lower (ref)	26 (14.3)
Upper lower	114 (62.9)
Lower middle	32 (17.6)
Upper middle	7 (3.86)
Upper	2 (1.1)

Table 2: Distribution of study subject among tobacco use, form, and presence of oral mucosal lesion

Variables	n (%)
Tobacco use	
Tobacco users	181 (61.2)
Non users	115 (38.8)
Form	
Smokeless	88 (48.6)
Smoking	66 (36.6)
Mixed	28 (15.4)

Table 3: Comparison of oro-mucosal lesions among tobacco users in the study population

Variables	n (%)	P-value
Keratosis	20 (62.8)	0.01*
Leukoplakia	5 (15.8)	
Smokers palate	3 (9.3)	
Oral submucous fibrosis	3 (9.3)	
Oral squamous cell carcinoma	1 (3.1)	

Test applied - Chi-square test. $P < 0.05$

Table 4: Correlation between oro-mucosal lesion and nicotine dependency among study subject

Nicotine dependency	Oro-mucosal lesion	OR
Very high	14 (70)	2.01
High	9 (40.9)	1.59
Medium	8 (6.0)	1.02
Low	1 (14.2)	0.87

Test applied=Regression analysis. OR: Odd's ratio

(70%) presented with lesions, highlighting the strong link between addiction severity and health outcomes. These findings suggest the need for targeted interventions to reduce nicotine dependency and prevent associated health complications in this high-risk population.

DISCUSSION

India, with its different types of ecosystem, is the home to a varied tribal community all over the place. These parts where they are inhabited constitute a major part of the economically deprived areas of the country. This study shows high prevalence of tobacco use among the study population in 13 different blocks of Dhar among adult tribal population. Gender, age group, educational status and marital status of the respondents were significantly associated with tobacco consumption. The use of tobacco consumption is higher in individual with lower education status.

Present Study revealed that the consumption of smoking tobacco was more predominant than the smokeless tobacco form the most commonly consumed. A study by Khan *et al.*^[14] from Gazipur, Bangladesh found results contrary to our findings that smoking was more prevalent than smokeless tobacco consumption. Difference might be due to different geographical location and socio-demographic characters of the study population.

Rudrajit Paul *et al.*,^[11] was found that more than 60% of the subjects used some form of tobacco.

Male subjects also had higher tobacco dependence. Daily tobacco use frequency was positively correlated with tobacco dependence score, which is similar to our present study. In other study that participants shows the grades III and IV of dependence, and which is different in our study as grade II and grade III shows higher nicotine dependence.

Ritik Agrawal *et al.*,^[15] was found that the overall prevalence of SLT use among tribal to be approximately 32% and a study conducted among the “Mishing” tribe of Assam showed a higher prevalence (48.5%).

A study conducted by Thakur *et al.*^[16] revealed that khaini was the most commonly used form of SLT (46.5%) which is almost similar to the results of our present study.

The probable reason for this difference could be regional and socio-cultural characteristics.

Here, it is worth noting that the SLT consumption among tribes is much greater than that of the general population (21.4%) in India, as reported by GATS-2.^[17]

A study conducted by Verma P *et al.*,^[18] shows high prevalence of tobacco use among the study population of Narayanganj block of Mandla districts. The prevalence of any form of tobacco consumption was 43.38%, However in our study found that 61.2% of study population was using tobacco in different forms.

NFHS – 4 19 reports the prevalence of any form of tobacco use as 59.5% in men and 10.4% in women in the age group of 13 to 49 years in Madhya Pradesh, while in our study area it was found to be 76.2% among male and 23.76 % among female.

CONCLUSION

This study shows the burden of tobacco use and nicotine dependency along with Oro-mucosal lesion, which can help in tailoring the tobacco control program among the tribal population. It was concluded that there was significantly higher use of tobacco seen among males in the tribal population compared to females and keratosis was the most commonly involved Oro-mucosal lesion, followed by leukoplakia.

REFERENCES

- Gupta B, Johnson NW, Kumar N. Global epidemiology of head and neck cancers: A continuing challenge. *Oncology* 2013;85:10-6.
- ICMR-NCIDR. National Cancer Registry Programme Report, 2020. Indian Council of Medical Research; 2020.
- WHO. WHO Report on the Global Tobacco Epidemic, 2008: The MPOWER Package. Geneva: WHO Press; 2008.
- Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The fagerström test for nicotine dependence: A revision of the Fagerström tolerance questionnaire. *Br J Addict* 1991;86:1119-27.
- Rani M, Bonu S, Jha P, Nguyen SN, Jamjoum L. Tobacco use in India: Prevalence and predictors of smoking and chewing in a national cross sectional household survey. *Tob Control* 2003;12:e4.
- Warnakulasuriya S, Greenspan JS, Greenspan D. Epidemiology of oral mucosal lesions in HIV-infected patients in India and Uganda. *J Oral Pathol Med* 2010;39:345-55.
- Silverman S Jr., Gorsky M, Lozada F. Oral leukoplakia and malignant transformation. A follow-up study of 257 patients. *Cancer* 1996;53:563-8.
- Sankaranarayanan R, Ramadas K, Thomas G, Muwonge R, Thara S, Mathew B, *et al.* Effect of screening on oral cancer mortality in Kerala, India: A cluster-randomised controlled trial. *Lancet* 2005;365:1927-33.
- Subramanian S, Sankaranarayanan R, Boffetta P. Oral cancer in India: An epidemiologic and clinical review. *Oral Oncol* 2015;51:385-93.
- Reddy KS, Gupta PC. Report on Tobacco Control in India. New Delhi: Ministry of Health and Family Welfare, Government of India; 2004.
- Paul R, Som K, Thakur I, Bandyopadhyay D. Tobacco product use in tribal population of west bengal with special emphasis on tobacco dependence score: A hospital-based study. *JIACM* 2018;19:251-55.
- World Health Organization. Oral Health Surveys: Basic Methods. 5th ed. Geneva: World Health Organization; 2013.
- Rustin TA. Assessing nicotine dependence. *Am Family Phys* 2000;62:579-84, 591-2.
- Khan NR, Mahmood AR. Pattern of tobacco consumption and related factors among the people residing in a rural area of Sripur Upazila, Gajipur District, Bangladesh. *Bangladesh Med J* 2015;44:32-7.
- Agrawal R, Goel S, Lal P, Singh RJ, Garg PK. Prevalence and pattern of smokeless tobacco use among tribal population: A community-based cross-sectional study in India. *J Family Med Prim Care* 2019;8:2312-7.
- Thakur D, Gupta T, Thakur A, Mazta SR, Sharma D, Verma AK. Prevalence and pattern of tobacco use among the school-going adolescent students of North India: A cross-sectional study. *J Family Med Prim Care* 2014;3:519-23.
- Ministry of Health and Family Welfare (MoHFW), Government of India. Global Adult Tobacco Survey: GATS 2 India 2016–17 Report.
- Verma P, Saklecha D, Kasar PK. A study on prevalence of tobacco consumption in tribal district of Madhya Pradesh. *Int J Community Med Public Health* 2018;5:76-80.
- NFHS-4 Factsheet - District Level Household and Facility Survey. Available from: https://www.rchiips.org/nfhs/pdf/nfhs4/mp_factsheet.pdf [Last accessed on 2017 Mar 18].