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CORRELATION BETWEEN PERIODONTAL DISEASES, ABO BLOOD GROUPS AND THEIR SECRETOR STATUS

Dental Science

Kausar Parvez Khan Senior Lecturer Department Of Periodontics, Vananchal Dental College, Garhwa, Jharkhand.

Vijayendra Pandey* Professor, Department Of Periodontics, Vananchal Dental College, Garhwa Jharkhand.*Corresponding Author

Mukesh Kumar Post Graduate Student, Department Of Periodontics, Vananchal Dental College, Garhwa Jharkhand.

Neha Singh Post Graduate Student, Department Of Periodontics, Vananchal Dental College, Garhwa Jharkhand.

Shweta Singh Post Graduate Student, Department Of Periodontics, Vananchal Dental College, Garhwa Jharkhand

Priyanka Kumari Post Graduate Student, Department Of Periodontics, Vananchal Dental College, Garhwa Jharkhand.

ABSTRACT

Introduction: Landsteiner divided blood into four groups A, B, AB and O depending on the antigens present on red cell membrane. The blood group substances A and B are not confined to red cells but can be detected in other tissue cells and in body fluids. They have wide distribution and have been found in serum and saliva. Those individuals whose saliva contains appropriate group specific substances (A, B and H) are called "secretors" and those whose saliva have only trace amounts or lacks such substances are called "non-secretors". Bacterial colonization of the oral cavity with specific microbes is an important aspect for the formation of dental plaque and initiation and progression of periodontal disease. Blood-group antigens may play a role as their presence in saliva may cause bacterial aggregation which promotes bacterial clearance of the oral cavity. **Materials and method:** 63 healthy subjects and 126 periodontal disease patients, including 63 gingivitis and 63 periodontitis, ie total of 189 subjects were tested for ABO blood groups and secretor status. Controls and patients were in age group of 20 to 70 years, with at least 20 teeth. ABO blood group was determined by slide agglutination method. Secretor and non-secretor status were determined by hemagglutination inhibition technique. **Results:** No significant difference was observed in the secretors and non-secretors for all the subjects of the three groups. Blood group A shows maximum plaque score but minimal periodontal destruction. Blood group O shows minimal plaque score but maximum periodontal destruction. Significant difference was observed in total number of secretors and non-secretors of controls and periodontal disease. The secretor subjects were more prone for periodontal disease. Among the different blood group substance being secreted, the BH secretor status was the most common. Conclusion: No significant relationship of any particular blood group substance could be established to periodontal disease. A study with a larger sample could conclusively establish the possible relationship between ABO blood groups, salivary secretor status and periodontal disease.

KEYWORDS

Blood Groups, Secretor, Non Secretor, Periodontitis, Gingivitis

INTRODUCTION

At the turn of 20th century, Karl Landsteiner first described the existence of serological differences between individuals and said that, the people of this world, irrespective of their race, can be divided into four groups depending on the antigens present on red cell membrane. This landmark discovery of Landsteiner opened up a new line of research that lead to identification of various other blood groups1. He divided the population into 3 groups, which he called A, B and O. A year later the existence of a fourth, less common group AB was established. This marked the beginning of the whole subject of blood transfusion practicable and for this reason; Landsteiner was awarded Nobel Prize in 1930. The four groups are determined by presence or absence on the red blood cells of the blood group antigen's A and B, and therefore, an individual is either group A, B, AB or O (O denoting the absence of A and B). In addition it has been shown that, corresponding to the antigens 'A' and 'B', there are antibodies anti-A (α) and anti-B(β) which occur as agglutinins in the sera of individuals whose red cells lack the corresponding antigen2. Although all individuals of the same ABO group have same kind of antigens on their red cells, the sensitivity of cells to agglutination varies from individual to individual. Moreover, these are wide variations in the amount of antibody in serum of different individuals belonging to the same ABO group. It is by means of agglutination reaction of red cells that ABO group of an individual is determined.

A, B and H substances in tissues and body fluids – Secretors and Non secretors.

The blood group substances A and B are not confined to red cells but can be detected in other tissue cells and in body fluids. They have wide distribution and have been found in serum, saliva, gastric juices, ovarian cyst fluid, semen, amniotic fluid and in smaller quantity in sweat, urine, tears, bile and milk (except CSF). These blood group substances were first demonstrated in serum by Moss in 1910 and Schiff confirmed it in 1924. Yamakami first discovered the presence of "A" and "B" antigens in saliva in 1926. The dimorphic character was shown in 1930 by Lehrs and Patkonen, who showed that there were secretors and nonsecretors[3].

.One of the richest and most readily available sources ofgroup specific substance is saliva and so it is extensively used in detecting presence of these substances in any given individual. In about 24% of the population, A and B group specific substances are almost absent from the saliva and other body fluids. Those individuals whose saliva contains appropriate group specific substances (A, B and H) are called "secretors" and those whose saliva have only trace amounts or lacks such substances are called "non-secretors".

Secretion of group specific substances is controlled by a pairs of alleles Se and se. Thus individuals can be homozygous (SeSe), heterozygous (Sese) or homozygous (sese). The first 2 classes are secretors and third class, non-secretor[4]. The persons who possess "Se" gene are called as secretor while individuals who carry "se" genes or a recessive one in homozygous state are non-secretors. Phenotypically, a secretor is defined as one who secretes blood group specific substances in the saliva. Non-secretor is defined as one who does not secrete blood group specific substance in saliva.

There are 2 distinct forms of group specific substance, one a water soluble glycoprotein present in most body fluids and one alcohol

soluble glycolipid present on red cells and almost all others tissues but absent from the secretions. The presence of water soluble form is controlled by secretor gene whereas the alcohol soluble form is not so controlled. Thus, tissue cells of every individual, whether secretor or non-secretor contains a form of group specific substance, which can be extracted with alcohol, but secretors, in addition to this contain the water-soluble form, which appears in body fluids. Secretors of groups A, B, AB in addition to A and / or B substance have H substance in saliva. Group O persons are divided into secretors and non-secretors according to whether their saliva contains H substance or not.

Amounts of A, B and H in saliva of secretors
Clarke et al5,1960, measured the A, B, H antigens in secretions of secretors. Their results are summarized as:-

1) The amount of antigen secreted by an individual is in part inherited.
2) Most of the inherited component of the variance in antigen secreted appears to be polygenic.

3) The "O" group secretes more "H" substance than do the group "A" who in turn secrete more than group "B" persons and group "AB" persons secrete least of all. This suggests that, there may be difference between homozygous and heterozygous subjects of group "A" and "B" with regard to the amount of substance "H" secreted.

ABO Blood groups and susceptibility to diseases:
Buchanan and Higley (1921) from Mayo clinic were the first to have attempted to find out a relationship between ABO blood group and susceptibility to diseases6. Their studies failed to find out any positive relationship between blood groups and diseases. Struthers7,1951, found that bronchopneumonia in infants was more in group A persons. The association between cancer of stomach and blood group A was made by Aird et al8 in1953.

Few studies have investigated the relationship between blood type and dental caries. Individuals of blood group A appear to have a lower incidence of caries and cavities compared with those with other blood groups; this difference is particularly marked if the Group A individuals are secretors. The secretion of ABO antigens into saliva probably inhibits the ability of bacteria to attach to the tooth surface; this isbecause many of these bacteria have surface lectins, which they use to attach to body surfaces and are often ABO specific. Also, non-secretors tend to have lower levels of the immunoglobulin A (IgA) antibodies in their saliva, which may compromise their ability to keep bacterial counts low9-12.

Bacterial colonization of the oral cavity with specific microbes is an important aspect for the formation of dental plaque and initiation and progression of periodontal disease. Saliva, in particular specific salivary components, plays key roles in these processes. Micro-organisms may adhere to dental pellicles involving specific interactions between their adhesins and the salivary proline rich proteins and mucins13. Process of microbial colonization is influenced by salivary blood-group antigens in a subject14. The blood-group antigens may play a dual role. Their presence in saliva may cause bacterial aggregation which promotes bacterial clearance of the oral cavity13. The selective adherence of bacteria to the oral epithelium and to the mucins in the dental pellicle, mediated through blood-group glycolipids, may promote colonization of the oral cavity and formation of dental plaque[13].

Etiopathogenesis of Periodontal Disease and its Clinical Implications
Cessation of oral hygiene promotes rapid accumulation of microbial plaque on teeth; within 2-4 days, clinical signs of gingival inflammation can be observed. In most individuals overt gingivitis is established after 10 to 20 days of plaque accumulation. Periodontal diseases in humans and other mammals are predominantly associated with gram-negative anaerobic organisms and, before destructive periodontal diseases are initiated, these microorganisms colonize tooth surfaces at and just below the gingival margin. The development of gingivitis is generally accompanied by redness, tendency to bleed, swollen gingivae and increased pocket depth. As the process proceeds the periodontal attachment apparatus and alveolar bone are destroyed. As periodontal destruction advances, the teeth often become mobile9. It is it difficult to determine the extent to which periodontitis is characterized by continuous activity or by intermittent periods of activity and inactivity. In 1982, Goodson et al.10 challenged the hypothesis that periodontal disease was a continuous, slowly progressive destructive disease and suggested that it existed as a dynamic condition of disease exacerbation and remission as well as periods of inactivity for an unknown number of weeks or months. They concluded that periodontal disease activity was cyclical and could be monitored by repeated periodontal probe measurements over time.

AIMS AND OBJECTIVES

The ABO blood group and secretor status may be linked to certain risk factors for periodontal disease. Very few studies have examined this relationship, in India. Hence this study was undertaken to determine whether any relationship exists between blood groups, secretor status and periodontal disease.

The present study has been undertaken to:-
i) Study the distribution of ABO blood group among periodontal disease patients and to compare them with controls.
ii) Study the distribution of secretor and non-secretor status among periodontal disease patients and to compare them with controls.

MATERIALS AND METHODS

Study Design

This was a cross-sectional double-blind study. The examiners were not aware of the blood group &salivary secretor status of the patients and the laboratory technicians were not aware of the periodontal status of the patients. The study design was reviewed and approved by the Institutional Ethical Committee

Subjects

This study was carried out in two groups of subjects to determine the distribution of blood groups and secretor status.

a) Control group

This group consisted of normal healthy subjects. Both males and females were included in this group.

b) Study group

This group consisted of patients suffering from either gingivitis or periodontitis attending Department Of Periodontology. Study group included both male and female subjects.

Size of sample

Data were collected from 189 systemically healthy patients. Both the control and study group, ie Gingivitis and Periodontitis group consisted of 63 patients each. Of this, 41 were males and 22 were females in each group.

Subjects from both the groups were tested for following tests:-
1) Determination of ABO blood group.
2) Determination of secretor and non-secretor status.

Periodontal Examination

Full mouth examinations (excluding third molars) were conducted for all patients. Six sites were examined for each tooth (mesiobuccal, mid-buccal, distobuccal, mesiolingual, mid-lingual, and distolingual). Plaque index (PI), bleeding on probing (BOP), and gingival index (GI) were recorded for each site. Probing depths (PD), distancefrom the cemento-enamel junction to gingival margin (CEJ-G), and clinical attachment loss (CAL) were recorded using a marked periodontal probe (UNC-15 Hu-Friedy®, Chicago, IL, USA). The following criteria were included in the study: Patient aged between 20 and 70 years and subjects having at least 20 teeth Exclusion Criteria were as follows: Patient with a previous history of systemic disease with periodontal implication, patient who had received periodontal treatment or antibiotic therapy for medical or periodontal reasons 3 months prior to study and pregnant and lactating females.

Determination of ABO Blood group

ABO blood group was determined by slide agglutination method.

Determination of secretor status

It was determined by the hemagglutination inhibition technique.

Statistical Analysis

All the data was entered into Microsoft Excel Sheet and then statistical analysis was done by using SPSS software version 21. Statistical analysis is done using Analysis Of Variance (ANOVA) and Pearson Correlation test for finding association between blood groups and periodontal disease. Chi- Square test was used to find correlation between secretor status and periodontal disease.

RESULTS

In the present study there were 63 subjects in control group, with 60 (95.3%) in age group 19-29 & 3 (4.7%) in age group 40-49. There were 63 subjects in gingivitis group, with 18 (28%) in 19-29, 24 (38%) in age group 30-39, 14 (22%) in age group 40-49 and 7 (12%) in age group 50 and above. There were 63 subjects in periodontitis group, with 11 (17.4%) in age group 19-29,31 (49.2%) in age group 30-39, 16 (25.5%) in age group 40-49 and 5 (7.9%) in age group 50 and above. In all three groups, males were found to be more prevalent (65%).

Among all the subjects included in the study, ie control, gingivitis and periodontitis group, blood group B was found to be more prevalent.

It was also found that 61.9% of control group were non-secretor. 53.9% and 58.7% of patients were secretors in gingivitis and periodontitis group respectively, among the secretors, BH was found to be more prevalent.

In the present study the mean plaque scores was higher in the age group of 19-29 years (1.81 ± 0.37) followed by participants aged 40- 49 years (1.68 ± 0.39)and 50 years & above (1.68 ± 0.57). However there was no statistical difference between plaque scores and age of participants (p value = 0.697).

The mean gingival index scores were also found to be higher in the age group of 19-29 years (1.83 ± 0.53) followed by individuals aged 30-39 years (1.70 ± 0.34) and 50 years & above (1.68 ± 0.51), mean CAL scores were found to be higher in older individuals aged 50 years and above (5.37 ± 0.73). However there was no statistical significant difference between age of individuals and periodontal parameters.

Males were found to have higher plaque scores (1.73 ±0.44) compared to females (1.59 ± 0.34). This was found to be statistically non-significant (p value = 0.177). Overall males had higher plaque scores, gingival scores, higher pocket probing depth and mean CAL as compared to females which was found to be statistically non-significant.

Table 1 shows individuals with blood group A had higher plaque scores (1.76± 0.47) followed by AB blood group participants (1.72± 0.47), B blood group participants (1.70±0.43) and the least plaque scores were found in O blood group individuals (1.62±0.35) but the differences were found to be statistically non-significant (p value =0.819).

AB blood group individuals had higher mean gingival index scores (1.88± 0.36) while in O blood group individuals, the mean gingival scores were 1.70± 0.38. The mean gingival scores in B &A blood group individuals were 1.68 ±0.39and 1.66±0.45 respectively. This difference was found to be statistically non-significant (p value =0.668) as well.

The mean pocket probing depth was found to higher in AB (5.27±0.30) and O blood group (5.27±0.65) individuals. The mean scores of pocket probing depth in B &A blood group were 5.21±0.52and 5.10±0.68 respectively. It was found to be statistically non-significant (p value =0.894).

Mean CAL was higher in AB (5.27 ±0.31). Mean CAL in B, Oand A were 5.26 ± 0.52, 5.24 ± 0.70 and 5.09 ± 0.44respectively. It was found to be statistically non-significant (p value =0.875).

Table 2 shows the mean plaque scores were found to higher in non-secretor group (1.79± 0.41) compared to secretor group (1.61± 0.39). It was observed to be statistically non-significant (p value = 0.079). Non secretor group (1.83± 0.42) demonstrated higher gingival scores when compared to secretor group (1.62± 0.34). This difference was found to be statistically significant (p value = 0.043).

Pocket probing depth was found to higher in non-secretor group (5.27± 0.58) as compared to secretor group (5.19± 0.55). There was no statistically significant found (p value = 0.562).

Mean CAL was observed to approximately similar in both non secretor group and secretor group, with the non-secretor group showing a marginally higher CAL.

Control Group

In the present study the mean plaque scores was higher in the age group of 40-49 years (0.36± 0.37) followed by participants aged 19-29 years (0.01± 0.03).Controls belonging to age 40-49 years showed statistically significant difference (p <0.000). The mean gingival index scores and mean CAL scores was zero in all groups.

Males had higher plaque scores, gingival scores, higher pocket probing depth and mean CAL as compared to females. This was found to be statistically non-significant.

Individuals with blood group B had higher plaque scores (0.05± 0.15) followed by O blood group participants (0.03± 0.04), A blood group participants (0.008±0.02) and the least plaque scores were found in AB blood group individuals (0). This was found to be statistically non-significant (p value =0.508). Mean gingival index and mean CAL scores were 0.

The mean plaque scores were found to higher in secretor group (0.033 ± 0.12) compared to non- secretor group (0.031± 0.08). It was observed to be statistically non-significant (p value = 0.923).

Table 3 shows the distribution and comparison of Secretors and Non-secretors between Controls and Periodontitis. There were 38.1% Secretors and 61.9% Non-secretors in control group. There were more Non-secretors than Secretors in the control group. In Periodontitis group, 58.7% were Secretors and 41.3% were Non-secretors. There were more Secretors than Non-secretors in the Periodontitis group. These differences were found to be statistically significant with p=0.02.

Table 4 shows the distribution and comparison of substance secreted. There were 5.5% with Substance ABH, 43.2% with AH, 13.5% with substance AH & 37.8% with substance H in Periodontitis Group while 8.4% with Substance ABH, 37.5% with 37.5%, 33.3% with substance AH & 20.8% with substance H in Control Group. These differences were found to be statistically not significant with p= 0.28

DISCUSSION

The ABO blood group distribution show marked variation around the world.Some variation may even occur in different areas within the same country15. It has been reported that the O blood type is most common in American and Canadian individuals, the B type in Chinese and Indian individuals, and the A type in Eskimos16.In this study, it was found that the most common blood group was B (44.4% of the total sample) and the lowest was AB (10.5%).18.5% (35 patients) were of group A and 26.4% (50 patients) were of group O.

Variety of diseases have been studied in relation to ABO blood groups and secretor status of blood groups antigens. Kaslick RS et al17 conducted a study comparing two hundred and thirty-eight Caucasians for ABO blood typingand periodontal diseases in young adults.Results showed the chronic gingivitis group was significantly different in ABO grouping than the control group with the gingivitis subjects having a larger percentage of AB types and a smaller percentage of O types. The periodontitis group showed a trend toward more A and B blood groups and a smaller percentage of O groups than the controls.The results were different from this study which showed that chronic gingivitis group had a larger proportion of B group and least in AB group.

Gawrzewska18 found that individuals with blood group O have greater severity of periodontal disease, whereas individuals with blood group A have greater resistance to periodontal disease, which is not in agreement with the present study. Results of this study show thatBlood Group B patients had higher percentage of gingivitis and periodontitis. Demiret al.19 investigated the relationship between periodontal disease and ABO blood group. In the 1351 blood samples surveyed, A blood group (48.5%) and O blood group (30.3%) were more common.

There was a relatively high percentage of blood group A patients (61.5%) in gingivitis and relatively high percentage of blood group O patients (41.5%) with periodontitis (P<.05). Contrary to this, the most common blood group was B (44.4% of the total sample) and the lowest was AB (10.5%) andBlood Group B patients had higher percentage of gingivitis and periodontitis in the present study.

A study was done by Al Ghamdi AST20 to investigate if there is an association between ABO blood group and severity of chronic periodontitis in 161 subjects.Periodontal parameters were compared among all ABO groups except for the AB group owing to its small sample size. Mean clinical attachment loss (CAL) and mean proportion of sites with CAL ≥ 3 mm were the greatest among group B, and the differences among groups were significant ($p < 0.05$). Other clinical parameters were not significantly different among groups. Significant relationships were determined between ABO blood type and the severity of chronic periodontitis. Patients with group B were found to be at greater risk of developing more severe form of periodontitis. Mean clinical attachment loss (CAL) was highest in blood group AB in periodontitis & gingivitis group in this study. Other clinical parameters were more severe in B group in periodontitis group in this study.

Demir T et al21 conducted a study to determine effects of different blood groups on the reproduction of periodontal pocket bacteria. They found that periodontal pocket bacteria formed colonies in different numbers in different ABO blood groups ($p<0.05$).

Koregol AC et al22conducted a study to determine the link of periodontal disease and ABO blood group. A total of 1,220 subjects aged between 20 and 55 years were examined. Study population was segregated into three groups according to Ramjford's Periodontal Index: Healthy, Gingivitis & Periodontitis. They found that gingivitis was higher in A group and periodontitis in O group. In this study, population was divided into the groups according to clinical parameters.Periodontal disease was found to be highest in B group.

Al Hashemy EH and Abbas MJ 23 conducted a study to determine the correlation between ABO Blood Groups and common oral diseases.A total of (82) subjects were selected randomly in the age group between (10-55) years of both the gender. All cases included in this study were non-smokers, non- alcoholic and none used antibiotics, were not pregnant and did not suffer from any systemic disease. It was found that the highest prevalence of periodontal disease was found in B blood group (32.2%).

Vivek S et al24 conducted a study to determine association of ABO Blood Group with periodontal disease. The study showed a greater propensity for periodontal disease among O (65.8%) blood group individuals while the propensity was least among AB (4%) blood group individuals. In the present study,periodontal disease was most prevalent in B blood group (32.2%).

Kundu D et al25 conducted a study for clinico-hematological appraisal of aggressive periodontitis. In this study, blood group B had maximum subjects of periodontal disease.

Pradhan A C et al26 did a study to determine the relationship between periodontal disease and blood groups with special reference to secretor status. Statistically significant relationship was found between periodontal disease and blood groups but none with secretor status. In the present study, there was a positive relationship between periodontal disease and secretor status.

Thaler Ret al27 did a quantitative study on the relationship of salivary blood group substances to periodontal disease. No correlation of the above indices to Blood Group Secretor status was established. In this study, periodontal disease was positively correlated with salivary blood group secretor status.

Holbrook WP & Blackwell CC28 conducted a study to determine Secretor status and dental caries prevalence. They concluded that dental caries is less common in secretors as blood group substances may interfere with the adherence of Streptococcus mutans to teeth. This study proposes that periodontal disease is more common in secretors.

Lie MA et al29 did a study to investigate a possible role for salivary blood-group antigens in the relative frequencies of selected periodontal pathogens and commensal oral micro-organisms in young adults who are secretors or non-secretors. Clinical measurements were recorded. In addition, presence of interproximal loss of attachment (LA) was assessed at sites with a pocket depth of ≥ 4 mm. Microbiological samples were taken from interproximal sites of ≥ 4 mm in conjunction with LA and from the saliva. The samples were analyzed for the presence of Actinomycesnaeslundii, Actinomycesviscosus, Campylobacter rectus, Fusobacteriummicleatum, Peptostreptococcus micros, Prevotella intermedia, Porphyromonas gingivalis and Actinobacillus actinomycetemcomitans. Clinically, no statistically significant differences were found in the periodontal status between secretors (78% of Population) and non-secretors. Furthermore, the occurrence of the monitored micro-organisms was not correlated to the secretor status. They concluded that bacterial colonization with the micro-organisms tested in this study, apparently occurred independent of secretor status. Among the periodontal pathogens, only P. intermedia was more frequently recovered from the saliva of subjects with interproximal LA (49%) than in those without (33%; $p=0.03$). In this study, Secretor status was correlated with the periodontal disease.

Frías MT and Lopez NJ30 conducted a study to determine the association between secretor status of ABO blood group antigens and localized aggressive periodontitis(LAP). The distribution of blood groups and secretor and non-secretor status of ABO group antigens in LAP patients and control subjects was not significant. This proved that there is no association between non-secretor status and LAP. Contrary to this, periodontal disease and secretor status was correlated the present study.

Shin ES et al31 did a study to investigate the relationship between oral Candida carriage and the secretor status of blood group antigens.Oral Candida carriage was not significantly related to the blood group or secretor status of ABH. This is in contrast to present study which showed correlation of secretor status and periodontal disease.

Cerovic R et al32 did a study to confirm the association of ABO blood group antigens in saliva on the development of the oral cancer. In total 114 subjects were examined, half of which suffered from oral cancer, while the other half was the healthy control group. All examinees were subjected to clinical examinations and the experimental group to pathohistological examination. They could not find any correlation between these two parameters. Contrary to this, in the present study, periodontal disease was correlated with secretor status.

CONCLUSION

The significant findings of various workers are conflicting and no uniform association has been found between distribution of blood groups, secretor status and periodontal disease, although preponderance of one or other blood group has reported from time to time. The results are so variable and inconclusive that, the possibility of factors related to ethnic or social factors in several studies with conflicting results cannot be ruled out. The results of attempts to elucidate this relationship are conflicting and inexplicable. However, they lead to the conclusion that, no regularity has been demonstrated in the relationship between secretor status, ABO blood group system and periodontal disease. The fact that, occurrence of periodontal disease is independent of ABH secretion is in agreement with this study.

In the present study, the plaque scores for different blood group was in following order; A, AB, B and O; for gingival index, order was AB, O, B and A; for PPD, it was AB, O, B and A; for CAL, it was AB, B, O and A.

Although the difference in all categories is statistically non-significant, some important observations are to be made. The blood group A have the maximum plaque score but clinically destructive disease in terms of Gingival Index, Probing Pocket Depth and Clinical Attachment Level are found least in this group. On the other hand, the O blood group is having minimum plaque score but clinical destruction is more in this blood group. It might suggest some other protective or

destructive phenomenon going on in relation to blood group. It may be related to secretor status or some other genetically determined factors which may play a role in pathogenesis of periodontal disease. Some of these factors are yet to be discovered.

The number of secretor patients is significantly higher in periodontitis group when compared to control group. Results of this study indicate that secretor status is more prone for development of periodontal disease. However, in the present study, no significant relationship of any particular blood group substance could be established to periodontal disease.

At the same time, to further investigate the relationship of different blood group determinants, the analysis of secretor status was done on different blood groups.No statisticaldifference was seen, although BH substance secretor groups were seen to be more prone to periodontal disease.

A study with a larger sample could conclusively establish the possible relationship between ABO blood groups, salivary secretor status and periodontal disease.

Table 1 Distribution according to blood group in patients with periodontitis

	Blood Group Type	N	Mean	SD	95% CI	p value
PI	A	9	1.76	0.47	1.40-2.13	0.819
	B	27	1.70	0.43	1.52-1.87	
	AB	7	1.72	0.47	1.29-2.16	
	O	20	1.62	0.35	1.45-1.78	
GI	A	9	1.66	0.45	1.31-2.01	0.668
	B	27	1.68	0.39	1.53-1.84	
	AB	7	1.88	0.36	1.55-2.22	
	O	20	1.70	0.38	1.52-1.88	
Mean PPD	A	9	5.10	0.68	4.57-5.63	0.894
	B	27	5.21	0.52	5.01-5.05	
	AB	7	5.27	0.30	4.98-5.55	
	O	20	5.27	0.65	4.97-5.85	
Mean CAL	A	9	5.09	0.44	4.75-5.43	0.875
	B	27	5.26	0.52	5.06-5.47	
	AB	7	5.27	0.31	4.98-5.55	
	O	20	5.24	0.70	4.91-5.57	

Table 2 Distribution according to secretor and non-secretor group in patients with periodontitis

		N	Mean	SD	95% CI	p value
PI	Secretor	37	1.61	0.39	1.47-1.74	0.079
	Non Secretor	26	1.79	0.41	1.62-1.96	
GI	Secretor	37	1.62	0.34	1.51-1.74	0.043*
	Non Secretor	26	1.83	0.42	1.65-2.00	
Mean PPD	Secretor	37	5.19	0.55	5.00-5.37	0.562
	Non Secretor	26	5.27	0.58	5.03-5.51	
Mean CAL	Secretor	37	5.23	0.55	5.04-5.41	0.926
	Non Secretor	26	5.24	0.56	5.01-5.47	

Table 3 Comparison of Secretors and Non-secretors between Controls and Periodontitis

Secretor/Non-secretor status	Controls	%	Periodontitis	%	Chisquare value and 'p' value
Secretor	24	38.1	37	58.7	5.37
Non-secretor	39	61.9	26	41.3	p=0.02*
Total	63	100	63	100	

Table 4 Comparison of Substance Secreted Among Controls and Periodontitis

Substance Secreted	Controls	%	Periodontitis	%	Chi square value and 'p' value
ABH	2	8.4	2	5.5	Chi Square-4.34; p value - 0.28
BH	9	37.5	16	43.2	
AH	8	33.3	5	13.5	
H	5	20.8	14	37.8	
Total	24		37		

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