Original Research Article

Evaluation of effects of smoking on gingival thickness - A clinical study

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Abstract

Introduction: Smoking is a known risk factor of periodontitis. Cotinine, a metabolic by product of nicotine is involved in the pathogenesis of periodontitis. Changes in gingival microvasculature, gingival epithelium take place which manifest clinically as decreased bleeding on probing and reduced inflammatory response, increased gingival thickness etc. Knowing the importance of gingival thickness in various root coverage procedures and restorative treatments in periodontics and the increased incidence and prevalence of smoking, assessing the relation between these two entities is becoming important. This clinical study is sought to compare the thickness of gingiva in systemically healthy smokers and non-smokers

Materials and methods: 40 age matched smokers and non-smokers were considered for the present study. Gingival thickness was measured in the maxillary and mandibular anterior teeth by transgingival probing using UNC-15 probe midbuccally in the attached gingiva and at the base of the interdental papilla. Plaque index and gingival bleeding index were recorded. Student's independent t-test was employed for comparing various periodontal parameters between smokers and non-smokers. A P-value of less than 0.05 was considered statistically significant. All P-values were two tailed.

Results: Both groups had similar gingival bleeding index and plaque index. Smokers had a higher thickness of gingiva both mid bucally and interdentally as compared to non-smokers.

Conclusion: Both midbuccal and interdental areas are thicker among smokers when compared to non-smokers at similar plaque and gingival bleeding levels.

Key words

Plaque index, Gingival bleeding index, Gingival thickness, Smokers, Non-smokers.

Introduction

Periodontitis defined as the chronic inflammation of supporting tissues of teeth is a complex interplay of plaque bacteria and host. Various risk factors have been implicated in its pathogenesis apart from host bacterial interaction such as environmental factors, socioeconomic factors, genetic and epigenetic factors [1]. Among the various factors, smoking has been found to be strongly associated with periodontitis. Increased alveolar bone loss; tooth mobility, probing pocket depth and eventual tooth exfoliation have been reported in smokers as compared to non-smokers [2]. Besides this a decreased response to a variety of non-surgical [3] and surgical procedures [4-7] has been reported in literature. Smoking also adversely affects the neutrophil chemotaxis and phagocytosis.

Gingival changes such as reduced oxygen tension, decreased gingival blood flow resulting in altered gingival inflammation and bleeding [8] have been proved in various studies and are the result of a nicotine metabolic by-product cotinine, a known peripheral vasoconstrictor. Thus morphologic and histologic changes in the gingival are produced. Gingival thickness is one among them.

In periodontics, thickness of gingival is of aesthetic and therapeutic significance. The results of various root coverage procedures and restorative treatments [9, 10] are predicted on initial gingival thickness. Thus knowing the importance of gingival thickness in the field of periodontics and implantology and the increased incidence and prevalence of smoking, assessing the relation between them becomes important.

This clinical study was sought to compare the thickness of gingiva in systemically healthy smokers and non-smokers.

Materials and methods

The present study was conducted in the Department of Periodontics, Govt. Dental College and Hospital Srinagar. 40 Patients (20 smokers and 20 non-smokers) of age group 20-40 years were included in this study. Patients were divided into 2 groups. Group 1 which included smokers with gingivitis (experiment group) and Group 2 subjects who are non-smokers with clinically healthy gingiva (control group).The experiment group followed CDC (Centre for Disease Control) criteria for current smokers [11] - those patients who have smoked more than 100 cigarettes in their lifetime and have smoked at the time of intervention.

Exclusion criteria

- Presence of periodontitis,
- History of systemic diseases, affecting the periodontium
- Gingival recession in anterior teeth,
- Pregnancy or lactation.

Inclusion criteria

- All teeth should be present except for 3rd molars.

Before start of the study, an informed consent was taken from the patients regarding the procedure. In both groups, gingival thickness was measured in both the maxillary and mandibular anterior teeth by transgingival probing [12]. Plaque index and Gingival bleeding index were recorded which was followed by scaling and root planing. The attached gingiva and interdental papilla were anesthetized using lignocaine spray (lignocaine 21.3 mg/ml) and if required infiltration was done using 2% lignocaine HCl with 1:80,000 adrenaline injection.

UNC-15 (University of North Carolina) probe was used to assess the gingival thickness midbuccally in the attached gingiva and at the base of the interdental papilla. Measurements were rounded to the nearest 0.5 millimeter. The recorded data was compiled and entered in a spread sheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Data was expressed as

Mean±SD. Student's independent t-test was employed for comparing various periodontal parameters between smokers and non-smokers. A P-value of less than 0.05 was considered statistically significant. All P-values were two tailed.

Results

The study included a total of 40 patients of which 20 were non-smokers and 20 smokers within the age group 20-40 years. The plaque index and gingival bleeding index (Ainamo and Bay) were assessed in both groups. A statistically insignificant value was found on inter group comparison of these two indices. Plaque index (p value=0.901), gingival bleeding index (p value=0.734) **Table - 1**. The midbuccal and interdental thickness in both groups was measured and compared. Mean gingival thickness at midbuccal site was 1.80±0.538 mm and at interdental site was 2.1±0.394 mm in smokers and in non-smokers was 1.25±1.874 mm in midbuccal and 1.5±0.408 mm in interdental site (**Table - 2**). Intergroup comparison of midbuccal gingival thickness among smokers and non-smokers shows that midbuccal thickness in smokers (1.80±0.538 mm) was higher than in non-smoker group (1.25±1.874 mm). Likewise, interdental gingival thickness in smokers (2.1±0.394 mm) was higher than in non- smokers (1.5±0.408 mm). Therefore, both intergroup comparison of the gingival thickness was higher in smokers than non-smokers and the values are statistically significant p-value <0.05 (**Table - 2**).

Table - 1: Comparison of plaque and gingival bleeding index among two groups.

Parameter	Smoker		Non-smoker		P-value[@]
	Mean	SD	Mean	SD	
Plaque Index	1.70	0.674	1.67	0.433	0.901
Gingival Bleeding Index	25.2	1.874	25.5	2.014	0.734

Table - 2: Comparison based on thickness of gingival at mid buccal site and interdental site among two groups.

Gingival Thickness	Smoker		Non-smoker		P-value
	Mean	SD	Mean	SD	
Mid Buccal Site	1.80	0.538	1.25	1.874	0.015*
Interdental Site	2.1	0.394	1.5	0.408	0.004*

Discussion

Smoking is a known risk factor for periodontal diseases. Tobacco smoke contains nicotine a cytotoxic substance which is involved in the pathogenesis of periodontitis by inducing immune-suppression, defective neutrophil functions and impaired gingival and periodontal health. Various gingival changes have been reported in literature. From the periodontal point of view gingival thickness is an important factor to be taken in consideration before undergoing any root coverage procedures. Because of the increased incidence and prevalence of smoking, assessing the relation between them becomes mandatory. This clinical study was conducted to see the effect of smoking on gingival thickness. All the participants of the study were matched for age and other known variables before the conduction of study.

In the present study, a statistically insignificant difference was found in inter group comparison of plaque index (p value =0.901). The results of our study are in accordance with the study conducted by Baastian RJ, Waite I. [13] and Bergstrom J [14]. Similarly for gingival bleeding index, a statistically insignificant difference was found in inter group comparison (p value

=0.734). The results of our study are in accordance with the study conducted by Jayashree and Vandana [15] but are in contrast with the study of Preber H, Kant T, Bergstrom J. [16] according to which, the long term impairment of periodontal vasculature occurs as a result of nicotine which clinically manifests as decreased bleeding. Inter group comparison showed that gingival thickness in midbuccal and interdental region was greater in smokers when compared to non-smokers (statistically significant $p < 0.05$). The gingival thickness in smoker group was 1.80±0.538 mm midbuccally and 2.1±0.394 mm interdentally. In non-smokers, midbuccally it was 1.25±1.874 mm and interdentally 1.5±0.408 mm. The results of our study are in accordance with the studies conducted by Gultekin SE, Sengüven B, Karaduman B [17] according to which increased rate of proliferation of gingival epithelium takes place under the influence of nicotine thus increasing epithelial thickness among smokers and Prebec, H. and Bergstrom, J [18] according to whom nicotine stimulates the collagen production. Hence to conclude, smoking is associated with an increased gingival thickness because of the effects of nicotine on various gingival components.

Conclusion

The conclusion of the study is that both midbuccal and interdental areas are thicker among smokers when compared to non-smokers at similar plaque and gingival bleeding levels.

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