

Association of ABO Blood Group and Rh factor with Periodontal Disease in a Population of Virajpet, Karnataka: A Cross-Sectional Study

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ABSTRACT

Background: The purpose of the present study was to determine whether there was an association between periodontal diseases and ABO blood groups.

Materials & Methods: An epidemiological study was carried out on 220 subjects who were randomly selected from individuals referred for periodontal treatment or for other reasons regarding Oral health at Coorg Institute of Dental Sciences.

Results: The findings of our study revealed that subject's blood group O (65.8) and Rh positive (73.33%) had a greater propensity for periodontitis.

Conclusion: The results of the present study revealed blood groups and Rh factor can act as a determinant of periodontitis.

Key Words: Periodontitis, Gingivitis, Dental Health.

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INTRODUCTION

Periodontal disease comprises a heterogenous group of infectious disease that lead to pathologic destruction of the periodontium. It is well known that periodontal disease can vary with respect to bacterial etiology, host response and clinical disease progression. Although differences exist among the various types of periodontal disease, all share the common characteristic of complex host – bacterial interactions and the disease onset and progression reflect the

periodontal tissue.¹

Although bacteria are the main cause of the inflammatory periodontal disease, there is increasing evidence that it is a chronic immune-inflammatory response associated with environmental influence, various host factors such as diabetes, smoking and genetic predisposition. It has been estimated that less than 20% of the variability in periodontal disease severity can be attributed to the quantity of specific

bacteria seen in disease-associated plaque. Instead, a key role for genetic effects has been suggested.²

In 1900, Landsteiner first described the existence of serologic difference between individuals, and classified people into four groups depending on whether their RBC cell membrane contained agglutinin (antigens) "A," agglutinin "B," neither A nor B (group O) or both A and B (group AB).³

Although human population shares the same blood systems, they differ in the frequencies of specific types. Some variations may occur in different areas within one country. For e.g. It was reported that Group O was found to be more common in India although studies have reported that group B was common in Northern India while Group O was more prevalent in South India.^{4,5} Unlike other blood typing systems, the ABO blood system has significance beyond transfusion and transplantation, for example it determines many of the immunological characteristics of the body.¹ Blood group A individuals have been reported to be more prone to gall stones, cholecystitis and tumors of salivary glands, [pancreas as well as ovary].⁶ Subjects with Blood group A, O and non O were found to be more prone for Cardiovascular diseases⁷⁻¹¹. During last few decades several reports have suggested that ABO blood groups, in particular non O blood groups, are associated with the risk of ischemic heart disease and of developing severe manifestation of atherosclerosis.¹² Results from the Framingham study and several other reports indicated the occurrence of ischemic heart disease might be higher in subjects with blood group A.¹³ Stakisaitis found that blood group B might be related to coronary atherosclerosis in Lithuanian women.¹⁴

Although several studies have been carried out to investigate the relation between ABO blood group and incidence of disease in medicine, limited research has been made to investigate the relation between ABO blood groups and incidence of oral diseases. Few researchers claimed that there was a relation where as some others could not find any, which was attributed, to geographical diversity in the population. Studies by Koregal C Arati et al¹⁵ and Demir et al³ showed that periodontitis was more common in blood group O and gingivitis more common in blood group A, while another study by Al Ghamdi¹ showed that blood group B were found to be at greater risk for developing

periodontitis. Another study by Pradhan AC et al fails to show any significant association between blood group and periodontal disease.¹⁶

In view of the existing conflicting results a study was planned to investigate the association, if any, between ABO blood group and Periodontitis in a group of people reporting to Coorg Institute of Dental sciences, Virajpet.

MATERIALS & METHODS

This cross sectional study examined 220 subjects, inclusive of both gender, aged between 20 - 55 years, chosen on a random basis. Subjects were selected from among patients who visited Coorg institute of Dental sciences, Virajpet, for periodontal treatment and for other dental health reasons. Few criteria were followed in order to determine ABO blood groups of subjects included in this study. The subjects who full filled the following criteria were considered for the present study.

- a) All participants had at least 20 teeth and had no periodontal or antibiotic treatment for dental or medical reasons 3 month prior to the study.
- b) Subjects had no history of systemic illness such as diabetes, leukemia, epilepsy, metabolic bone disease etc...
- c) They were non smokers.
- d) They had similar socio-economic status.
- e) Periodontitis subjects who exhibited at least one site attachment loss greater than 3 mm, periodontal pockets depth higher than 4 mm. Healthy subjects who displayed less than 3 mm of attachment loss, periodontal pockets depth less than 3 mm, and no gingivitis signs.

The periodontal examination was carried out after the participants had been interviewed on behavior and socioeconomic background. The purpose of the study and methodology were explained to the subject and consent for the study were taken from the subjects. Sample size for this study was estimated using the formula $n = N/1 + Ne^2$. $P < 0.05$ was considered as statistically significant. The collected data was classified

and tabulated in Microsoft Office excel. Statistical Package for Social Sciences © for windows Version-16 (2007) was employed for statistical analysis.

The Informed consent was obtained from each participant and ethical approval was obtained from the Institutional review board at Coorg Institute of Dental Sciences, Virajpet.

blood groups and the Rh factor. Blood samples were taken by a sterile finger prick with a disposable needle. The blood grouping and Rh factor examination was done by the slide method.¹⁴ The number of participants in each study groups and their ABO blood groups were tabulated. The percentage distribution was calculated in both. To explore the relationship between the study

Table 1: Distribution of periodontal status with the blood group of the study population.

Blood Group	Periodontal Status	
	Healthy n (%)	Periodontitis n(%)
O	51(51%)	79(65.8%)
A	32(32%)	25(20.8%)
B	05(05%)	12(10%)
AB	12(12%)	04(3.3%)
Total	100(100%)	120(100%)

Chi- square test. P=0.007

*= Statistically Significant

Table 2: Frequency of Rh factor in subjects with healthy periodontium.

Blood Group	Periodontal Status Healthy n(%)	Rh Factor	
		Positive n(%)	Negative n(%)
O	51 (51%)	39(45.34%)	12(85.71%)
A	32 (32%)	31(36.04%)	01(7.14%)
B	05 (05%)	05(5.81%)	00(0.00%)
AB	12 (12%)	11(12.79%)	01(7.14%)
Total	100 (100%)	86 (100%)	14 (100%)

P=0.04*

Table 3: Frequency of Rh factor in subjects with periodontitis.

Blood Group	Periodontal Status Periodontitis n(%)	Rh Factor	
		Positive n(%)	Negative n(%)
O	79	53(60.22%)	26(81.25%)
A	25	20(22.72%)	05(15.62%)
B	12	11(12.50%)	01(3.12%)
AB	04	04(4.54%)	00(0.00%)
Total	120(100%)	88(100%)	32(100%)

P=0.012

Investigation: The venous blood samples were collected to classify the subjects based on their ABO

groups, ABO blood groups and Rh factor, the data was statistically analyzed using the Chi-square test.

RESULTS

The present study was carried out to find if an association exists between the occurrence periodontitis in specific blood groups.

Table 1 depicts the distribution of periodontal status with the blood group of the study population. It can be seen from this table that periodontitis was observed in 65.8% individuals of blood group O and 3.3% study participants of blood group AB. There was a statistically significant association between blood group and the periodontal status of the study participants.

Table 2 shows the difference in the prevalence of Rh factor among those study participants who had a healthy periodontium. It is evident from the table that 86% of the study participants who had a healthy periodontium were Rh positive against 14% who were Rh negative and this was statistically significant.

The difference in the Rh factor in those study participants diagnosed as having periodontitis is given in **Table 3**. Of the total 120 participants who had periodontitis, 88 (73.33%) participants were Rh positive and 32 (26.66%) participants were Rh negative.

DISCUSSION:

Periodontal diseases, including gingivitis and periodontitis, are serious infections that, if left untreated, may lead to loss of teeth. The principal cause of periodontal diseases is bacterial plaque. Poor oral hygiene and plaque were cited as the main etiology of periodontitis. However, with the increase in understanding the etiology of periodontitis, it was concluded that periodontal diseases are multifactorial. With advances in research it was understood that apart from the common etiological agents and environmental factors, certain unknown factors did play a role in the development of periodontal disease. Thus the focus of determining the disease susceptibility changed to genetics. However, the studies investigating the relation between ABO blood grouping and periodontitis is limited.

ABO blood group and Rh system distributions show marked variation around the world. Some variations

have even been reported different areas within the same country. 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 Eskimos¹³. In the present study population there was a 59% prevalence of O group and 7.5% of AB group.

Periodontal disease is the most common disease affecting mankind. The various risk factors for the periodontal disease have been identified and preventive strategies aimed at reducing the disease. Very few studies have tried to elucidate the association between blood group, Rh factor and periodontal disease in the Indian population. The identification of this particular association may open new arenas in the prevention of periodontal disease.

The tissue localization of the histo-blood group antigens has shown that the antigens in the tissues correspond 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 a factor influencing the development of systemic oral diseases in the stratified epithelium. The expression of histo-blood group antigens depends on the level of cellular differentiation and maturation, and there is a sequential elongation of the terminal carbohydrate chain during the life span of the cell. Basal cells usually exhibit the short carbohydrate chains that are A/B precursors, whereas A or B antigens may be seen in the spinous cell layer. Variation in the differentiation patterns among keratinized against non-keratinized epithelium plays an vital role in the expression of blood group antigens. Keratinized squamous layer may express A or B antigens in only very a small number of highly differentiated cells, leaving the precursor H antigen expressed on spinous cells.¹⁶⁻¹⁸

The present study showed a greater propensity for periodontal disease among O blood group individuals while the propensity was least among AB blood group individuals. This is similar to a study done by Gawrzewska.¹⁹ However a study by pai et al found that periodontitis patients were more likely to have A blood groups.¹⁷

A significant association of periodontitis with Rh factor was seen with more individuals being Rh positive as

compared with Rh-ve. This is in contrast to a study done by Demir et al which showed no significant difference in the prevalence of periodontitis between Rh+ve and Rh-ve individuals.³

CONCLUSION

However, these associations should be dealt with caution taking into account the small sample size and the sample design that was used for the study. The findings of this study suggest a relation between the ABO blood group and periodontitis. Further studies taking into consideration larger randomly selected samples, on spot blood group testing, diverse population and longitudinal studies have to be carried out to confirm the external validity of the study and explain the biological plausibility.

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