

How to Cite:

Charokar, A., Gupta, A., Singh, V., Sharma, S., Rajput, A. S., & Goswami, P. (2022). Correlation between periodontal pocket depth and red complex bacteria among tobacco user. *International Journal of Health Sciences*, 6(S2), 6023–6028.
<https://doi.org/10.53730/ijhs.v6nS2.6561>

Correlation between periodontal pocket depth and red complex bacteria among tobacco user

Aarti Charokar

Ph.D. Scholar, Department of Microbiology, RKDF Dental College & Research Centre, Bhopal (MP)
Corresponding author email: chrokaraarti@gmail.com

Dr. Abhishek Gupta

Ph.D. Guide, SRK University, Bhopal (MP)

Dr. Vikram Singh

Professor, Department of Oral Medicine & Radiology, RKDF Dental College & Research Centre, Bhopal (MP)
Email: vikramdr_shree@rediffmail.com

Dr. Sakshi Sharma

Associate Professor, Department of Oral Medicine & Radiology, RKDF Dental College & Research Centre, Bhopal (MP)
email-sakshi23jan@gmail.com

Dr. Ankur Singh Rajput

Assistant Professor, Department of Periodontology, RKDF Dental College & Research Centre, Bhopal (MP)
Email: dr.ankur87@yahoo.com

Dr. Pallavi Goswami

PG Student, Department of Periodontology, Babu Banarasi Das College of Dental Sciences, Lucknow (UP)
Email: pulsspallavi26@gmail.com

Abstract---Aims- The present study is to evaluate the presence of red complex microorganism and relation with the prevalence of anaerobic bacteria and correlation with pocket depth in Periodontitis among tobacco user. Materials and Methods- The BANA (N-benzoyl-DL-arginine-naphthylamide) test was used to analyze subgingival microbiota. 400 subject age between 20-55 enrolled in this study, subject divided into three groups Tobacco Chewers, Tobacco Smokers, Both chewers and smokers and Non tobacco user. Result – The present study compared the subject with BANA test and pocket depth,

the study shows tobacco smokers had deep pocket in comparison to other subject, which concluded that tobacco smokers show greater destruction of periodontium. Conclusion- Tobacco is harmful substance either it is used in any form (Chewing and Smoking), but study clearly indicate tobacco smoking are responsible for more destruction of Periodontium. The tobacco cessation programme should be implemented to prevent periodontitis and smoking prevention should be done by health education.

Keywords--periodontitis, BANA test, tobacco user, probing depth.

Introduction

Periodontal infection is a endogenous infection which is caused by periodontopathic bacteria present in subgingival plaque. Periodontal disease occurs due to the combination of oral bacteria and specific species of bacteria are suspected as contributors to this disease. Socransky reported the three bacteria which belong "red complex" that is *P.gingivalis*, *T.denticola*, *T. forsythia* are responsible for severity of periodontal disease.¹ Anaerobic bacteria are believed to be the leading causative factor in periodontal disease.² In the initial stage of gingivitis Gram –positive and facultative organism predominate. In chronic periodontitis the two distinct zone is there: a zone of Gram positive cocci and bacilli close to the tooth surface and a zone of Gram –negative and anaerobic microorganism next to the gingival cervix. In active pockets *P.gingivalis*, *Actinobacillus*.

Actinomycetemcomitans, *Prevotella intermedia* and *Fusobacterium nucleatum* may also present.³ The microorganism of dental plaque are responsible for the destruction of Periodontium.⁴ There are several risk factor for periodontitis tobacco is one of them. Bergstrom revealed that tobacco is an important risk factor for the destruction of Periodontium.⁵ Bergstorm and colleagues showed that severity of disease increases with the frequency of smoking. Smoking is also associated with an increased risk of periodontal disease.⁶ Smokers not only to have significantly increased probing depths and bone loss, also increased tooth mobility. Some studies revealed the relationship between the effect of cigarette consumption and periodontal attachment loss.^{7,8}

The red complex bacteria are Gram –negative anaerobes have an enzyme, capable of hydrolyzing the synthetic trypsin substrate N-benzoyl-DL-arginine –beta –naphthylamide. (BANA).^{9,10} The presence of at least 10^4 cells of red cluster show blue colour on the card. These tests is used for the detection of BANA enzyme in sample which show the presence of periodontal pathogens.¹¹ The BANA test has been used in several studies. The result of the BANA reaction have been previously compared with other microbiological techniques such as PCR,¹² ELISA test.¹³ However, these studies compared only the bacterial enzymatic activity with the presence or absence of the microorganism. The aim of this study was to evaluate the ability of the BANA test to detect the correlation between pocket depth and presence of red complex bacteria among tobacco user.

Material and Methods

The study is based on data obtained from a series of subgingival microbial samples collected at the Department of Periodontology and Processed at the Department of Microbiology at RKDF Dental College and Research Centre under 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.

Selection 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.

Sample Collection and Procedure

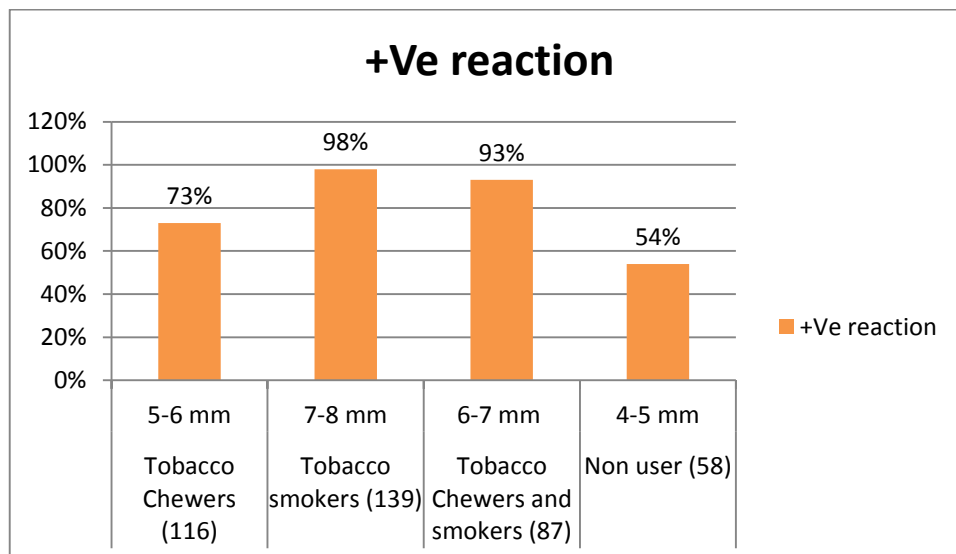
- The clinical parameter were recorded such as Probing depth (PD), Plaque index, attachment loss, and gingival index)
- The deepest (≥ 5 mm) six pockets were selected for sampling. After supragingival plaque removal, subgingival plaque samples were collected with the help of sterile number 30 paper point. (ProTaper universal Absorbent points, Dentsply) for 20 second. The sterile paper point is inserted into the periodontal pocket for 20 seconds.
- After 20 seconds sub gingival plaque sample (paper point) collected for BANA reaction.
- Each sample was applied on the lower reagent strip of the BANA test card. The upper strip is lightly moistened with distilled water and the strips are folded together and incubated for 5min at 55 degree C.
- The strip is removed and the intensity of the blue colour is read as weak positive or positive.

Observation

Table – 1.1 BANA reactions and periodontal pocket

Subject	Probing depth	+Ve reaction
Tobacco Chewers (116)	5-6 mm	73%
Tobacco smokers (139)	7-8 mm	98%
Tobacco Chewers and smokers (87)	6-7 mm	93%
Non user (58)	4-5 mm	54%

Graph – 1.1 - BANA reaction and periodontal pocket depth



Result

On the basis of BANA reaction table and graph revealed that out of total 139 Subject those consume tobacco in the form of smoke, in which 98% of smokers show BANA reaction positive and 7-8 mm pocket depth which is highest from the entire subject. 93% subject positive for test those consume both form of tobacco (chewers and smokers) and pocket depth around 6-7 mm ,while 83% tobacco chewers and 54% non tobacco user show positive test for BANA reaction, while pocket depth are 5-6mm and 4-5mm. The present study show the relation between pocket depth and BANA positive reaction, which show the red complex bacteria (*P.gingivalis*, *T.denticola* and *T. forsythia*) are present in deep pocket and responsible for periodontal disease.

Discussion

On the basis of biochemical reaction (BANA Test) and probing depth tobacco smokers show high percentage of positive reaction and increasing probing depth compare with other subject. There was a statistically significant correlation between increasing probing depth and positive BANA test. The relation between probing depth and BANA test revealed that the periodontal pathogens which belongs red complex are present in deep pocket. In this study compare the subject with BANA test and pocket depth the study show tobacco smokers had deep pocket comparison to other subject, which concluded that Tobacco smokers show greater destruction of periodontium. The present study correlated with other study.^{13,14,15,16,17,18,19} 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. The result of present study similar with other study and they found progressive destruction of periodontal disease with increasing age.²⁰

Conclusion

Tobacco is a harmful substance either it is used in any form (Chewing and Smoking), but study clearly indicate tobacco smoking are responsible for more destruction of Periodontium. The tobacco cessation programme should be implemented to prevent periodontitis and smoking prevention should be done by health education.

References

1. Socransky SS, Haffajee AD., Cugini , M.A., Smith, C.& Kent, R.L. Jr.(1998). Microbial complexes in subgingival plaque. *Journal of Clinical Microbiology*, Vol.25 (No.2):134-144
2. Bollen C.M.L., Vandekerckhove B.N.A., Papaioannon W., Vaneldere J.,Quirynen M.(1996). Full-versus partial mouth disinfection in treatment of periodontal infections. A pilot study, long term microbiological observation. *J. Clin. Periodontal* Vol. 23:960-970.
3. Samaranayake L.(2006). *Essential Microbiology for Dentistry*, Churchill Livingstone Company, London: 275.
4. MooreW.E.C., Moore L.V.H (1994) The bacteria of periodontal disease. *Periodontology 2000* Vol. 5: 66-77.
5. Bergstrom ,J.(1989) Cigarette smoking as risk factor in chronic periodontal disease. *Community Dentistry and Oral Epidemiology*, 17, 245-247.
6. Bergstrom, J., Eliasson, S. and Dock, J. (2000) Exposure to tobacco smoking and periodontal health. *Journal of Clinical periodontology*,27,61-68.
7. Grossi SG, Zambon JJ, Hov AW, Koch G, Dunford RG, Machtei EE et al. Assessment of risk for periodontal disease. Risk indicators for attachment loss. *J Perio* 1994; 65:260-267.
8. Haffajee AD, Socransky SS Relationship of cigarette smoking to attachment level profiles. *J Clin perio* 2001 28. 283-295
9. Loesche WJ: The identification of bacteria associated with periodontal disease and dental caries by enzymatic methods. *Oral Microbial Immunol* 1 : 1-6 1986.
10. Loesche WJ, Syed SA, Schmidt E, Morrison EC: Bacterial profiles of subgingival plaques in periodontitis. *J Periodontal* 56: 447-456, 1985.
11. Loesche WJ, Lopatin DE, Giordano J, Alcoforado G, Hujoel P. Comparison of the benzoyl-DL-arginine-naphthylamide (BANA) test, DNA probes, and immunological reagents for ability to detect anaerobic periodontal infections due to *Porphyromonas gingivalis*, *Treponema denticola* and *Bacteroides forsythus*. *J.ClinMicrobiol.* 1992 Feb; 30 (2): 427-33
12. Bretz WA, Eklund SA, Radicchi R, Schork MA, Schork N, Scottenfeld D, et al. The use of a rapid enzymatic assay in the field for the detection of infections associated with adult periodontitis. *J public Health Dent.* 1993 Dec; 53(4): 235-40
13. Takaishi Y, Morri H. Miki T. The benzoyl – DL arginine-naphthylamide (BANA) test and polymerase chain reaction measurement of pathogenic bacteria can assess the severity of periodontal disease. *Int J Tissue React.* 2003;25(1) :19-24.

14. C. Kazor, G. W. Taylor, and W. J. Loesche, "The prevalence of BANA-hydrolyzing periodontopathic bacteria in smokers," *Journal of Clinical Periodontology*, vol. 26, no. 12, pp. 814–821, 1999.
15. Loesche WJ, Bretz WA, Kerschensteiner D, Stoll J, Socransky SS, Hujoel P, *et al.* Development of a diagnostic test for anaerobic periodontal infections based on plaque hydrolysis of benzoyl-DL-arginine-naphthylamide. *J Clin Microbiol* 1990;28:1551-9.
16. Kamma JJ, Nakou M, Baehni PC. Clinical and microbiological characteristics of smokers with early onset periodontitis. *J Perio Res* 1999; 34: 25 – 33.
17. Preber H, Bergstrom J, Linder LE: Occurrence of periopathogens in smoker and non-smoker patients. *J Clin Periodontol* 1992, 19(9 Pt1):667-671.
18. Hamdoon SM, Abdul Rahman Gh Y. Prevalence of Anaerobic Bacteria in Periodontitis in Relation to Pocket Depth Al- Rafidain *Dent J.* 2014; 14(2):320-328
19. Michiya Kubota^{1,2}, Mariko Tanno-Nakanishi², Satoru Yamada², Effect of smoking on subgingival microflora of patients with periodontitis in Japan, *BMC Oral Health* 2011, 11:1.
20. Anil S, Hari S, Vijaykumar T. "Periodontal conditions of a selected population in Trivandrum district, Kerala, India". *Community dental oral epidemiology*, 1990; 18:325.