



A Study on Tobacco Induced Oral Cavity Diseases

K. Ram Prasad¹, Shreya Udutha², Balaji Thangella³, Akshara Mittapally⁴, Mohammad Moiz Idris⁵, A. Rama Narsimha Reddy^{6*}

¹Professor, Faculty of Pharmaceutical Sciences, Roorkee, Haridwar, Uttarakhand-247661

^{2,3,4,5,6}Sree Chaitanya Institute of Pharmaceutical Sciences, LMD colony, Timmapur, Karimnagar, Telangana State-505427.

Received: 29 May 2025/ Accepted: 2 Jun 2025 / Published online: 1 Oct 2025

*Corresponding Author Email: ramprasad8555@yahoo.com

Abstract

Tobacco use remains one of the leading preventable causes of morbidity globally and is strongly associated with a wide spectrum of oral cavity diseases. This study aimed to evaluate the prevalence, pattern, and severity of tobacco-induced oral lesions among individuals attending the dental outpatient department of a District Government Hospital in Karimnagar. A prospective observational study was conducted among 150 patients with a history of either smoking or smokeless tobacco use. Data were collected using a structured Tobacco Assessment Form (TAF), including demographic details, type and duration of tobacco exposure, and findings from systematic oral examinations. Statistical analysis was performed using Two-Way ANOVA. The major oral conditions identified included oral submucous fibrosis (OSMF) (30%), periodontitis (23.34%), oral carcinoma (20%), smoker's palate (13.34%), leukoplakia (10%), and erythroplakia (3.4%). OSMF was more prevalent among males (80%) than females (20%). Smoking was more common (57.34%) than chewing tobacco (51%). Two-Way ANOVA revealed that both the type of tobacco product and mode of use significantly influenced oral disease occurrence ($p < 0.05$). This study demonstrates a strong association between tobacco consumption and potentially malignant and malignant disorders of the oral cavity. Early detection, community-based screening, and intensified tobacco cessation programs are essential to reduce disease progression and improve oral health outcomes.

Keywords

Tobacco, Oral Submucous Fibrosis, Smoking, Chewing Tobacco, Oral Carcinoma, Periodontitis, Epidemiology.

INTRODUCTION

Tobacco use continues to be a major public health challenge, especially in developing countries such as India, where both smoked and smokeless forms of tobacco are widely consumed [1]. The oral cavity is the first point of contact for tobacco carcinogens, making it highly susceptible to a range of pathological changes, from reversible inflammatory

conditions to potentially malignant disorders (PMDs) and frank malignancies.

According to global health estimates, tobacco accounts for millions of deaths annually and contributes substantially to oral cancer incidence worldwide [2]. In South Asia, the burden is disproportionately higher due to cultural habits such as chewing betel quid, gutkha, khaini, and other tobacco preparations. Smokers are significantly

more prone to developing periodontal disease, leukoplakia, smoker's palate, and oral sub mucous fibrosis [8].

Despite extensive research, early diagnosis remains inadequate due to lack of awareness, delayed reporting, and socio-economic barriers [9]. This study was undertaken to systematically evaluate the prevalence and distribution of tobacco-associated oral diseases in a hospital-based population and to analyze contributing factors such as age, gender, mode of consumption, and type of product used [10]. A comprehensive understanding of these patterns is essential for designing targeted public health interventions and strengthening tobacco cessation strategies.

METHODOLOGY

Study Design: Prospective observational study.

Study Center: District Government Hospital, Karimnagar.

Study Duration: 6 months.

Sample Size: 150 patients.

Inclusion Criteria:

- Individuals with a history of tobacco smoking or chewing.
- Both male and female patients.

Exclusion Criteria:

- Non-tobacco users.
- Patients unwilling to participate.

Data Collection:

A structured Tobacco Assessment Form (TAF) was used to record demographic information, type of tobacco exposure, frequency of use, duration, and detailed findings of oral examination. The clinical evaluation included inspection for trismus, mucosal changes, ulcerations, fibrotic bands, pigmentation, patches, and tumor-like growths.

Statistical Analysis:

Two-Way ANOVA was applied to determine the influence of tobacco type and mode of consumption on disease prevalence. A p-value < 0.05 was considered statistically significant.

RESULTS

Table 1: Data Based on Tobacco Induced Oral Diseases:

Oral Diseases	No. of Cases
Periodontitis	35
Oral Submucosal Fibrosis	45
Carcinoma	30
Leukoplakia	15
Erythroplakia	5
Smoker's palate	20

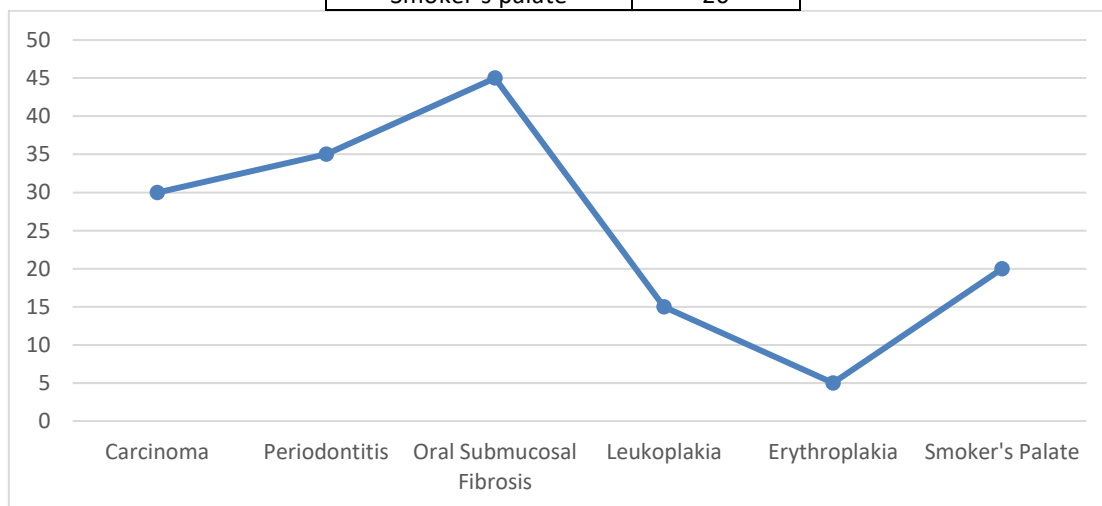
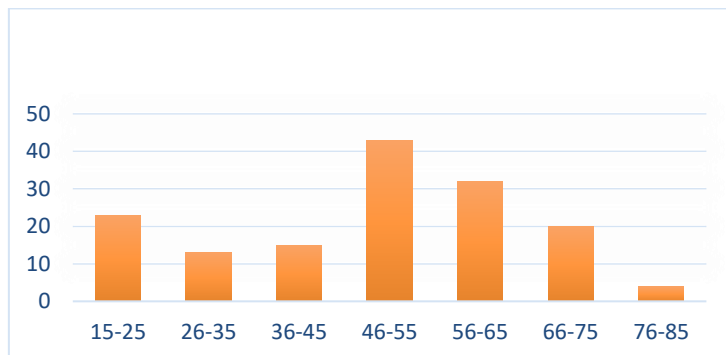


Figure 1: Graphical Representation of data based on Tobacco Induced Oral Diseases:

Out of 150 cases involved in this study, carcinoma were 30 cases (20%), OSMF were 45 cases (30%), periodontitis were 35 cases (23.34%), leukoplakia were 15 cases (10%), erythroplakia were 5 cases (3.4%), smoker's palate were 20 cases (13.34%).

Table 2: Data Based on Age:

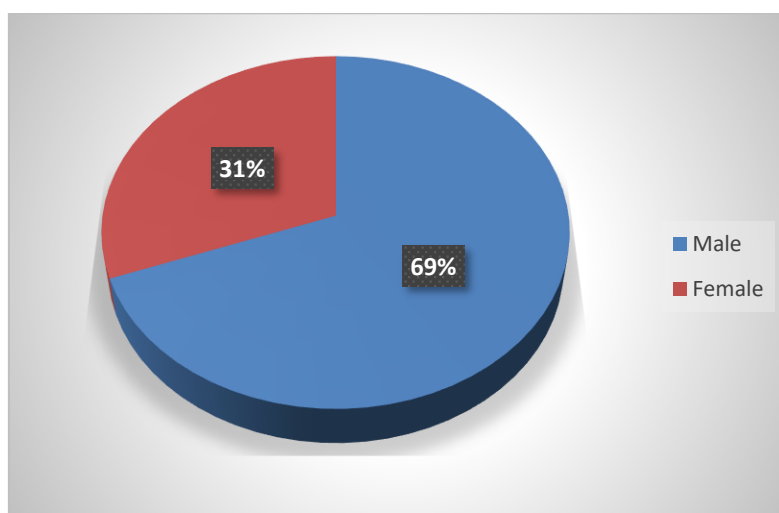
Age in years	No. of Cases
15-25	23
26-35	13
36-45	15
46-55	43
56-65	32
66-75	20
76-85	4


Figure 2: Graphical Representation of data based on Age:

Out of 150 patients involved in the study, patients of the age group, 15-25 years 23 (15.34%), 26-35 years are 13 (8.67%), 36-45 years are 15 (10%), 46-55 years are 43 (28.67%), 56-65 years are 32 (21.34%), 66-75 years are 20 (13.34%), 76-85 years are 4 (2.67%) respectively.

Table 3: Data Based on Gender:

Gender	No. of Cases
Male	104
Female	46


Figure 3: Graphical Representation of data based on Gender

Based on gender, out of 150 cases involved in this study, male was 104 (69%), female was 46 (31%).

Table 4: Data Based on Modes Of Use

Modes of Use	No. of Cases
Smoking	86
Chewing	81

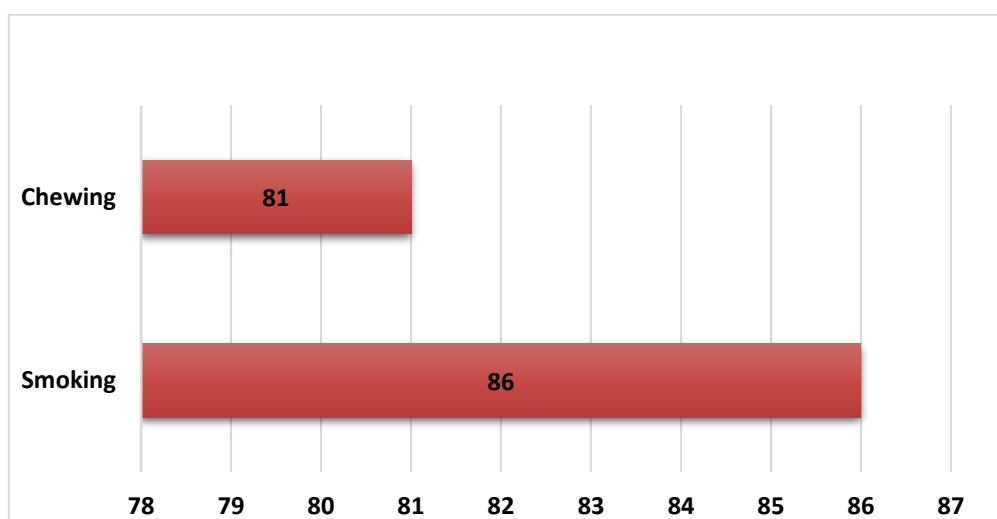


Figure 4: Graphical Representation of data based on modes of use

Based on the modes of use of tobacco products, Smoking were 86 cases (57.34%), chewing were 81 cases (51%).

Two-Way ANOVA revealed statistically significant effects of both row and column factors on disease occurrence ($p < 0.05$), confirming a strong relationship between tobacco exposure variables and oral morbidity.

DISCUSSION

The findings of this study demonstrate a significant burden of tobacco-related oral diseases in the target population. OSMF emerged as the most common lesion, consistent with numerous studies showing the strong association between areca nut-based smokeless tobacco products and sub mucosal fibrosis.

Periodontitis prevalence was high among smokers, supporting evidence that nicotine alters host immune response, reduces vascularity, and accelerates periodontal destruction. Oral carcinoma accounted for 20% of cases, reinforcing the established role of tobacco as a major etiological agent in head-and-neck cancers.

Leukoplakia and erythroplakia, both considered PMDs, were present in a substantial proportion of patients. These lesions require vigilant monitoring due to their malignant transformation risk.

The study further confirms that males are more affected due to higher tobacco consumption rates. The age group most impacted (46–55 years) aligns with the timeframe of cumulative exposure.

The significant ANOVA results highlight that both the type of tobacco (smoked vs. smokeless) and the mode of use are critical determinants of oral disease development. Public health programs must focus on behavioral modification, early screening, and cessation support.

CONCLUSION

Tobacco-induced oral diseases represent a major health challenge with serious long-term consequences. This study highlights a high prevalence of OSMF, periodontitis, leukoplakia, erythroplakia, smoker's palate, and oral carcinoma among tobacco users. The strong correlation between type of tobacco exposure and disease occurrence underscores the need for robust prevention strategies, public awareness campaigns, and early intervention.

Comprehensive community-based screening and structured cessation counseling should be integrated into routine healthcare delivery to reduce disease burden and prevent malignant transformation.

REFERENCES

1. Mahapatra, Shilpa et al. Influence of Tobacco Chewing on Oral Health: A Hospital-Based Cross-Sectional Study in Odisha. *Indian Journal of Public Health* 62(4): p 282-286, Oct–Dec 2018.
2. Wang M, Duan C, Wei Y, Xu X. Prevalence of oral submucous fibrosis across diverse populations: a systematic review and meta-analysis. *PeerJ*. 2024 Nov 6;12: e18385. DOI 10.7717/peerj.18385
3. Porto UN, et al. Leukoplakia and Erythroplakia in Youngers Versus Older Individuals: a Clinicopathological Retrospective Study. *Med Oral Patol Oral Cir Buccal*. 2024 Sep 1;29(5): e665-e672. PubMed PMID: 39088712. https://www.unboundmedicine.com/medline/citation/39088712/Leukoplakia_and_erythroplakia
4. Roza AL, Kowalski LP, William Jr WN, de Castro Jr G, Chaves AL, Araújo AL, Ribeiro AC, Brandão TB, Lopes MA, Vargas PA, Santos-Silva AR. Latin American Cooperative Oncology Group-Brazilian Group of Head and Neck Cancer. Oral leukoplakia and erythroplakia in young patients: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2021

- Jan;131(1):73-84.
<https://doi.org/10.1016/j.oooo.2020.09.002>.
5. Chaudhry K, Bali R, Patnana AK, Bindra S, Jain G, Sharma PP. Impact of oral submucous fibrosis on quality of life: a cross-sectional study. *Journal of Maxillofacial and Oral Surgery* 2019 Jun 1;18: 260-5.
<https://doi.org/10.1007/s12663-018-1114-3>.
 6. Dos Santos RB, Katz J. Nicotinic stomatitis: Positive correlation with heat in maté tea drinks and smoking. *Quintessence International*. 2009 Jul 1;40(7).
<https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authType=cr>
 7. Banthia R, Jain P, Jain AK, Belludi SA, Agarwal N, Patidar M. Evaluation of the association between periodontal disease and total cancer risk: A cross-sectional study. *Dental and medical problems*. 2024;61(6):843-50.
<https://pubmed.ncbi.nlm.nih.gov/39655562/>.
 8. Gupta, Sanjay1; Gupta, Ruchika1; Sinha, Dharendra N.3; Mehrotra, Ravi2. Relationship between type of smokeless tobacco & risk of cancer: A systematic review. *Indian Journal of Medical Research* 148(1): p 56-76, July 2018. | DOI: 10.4103/ijmr.IJMR_2023_17.
https://journals.lww.com/ijmr/fulltext/2018/48010/relationship_between_type_of_smokeless
 9. Deshmukh S, Ghooli S, Kurle RS. Knowledge, attitude, and practice of gutkha chewing among youth in Hiroli village of Kalaburagi district. *Int J Community Med Public Health*. 2019 Mar;6: 1324-8. *International Journal of Community Medicine and Public Health* 6(3):1324
 DOI:10.18203/2394-6040.ijcmph20190634
 10. Souto ML, Rovai ES, Villar CC, Braga MM, Pannuti CM. Effect of smoking cessation on tooth loss: a systematic review with meta-analysis. *BMC oral health*. 2019 Dec; 19:1.
<https://doi.org/10.1186/s12903-019-0930-2>.
 11. Textbook of Periodontics by Shanu Bathla 1 st edition Chapter-16: Smoking and Periodontium page no: 150.
 12. Textbook of Periodontics by Shanu Bathla 1 st edition Chapter-6: Periodontal Diseases page no: 49.
 13. Textbook of Human Anatomy Volume-3, by BD Chaurasia 8 th edition Chapter 14: Mouth and Pharynx page no: 246 (oral cavity).
 14. Mishra S, Mishra MB. Tobacco: its historical, cultural, oral, and periodontal health association. *Journal of International Society of Preventive and Community Dentistry*. 2013 Jan 1;3(1):12-8.
<https://pmc.ncbi.nlm.nih.gov/articles/PMC3894096/>.
 15. Gajendra S, McIntosh S, Ghosh S. Effects of tobacco product use on oral health and the role of oral healthcare providers in cessation: A narrative review. *Tob Induce Dis*. 2023 Jan 25;21: 12. doi: 10.18332/tid/157203. PMID: 36741542; PMCID: PMC 9875717.
<https://pmc.ncbi.nlm.nih.gov/articles/PMC9875717/>.
 16. Dubal, Mrunali; Nayak, Ajay1; Suragimath, Ashwinirani1; Sande, Abhijeet1; Kandagal, Suresh1. Analysis of smoking habits in patients with varying grades of smoker's palate in South Western region of Maharashtra. *Journal of Oral Research and Review* 7(1): p 12-15, Jan–Jun 2015. | DOI: 10.4103/2249-4987.160171.
https://journals.lww.com/jorr/fulltext/2015/07010/Analysis_of_smoking_habits_in_patients_with.3.aspx.
 17. Soares AC, Gomes AP, Calderipe CB, Salum FG, Cherubini K, Martins MD, Schuch LF, Kirschnick LB, Abreu LG, Santos- Silva AR, Vasconcelos AC. Oral leukoplakia and erythroplakia in young patients: a southern Brazilian multicentre study. *Brazilian Oral Research*. 2024 Aug 5;38: e069.
<https://www.scielo.br/j/bor/a/dwJn9TSwqJGDZ65mgwx9zVQ/>.
 18. Divya, Bose; Vasanthi, V.; Ramadoss, Ramya1; Kumar, A. Ramesh; Rajkumar, Krishnan. Clinicopathological characteristics of oral squamous cell carcinoma arising from oral submucous fibrosis: A systematic review. *Journal of Cancer Research and Therapeutics* 19(3): p 537-542, Apr–Jun 2023. | DOI: 10.4103/jcrt.jcrt_1467_21.
https://journals.lww.com/cancerjournal/fulltext/2023/19030/Clinicopathological_characteristics_of_oral.4.aspx.
 19. Khan Z, Tönnies J, Müller S. Smokeless tobacco and oral cancer in South Asia: a systematic review with meta- analysis. *Journal of cancer epidemiology* 2014;2014(1):394696.
<https://onlinelibrary.wiley.com/doi/abs/10.1155/2014/394696>.
 20. Niaz K, Maqbool F, Khan F, Bahadar H, Ismail Hassan F, Abdollahi M. Smokeless tobacco (paan and gutkha) consumption, prevalence, and contribution to oral cancer. *Epidemiol Health*. 2017 Mar 9;39: e2017009. doi: 10.4178/epih.e 2017009. PMID: 28292008; PMCID: PMC5543298.
<https://pmc.ncbi.nlm.nih.gov/articles/PMC5543298/>.