

Correlation of Smoking, Periodontal Health Status and Gingival Melanin Pigmentation

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ABSTRACT

Objective: Cigarette smoking causes pigmentation of oral mucosa and is a significant risk factor for periodontal diseases. This study evaluates the gingival melanin pigmentation and periodontal health status in smokers and non - smokers.

Materials & Methods: A total of 75 smokers and an equal number of non-smokers were recruited for this cross-sectional, comparative study. Subjects were selected randomly from the patients attending dental outpatient department of Mahatma Gandhi dental college and hospital, Jaipur. Subjects were assessed for gingival pigmentation based on Hedin's classification of melanin index and for overall periodontal status with Community Periodontal Index (CPI). A questionnaire was also completed by each patient.

Results: Statistically very high significant mean gingival pigmentation score was seen in smokers as compared to non smokers ($p < 0.0005$). Mean CPI index was also significantly higher in smoker group than non smoker ($p < 0.05$).

Conclusion: Increased gingival melanin pigmentation and poor periodontal status in smokers indicate that chronic smoking exerts an adverse effect on health of teeth and periodontal tissue, which may lead to various periodontal diseases. Increased degree of gingival melanin pigmentation correlated with deteriorating periodontal status, thus smokers having increased gingival melanin pigmentation should be further evaluated for periodontal status.

Key words: Gingival Melanin Pigmentation, Smoking, Periodontal Diseases.

INTRODUCTION

Periodontal diseases are one of the most common chronic diseases in adults. Periodontitis is second only to dental caries as a cause of tooth loss among adults in developed countries. [1] It is defined as one or more sites with clinical attachment loss of 4 mm or greater and pocket depth of 4 mm or greater. It has been associated with a two to eight fold increase in the risk of attachment loss based on disease severity and history of smoking. [2,3]

Most epidemiological studies indicate that smoking is directly related to incidence & prevalence of a variety of medical problems including pulmonary, cardiovascular, gastrointestinal diseases, low birth weight and cancer. Tobacco smoking causes about 80% of myocardial infarctions before the age of 50 years and 70% of chronic lung diseases. Diagnosis of periodontal disease is still primarily based on the detection of periodontal pockets, loss of connective tissue attachment, and/or

assessment of alveolar bone loss performed on radiographs. [4]

Smokers have also been reported to have poorer success rate with scaling and curettage. Smokers have increased levels of salivary antibodies (IgA) and serum IgG antibodies to *P intermedia* and *F Nucleatum*. [5]

Smoking is also a well-established risk factor for periodontitis. The association between use of tobacco products and dental problems poses a significant public health problem. It has been well demonstrated that there is a dose response relationship for tobacco use and the risk of the development of oral cancer. Smoking has been associated with periodontal disease pathogenesis and a significant increase in risk for periodontitis. [6-10] Smoking compromise the healing of periodontal tissue after a disease by impairing the immune system.

Melanin pigmentation is brownish or black discoloration of teeth occurring as a solitary unit or as a continuous ribbon in gingiva. It can be distinguished from other forms of oral pigmentation. [11-14] It is very commonly found in chronic smokers. Gingival pigmentation has been examined in terms of its association with smoking in various countries and smoking has been found to stimulate melanin production in gingival tissue causing excessive melanin pigmentation in gingiva. In present study, we have investigated the relationship between the gingival melanin pigmentation and periodontal health status in smokers and non - smokers.

MATERIALS AND METHODS

A total of 75 smokers and an equal number of non-smoker controls comprised the study sample. Subjects were selected from the department of Periodontology, Mahatma Gandhi Dental College & Hospital, Jaipur. After enrolling subjects into study, based on inclusion and exclusion criteria, a detailed history was taken and a questionnaire was completed by each patient. Using criteria established by the Centers for Disease Control and Prevention

(CDC), “current smokers” were defined as those who had smoked 100 or more cigarettes over their lifetime and smoked at the time of the interview; “former smokers” had smoked 100 or more cigarettes in their lifetime but were not currently smoking; and “nonsmokers” had not smoked 100 or more cigarettes in their lifetime. Intraoral examination was conducted using sterilized mouth mirror, CPITN probe. All the participants were assessed for pigmentation on gingiva based on the classification of melanin index proposed by Hedin and overall periodontal status with Community Periodontal Index (CPI). Ten index teeth recommended by WHO were recorded.

Inclusion criteria

- Subjects lying in age group of 18 to 65 years of age.

Exclusion criteria

- Subjects having chronic systemic pathology such as diabetes and other endocrine pathologies, hematological pathologies.
- Subjects with no clinical signs of periodontal inflammation (CPI=0).
- Less than 10 natural teeth present.

Codes and criteria of CPI index [15]

Code-0=No periodontal disease (healthy periodontium).

Code-1=Bleeding observed during or after probing.

Code-2=Calculus or other plaque retentive factors either seen or felt during probing.

Code-3=Pathological pocket 4 to 5 mm in depth. Gingival margin situated on black band of the Probe.

Code 4=Pathological pocket 6 mm or more in depth. Black band of the probe is not visible.

Degree of gingival pigmentation in each jaw was scored based on the classification of melanin index proposed by Hedin (1977) [16]

Score 0 - No pigmentation

Score 1 - one or two solitary unit(s) of pigmentation in papillary gingiva without formation of a continuous ribbon between solitary units.

Score 2 - more than three units of pigmentation in papillary gingiva without formation of continuous ribbon.

Score 3 - one or more short continuous ribbons of pigmentation.

Score 4 - one continuous ribbon including the entire area between canines, respectively.

Total score of upper and lower arches were taken and the final score was calculated by summing the scores.

RESULTS

Table No. 1: Distribution of study subjects according to various parameters

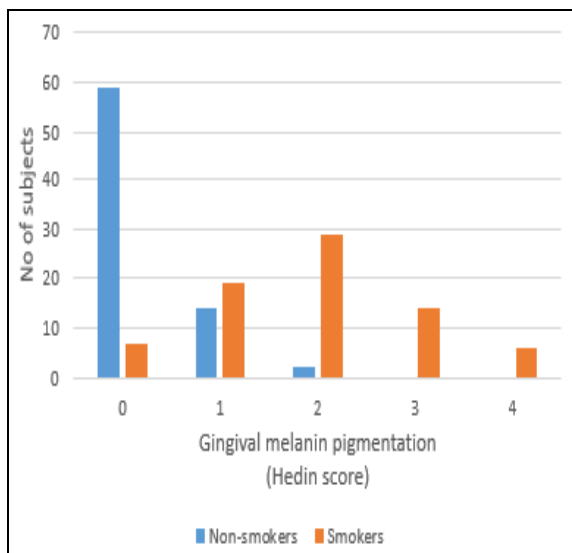
| S. No. | Parameter | | Nonsmokers(75) N (%) | Smokers (75) N (%) |
|--------|-------------------------------------|--------------------------|-------------------------|-----------------------|
| 1. | Age (Years) | 20-30 | 43 (57.33) | 39 (52.00) |
| | | 31-45 | 19 (25.33) | 28 (37.33) |
| | | 46-60 | 13 (17.33) | 8 (10.67) |
| 2. | Duration of smoking (years) | <2 | - | 11 (14.67) |
| | | 3-5 | - | 18 (24.00) |
| | | 6-10 | - | 26 (34.67) |
| | | >10 | - | 20 (26.67) |
| 3. | Frequency of smoking (Units/day) | 1-10 | - | 68 (90.67) |
| | | 11-20 | - | 7 (9.33) |
| 4. | Gingival pigmentation (Hedin score) | 0 | 59 (78.67) | 7 (9.33) |
| | | 1 | 14 (18.67) | 19 (25.33) |
| | | 2 | 2 (2.67) | 29 (38.67) |
| | | 3 | 0 (0) | 14 (18.67) |
| | | 4 | 0 (0) | 6 (8) |
| 5. | Periodontal status (CPI Index) | Healthy (0) | 25 (33) | 5 (6.66) |
| | | Bleeding on probing (1) | 26 (34.66) | 24 (40) |
| | | Presence of calculus (2) | 16 (21.33) | 27 (36) |
| | | Pocket 4-6mm (3) | 6 (8) | 9 (12) |
| | | Pocket >4mm (4) | 2 (2.66) | 10 (13.33) |
| 6. | Frequency of tooth brushing | Occasional | 3 (4) | 11 (14.67) |
| | | Once | 58 (77.33) | 58 (77.33) |
| | | Twice | 14 (18.67) | 6 (8) |

Table No. 2: Comparison between non-smoker and smoker groups

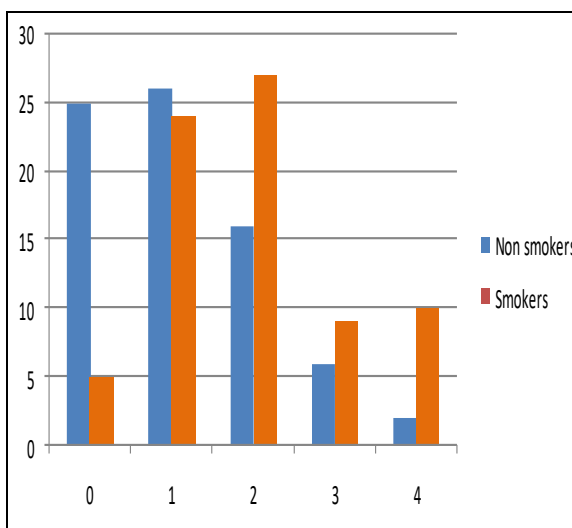
| S. No. | Parameters | Nonsmokers (N=75) | Smokers (N=75) | P value |
|--------|---|-------------------|----------------|----------------------------------|
| 1. | Mean age ± SD (Years) | 32.87 ± 10.49 | 32.64 ± 10.23 | >0.05 |
| 2. | Gingival pigmentation score (Mean ± SD) | 0.24 ± 0.49 | 1.91 ± 1.07 | <0.0001 Very high significant |
| 3. | Periodontal status (Mean ± SD) | 1.04 ± 0.94 | 1.53 ± 0.89 | <0.01 High significant |

Among smokers maximum number of subjects 39 (52%) were in 20-30 years age group (youngest). Among non-smokers highest number of subjects (59; 78.67%) had gingival pigmentation score 0 & none had scores 3 or 4 while in smoker group highest number of subjects [29; 38.67%] had score 2; 14 smokers had score 3 and 6 smokers had score 4. Mean age of non-smokers was 32.87 ± 10.49 years while in smoker group was 32.64 ± 10.23 years (Table 2). Similarly Highest number of non-smokers 26 (34.66 %) had CPI index score

1 while maximum number of smokers 27 (36%) had score 2 (Table 1). Mean frequency of tooth brushing was more in non smoker group than smoker group. Mean gingival pigmentation score in non-smoker group was 0.24 ± 0.49 while in smoker group was 1.91 ± 1.07 which is statistically very high significant (p < 0.0001). Similarly mean CPI index in non-smoker group was 1.04 ± 0.94 while in smokers was 1.53 ± 0.89 which was highly significant statistically (p < 0.01) (Table 2).



Graph 1: Gingival melanin pigmentation in smokers and non smokers



Graph 2: Periodontal health status (CPI Index)

DISCUSSION

In majority of population studies undertaken in India, the study population belongs to low socio economic level. These patients have poor or no access to formal oral health care services. Ironically 78% of the individuals mentioned that they had never been to a dentist. This study also revealed poor oral hygiene habits in the subjects, since most of them restricted to finger with tooth powder and neem sticks to clean their teeth. The association between the age of the subjects and their periodontal status was evident. Smoking was significantly associated with severity of alveolar bone loss in a similar manner as it was associated with attachment loss. [4]

There is a significant impact of smoking on the severity of periodontal diseases. Also the risk of periodontal pockets increased as the duration and frequency of smoking. [5] The gingival bleeding and gingival inflammatory symptoms appeared to be suppressed in smokers. [17] Most studies that have addressed the relationship between smoking and periodontitis have been based on a self-reported assessment of tobacco consumption. Self-reporting may be influenced by cultural and social factors, and the effects of smoking on health may also be influenced by individual variations because of differences in metabolism, depth of inhalation, and nicotine concentration in cigarettes. [18]

A dose-response relationship was also identified between levels of exposure to smoking and lip and gingival pigmentation. Correlation in terms of levels between lip and gingival pigmentation was apparent in Current Smokers. [19] According to Cochrane, people who brush and floss regularly have less gum bleeding compared to tooth brushing alone and this paper further supports the relationship between flossing and periodontal health. [20]

The negative impact of heavy smoking on tooth retention, probing depth, clinical attachment level and severity of periodontitis was confirmed by Phipps *et al.* [21] Smoking also has been shown to affect periodontal disease severity in younger individuals. Cigarette smoking is associated with increased severity of generalized aggressive periodontitis (formerly termed “early-onset periodontitis”) in young adults, and those age 19 to 30 years who smoke are 3.8 times more likely to have periodontitis than non smokers. [22] Bleeding on gentle probing was more extensive in the smokers than the non smokers. This was probably related in part to the higher levels of sub gingival deposits and the less appropriate home care of the smokers. There is considerable debate regarding the relationship between smoking and periodontal disease. Several studies have concluded that smoking per se has no effect

and that differences are due to higher plaque levels in smokers than non-smokers. [23,24] It is difficult to make direct comparisons with other studies, due to differences in the subjects' age ranges. Young smokers have been shown to have more extensive gingivitis than non-smokers associated with higher plaque levels in the smokers.

CONCLUSION

Periodontal status (CPI index) & gingival melanin pigmentation (Hedin score) were significantly poor in smokers than non smokers indicating that chronic smoking exerts an adverse effect on health of teeth and may lead to various periodontal diseases. Degree of gingival melanin pigmentation may correlate with deteriorating periodontal status and may be used as an early marker of evolving periodontal diseases, but this needs further studies to prove the correlation. Smokers had less mean tooth-brushing frequency as compared to non-smokers further indicating less awareness and poor dental hygienic habits. Maximum numbers of smokers were of age group 20-30 years which is quite young age indicating high prevalence of smoking in youth and making them further vulnerable for periodontal diseases.

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APPENDICES

Self administered Questionnaire

Patient's Name

Age/Gender:

C. R. No:

Case Id

Occupation

Date:

Address:

Please tick most appropriate single answer to each question

1. How many times do you brush your teeth every day?

1 2 after each meal occasionally

2. How long do you brush your teeth for?

1 minute 2 minutes 3 minutes Over 4 minutes

3. Which secondary methods for plaque control do you use?

Dental floss Inter-dental brushes Toothpicks Mouthwash None

4. Do you smoke?

Yes No I quit smoking

If yes then, Occasionally Regularly

If you have quit then how much time before:

5. If you are a smoker, how many cigarettes/ bidi do you smoke daily?

1-10 11-20 21-40 more than 40

6. Duration of smoking?

0-3yrs 3-5 yrs 6-10 yrs >10 yrs

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