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Impact of tobacco on periodontium (Microbiological findings)

Aarti Charokar

PhD Scholar, Department of Microbiology, RKDF Dental College & Research Centre, SRK University Bhopal.

Dr. Abhishek Gupta, PhD

Guide. SRK University, Bhopal

Abstract---Tobacco is the major risk for causing oral lesion or disease as well as systemic disease. Tobacco smoking and chewing is a significant contributing factor of periodontal health. The bacteria that are involved in periodontitis accumulate in the subgingival plaque that comprises predominantly of Gram negative strict anaerobes. This clinical study was designed to evaluate the clinical, microbiological changes in Tobacco user and compared these to the Non Tobacco user. 400 subjects were enrolled with an age distribution from 20-55 years complain with periodontitis, Subject were classified in four group Tobacco chewers, Tobacco smokers, Both chewers and smokers and non tobacco user. To identify the growth of anaerobic bacteria using anaerobic culture method in periodontitis patient. To analyse prevalence of periodontal disease among tobacco user a descriptive method involving the colony forming units per millilitre (CFU/ml) and mean of the total flora percentage. The study shows a high percentage of anaerobic bacteria in tobacco smokers compare with tobacco chewers and non tobacco user. On the basis of CFU/ml and mean% of the total flora. Tobacco smokers show high percentage of anaerobic bacteria compare to other subject. It can be concluded that tobacco consumption in both forms harmful for individual, this study revealed that there is relation between smoking and periodontal disease.

Keywords---Periodontitis, Tobacco, CFU/ml, anaerobic culture.

Introduction

Periodontitis is defined as an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone

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Corresponding author: Charokar, A.

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with pocket formation, recession, or both.¹ Periodontal diseases are infections caused by dental plaque, but risk factors can modify the host response to microbial aggression.² The disease is mainly restricted to the gingival and is called chronic marginal gingivitis; later the supporting tissues are involved, and are called marginal Periodontitis. Gingivitis is a problem commonly occurring in young adults, which often gets unnoticed. Periodontitis or inflammation of the periodontium result from the addition of the inflammatory process initiated in the gingival to the supporting periodontal structure leading to bone damage and loosening & ultimately loss of teeth.³ There are certain risk factors like age, diabetes, tobacco usage and pathogenic bacteria and microbial tooth deposits that can change the host response to microbial aggregations.²,⁴ Tobacco is the major risk factor for oral diseases including oral cancer, oral mucosal lesions, periodontal diseases, dental implants failure, wound healing failure, gingival inflammation, acute necrotising ulcerative gingivitis and apthous ulcer and also cause systemic disease.^{5,6} There is a diagnosed biologic intent for the terrible impact of smoking on periodontal tissues. It has an immunosuppressive impact on the host, adversely affecting host- bacterial interactions, and this change can be due to changes within the composition of sub-gingival plaque. Smoking may also provide a high-quality environment for some of the periodontal pathogenic species in the plaque and may be one cause why smoking is a chance issue in periodontal sickness improvement.⁷ Smoking is a significant risk factor for many diseases, and increasing evidence suggests that smoking adversely affects periodontal health.⁸ Smoking has been linked to lung disease, cancer, cardiovascular disease, and poor pregnancy outcomes, such as miscarriage and low birth weight. Over the past two decades, it has also been recognized that smoking is associated with periodontal disease.⁹ The concept that smoking tobacco may be harmful to periodontal health is not new. In fact, Pindborg observed an relationship between acute necrotizing ulcerative gingivitis and smoking nearly 60 years ago ¹⁰.

The bacterial etiology of periodontitis is complex with a variety of organism responsible for initiation and progression of disease. The microorganisms of dental plaque are capable of initiating the mechanisms of destruction of periodontal tissues. Although over 400 different bacterial species have been detected in the oral cavity.¹¹ Gram positive and facultative organisms including Streptococci, Actinomyces spp are responsible for initial stage of gingivitis. In chronic periodontitis the subgingival plaque has two distinct zones: a zone of Gram- positive close to the tooth surface and zone of Gram negative and anaerobic organisms next to the gingival cervice. In active pockets Porphyromonas gingivalis , Actinobacicillus actinomycetemcomitans, Prevotella intermedia and Fusobacterium nucleatum may also present.¹²

Aim of the study

Isolation and counting of anaerobic bacteria from sub gingival plaque sample in patient with periodontitis and compare with tobacco user and non tobacco user.

Materials and Methods

The study is to measure the prevalence of periodontal disease and to measure the association between periodontal diseases among tobacco user.

The variables for the study included:

- Age group -those people in the age of 20 -50 years (Tobacco users and non users)
- Sex -both men and woman in the age group 20 -50 years were included in this study.
- Tobacco consumption in the form of smoking and chewing.

Data collection

The participants of the study were classified in to four groups:

- 1. Tobacco Chewers 2. Tobacco Smokers 3. Both Chewers & Smokers
- 4. Non user

The study is based on data obtained from a series of sub gingival microbial samples collected at the Department of Periodontology and Processed at the Department of Microbiology of SRK University Bhopal. Four hundred patients aged 20-55 years with periodontitis were enrolled in the present study. Study consist of Tobacco Chewers, Tobacco smokers, Non Tobacco User and Both chewers and smokers.

Inclusion criteria

- Subject should be tobacco user for more than 3 years.
- Subject should have 22 natural teeth in situ.
- At least 6 pockets with PPD of > 5mm
- No professional periodontal therapy during last six month.
- Periodontal disease is confirmed by radiologically diagnosis.
- Detail case history and informed consent will be taken from each subject.

Exclusion criteria

- Subjects under antimicrobial therapy
- Subjects using local medication.
- Undergone periodontal therapy in last 6 months.
- Subjects using partial denture.
- Medically compromised disease.

Method

- Subjects coming to OPD at RKDF Dental College, Bhopal
- Subject is examined by dental specialist
- A radio logically confirmation is done to confirm the periodontal disease.
- Clinical Parameters were also recorded including Pocket depth, Plaque index, bleeding on probing by specialist.
- Once confirmation is done subjects is consider for the sample collection
- Inform consent and detail history is taken.

Sample Collection

After the clinical parameter recording (Probing depth(PD), Plaque index, attachment loss, and gingival index)

- The deepest (\geq 5mm) six pockets were selected for sampling.
- The sterile paper point is inserted into the periodontal pocket for 20 seconds.
- After 20 seconds sub gingival plaque sample (with paper point) collected for for the isolation of anaerobic bacteria.
- Collected sample sterile paper points were transferred to a test tube containing 1 ml of the VMGA-III transport medium under anaerobic conditions.
- All samples were processed in ≤ 24 hrs at room tem. & incubated in anaerobic culture system (anaerobic jar).

Microbiological procedure

- Collect sample were vortex for 2 minute and 100 microlitre was used to prepare 10 fold dilution (10⁴) in sterile phosphate buffer saline.
- 100 microlitre (sample) from dilution was taken by micropipette and cultured by spreading evenly on Blood Agar plate and incubated anaerobically using anaerobic jar with gas generating system at 37 C for 7 days.
- After incubation:- Total viable count /colony forming unit (CFU) using colony counter.
- Total viable counts (TVC) were defined as the total number of colony forming units obtained on non selective media plates.

Distribution and Results

As Study comprised of 400 subjects age group ranging between 20-50 years were selected, patients coming to RKDF Dental College & Research Centre, Bhopal.

Group I

Graph - 1.1 Distribution of Population



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The table and graph show the distribution of population in which 366 were male and 34 were female.

Group II





On the basis of tobacco consumption, subjects were categorised in various form. The table shows 21.75% of total sample population consume both forms of tobacco (chewers and smokers), 29% of the subject were chewers while 34.75% were smokers. Thus 85.5% of the subjects consume tobacco in any form as mentioned above table and 14.5% of the total sample population abstained from consuming any forms of tobacco (nonuser).

Group III

GRAPH- 1.3 - Male female comparisons of tobacco consumption



The graph shows that, the using of both forms of tobacco and smoking alone were predominantly common among males while in the chewer category, females were less in both the form when compared to males. In the non-user category, of the respective sample population for each sex (366 & 34 respectively for males and

females) 9.01 % of males and 73.52 % of females were not consuming any forms of tobacco.



Graph – 1.4 - Distribution of subject according to age group

As mentioned above, 400 subjects (Male, Female) divided in a group on the basis of age from 20-50 yrs. In above graph the female population is more as compare to males in age group of 31-35 and 41-45.



Observations

Graph revealed that the total count of anaerobic bacteria (CFU/ml) isolated from the sugingival plaque samples and cultivated on blood agar which were incubated an aerobically In sample of tobacco smokers show highest count of bacteria 89 % which show a high prevalence of anaerobic bacteria which are responsible for destruction of periodontium, 87% of bacteria present in a subject those consume

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both form of tobacco, Tobacco chewers show 83% of bacteria. Among the non user shows 48% of bacteria.





The graph had categorised into four groups. Those subject who were consuming both forms of tobacco, smokers alone, chewers alone and non –users of tobacco. The table reveals that 89 % of the subjects who were tobacco smokers had high prevalence of periodontal disease. While comparing with both form of tobacco (smokers and chewers), chewers and non user. It was observed that 78% of subject who consumed both forms of tobacco(smokers and chewers) had high prevalence where as only 74% of chewers show high prevalence of disease. In the non user category, of the total 58 subjects 65.5% were having prevalence.





Graph show 79% of subject having high prevalence of periodontal disease and 21% having low prevalence of disease.



Graph – 1.8 Male- female comparison of periodontal disease in population

The graph show the comparison of periodontal disease in male and female of the study population. There is a clear difference in the prevalence of periodontal disease between male and female. The Prevalence of periodontal disease among males was 85% and the among female was 12%.

Graph – 1.9 - Periodontal disease status of the population in relation to different age groups



Normally periodontal disease seen in the age group of 46-50 or later. In this study the prevalence of periodontal disease seen between the age group of 36 - 50 due to frequency and duration of tobacco use. Of the 237 subjects in this age group. 92% were having periodontal disease. This table reveals that the use of tobacco responsible for prevalence of periodontal disease in different age groups. Chi – square test shows positive association between age group and the periodontal disease (p value < 0.001)

Discussion

The present study showed the high percentage (CFU/ml) of anaerobic bacteria in tobacco smokers compare with tobacco chewers and non tobacco user. On the basis of traditional procedure (CPITN) of Dentistry when we compare with our traditional procedure (Microbiological finding) result of both method show high prevalence of periodontitis in tobacco smokers other than tobacco chewers and non tobacco user. Tobacco smokers show deep periodontal pocket, more calculus, more attachment loss and high percent of anaerobic bacteria which show more destruction of Periodontium than other subject. The study also conform that smokers have more strong chronic dose dependent effect on peridontium in severe periodontal disease. Tobacco smoking was noted as very potent environmental risk factor in periodontitis. Tobacco smoking not only affects the oral environment but the gingival and the blood supply in inflammatory response and immune response and the healing potential of periodontal connective tissue. There is lots of clinical evidence is present which shows there is a smoking with destructive periodontal disease is associated. The ability of microorganism to colonise the different oral surfaces depends on their binding potential. Various environmental factors and host factors are involved in the harbouring of microbes and they are anaerobes associated with oral infections and be the origin of distant infection.^{13,14,15} The result of present study correlated with other study. In our study subject due to tobacco consumption and basis of frequency of tobacco intake we found higher prevalence of bacteria and deep periodontal pocket from the age of 36 -50 year. The result of present study similar with other study and they found progressive destruction of periodontal disease with increasing age.¹⁶

Conclusion

Study concluded that tobacco is harmful for health either it is used in the form of chewing or smoking. But present study revealed that tobacco in the form of smoke are more dangerous for health as well as wealth. So there need to be carried out to be further study to find out degree of destruction cause by different bacteria. The smoking inspiration programme need to be applied in smokers to prevent periodontitis and smoking prevention need to be completed by fitness education by using advising and advocating and facilitating smoking cessation programmes for the various affected person.

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