Journal of Contemporary Issues in Business and Government Vol. 27, No. 2, 2021
https://cibg.org.au/

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.346

# Prevalence Of Dental Caries Among Smokers And Non Smokers Visiting A Private Dental Institution - A Retrospective Study

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**Abstract**: **Introduction**:Dental caries is one of the most prevalent oral diseases. It is the primary focus of dental health prevention as it is one the most prevalent chronic diseases . Smoking is a public health problem that harms one's general and oral well-being. In smokers, Nicotine would promote the attachment of streptococcus mutans to the dental surface, and further increases the incidence and severity of dental caries. In non smokers, a frequent high intake of fermentable carbohydrates, especially sucrose, has been known to be associated with caries initiation and development. The aim of the present study was to find out the association of dental caries between smokers and nonsmokers.

**Materials and Methods :**During the period from June 2019 to March 2020, we reviewed the case record of 86000 patients out of which a total of 1000 smokers and 1000 non smokers between the age group of 18-40 years with dental caries were selected for this study. A customized examination form was used to collect the data and a special table for data collection was prepared. The data collected was classified according to no of caries affected teeth, no of missing and filled teeth. DMFT index was also calculated. Dependent variables were dental caries and Independent variables are smokers and non smokers. Data were analysed using descriptive statistics and chi square test was done to determine the association between the caries and smokers and non smokers. P value less than or equal to 0.05 was considered as statistically significant.

**Results** :Among the 1000 smokers and non smokers, around 97% of the patients were male. The prevalence of dental caries was more among the age group of 31-40 years in smokers (44%) and 18-25 years in non-smokers (38.7%). Average number of teeth affected by caries was 4-6 caries among smokers and non smokers with p=0.015 and number of filled teeth, missing teeth was found to be more in smokers than non smokers. DMFT value of smokers was found to be more than non smokers with p value = 0.559 statistically not significant.

**Conclusion** :From the present study, it can be concluded that smokers have more number of dental caries compared to non smokers.

**Keywords:** Dental caries; tobacco; smokers; non smokers.

## INTRODUCTION

Dental caries is one of the major dental public health problems worldwide (Selwitz, Ismail and Pitts, 2007). Poor oral health and untreated oral diseases have a negative impact on the quality of individuals and their overall health (Hagh et al., 2013)(Gupta et al., 2018). The severity of dental caries and odontogenic infections varies from mid buccal space infection to severe multispace infections (Nidhi, Nidhi and Singh, 2019). If not treated on time, dental caries can cause progressive destruction of hard tissue of teeth, perforate the pulp, lead to pulpitis and periapical inflammation and finally lead to tooth loss. Many factors such as food, environment and micro organisms are associated with caries.

Dental caries is a multifactorial infectious and transmissible disease involving an imbalance of normal molecular interactions between the tooth surface/subsurface and the adjacent microbial biofilm where acids are produced. One of the reasons for missing teeth in smokers can be due to any systemic health problems (Sivaramakrishnan and Ramani, 2015). There is considerable epidemiological evidence demonstrating the adverse effects of both tobacco and alcohol contributing to tooth decay, periodontal disease,

tooth loss, staining of teeth and dental restorations, reduction of the ability to smell and taste. It was found to be higher in smoker's saliva, the concentration of thiocyanate. If thiocyanate concentrations are higher, one might predict less dental caries. However, a possible lower salivary pH and buffering, and the fact that there is a shift of the bacterial population toward lactobacillus and the cariogenic streptococci in smokers might all argue for increased dental caries. Hence, one might predict less dental caries in smokers (Balto et al., 2019). Decreased buffering effect and possible lower pH of smoker's saliva shows higher number of Lactobacilli and Streptococcus mutans which indicates an major propensity to caries (Tanaka, Miyake and Sasaki, 2010). Patients who have the habit of tobacco have higher chances of developing potentially malignant disorders and oral squamous cell carcinoma (Gifrina Jayaraj, Sherlin, et al., 2015; G. Jayaraj et al., 2015; Gupta and Ramani, 2016; Thangaraj et al., 2016; Viveka et al., 2016; Sridharan, Ramani and Patankar, 2017; Gheena and Ezhilarasan, 2019a) . The integrity of the teeth, pH, and composition of the saliva and plaque has a local effect on oral health . Nutrition, however, has a systemic effect on the integrity of the oral cavity including teeth, periodontium (supporting structure of the teeth), oral mucosa, and alveolar bone (Jiang, 2019). A frequent high intake of fermentable carbohydrates, especially sucrose, has been known to be associated with caries initiation and development.Saliva composition is an important factor in determining the prevalence of caries. Whole saliva therefore represents a complex balance among local and systemic sources (Shree et al., 2019). Many studies have shown that salivary secretory immunoglobulin A (sIgA), pH, and flow rates play an important role in oral mucosal immunity. In order to document the prevalence of dental caries photo documentation is mandatory (Hannah et al., 2018). Prevalence of dental caries can be reduced by identifying and treating the etiological factors of the disease condition. Previously our team had conducted numerous clinical studies (Gifrina Jayaraj, Ramani, et al., 2015; Jangid et al., 2015; Sherlin et al., 2015; Swathy, Gheena and Varsha, 2015; Sridharan et al., 2019a) . The idea for this study stemmed from the current interest in our community. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar et al., 2018; Rajeshkumar et al., 2018, 2019; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019b; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020)

Hence, the aim of the current study is to determine the association of dental caries between smokers and non smokers.

## MATERIALS AND METHOD

This study is a retrospective cross sectional study conducted in a Private Dental Institution, in chennai to determine the association between smoking and dental caries with the approval from the Institutional Review Board . It included demographic data of the patients along with dental status of each individual. The data collection was done by reviewing the patient's record and analysed the data of 86000 patients between June 2019 and March 2020. Based on the previous study, 2000 samples were then filtered from patients' records of age group 18 - 40 years which was categorised in two groups. Group A had 1000 patients who were habitual smokers with a history of habit for a minimum of 6 months and Group B with 1000 non smoking individuals. A customised examination was used to collect data and a specified table for data collection was prepared. The following parameters such as age, gender, number of caries, missing, filled teeth in both smokers and non smokers, frequency and duration of the habit in subjects who had the history of smoking were recorded. The data recorded was cross verified by another examiner. Dependent variable are incidence of caries and independent variables are age, sex, smoking habit. Data collected was analysed using SPSS software version 20. Descriptive statistics and Chi square test was done to determine the correlation between the variables with P value less than 0.005 was considered as statistically significant.

## RESULTS

The dental caries were more common in the age range of 31–40 years in the smokers group and in non-smokers within the age group of 18-25. Around 43.5% of the smokers and 40.8% of non smokers were affected with a maximum of 4-6 caries. Association between the number of caries among smokers and non-smokers was statistically significant with P value found to be 0.00 (Figure 1). Majority of smokers (57.6%) and non-smokers (35.3%) had an average of 1-10 missing teeth. Correlation between the number of missing teeth among smokers and non-smokers was done and P value was found to be 0.00, which is statistically significant (Figure 2). Smokers (64.5%) had more filled teeth than non smokers (40.8%) (figure 3) and the mean decayed filled teeth (DMFT) value for smokers (1.44 ) was higher compared to non smokers (1.35)(Table1). Correlation between the number of filled among smokers and non-smokers was statistically significant with P value = 0.00 (Figure

3). Correlation between the DMFT value among smokers and non-smokers was statistically significant with P value = 0.014 (Figure 4).

## DISCUSSION

A total of 1000 smoking and 1000 non smoking patients from Private Dental Institution were included in the study. This study showed an inclination of the prevalence of dental caries more in the age range of 31–40 years in the smokers group and in non-smokers within the age group of 18-25 (Table 1). The results correlated with the previous article (Chaitanya et al., 2018). With regards to the number of caries affected for each individual, 4-6 teeth affected by caries was seen in both smokers (43.5%) and non-smokers (40.8%), the difference being statistically significant with p value = 0.000 (Table 1). From the current study it was seen that the number of caries in smokers is more in number than non smokers. The results of the present study correlate with the study done by Asha Lodagala et al., according to which dental caries were present in 46.5% of tobacco users and 65.8% of nonusers. Nicotine content in smoke is one of the main reasons for the increase of caries in the oral cavity (Lodagala et al., 2018).

From the present study, the majority of smokers (57.6%) and non smokers (35.3%) had an average of 1-10 missing teeth and differences were statistically significant (p=0.000) (Table 1). The study done by Elizabeth Krall et al.(Krall et al., 2006), showed smokers 95% had missing teeth. The previous literature is not in consensus with the present study. Number of missing teeth in a person could be due to systemic diseases with increasing age.

The number of filled teeth among smokers and non smokers were with an average of 1-10 teeth among the study population. Out of which, smokers had 64.5% filled teeth which was more compared to non smokers (40.8%) and the difference was statistically significant (p=0.000 (Table 1). Several studies showed that smokers had a higher number of filled teeth surfaces (p=0.000) than non-smokers which is consensus with the present study (Axelsson, Paulander and Lindhe, 1998). Smokers tend to have more of replaced/filled teeth than non-smokers as they are more prone to caries in the first place, due to their poor oral hygiene they have higher risk of losing teeth due to periodontal issues.

The mean decayed filled teeth (DMFT) value for smokers (1.44 ) was higher compared to non smokers (1.35) (Table 1) which correlates with the previous studies which shows that DMFT value of smokers to be (3.65 ± 5.78) and DMFT value of non-smokers to be (3.01 ± 2.66) (Shivam and Azam, 2019). Smokers have significantly higher risk of dental problems than people who don't smoke. Due to the presence of nicotine content in cigarettes, risk of caries and periodontal problems in smokers is more. However, the results of the study could not be generalised because sample size is less, single centered study and doesn't include all age groups.Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019b; Vijayashree Priyadharsini, 2019; Mathew et al., 2020)

## CONCLUSION

From the present study it is evident that dental caries is common among smokers compared to non smokers. The general population should be educated, motivated regarding the illness of tobacco in general as well as one's oral health.

## ACKNOWLEDGEMENT

The authors would like to thank the study participants for their participation and kind cooperation throughout the study

## AUTHORS CONTRIBUTIONS

Tasleem Abitha S : Literature search, data collection, analysis, manuscript writing
Dr. Archana Santhanam : Study design, data verification, manuscript drafting

## CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest in the present study

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**Legend For figures:**

**Figure 1 :** Bar graph showing the association between the number of caries among smokers and non smokers, done by using chi square test.

**Figure 2 :** Bar graph showing the association between the number of missing teeth among smokers and non smokers, done by using chi square test.

**Figure 3 :** Bar graph showing the association between the number of filled teeth among smokers and non smokers, done by using chi square test.

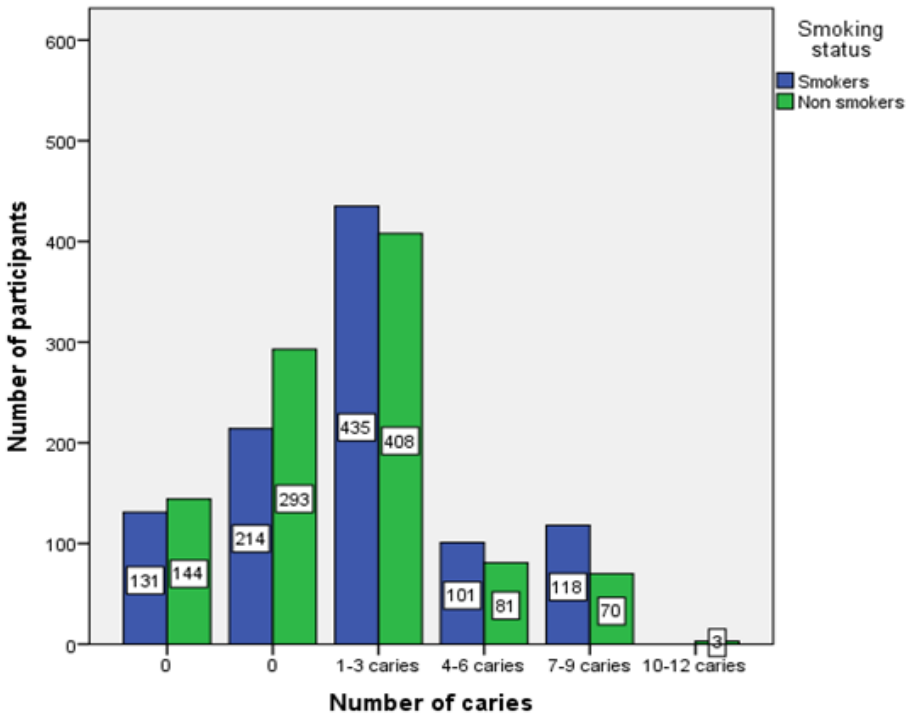


**Fig.1 : The bar graph shows the association between the number of caries in smokers and non smokers. X axis represents the number of caries and Y axis represents the number of participants. Blue represents smokers and Green represents non smokers. Chi square test was done to obtain the association between the number of caries in smokers and non smokers and it was found to be statistically significant. Pearson chi square value = 31.242. On the basis of the number of caries, it was observed that smokers had more number of caries, 4-6 caries teeth (435 - Blue) compared to non smokers (408 - Green) (p=0.00).**

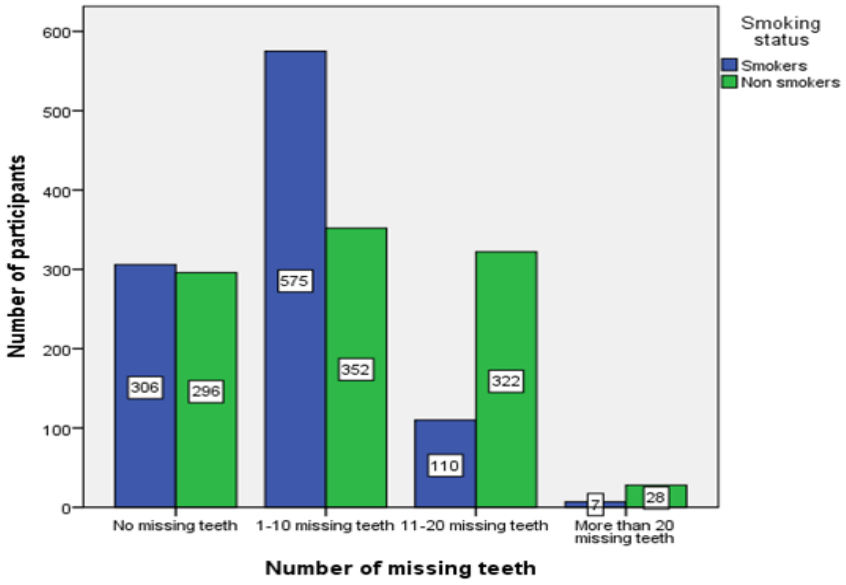


**Fig.2 : The bar graph shows the association between the number of missing teeth in smokers and non smokers. X axis represents the number of missing teeth and Y axis represents the participants. Blue represents smokers and Green represents non smokers. Majority of the smokers had 1-10 missing teeth (575 - Blue) and majority of the non-smokers also had 1-10 missing teeth (352 - Green). Chi square test was done to obtain the association between the number of missing teeth in smokers and non smokers and it was found to be statistically significant. Pearson chi square value = 170.448. On the basis of the number of missing teeth, it was observed that smokers had more number of missing teeth, 1-10 missing teeth (575 - Blue) compared to non smokers (352 - Green) (p=0.00).**

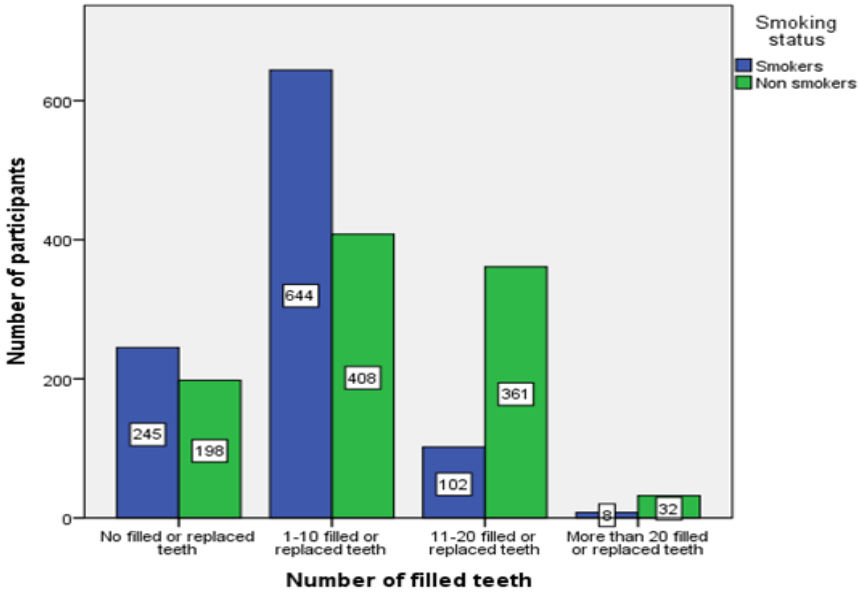


**Fig.3 : The bar graph shows the association between the number of filled teeth in smokers and non-smokers. X axis represents the number of filled teeth and Y axis represents the number participants. Blue represents smokers and Green represents non smokers. Majority of the smokers had 1-10 filled teeth (644 - Blue) and the majority of the non-smokers had 1-10 filled teeth (408 - Green). Chi square test was done to obtain the association between the number of filled teeth in smokers and non smokers and it was found to be statistically significant. Pearson chi square value = 217.213. On the basis of the number of filled teeth, it was observed that smokers had more number of filled teeth, 1-10 filled teeth (644 - Blue) compared to non smokers (408 - Green) (p=0.00).**