



**ORIGINAL RESEARCH PAPER**

**Dental Science**

**EFFECT OF CIGARETTE SMOKING IN DEVELOPMENT OF DENTAL CARIES:A CROSS SECTIONAL STUDY**

**KEY WORDS:** Cigarette smoking, dental caries, intra oral camera

**Dr. Neha Pathangy\***

Dental Consultant, OroGlee Solutions Private Limited, Hyderabad\*Corresponding Author

**Dr. Kamakshi Kalla**

Director, OroGlee Solutions Private Limited, Hyderabad

**ABSTRACT**

**Background:** Cigarette smoking is a major public health challenge globally. It not only affects the general health but also impacts the oral health. It causes an array of oral health lesions including dental caries which causes pain and infection and can result in the requirement of the tooth to be extracted. **Aim:** The aim of the study is to investigate the relationship of cigarette smoking and dental caries in the adult population in the city of Hyderabad. **Materials and Methods:** This study was conducted by OroGlee Solutions Private Limited, Hyderabad. A total of 1019 subjects aged 18 to 60 years were examined. Oral examination was done using intraoral camera, mouth mirror and torch. **Results:** Percentage of smokers having dental caries was 89.4% and percentage of non smokers having dental caries was 81.8%. Chi square test was used to determine the significance of difference between the prevalence of caries in smokers and prevalence of caries in non smokers. It showed a statistically significant correlation between dental caries and smoking cigarette. **Conclusion:** Smoking leads to multiple oral health problems including high incidence of dental caries. The incidence of dental caries further increases in presence of coexisting factors such as poor oral hygiene, food habits, limited preventive dental visits and old age.

**Introduction:**

Cigarette smoking and other tobacco use imposes a huge and growing public health burden globally. [1] Cigarette smoking is a major threat to human health. It majorly affects the lungs and oral cavity ultimately causing lung cancer and oral cancer.

Smoking has many negative effects in the oral cavity including staining of teeth, reduction of the ability to smell and taste, the development of oral diseases such as smoker's palate, smoker's melanosis, coated tongue, oral candidiasis, dental caries, periodontal disease, implant failure, oral precancerous and cancer. [2]

Dental caries is defined as an irreversible microbial disease of the calcified tissues of the teeth, characterized by demineralization of the inorganic portion and destruction of the organic substance of the tooth, which often leads to cavitation. [3]

Dental caries is one of the most common diseases in humans. Tooth decay is a preventable, chronic and non communicable disease. It causes pain, decay, infection and if not treated then has to be extracted.

Streptococcus mutans is a major pathogen that causes dental caries. Streptococcus mutans is facultative, anaerobic gram positive cocci found commonly in oral cavity. The presence of Streptococcus mutans is 70 times higher in caries-affected subjects than in caries-free subjects. [4]

The ability of Streptococcus mutans to synthesize extracellular polysaccharide (EPS) and produce acids leads to the establishment and development of highly cariogenic dental biofilms. [4]

Nicotine, an alkaloid component in cigarette smoking, stimulates biofilm formation and metabolic activity of Streptococcus mutans, one of the most important pathogens of dental caries. [5]

The aim of the study is to assess the prevalence of the dental caries in smokers and to establish the relationship between cigarette smoking and dental caries.

**Materials and Methods:**

A cross-sectional survey was conducted by OroGlee Solutions Private Limited, Hyderabad, among the staff (aged between 18 and 60 years) of 21 different cafes and corporate offices in the city of Hyderabad in the duration of 8 months from November 2021 to June 2022. A total of 1019 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.

Dental caries was checked and recorded according to the area and teeth involved. Oral examination was carried out by a dentist using mouth mirror, torch and intraoral camera. Intraoral camera is very helpful to record the minute details in the oral cavity. Informed oral consent of the participants was obtained before examination.

**Inclusion Criteria:**

Participants from the age group of 18 to 60 years were included in the study.

Cases included current smokers. Current cigarette smokers were defined as those people who smoked at least one cigarette per day for at least last 6 months.

Controls were the subjects who did not have the habit of smoking.

**Exclusion Criteria:**

Participants who are above 60 years of age are excluded.

Participants who are former smokers were excluded from study. Former smokers were defined as those people who had stopped smoking more than 6 months prior to the study.

The data analysis was done using SPSS version 28. The Chi-square test was used to test whether there was significant difference in the prevalence of dental caries in people with and without smoking cigarette.  $P \leq 0.05$  was considered statistically significant.

**Results:**

A total of 1019 subjects, aged between 18 and 60 years participated in the study. Among these, 5 subjects were

former smokers (people who had stopped smoking more than 6 months prior to the study) who were excluded from study. Only current smokers (people who smoked at least one cigarette per day for at least last 6 months) were included in cases.

The study subjects were divided into two groups: people with the habit of cigarette smoking (26.9%) and those without the habit of cigarette smoking (73.1%). Caries percentage among study subjects in the two groups were as follows: prevalence of caries in smokers is 89.4% whereas prevalence of caries non smokers is 81.8%. The significance of difference between the prevalence of caries in smokers and non smokers was determined by the Chi square test. Chi square value is 4 which is higher than the value (3.84) for the significance level of 0.05. This shows that there is a significant relation between cigarette smoking and dental caries.

**Table 1: Prevalence of dental caries among smokers and non-smokers**

	People with caries	People without caries	Total
Smokers	244	29	273
Non-smokers	606	135	741
Total	850	164	1014

**Discussion:**

Tobacco use is a major public health concern owing to its high prevalence and its deleterious effects on health. Nearly 267 million people above 15 years in India (29% of population above 15 years) are users of tobacco, according to the Global Adult Tobacco Survey India, 2016-17.<sup>[6]</sup> The most prevalent form of tobacco use in India is smokeless tobacco and commonly used products are khaini, gutkha, betel quid with tobacco and zarda. Smoking forms of tobacco used are bidi, cigarette and hookah.

Cigarette smoking not only affects systemic organs like heart and lungs but it also has a significant influence on periodontal and other oral tissues. People who smoke are at a higher risk of developing oral cancer, gum problems, losing teeth, decay on the roots of teeth, and complications after tooth removal and gum and oral surgery.

Dental caries is a preventable disease in humans. Dental decay is caused by a complex interaction between acid-producing bacteria and fermentable carbohydrates along with many host factors including teeth and saliva. It affects both primary and permanent teeth. Dental caries not only occurs on the crown portion but it can also occur in the root of the teeth.<sup>[7]</sup>

A lower salivary pH, buffering power, shift of the bacterial population towards lactobacillus and the cariogenic streptococci in smokers, might all predispose to increased dental caries.<sup>[8]</sup>

In our study, a total of 1014 subjects were divided into two groups. Percentage of smokers is 26.9% whereas percentage of non-smokers is 73.1%. Prevalence of dental caries in smokers is 89.4% and prevalence of dental caries in non-smokers is 81.8%. The significance of difference between the prevalence of dental caries in smokers and non-smokers is determined by using Chi square test, which shows statistically significant relation between smoking and dental caries.

The findings of our study are in accordance with the study done by JM Hirsch et al. Their study shows that an increased number of cigarettes smoked per day are positively correlated with increase in the number of decayed, missing and filled teeth, showing that there is a correlation between smoking and dental caries.<sup>[9]</sup>

A study conducted by Ludwick & Massler, reported that those who smoked more than an average of 15 cigarettes per day had a significantly greater number of decayed, missing and filled teeth/tooth surfaces than those who smoked less than 6 cigarettes per day.<sup>[10]</sup>

A study conducted by Chanea et al, reported that in presence of nicotine, Streptococcus mutans adherence to biofilm is significantly increased. Streptococcus mutans makes use of sucrose for metabolism, and its byproducts are mainly responsible for adherence and caries formation.<sup>[11]</sup>

Nicotine stimulates Streptococcus mutans planktonic cell glucosyltransferase (Gtf) synthesis and glucan-binding protein (Gbp) expression as a mechanism to increase planktonic cell attachment to biofilm matrix leading to an increased number of cells in the biofilm which causes the development of more carious lesions in smoker.<sup>[5]</sup>

**Conclusion:**

Oral cavity is greatly affected by smoking, since it is the first part exposed to cigarette smoke. Smoking supports bacterial growth, plaque and tartar build-up leading to cavities, decay and tooth loss. Measures should be established to educate the people about harmful effects of smoking. Dentists play a great role in creating awareness about the harmful effects of smoking and providing counseling to smokers.

**Conflict of Interest:** There is no conflict of interest.

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