

Association of ABO Blood Group and Rh Factor With Periodontal Disease In Adult Population Of Greater Noida: A Cross Sectional Study

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Abstract: Introduction: Periodontal Disease Is One Of The Two Major Dental Diseases That Affect Human Populations Worldwide At High Prevalence Rates Of 15-20%. Periodontal Disease Is A Chronic Immune-Inflammatory Response Associated With Both Genetic Makeup And Environmental Influence. Genetic Difference In Immune Cell Development And Antigen Presentation May Contribute To The Susceptibility Of Disease. ABO Blood Group Has Been Found To Act As Risk Factor For Various Systemic Diseases But There Is Need To Explore The Relation Between Blood Group And Periodontal Disease.

Objectives: To Find Association Of Blood Groups And Rh Factor With Periodontal Disease In Adult Population Of Greater Noida.

Methods: 288 Persons Participated In This Study. The Patients Were Divided Into Three Groups' Namely Individuals With Healthy Gingiva, Gingivitis And Periodontitis. The Blood Sample Was Taken By A Sterile Finger Prick Method With Disposable Needle. The Blood Grouping And Rh Factor Examination Was Done By The Slide Method.

Results: It Was Found That B Blood Group (44.1%) Showed Higher Percentage In Gingivitis Group. Subjects With Blood Group A And B Are More Prone To Develop Periodontitis As Compared To AB And O. A Significant Relationship Was Found Between Rh Positive Factor And Periodontal Disease.

Conclusions: The Result Of The Study Is Suggestive Of Correlation Between Periodontal Disease And Blood Groups, Which May Act As Risk Predictors For Periodontal Disease.

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I. Introduction

Periodontal disease is one of the most prevalent dental diseases with a multifactorial etiology affecting a large population worldwide and one of the major reasons for tooth loss in adults.¹ The prevalence of periodontal condition varies in different regions of the world and it's more frequent in developing countries².

Although periodontal bacteria are responsible for infective periodontal disease; individual host response determines disease progression³. Bacterial plaque may be a primary etiological factor, but the occurrence and severity of periodontal disease varies among the individuals with similar amount of deposits, hence the genetic factors plays an important role in the etiology of periodontal disease and to determine if any innate factor is associated with it. Genetic variations may alter oral ecology and probably can act as protective or risk factors for few conditions, including periodontitis.⁴

In 1930 Karl Landsteiner, an Australian physician, discovered the human blood groups. He classified people into four groups A, B, O, and AB, depending on whether their red cells contained agglutininogen "A", agglutininogen "B", neither A nor B or both A and B. The Rh system was discovered in 1940 by Landsteiner and Wiener. Since then, ABO system and the Rh system are the most commonly used blood grouping systems.⁵

The clinical significance of ABO blood type is not only limited to transfusion medicine and solid organ transplantation but has also proven its correlation to various systemic diseases. Blood group A individuals have been reported to be more susceptible to gall stones, colitis⁶ and tumors of salivary glands, pancreas as well as ovary.⁷ Cardiovascular diseases are more common in non – O blood groups type⁸. Diabetes mellitus is higher in subjects of blood groups B^{9,10}.

A plethora of studies have been conducted in the field of medicine. However, very few researches have been conducted to determine the relation between ABO blood group and the incidence of oral or dental diseases. Thus, there is a need to conduct a research to know whether blood groups can be predictors of oral diseases. It is expected that performing investigations in this research area will also make it possible to better-understand the risk factors of periodontal diseases and to predict the effective methods of prevention and treatment of periodontal diseases.¹¹ Hence the aim of the study was to determine the association between ABO Blood group and periodontal disease in the adult population in Greater Noida.

II. Material And Methods

The present cross sectional study was carried out on 288 subjects, 156 males and 132 females, aged between 18 - 55 years. Subjects were randomly selected from the outpatients Department of Public Health Dentistry. The subjects with following criteria were considered for the present study. All participants should have at least 20 teeth, non smokers and had given consent. Subjects with history of systemic diseases and the subjects who had undergone any periodontal treatment or antibiotic treatment for dental or medical reasons 3 month prior to the study were excluded from the study.

The ethical clearance to conduct the study was obtained from the Ethical Committee of the institution.

Clinical examination

Intra oral periodontal examination was carried out after the participants had been interviewed and informed about the nature, purpose and the methodology of the study. An initial training and calibration exercise was conducted prior to the study by the faculty of Department of Public Health Dentistry. The Community periodontal Index (CPI) was recorded using a dental mirror and CPI probe under artificial light.

After examination the patients were divided into three categories.¹²

1. Healthy category: attachment loss less than 3 mm, periodontal pockets depth less than 3 mm, and no signs of gingivitis.

2. Gingivitis category : attachment loss less than 3 mm, pocket depth less than 3 mm, signs of gingivitis such as gingival bleeding, erythematous enlargement of marginal and papillary gingiva, and changes in surface texture.

3. Periodontitis category: attachment loss was over 3 mm, and periodontal pocket depth more than 4 mm¹².

The subjects were then referred to the Oral Pathology Department for determination of ABO blood group. Venous blood samples were collected and the subjects were classified based on their ABO blood groups and the Rh factor by a trained pathologist. Blood sample was taken by a sterile disposable lancet and finger prick. The blood grouping and Rh factor examination was done by the slide agglutination method using combined ABD, monoclonal antibodies for blood typing kit.

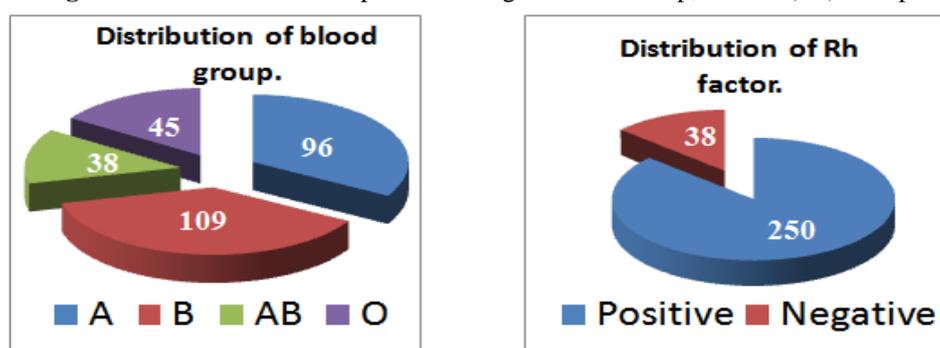
Statistical analysis

Chi-square test and one way ANOVA was used to compare the groups statistically. SPSS software version 21 was used for statistical analysis.

III. Result

The study was carried out on 288 subjects 156 (54.17%) males and 132(45.83%) females. Out of 288 subjects prevalence of blood group B was found to be greatest in 109(37.84%) individuals followed by blood group A 96(33.33%) then blood group O 45(15.62%) and the least prevalence was of blood group AB 38(13.19%). 250 (87%) subjects were Rh positive whereas only 38 (13.19%) subjects belonged to Rh negative group. (Figure 1)

Figure 1: Distribution of samples according to Blood Group, Rhesus (Rh) Group



A majority of subjects belonging to healthy group were individual with blood group A(45.78%). A high percentage of subjects with blood group B(49.24%) was observed in gingivitis group and least number in blood group AB(10.60%). While the periodontitis groups have more subjects belong to blood group B(35.61%) and A(32.87%) and very less number of patients belonging to blood group AB. (table 1).

Out of the total population having gingivitis 115 belonged to Rh positive group and only 17 belonged to Rh negative group. And out of total population suffering from periodontitis 67 were Rh positive and 6 were Rh negative. (Table 2). Chi square test showed significant association between blood groups and periodontal status (p=0.001). No significant association was observed between Rh factor and periodontal diseases. (P = 0.191).

Table 1 Percentage distribution of ABO blood group in study population

Groups	A	B	AB	O
Healthy (83)	38(45.78%)	15(18.07%)	13(15.66%)	17(20.48%)
Gingivitis (132)	37(28.03%)	65(49.24%)	14(10.60%)	16(12.12%)
Periodontitis (73)	24(32.87%)	26(35.61%)	11(15.06%)	12(16.43%)

p=0.001

Table 2 : Distribution of Rh factor in study population

	Gingival Status			Total
	Healthy	Gingivitis	Periodontitis	
Rh positive	68(27.2%)	115(46.00%)	67(26.80%)	250
Rh negative	15(39.47%)	17(47.73%)	6(15.78%)	38

p=0.191

One Way ANOVA post hoc comparison between the groups it was found that Blood group A and Blood group B showed a statistically significant difference in gingival status in comparison to AB and O blood group. (Table 3)

Table 3 Comparison Between The Groups And Gingival Status

(I) BLOOD GROUP	(J) BLOOD GROUP	Sig.
A	B	.017*
	AB	.526
	O	.818
B	A	.017*
	AB	.259
	O	.100
AB	A	.526
	B	.259
	O	.717
O	A	.818
	B	.100
	AB	.717

p=0.017

IV. Discussion

The prevalence of periodontal diseases dated back to early human civilization indicated by paleopathological studies.¹³ As a result of plethora of studies in this field it is concluded the presence of microorganisms is a crucial factor in inflammatory periodontal disease, but the progression of disease is related to host-based risk factors.

In our study we found out that there is a significant association between blood group and periodontal diseases. Possible mechanisms regarding the effects of ABO blood antigens in developing risk of periodontal disease are included as follows:

- The tissue localization of the histo-blood group antigen has shown that the antigen in the tissue corresponds to the erythrocyte blood group but the tissue expression is dependent on the secretor status of the individual. Secretor status is secretion of blood group antigens ABO(H), which may be factor influencing the development of systemic oral disease in the stratified epithelium.³
- According to Malena, the ABO specificity of different bacteria is well-established and antibody titers to those specificities vary with the host blood type and perhaps, more importantly, high to antigens recognized as "non-self." Experimentation is being conducted to further investigate this hypothesis.¹⁴
- Al Ghamdi⁴ pointed out that the secretion of the ABO antigens into the saliva probably inhibits the ability of bacteria to attach to teeth surfaces this is because many of these bacteria have surface lectins, which they use to attach to body surface and are often ABO specific.
- Demir found that various ABO blood groups might show differences in significant rates in the colonization number of bacteria that are the main etiologic agents of periodontal disease.¹²

e. Singh demonstrated that the antigens of ABO system also acting as receptors for infectious agents.¹⁵

The present study showed a greater prosperity for periodontal diseases among the blood group B individuals which was in line with the results obtained by Ghalyani et al¹⁶ who observed that gingivitis was more frequent in blood group B(39%). Similar results were demonstrated by Singh et al¹⁵ Ramamoorthy B et al¹⁷ also observed that blood group B individuals are more at risk of developing gingivitis with incidence of 43.6% and 20.9% respectively. However Koregal³ et al found that periodontitis patients were more likely to have Blood Group A. But Vivek¹⁸ et al showed a greater propensity for periodontitis among blood group O individual.

In our study findings and other studies individual of blood group AB have the least inclination towards developing periodontal diseases.

There was no significant difference in prevalence of periodontitis between Rh+ve and Rh-ve individuals. Similar findings were observed by Demir et al¹². This was in contrast to the findings by Vivek S¹⁸ et al who observed a significant association of periodontitis with Rh +ve factor. this may be related to difference in substitutes f cell membrane protein, which is determined by series of allelic genes at a single locus.

In this study individuals with blood group B are more prone to develop periodontitis. The individuals with blood group AB were least at risk of developing periodontal diseases. The result obtained also follows the general distribution of the blood group in study population. In the present study and various other studies that reported on ABO blood group and periodontal disease, a difference is found in the percentage and frequency distribution of A, B, AB, and O blood group in different periodontal status and also in different grades of periodontal involvement. It is very difficult to elaborate a hypothesis on why subjects with particular blood group are found in increased frequency in healthy, gingivitis, and periodontitis groups, and also in various grades of periodontal involvement. However, occurrence of gingivitis and periodontitis is the result of many factors and the probable genetic influence demonstrates a small facet of multifactorial etiology of this disease. Since most of these studies are carried out on a small group of subjects' further studies with large sample size should be considered.

V. Conclusion

The genetic factors may alter the oral ecology and have a bearing on the etiopathogenesis of periodontal diseases. Genetic differences in immune cell development and antigen presentation may contribute to the susceptibility to certain infectious diseases. Even though our study having a broader focus showed blood groups B having an association with periodontal disease, future studies with an emphasis on the correlation between the blood group antigens and development of periodontitis are necessary in order to gauge the susceptibility pattern of different individuals. The derived results can be used as a stepping stone in order to focus the research on targeting highly susceptible individuals and developing customized treatment strategies.

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