

LOCALIZED GINGIVAL RECESSON ASSOCIATED WITH SMOKELESS TOBACCO PLACEMENT IN THE ORAL CAVITY: A PAIRED COMPARISON STUDY

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ABSTRACT

OBJECTIVES

This study aimed to identify the association between smokeless tobacco consumption and localised gingival recession in the oral cavity.

METHODOLOGY

A paired comparison study was conducted in the Oral Diagnosis Departments of Dow University of Health Sciences between 2019 and 2022. In the convenience sampling, 380 participants provided informed consent, and data were collected using a closed-ended questionnaire. Gingival recession was evaluated using the CPITN probe (community periodontal index of treatment needs) procedure with Miller's classification. Data was analysed with SPSS 26 for descriptive and analytical statistics.

RESULTS

The gingival recession was more prevalent on the side exposed to chewing tobacco ($p=0.019$). Variables such as age and smoking also showed statistically significant results with gingival recession ($P<0.001$). Binary logistic regression analysis demonstrated that chewing tobacco habits were significantly associated with gingival recession ($B = 1.063$, $SE = 0.265$, $Wald = 16.151$, $p < 0.001$). The odds ratio indicated that individuals with a chewing tobacco habit had 0.345 times the odds of the outcome compared with those without the habit.

CONCLUSION

Smokeless tobacco consumption is strongly associated with gingival recession.

KEYWORDS: Smokeless Tobacco, Chewing Tobacco, Oral Tobacco, Gingival Recession, Receding Gums

INTRODUCTION

The apical displacement of the gingival margin from the cement-enamel junction is known as gingival recession, a common oral health condition.¹ Gingival recession can be a consequence of chronic oral and periodontal diseases, which can even lead to significant tooth loss.² Gingival recession is also linked to multiple systemic diseases such as diabetes, hypertension, and heart issues.^{3,4} Products like chewing tobacco, snuff, betel quid with tobacco, and paan are all considered smokeless tobacco (SLT).⁵ People who use SLT are more likely to get high levels of nitrosoproline, nitroso-diethanol-amine, and other nitrosamines, which can cause significant chemical harm to gingival and mucosal tissues, leading to gingival recession.⁸ It is estimated that 600,000,000 individuals chew SLT worldwide. In Pakistan, regular use of SLT in the forms of paan, betel nut, gutka, niswar, and khaini/tumbaku is accepted and regarded as a typical cultural custom.⁹ The

Pakistan Demographic and Health Survey 2017–18 found that 3.4% of women and 14.6% of men aged 15–49 use SLT in some capacity. In Pakistan, betel quid with tobacco (paan), gutka, naswar, dry packet, mawa/mainpuri, and betel nut are the most widely used forms of SLT. Over the past few decades, appealing sachets of SLT, particularly betel quid and Gutka alternatives, have become more popular and accessible. Despite being cleverly marketed as having risks to oral health, the young and old, as well as some immigrants, continue to use them. SLT has been shown to impose a high socioeconomic cost on society and the country; this burden can be reduced through awareness campaigns and targeted policymaking.¹¹ The purpose of this study was to determine whether tobacco use was linked to localised gingival recession in the oral cavity. This study also assisted in evaluating several demographic and socioeconomic factors related to dental recession and participants' preferences for the type of smokeless tobacco they used, as no such

comprehensive study has been conducted in our local population.

METHODOLOGY

A paired-comparison design study was conducted from February to March 2022 to compare the exposed side of the oral cavity due to smokeless tobacco use and its association with gingival recession at the Oral Diagnosis Department of all dental colleges of Dow University of Health Sciences. (Ishrat-ul-Ibad Khan Institute of Oral Health Sciences, Dow Dental College, and Dow International Dental College). The ethical certificate reference number is Ref No. DIKIOHS/PROJ-APPROVED/2018/09-19, Dated: 19-09-2018. The sample size was calculated using OpenEpi with a gingival recession frequency of 43.51% in our community, a 95% confidence interval, and a 5% margin of error, yielding a minimum of 378 samples.¹² Before the commencement of the study, the examiner received training for the assessment of gingival recession using Miller's classification and the use of the Community Periodontal Index of Treatment Needs (CPITN) probe under the supervision of a periodontist. To ensure consistency of clinical measurements, intra-examiner reliability was evaluated by re-examining a subset of patients at different times, and satisfactory agreement was achieved.¹² For this study, 380 participants were enrolled with convenience sampling who provided informed consent, including both genders and smokeless tobacco users for years, dentate or partially dentate males and females between 18 and 50 years of age. Edentate patients, cigarette smokers, or patients with any systemic disease were excluded from the study. Participants with systemic diseases were excluded to control for confounding variables, as systemic conditions may independently influence periodontal status and gingival recession. Data was collected using a closed-ended questionnaire.¹³ For this study, the exposed site was defined as the intraoral location where the participant habitually placed smokeless tobacco (most commonly the buccal vestibule or gingivobuccal sulcus). This information was obtained through the questionnaire and patient self-report. The unexposed site was defined as the contralateral side of the oral cavity where tobacco placement was not reported. 380 patients were evaluated for gingival recession on tobacco on both exposed and unexposed sites of the oral cavity with the CPITN probe (community periodontal index of treatment needs) procedure using Miller's classification in every patient. According to Miller, there are four classes of gingival recession. Class I gingival recession that does not extend to the junction of mucosa and

gingiva, Class II gingival recession that extends to or beyond the junction of mucosa and gingiva, with no periodontal attachment loss. Class III gingival recession that extends to or beyond the junction of mucosa and gingiva with periodontal attachment loss in the interdental area or malalignment of the teeth. Class IV gingival recession that extends to or beyond the mucogingival junction with severe bone or soft-tissue loss in the interdental area and/or severe malpositioning of the teeth.¹³ A single trained examiner performed all clinical examinations. Statistical analysis was performed using SPSS 26, and the data were subjected to descriptive and analytical statistics.

RESULTS

Out of the 380 study population, 245 (64.4%) were males, and 135 (35.5%) were females. Most participants were in the 28-37 age group (54.47%). Males had more gingival recession on the exposed site than females, though the difference was not statistically significant. Most of the study participants were paan consumers (31.8%) and kept the tobacco pouch at the right upper posterior area of the oral cavity (43.6%). (Table 1) Three fifty-six (93.6%) of the samples showed eight times more prevalence of gingival recession on the exposed side than the non-exposed side of the oral cavity. Most of the participants had a habit of tobacco chewing 10-13 times a day (37.3%), and almost 80% had tooth sensitivity in the exposed area. (Table 2) The association between chewing tobacco habits and gingival recession was assessed using the McNemar test. A significant difference was observed between the tobacco-exposed and non-exposed sides of the oral cavity ($p = 0.019$), indicating that gingival recession was more prevalent on the side exposed to chewing tobacco. Variables such as age and smoking also showed statistically significant results with gingival recession. (Table 3) Binary logistic regression was conducted to examine the association between smoking habit and gingival recession, yielding smoking as a nonsignificant predictor ($B = 0.071$, $SE = 0.309$, $Wald = 0.053$, $p = 0.817$). The odds ratio suggested that smokers had 1.07 times higher odds of gingival recession than non-smokers, but this association was not statistically significant. (Table 4a) Binary logistic regression analysis demonstrated that chewing tobacco habits were significantly associated with gingival recession ($B = 1.063$, $SE = 0.265$, $Wald = 16.151$, $p < 0.001$). The model explained 6.4%–8.6% of the variance in gingival recession. The odds ratio indicated that individuals with a chewing tobacco habit had 0.345 times the odds of the outcome compared with those without the habit. (Table 4b)

Table 1: Socioeconomic details of the participants (N=380)

Variable	n	%age
Gender		
Male	245	64.4
Female	135	35.5
Age		
18 – 27 Years Old	91	23.9
28 – 37 Years Old	207	54.4
38 – 50 Years Old	82	21.5
Education Level		
None	47	12.3
Primary	36	9.4
Middle	90	23.6
Matric	78	20.5
Graduation	110	28.9
Master	19	5.0
Profession		
Unemployed	152	40
Employed	149	39.2
Self Employed	79	20.7
Dental Visits		
Never Visited	211	55.5
Every Three Months	27	7.1
Every Six Months	47	12.3
Every Year	95	25

Table 2: Chewing habits and dental details of the patients (N=380)

	n	%age
Type of Chewing Tobacco		
All	10	2.6
Pan	121	31.8
Gutka	91	23.9
Bettelnutt	15	3.9
Snuff/niswar/khaini	89	23.4
pan and gutka	21	5.5
Gutka and khaini/snuff/niswar	08	2.1
Gutka/pan	17	4.4
Khaini/niswar/snuff		
Pan and Khaini/niswar/snuff	03	0.7
bettelnutt/khaini and niswa	05	1.3
Site of Chewing Tobacco in the Oral Cavity		
Upper right anterior	48	12.6
Upper right posterior	166	43.6
Upper left posterior	86	22.6
Lower right anterior	16	4.2
Lower right posterior	60	15.7
Lower left posterior	04	0.1
Sleeping Habits with Tobacco in the Oral Cavity	56	14.7
Duration of Use of Tobacco in years intervals		
0-4 years	79	20.7
5-7 years	116	30.5
8-12years	110	28.9
13-17years	52	13.6
18-22 years	20	5.2
23-25years	01	0.02
25-28years	02	0.5
Frequency of Use of Tobacco in intervals		
2-4 times a day	30	7.8
5-8 times a day	69	18.1
10-13 times a day	142	37.3
15-18 times a day	82	21.0
19-20 times a day	42	11.0
21-25 times a day	14	3.6
26-30 times a day	01	0.02

Gingival Recession		
tobacco-exposed site	356	93.6
tobacco-unexposed site	42	11.1
Teeth Sensitivity		
tobacco-exposed site	306	80.5
tobacco-unexposed site	40	10.5
Tooth Mobility		
tobacco-exposed site	131	34.5
tobacco-unexposed site	16	4.2
Grading of GR on the tobacco-exposed site		
Grade 0	24	6.3
Miller's Class 1	192	50.5
Miller's Class 2	132	34.7
Miller's Class 3	32	8.4
Grading of GR on the tobacco-unexposed site		
Grade 0	363	95.5
Miller's Class 1	00	00
Miller's Class 2	05	1.3
Miller's Class 3	02	0.5

Table 3: Variables Associated with Gingival Recession in the Oral Cavity

Characteristics	Gingival Recession		p- value
	Yes	No	
Chewing Tobacco			0.019*
Yes	92	36	
No	60	68	
Smoking			P<0.001*
Yes	34	22	
No	118	82	
Gender			0.08
Male	137	92	
Female	77	74	
Age	40.74±12.96	33.24±10.11	P<0.001*

Note: McNemar's test and Paired sample T test applied,
* statistically significant p-value (p < 0.05)

Table 4A: Binary Logistic Regression Analysis of Smoking Habit as a Predictor of Gingival Recession

Predictor Variable	B	SE	Wald	p-value	OR (Exp B)
Smoking Habit	0.071	0.309	0.053	0.817	1.074
Constant	0.364	0.144	6.409	0.011	1.439

Note: The cut-off value for predicted probabilities was 0.5. OR = odds ratio; SE = standard error.

Table 4B: Logistic Regression Analysis for the Association Between Chewing Tobacco Habits and Gingival Recession

Predictor Variable	B	SE	Wald	p-value	OR (Exp B)
Chewing Tobacco Habits	1.063	0.265	16.151	<0.001	0.345
Constant	0.125	0.177	0.499	0.480	1.133

DISCUSSION

As is known since ancient times, smokeless tobacco is considered an essential component of many South Asian societies and, despite occasional misinformation, is valued for its numerous therapeutic advantages.¹³ Our findings showed that the majority of people enjoy chewing snuff keepers, paan, and gutka separately regularly. According to a survey conducted among adults and adolescents in Karachi, Pakistan, 40% of the

population chewed at least one type of smokeless tobacco product daily, including betel, areca nut, and paan, snuff, betel quid, or gutka. According to the poll, over 60% of men and 38% of women chew smokeless tobacco from an early age, which is similar to our results.¹⁴ A Taiwanese epidemiological survey found that men chew smokeless tobacco at a higher rate than women (9.8 versus 1.6 per cent), which is not consistent with our statistics, as no significant difference occurred on a gender basis in our study.¹⁵ The reason could be that tobacco chewing is a tradition rather than a habit in some cultural classes. Our data also shows that more young individuals consume smokeless tobacco, and similar findings are stated in another survey claiming that Karachi has a greater incidence of oral disorders in youth, as the young population is indulging in such activities, and numbers are growing each day.¹⁶ Such habits are additionally related to many oral health issues.¹⁷ The geographic predominance of these facts is correlated with the frequency of 58% of head and neck pathologies worldwide occurring in South Asia, particularly in Karachi, Pakistan. According to time trend research, the incidence of both deadly and non-fatal diseases of the oral cavity is gradually increasing in Pakistan, particularly in Karachi, due to inappropriate addictions and habits.¹⁸ A survey conducted in Pakistan revealed that almost 40% of tobacco chewers have significant gingival recession (98%).¹⁹ Gingival recession was high among second-decade Indian gutka consumers. There were reports of surveys indicating a high prevalence of tobacco-related oral diseases in the second and third decades.^{20, 21} The duration and frequency of smokeless tobacco use during the day were also identified as important factors in our study. Once we considered the age to start SLT, 60% of participants in our study started smoking and tobacco chewing at a young age,²² Similarly, most of the members in the study were using tobacco for 5-7 years. According to another research, those who have been using smokeless tobacco for more than 15 years have a higher incidence of oral disease and are more likely to have it than those who do not.²³ Our study demonstrated a higher chance of gingival recessions in the tobacco-introduced sites of the oral cavity. Similar to our results in a study by Kopperud, Snus (moist tobacco)- induced gingival lesions were observed more frequently (79.2%) among daily snus users. The odds of dental retraction were 34% higher with each year of snus use. Most of the adolescents had snus-induced lesions, with one-fifth having gingival recessions.²⁴ Nimbal also documented that gingival bleeding, pocket depth, and attachment loss in teeth are strongly associated with smokeless tobacco keratosis (STK) compared to teeth at the contralateral sides of the arch. The duration of tobacco use had a significant effect on

the severity of loss of attachment at the tobacco pouch keratosis side.²⁵ In addition, Muthukrishnan declared that dental mobility on the exposed side is high (91 per cent) compared to the unexposed side (31 per cent), which is likewise high according to another study. Gingival recession and tooth sensitivity are closely related, especially on the tobacco-exposed side of the oral cavity. This is because, as the tooth loses gingiva due to bone and root surface exposure, it becomes more sensitive.²⁶ Ahad documented that the highest risk of gingival recession is associated with the dual habit of both smoking and tobacco use. These findings emphasise that individuals with dual habits have an additional risk for periodontal destruction.²⁷ The results of the analysis demonstrated that chewing tobacco habits are significantly associated with gingival recession. An even stronger association has been observed with SLT chewing compared with cigarette smoking for gingival recession in our study. Trullenque also identified that the smoking of any kind increases gum issues with probing pocket depth (≥ 4 mm) in late adolescence and young adulthood.²⁸ Thwin also conducted his oral health survey on the periodontal status and risk factors, concluding that gingival recession and gingivitis are 38-44% compounded with periodontal complications among tobacco chewers and smokers in older adults.²⁹

LIMITATIONS

Our research is a small sample-sized study conducted only in an urban area. As the use of tobacco is increasing in both rural and urban settings, among all ages, across all ethnic groups and genders, such studies must be conducted to get a clear status of the condition. Additionally, multiple seminars and programs should be organized to raise awareness of this important issue.

CONCLUSIONS

Smokeless tobacco has been strongly associated with gingival recession, with 8 times the risk in the exposed area of the oral cavity.

CONFLICT OF INTEREST: None

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REFERENCES

1. Fiorellini JP, Stathopoulou PG, Naik DG, Uppoor A. Clinical features of gingivitis. In: Newman MG, Takei HH, Klokkevold PR, Carranza FA, editors. Newman and Carranza's clinical periodontology. 4th South Asia ed. Philadelphia: Elsevier; 2024. p.158.

2. Kulkarni V, Uttamani JR, Bhatavadekar NB. Comparison of clinical periodontal status among habitual smokeless tobacco users and cigarette smokers. *Int Dent J*. 2016;66(1):29-35. <https://doi.org/10.1111/idj.12192> PMID: 26488996.
3. Albandar JM, Rams TE. Global epidemiology of periodontal diseases: an overview. *Periodontol* 2000. 2002;29(1):7-10. <https://doi.org/10.1034/j.1600-0757.2002.290101.x> PMID: 12102702.
4. Shahid M, Srivastava S, Shukla P, Yadav R, Sajid M, Kumar A, et al. Characterisation of physicochemical parameters and their effect on microbial content of smokeless tobacco products marketed in North India. *Indian J Med Res*. 2023;158(5-6):542-551. https://doi.org/10.4103/ijmr.ijmr_1467_22 PMID: 38341705.
5. Gombra V, Kaur M, Hasan S, Mansoori S. Smokeless tobacco and quid-associated localised lesions of the oral cavity: a cross-sectional study from a dental institute. *Dent Med Probl*. 2024;61(5):687-696. <https://doi.org/10.17219/dmp/152439>.
6. Quadri MFA, Kamel AM, Nayeem M, et al. Smokeless tobacco and periodontitis: a systematic review with meta-analysis. *J Periodontol Res*. 2024;59:1062-1070. <https://doi.org/10.1111/jre.13274> PMID: 38648212.
7. Nasir SM, Sultana T, Hashmi S, et al. Patterns and predictors of periodontal disease and tooth loss among users of smokeless tobacco. *BMC Oral Health*. 2023;23:428. <https://doi.org/10.1186/s12903-023-03087-8> PMID: 37303009.
8. Siddiqi K, Shah S, Abbas SM, Vidyasagaran A, Jawad M, Dogar O, et al. Global burden of disease due to smokeless tobacco consumption in adults: analysis of data from 113 countries. *BMC Med*. 2015;13:194. <https://doi.org/10.1186/s12916-015-0424-2> PMID: 26373426.
9. National Institute of Population Studies (NIPS) [Pakistan], ICF. Pakistan demographic and health survey 2017-18. Islamabad: NIPS and ICF; 2019.
10. Imam SZ, Nawaz H, Sepah YJ, Pabaney AH, Ilyas M, Ghaffar S. Use of smokeless tobacco among groups of Pakistani medical students: a cross-sectional study. *BMC Public Health*. 2007;7:231. <https://doi.org/10.1186/1471-2458-7-231> PMID: 17880732.
11. Memon SM, Kumar N, Rahman AAU, Syed BM. Evaluation of C-reactive protein and haematological parameters in smokeless tobacco users: a comparative cross-sectional study. *Pak J Med Sci*. 2021;37(4):983-987. <https://doi.org/10.12669/pjms.37.4.3841> PMID: 34322054 PMCID: PMC8294120.
12. Saeed U, Mansoor Z, Naeem S, Mahmood H, Irfan S, Baig A. Frequency of gingival recession in correlation with gingival phenotype: a cross-sectional study. *Ann PIMS*. 2024;20(3):356-360.
13. Kakde S, Bhopal RS, Jones CM. A systematic review on the social context of smokeless tobacco use in the South Asian population: implications for public health. *Public Health*. 2012;126(8):635-645. <https://doi.org/10.1016/j.puhe.2012.05.002> PMID: 22704659.
14. Mazahir S, Malik R, Maqsood M, Merchant KA, Malik F, Majeed A, et al. Sociodemographic correlates of betel, areca and smokeless tobacco use as a high-risk behaviour for head and neck cancers in a squatter settlement of Karachi, Pakistan. *Subst Abuse Treat Prev Policy*. 2006;1:10. <https://doi.org/10.1186/1747-597X-1-10> PMID: 16719935.
15. Wen CP, Tsai SP, Cheng TY, Chen CJ, Levy DT, Yang HJ, et al. Uncovering the relation between betel quid chewing and cigarette smoking in Taiwan. *Tob Control*. 2005;14 Suppl 1:i16-i22. <https://doi.org/10.1136/tc.2004.008003> PMID: 15923449.
16. Bhurgri Y, Bhurgri A, Hussaini AS, Usman A, Faridi N, Malik J, et al. Cancer of the oral cavity and pharynx in Karachi: identification of potential risk factors. *Asian Pac J Cancer Prev*. 2003;4(2):125-130. PMID: 12875625.
17. Nair U, Bartsch H, Nair J. Alert for an epidemic of oral cancer due to use of the betel quid substitutes gutkha and pan masala: a review of agents and causative mechanisms. *Mutagenesis*. 2004;19(4):251-262. <https://doi.org/10.1093/mutage/geh036> PMID: 15215327.
18. Ali NS, Khuwaja AK, Ali T, Hameed R. Smokeless tobacco use among adult patients who visited family practice clinics in Karachi, Pakistan. *J Oral Pathol Med*. 2009;38(5):416-421. <https://doi.org/10.1111/j.1600-0714.2009.00759.x> PMID: 19302433.
19. Khawaja MR, Mazahir S, Majeed A, Malik F, Merchant KA, Maqsood M, et al. Chewing of betel, areca and tobacco: perceptions and knowledge regarding their role in head and neck cancers in an urban squatter settlement in Pakistan. *Asian Pac J Cancer Prev*. 2006;7(1):95-100. PMID: 16629536.
20. Verma SK, Kumar BD, Singh S, Kumari P, Agarwal A, Singh TK, et al. Effect of gutkha chewing on periodontal health and oral hygiene of people in Delhi NCR region of North India: a cross-sectional multicentered study. *J Family Med Prim Care*. 2019;8(2):564-568. https://doi.org/10.4103/jfmpc.jfmpc_439_18 PMID: 30984698.
21. Sarah EJ, Taylor E, Tattan-Birch H, East K, Shahab L, Cox S, et al. Prevalence and patterns of different types of non-cigarette tobacco use in England: a population study. *New Engl J*. 2025;4(1):25-33.
22. Nisar N, Billoo N, Gadit AA. Pattern of tobacco consumption among adult women of a low socioeconomic community in Karachi, Pakistan. *J Pak Med Assoc*. 2005;55(3):111-114. PMID: 15960242.
23. Sharma R, Kanaan M, Siddiqi K. Diversity in tobacco use among women of reproductive age (15-49 years) in Pakistan: secondary analysis of a multiple indicator cluster survey 2016-2018. *Nicotine Tob Res*. 2024;26(7):931-939. <https://doi.org/10.1093/ntr/ntae016> PMID: 38222159.
24. Kopperud SE, Ansteinsson V, Mdala I, Becher R, Valen H. Oral lesions associated with daily use of snus, a moist smokeless tobacco product: a cross-sectional study among Norwegian adolescents. *Acta Odontol Scand*. 2023;81(6):473-478. <https://doi.org/10.1080/00016357.2023.2186803> PMID: 36801169.
25. Nimbal AV, Kharkar SP, Vishwakarma AP, et al. Comparative analysis of dentition and periodontal status in patients with unilateral smokeless tobacco pouch keratosis. *Cureus*. 2023;15(11):e48923. <https://doi.org/10.7759/cureus.48923> PMID: 37993509 PMCID: PMC10667321.
26. Muthukrishnan A, Warnakulasuriya S. Oral health consequences of smokeless tobacco use. *Indian J Med Res*. 2018;148(1):35-40. https://doi.org/10.4103/ijmr.IJMR_1793_17 PMID: 30264752.
27. Ahad A, Bey F, Khan S, Ahmed MS. Periodontal status with dual habits of smoking and smokeless tobacco use: a cross-sectional study in young adults. *J Adv Periodontol Implant Dent*. 2021;13(2):69-75. <https://doi.org/10.34172/japid.2021.014>.
28. Trullenque Eriksson A, Derks J, Andersson JS. Onset of periodontitis: a registry-based cohort study. *Clin Oral Invest*. 2023;27:2187-2195. <https://doi.org/10.1007/s00784-022-04816-1> PMID: 36503273.
29. Thwin KM, Ogawa H, Phantumvanit P, Songpaisan Y, Miyazaki H. Periodontal status and potential risk factors in the Myanmar population: data from the first national oral health survey in 2016-2017. *WHO South East Asia J Public Health*. 2023;12:110-115. <https://doi.org/10.4103/2224-3151.373106> PMID: 37536472.

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The authors accept responsibility for all aspects of the work and will ensure that any concerns regarding the accuracy or integrity of any part are properly investigated and resolved.



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