



ASSOCIATION BETWEEN TOBACCO CHEWING AND GINGIVAL RESSION: A CROSS SECTIONAL STUDY

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ABSTRACT

Background: Tobacco contains various harmful substances that increases the risk of malignancy, dental caries, gingival diseases and causes staining of teeth. Gingival recession, characterized by exposure of the tooth root surface due to apical migration of free gingival margin, is a significant oral health concern associated with tobacco chewing habit. **Objective:** To determine the significance of gingival recession associated with the tobacco chewing habit in the city of Hyderabad. **Materials And Methods:** This study was conducted by OroGlee Solutions Private Limited, Hyderabad. A total of 2895 subjects aged 18 - 50 years were examined and grouped based on their tobacco chewing habit. Oral examination was done using an intraoral camera. **Results:** Percentage of people with tobacco chewing habit having gingival recession was 24.89% whereas people without tobacco chewing habit having gingival recession was 2.97%. Chi square test was used to determine the significance of the difference between the prevalence of gingival recession in tobacco chewers and non-chewers. It illustrated a strong correlation between tobacco chewing and gingival recession. **Conclusion:** The impact of tobacco chewing on gingival health is undeniable. It accelerates gingival recession, compromises oral hygiene and heightens the risk of periodontal diseases. Seeking professional dental care combined with cessation of the habit is vital for addressing and preventing gingival recession.

KEYWORDS : Gingival recession, Tobacco chewing, Association, Chi-square test.

INTRODUCTION

The Global Adult Tobacco Survey India, 2016–17, estimates that 267 million adults in India use tobacco, accounting for 29% of all adults.^[1]

In India more than 40 types of smokeless tobacco, such as pan, paan masala, khaini (tobacco-lime mixture), sarda, mawa (areca nut, tobacco, slaked lime) gutka (a mixture of powdered tobacco, lime, areca nut and catechu), gul and gudakhu, are used to chew and apply to the teeth and gums.^[2]

The use of tobacco leads to a number of oral health problems. The major consequence of chewing tobacco are malignant & pre-malignant conditions (leukoplakia, erythroplakia, and erythroleukoplakia), tobacco pouch lesion and significant staining of the teeth. Chewing tobacco also accelerates the gingival recession process which leads to the exposure of tooth root surface, periodontal pocket formation, plaque and calculus accumulation which results in periodontitis.^[3]

Gingival recession is defined as the apical shift of the marginal gingiva from its normal position on the crown to the level of root surface beyond cemento-enamel junction. Although the cemento-enamel junction (CEJ) is not often an easy structure to discover clinically, it is more noticeable at recession sites because it is present supragingival to the marginal gingival tissue.^[4]

Gingival recession can occur because of many reasons which include ageing, aggressive tooth brushing, calculus accumulation, tooth movement by orthodontic forces, habit of tobacco chewing etc.^[5]

Among these causes, tobacco chewing habit is the one which aggressively progresses the process of gingival recession.

As the primary alkaloid found in tobacco, nicotine has a variety of adverse effects on the immune system and wound healing. It is possible that these actions also contribute significantly to the deterioration of gingival tissue.^[6]

The aim of the study was to determine the prevalence of gingival recession linked to tobacco chewing habit, highlighting the need for public health education, intervention and provide necessary support to cease this harmful habit and promote better oral well-being.

MATERIALS AND METHODS

A cross-sectional survey was conducted by OroGlee Solutions Private Limited among the employees and staff of various corporate offices and cafes in the city of Hyderabad. The total number of 2895 adults were examined at their respective places of work. A survey questionnaire was prepared to acquire personal details such as age, gender, occupation, hometown, relevant dental and medical history and habits like tobacco or paan chewing, smoking and alcohol consumption along with their duration.

Oral examination was done using an intraoral camera connected to a laptop to record videos of all aspects of teeth. Informed oral consent of the participants was obtained before examination.

Inclusion Criteria:

Participants from the age group of 18 to 50 years were included in the study. Cases included subjects who had a habit of chewing tobacco since the past 1 or more years. Controls were the subjects who did not have the habit of chewing tobacco.

Exclusion Criteria:

Participants below the age of 18 years and those above the age of 50 years were excluded from the study.

Data analysis was done using SPSS version 29. The Chi-square test was used to determine whether the differences in the prevalence of gingival recession in tobacco chewers and non-chewers is significant or not. $P \leq 0.05$ was considered statistically significant.

RESULTS

A total of 2895 subjects, aged between 18 and 50 years participated in the study. They were divided into two groups: people with tobacco chewing habit were 237 (8.19%) and those without the tobacco chewing habit were 2658 (91.81%). Gingival recession among the study subjects in the two groups were as follows: Number of people with tobacco chewing habit having gingival recession were 59 (24.89%) and number of people without tobacco chewing habit but having gingival recession were 79 (2.97%). People with tobacco chewing habit and without gingival recession were 178 (75.11%) and people without tobacco chewing and without gingival recession were 2579 (97.03%). Chi-square test was conducted, which

revealed a statistically significant difference in the prevalence of gingival recession between the tobacco chewers and the control group. The result shown by the Chi-square test is 230.36 which is remarkably higher than the value 3.84 for the significance level of 0.05. The result is significant at $P < 0.05$. The p-value for our study is < 0.00001 . This shows that there is a significant relation between tobacco chewing habit and gingival recession.

Table 1: Prevalence Of Gingival Recession Among Tobacco Chewers And Non-chewers

Category	Number of people with gingival recession	Percentage of people with gingival recession	Number of people without gingival recession	Percentage of people without gingival recession	Total
People with tobacco chewing habit	59	24.89%	178	75.11 %	237
People without tobacco chewing habit	79	2.97 %	2579	97.03 %	2658
Total	138		2757		2895

DISCUSSION

Gingiva is one of the four principal components of the periodontium. Other components are periodontal ligament, alveolar bone and cementum. In a healthy mouth with good oral hygiene, the gingiva covers the alveolar bone and tooth root up to the cemento-enamel junction. Anatomically, the gingiva is categorized into three domains:

- i) free marginal gingiva
- ii) interdental gingiva
- iii) attached gingiva^[7]

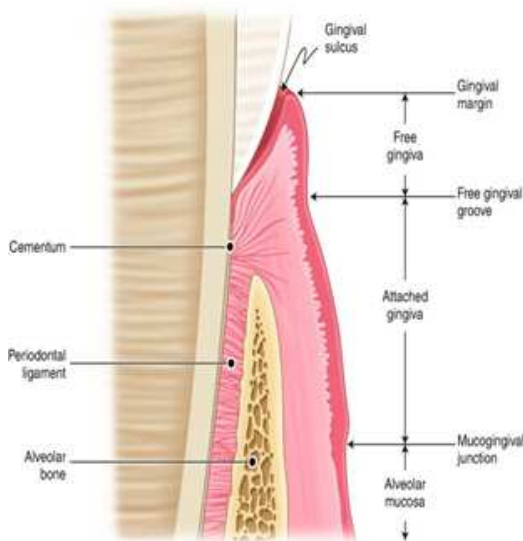


Figure 1: The Periodontium Components^[8]

Histologically, it is composed of two different components: epithelial structures and connective tissue. The connective tissue is less cellular than the epithelium and consists of a

network of proteins, growth factors, minerals, lipids, and water. These two components are in charge of coordinating the early reactions associated with gingivitis and periodontitis.^[7] Some of the salient clinical features of the periodontitis are bleeding on probing, periodontal pocket formation, furcation involvement, gingival recession and clinical attachment loss.^[9]

The primary emphasis of this study is gingival recession.

Gingival recession is characterized by the shifting of the gingival margin apical to the cemento-enamel junction, exposing the root to the oral environment.^[10]

This condition can lead to various issues including root caries, dental hypersensitivity, periodontal disease, and aesthetic problems particularly when it affects the anterior teeth.^[10]

Classification Of Gingival Recession:

Sullivan and Atkins proposed one of the first classification of gingival recession. The depth and width of the defect served as the foundation for the classification of gingival recession. The four categories were:

- i) Deep wide
- ii) Shallow wide
- iii) Deep narrow
- iv) Shallow narrow

Another famous and most widely used classification is Miller's classification of gingival recession which was proposed in 1985.

Class I: Marginal tissue recession that does not extend to the mucogingival junction.

Class II: Marginal tissue recession that extends to or beyond the mucogingival junction with no periodontal attachment loss in the interdental area.

Class III: Marginal tissue recession that extends to or beyond the mucogingival junction with periodontal attachment loss in the interdental area or mal-positioning of teeth.

Class IV: Marginal tissue recession that extends to or beyond the mucogingival junction with severe bone or soft tissue loss in the interdental area and/or severe mal-positioning of teeth.^[11]



Figure 2: Morphological Miller's Classification of Gingival Recession^[12]

Etiology:

Although several etiological factors have been identified, the precise process of gingival recession remains unclear. Plaque

buildup in the teeth that causes gingival irritation and inflammation is the main contributory factor of gingivitis. In addition to these, additional risk factors include frictional injury from scratching the gingiva, developmental defects including bone dehiscence, chronic trauma from behaviours like persistent foreign body impaction against the gingiva, and improper teeth cleaning. Other conditions include faulty frenum attachment, tooth malposition, advancing age, smoking, tobacco chewing and iatrogenic dentistry.^[10]

In this study we will focus on gingival recession caused due to tobacco chewing habit.

Tobacco use is one of the most significant risk factors for periodontal disease. A large number of studies have been conducted to understand the role of smoking in the etiology of periodontal diseases. Available data shows that smoking is associated with increased prevalence and severity of periodontal disease. It could be due to the negative effects of tobacco smoke on the physiology, immunology, and microbiology of the oral environment. Compared to smoking, oral smokeless tobacco (SLT) or chewable tobacco has received significantly less attention in the etiology of periodontal disease.^[6]

Hence, we have conducted this study to understand the role of tobacco chewing as one of the etiological causes of gingival recession.

Chewable tobacco products sold in India and other Asian nations have over 4000 hazardous components that might induce tissue damage due to their mutagenic and carcinogenic properties. These include alkaloids such as nicotine, tobacco-specific nitrosamines, phytosterols, heterocyclic hydrocarbons, alkali nitrites, radioactive compounds, and hazardous metals notably lead, cadmium, and arsenic. N-Nitrosornicotine (NNN), 4-(methylnitrosamino)-1 (3-pyridyl)-1 butanone (NNK), and N-nitrosamino acids are quantitatively the most prevalent strong carcinogens in smokeless tobacco (SLT).^[13]

Pathogenesis:

Nicotine exposure has been linked to vasoconstriction^[14] and decreased angiogenesis. It affects neutrophil activity by increasing adhesion molecule shedding and disrupting f-actin kinetics, which results in reduced neutrophil migration into oral tissues, as well as inhibiting phagocytosis and oxidative killing. Excessive exposure to nicotine has been linked to reduced T-lymphocyte proliferation and function, decreased phagocytosis and production of pro-inflammatory cytokines and oxygen radicals by monocytes, increased levels of tissue-destructive cytokines like TNF- α , decreased levels of antibodies to periodontal pathogens,^[6] and impaired attachment of periodontal ligament fibroblasts.^[15]

All this leads to the deterioration of periodontal tissue resulting in gingival recession.

Consequences Of Gingival Recession:

- i) **Aesthetic:** Gingival recession leads to the exposure of the root surface. This compromises the aesthetic appearance especially when anterior teeth are involved.^[16]
- ii) **Abrasion:** Gingival recession can lead to abrasion as the exposed tooth surfaces are more susceptible to wear.^[6]
- iii) **Dental Hypersensitivity:** Recession will expose the cervical dentine to the oral environment. Hypersensitivity is typically acute and brief.^[16]
- iv) **Dental Caries:** Exposed root surface is more prone to the development of the root caries.^[16]
- v) **Plaque Retention:** Recession site can become the site of plaque retention. It refers to the ability of dental plaque to adhere to tooth surfaces, leading to accumulation of bacteria and debris.^[16]

Treatment:

i) **Tissue grafting:** The objective of tissue grafting is to cover the roots. To achieve that purpose, a variety of methods and flap designs have been employed.^[17]

ii) **Guided Tissue Regeneration:** American Academy of Periodontology has defined regeneration as "a reproduction or reconstitution of a lost or injured part. It is, therefore, the biologic process by which the architecture and function of lost tissues are completely restored". This indicates the regeneration of the tooth's supporting tissues, such as alveolar bone, periodontal ligament, and cementum.^[17] Guided Tissue Regeneration, which uses barrier membranes with or without bone substitute grafts, relies on epithelial exclusion in order to repair periodontal tissues while preserving their original structure and function.^[18]

The present study was conducted to find the association between tobacco chewing and gingival recession in the adult population of the Hyderabad. Out of 2895 people, 237 people had a habit of tobacco chewing and 2658 did not have the habit of tobacco chewing. Among the tobacco chewers 59 (24.89%) adults had gingival recession. The number of people without tobacco chewing habit who had gingival recession were 79 (2.97%). People with tobacco chewing habit and without gingival recession were 178 (75.11%) and people without tobacco chewing and without gingival recession were 2579 (97.03%). The Chi Square test was used to determine the significance of difference in the prevalence of gingival recession in tobacco chewers and non-chewers. The result shown by the Chi-square test was 230.36 which is notably higher than the value 3.84 for the significance level of 0.05. The p-value is <0.00001. This result demonstrates the strong association between the habit of tobacco chewing and gingival recession.

A cross-sectional study was conducted by Syed Muazzam Nasir et al. in Fatima Jinnah Dental College Hospital located at Karachi, Pakistan. Total of 377 individuals were included out of which 238 were males (63%) and 139 were females (37%) of age 15 - 45 years with the habit of smokeless tobacco consumption. Among all periodontal disorders, gingival recession of Class II-IV (65.8%) was shown to be the most prevalent in smokeless tobacco users.^[19]

A cross-sectional study was conducted by Amarnath et al. in the Department of Periodontology, Rama Dental College, Hospital and Research Centre, Kanpur. Male subjects belonging to age group of 35 to 50 years who chewed 2 or more sachets of gutkha per day for ≥ 10 years and with no history of periodontal disease were included. The prevalence of furcation involvement was 61.2% in gutka consumers. The results of their study showed that chewing tobacco is correlated with gingival recession.^[20]

CONCLUSION

While there are many variables that contribute to the etiology of gingival recession, the results of this study show that chewing tobacco is a significant component contributing to it. Effort should be made by dentists to educate patients about the oral risk factors associated with tobacco chewing including gingival recession, periodontal diseases and development of oral malignancy. Patient should be encouraged to schedule regular check-ups to monitor oral health and catch any issues early on. Necessary comprehensive support and resources should be provided for quitting tobacco.

Conflict Of Interest

There is no conflict of interest.

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