

Periodontal Health Status in Cigarette Smokers and Non-Smokers: A Cohort Study

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ABSTRACT

Background: To evaluate and compare the effect of smoking on periodontal tissues in smokers and non-smoker

Material and Methods: A cohort of 400 subjects was randomly selected from age group of 18 to 65 years (200 smokers vs 200 non-smokers). All the subjects were assessed using Community Periodontal Index and a structured questionnaire.

Result: The CPI scores 2, 3, 4, were significantly higher in smokers as compared to non-smokers ($P = 0.001$) whereas CPI scores 0, 1 were significantly higher in non-smokers ($P = 0.001$).

Conclusion: Within the limitations of the study it can be concluded that smoking has a significant impact on the periodontal health status of an individual. Thus, increasing the chances of periodontal disease in smokers as compared to non-smokers.

Keywords: Nicotine, Tobacco, Periodontium, community, Public Health.

INTRODUCTION

Health is a multi-dimensional concept and many factors combine to affect the health of people and communities. Among them, adverse habits such as smoking and alcoholism are the ones with whom people unintentionally hurt their body. For the past few decades, it has been widely known in developed countries that tobacco is hazardous. Many people inaccurately believe that experimenting with smoking or even casual use will not lead to any serious dependency. However, actually consumption of smoking as well as smokeless tobacco causes cancers of different sites in the human body and its usage is harmful to all human biological systems; including the oral cavity^{1, 2}. India is the second largest consumer of tobacco in the

world, after China, with 275 million adults consuming different tobacco products. According to World Health Organization (WHO), at present, tobacco smoking is causing over 3 million deaths a year worldwide, and if current smoking trends continue the annual mortality will exceed 10 million by around 2030.²

Tobacco use plays a significant role in the etiology of a number of oral conditions. It is a primary risk factor for oral cancer, periodontitis and delayed wound healing. Similarly tobacco use is associated with halitosis (foul odour), stained teeth, exposed roots, loss of taste and several other intra oral lesions. Smokeless tobacco also increases the risk for pharyngeal and esophageal cancers. Thus, the

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relationship between smoking and its effect on periodontal tissues has long been established.³

More than 4000 toxins are known to be present in cigarette smoke like carbon dioxide, oxidizing radicals, Nitrosamines, Nicotine, Cotinine, Thiocyanate etc. Nicotine is the most common pharmacologically active compound in tobacco smoke. In smokers the oral tissue are continuously exposed to high nicotine concentrations that negatively affect local cell populations. Gingival crevicular fluid nicotine concentrations can be up to nearly 300 times more than that of nicotine plasma concentrations in smokers. Nicotine binds to root surface in smokers and in vitro studies show it can be stored and released from periodontal fibroblasts. Nicotine may inhibit fibroblast attachment and integrin expression, fibronectin and collagen production and increase fibroblast collagenase activity. Some studies indicate that smoking may stimulate colonization of the subgingival area by periodontal pathogens like *P.gingivalis*, *T.denticola* or *T.forsythia* leading to increased attachment loss and periodontitis.⁴

Smoking promotes growth of pathogenic bacteria at shallow pockets and may have a role in initial development of periodontal lesions. It may be said that smoking disrupts the positive relationship between increasing probing depth and increasing growth of bacteria with pathogenic potential that is found in non-smokers, due to this disruption there is an increase in the ability of *P. gingivalis* to grow equally well in smokers who have either shallow probing depths at sampling sites (<5mm) or deep probing depths at sampling sites. Research which has been done on smoking and its effects on periodontitis shows us that smoking is a major risk factor for increasing the prevalence and severity of periodontal destruction.^{2,5}

Thus, the aim of the present study was to evaluate and compare the affect of smoking on periodontal tissues in smokers and non-smokers.

MATERIALS AND METHOD

STUDY POPULATION

In the present study, 400 subjects were randomly selected from age group of 18 to 65 years (200 smokers vs 200 non-smokers) who attended dental out-patient Department of Periodontology and Oral

Implantology at BRS Dental College and General Hospital, Panchkula. In this study Community Periodontal Index (CPI) was used as an epidemiological tool to assess and compare the periodontal health status of smokers and non smokers. Clinical attachment level was also compared between smokers and non smokers. Ethical approval had been obtained from ethical committee. An informed consent was taken and the participants were enrolled in this study respectively.

A questionnaire including questions on oral hygiene and smoking habits were given to the patients. Based on this we have segregated the subjects into three groups:

- a. No. of cigarette smoked per day?
- b. No. of years since smoking?
- c. Age of onset of smoking?

Patients aged between 18- 65 years of age group and having More than 10 natural teeth present.were included in the study whereas patients with complicated medical/systemic conditions such as diabetes, endocrinal problems , pregnancy ,cardiovascular problems or patients using any drugs like phenytoin , nifedipine etc, which may affect the periodontium.⁵² and Patients subjected to periodontal therapy or on any antibiotic or medication during the last 6 months were excluded from the study.

STATISTICAL ANALYSIS

The data was entered in the Microsoft Excel 2007 and analyzed using the SPSS statistical software 19.0 Version.for descriptive statistics included mean, standard deviation .The inter group comparison was done using independent t test and One Way ANOVA to find the difference between the individual time intervals The level of the significance for the present study was fixed at 5%

RESULTS

Table 1a represents CPI score based on No. of Cigarettes smoked per day .Among the smokers The CPI scores were significantly higher in those smoking more cigarettes per day ($p=0.001$). The mean number of sextants with CPI score 0 and CPI score 1 was significantly higher in smokers of less than 5 cigarettes per day whereas the mean number

of sextants with CPI Score 2, CPI score 3 and 4 were significantly higher in the smokers consuming more than 15 cigarettes per day (p=0.001).
Table 1a. Based on No. of cigarette Smoked Per Day –CPI.

	Less than 5	5-10 Cig	10-15 Cig	More than 15	P value
Based on Highest CPI Score	2.75±0.70	3.33±0.53	3.50±0.51	3.55±0.51	0.001
Mean No of Sextant with Score 0	0.82±0.89	0.29±0.62	0.27±0.46	0.20±0.61	0.001
Mean No of Sextant with Score 1	1.05±1.06	0.51±0.74	0.27±0.46	0.20±0.52	0.001
Mean No of Sextant with Score 2	1.30±0.91	2.33±1.22	2.58±1.13	2.71±1.19	0.001
Mean No of Sextant with Score 3	1.15±1.31	1.82±1.00	2.22±0.73	2.40±1.14	0.001
Mean No of Sextant with Score 4	0.20±0.53	0.48±0.70	0.61±0.69	1.30±1.71	0.001

P≤0.05 Significant using One Way ANOVA

Table 1b: Represents loss of attachment Based on No. of Cigarette Smoked Per Day - Among the smokers The Loss of Attachment scores were significantly higher in those smoking more cigarettes per day (p=0.001).

	Less than 5	5-10 Cig	10-15 Cig	More than 15	P value
Based on Highest LOA Score	1.58±0.67	2.01±0.68	2.05±0.87	3.25±4.24	0.001
Mean No of Sextant with Score 0	1.72±1.39	1.01±1.08	0.88±0.96	0.65±0.98	0.001
Mean No of Sextant with Score 1	2.90±1.40	2.70±1.42	2.61±1.97	1.70±1.71	0.001
Mean No of Sextant with Score 2	1.14±1.47	1.58±1.29	1.61±1.64	2.10±1.61	0.001
Mean No of Sextant with Score 3	0.18±0.72	0.39±0.93	0.61±0.91	0.95±1.31	0.001

P≤0.05 Significant using One Way ANOVA

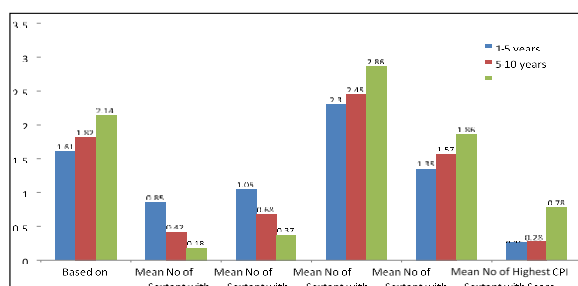


Figure 1. shows relation of CPI with years since smoking. It was found that Among the smokers with smoking years of more than 15 years the CPI scores were significantly higher as compare to those smoking for 5-10 years and 1-5 years. The mean number of sextants with Score 0 and Score 1 were significantly higher in those smoking for 1-5 years

as compared to those smoking for 5-10 years and more than 15 years. The mean number of sextants with Score 2 Score 3 and Score 4 were significantly higher in those smoking for more than 15 years as compared to those smoking for 5-10 years and 1-5 years.

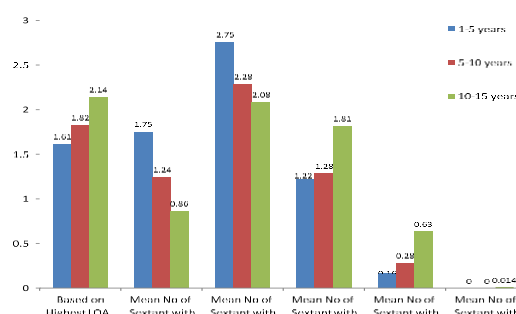


Figure 1a. Shows relation between loss of attachment with years since smoking. It was observed that Among the smokers with smoking years of more than 15 years the LOA scores were significantly higher as compare to those smoking for 5-10 years and 1-5 years. The mean number of sextants with Score 0 and Score 1 were significantly higher in those smoking for 1-5 years as compared to those smoking for 5-10 years and more than 15 years. The mean number of sextants with Score 2, Score 3 and Score 4 were significantly higher in those smoking for more than 15 years as compared to those smoking for 5-10 years and 1-5 years

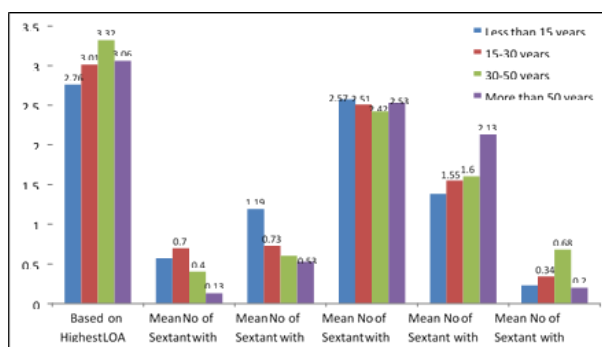


Figure 2 shows relation of age of onset with CPI. It was observed that among the smokers those having age of onset more than 50 years were having highest CPI scores as compared to those having younger age of onset. The mean number of sextants with Score 0 and 1 were higher in those subjects with younger age of onset whereas the mean number of sextants with Score 2, Score 3 and Score 4 were significantly higher in the subjects age of onset at older age groups.

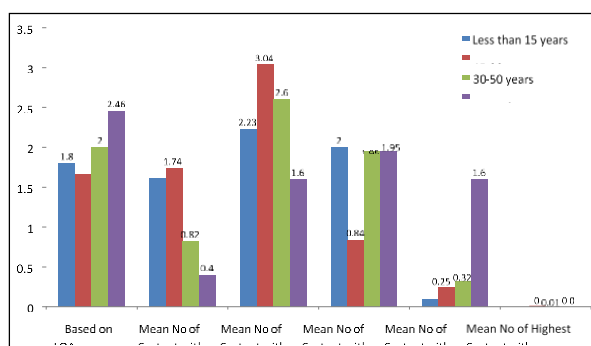


Figure 2a shows of relation of age on onset with loss of attachment. It was observed that among the smokers those having age of onset more than 50 years were having highest LOA scores as compared to those having younger age of onset. The mean

number of sextants with Score 0 and 1 were higher in those subjects with younger age of onset whereas the mean number of sextants with Score 2, Score 3 and Score 4 were significantly higher in the subjects age of onset at older age groups.

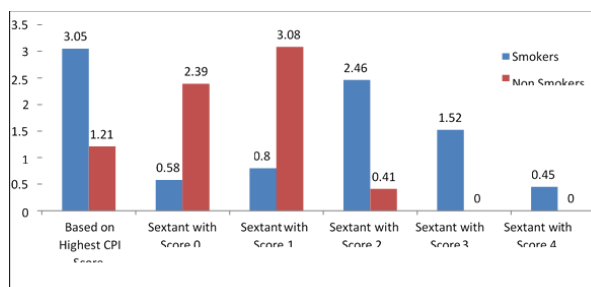


Figure 3 shows Compariosn Between Smokers and Non Smokers Based for CPI Score. It was observed that the CPI scores in smokers were significantly higher in smokers as compared to the non-smokers ($p=0.001$). The mean number of sextants with CPI score 0 and CPI score 1 was significantly higher in non-smokers whereas the mean number of sextants with CPI Score 2, CPI score 3 and 4 were significantly higher in the smokers as compared to the non-smokers ($p=0.001$).

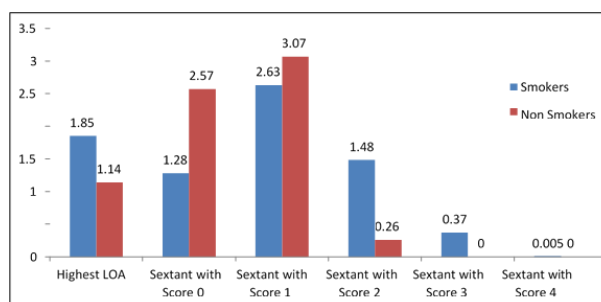


Figure 4. shows Comparison between Smokers and Non Smokers Based for LOA Score The Loss of Attachment scores in smokers were significantly higher in smokers as compared to the non-smokers ($p=0.001$). The mean number of sextants with LOA score 0 and LOA score 1 was significantly higher in non-smokers whereas the mean number of sextants with LOA Score 2, LOA score 3 and 4 were significantly higher in the smokers as compared to the non-smokers ($p=0.001$).

DISCUSSION

This study was done to assess and compare the periodontal health status in cigarette smokers and non smokers using CPI index. The hypothesis of our study was that there is significant association

between cigarette smokers and periodontitis as compared to non smokers. In our study, clinical findings such as CPI score and loss of attachment were greater in smokers as compared to non smokers.

The CPI scores 2, 3, 4, were significantly higher in smokers as compared to non smokers ($P = 0.001$) whereas CPI scores 0, 1 were significantly higher in non smokers ($P = 0.001$). Thus our findings are in agreement with similar study conducted in **Saudi Al-Ghamdi H S and Anil S (2007)** ⁶ showing significant (<0.001) detrimental association between cigarette smoking and periodontal health status. Whereas CPI code 0, 1 show significantly higher number in non smokers in comparison to smokers. The finding in the present study are consistent with the studies done by **Sreedevi M et al.**⁴ and **Jain C D et al** ⁷. thus showing that the present study gives data only about the periodontal health status and not all the disease associated with the tobacco. The age of onset for cigarette smoking were taken into consideration as the tobacco habits and its relation to the severity of periodontal disease are significantly related.⁵⁴

Similarly in the present study, the loss of attachment scores significantly higher in smokers as compared to non smokers ($P=0.001$). These findings are similar to the studies done by **Tonetti (1998)** ⁸ in his private practice, and also supporting study was done on **Dutch population by Stivoro (1997).**⁹

Duration of smoking, age of onset and its frequency were also taken into consideration which could had a significant effect on the periodontal health status of subjects. As also mentioned in the study conducted by **Guillremo (2000).**¹⁰ In the future, study can be further improved by taking into consideration nicotine levels in blood and other related parameters.

We used the CPI as recommended by the World Health Organization. CPI is not a perfect measure of periodontal disease and excludes measurement of attachment loss, gingival recession, alveolar bone level, and other clinical periodontal parameters. Nevertheless, it was originally proposed as an appropriate estimation of disease in large epidemiological surveys and has contributed to an understanding of the epidemiology of periodontal disease on a global level.¹¹

Data from the present study may therefore only offer an estimation of the prevalence of the moderate or deep periodontal pocketing, and not of all clinical disease parameters. The result of this study confirms a consistent association between smoking and periodontal status. Smoking duration was also recorded and this determinant was included in the analyses. It should be noted that given the small difference between smokers and non smokers, other factors should have been considered such as socio-economic status and stress.

CONCLUSION

Within the limits of this study, it can be concluded that smoking has a significant impact on the periodontal health status of an individual. Thus increasing the chances of periodontal disease in smokers as compared to non-smokers.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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