

Evaluation and Comparison of Correlation between ABO Blood Group and Rh Factor and Periodontal Diseases: A Clinical Study

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Abstract: ***Background:** Genetic variations may act as protective or risk factors for certain conditions, including periodontitis. The ABO blood type system has significance beyond transfusion and transplantation, as it determines many of the digestive and immunological characteristics of the body. The dominant aetiology of most periodontal diseases are bacteria, but studies show that genetic factors also have a major role in periodontal diseases and possibly a major contributor to different prevalence rates of this condition among various groups. **Aim:** The present study was conducted to determine whether there is any correlation between periodontal diseases and ABO blood groups and Rh factor. **Material and methods:** This study was carried out on 150 subjects attending Faculty of Dental Sciences OPD in Al badar rural dental and hospital, kalaburagi. Subjects were divided into three groups: group I (healthy subjects), group II (subjects with gingivitis), and group III (subjects with periodontitis) based on periodontal examination (Gingival index, Bleeding Index, Probing pocket depth and clinical attachment level). ABO Blood grouping were done and correlated with the periodontal status of study subjects. **Results:** In this study, there was a greater prevalence of gingivitis and periodontitis in blood group B. The blood group AB showed the least prevalence of periodontal diseases. Similarly gingivitis and periodontitis were significantly higher among Rhesus positive groups when compared with Rhesus negative groups. **Conclusion:** Significant correlation between the prevalence and severity of periodontal disease and blood groups existed in this study. This broad correlation between periodontal disease and ABO blood group points toward the susceptibility of subjects with certain blood groups to periodontal disease. However, long-term studies with greater sample size are required to make more comprehensive assessment of this association.*

Keywords: Blood Group, Rhesus factor, Gingivitis, Periodontitis, Periodontal Disease, Clinical Attachment Level and Pocket depth

1. Introduction

Periodontal disease comprises a heterogeneous group of infectious diseases caused by the interaction of plaque bacteria and the host. This interaction results in destruction of the supporting alveolar bone and connective tissue. It is known that the periodontal disease can vary with respect to bacterial etiology, host response, and clinical disease progression. Disease onset and progression reflect the balance between homeostasis and destruction of the periodontal tissue.¹

Several blood grouping systems have been identified so far, the most commonly used blood grouping system is ABO system that is discovered by Landsteiner and Weiner. The other important blood grouping systems are the Rhesus (Rh) and the MN system. ABO and Rh systems have major clinical significance and determined by the nature of different proteins present on the surface of red blood cells. Landsteiner described the existence of serologic differences between individuals, and classified people into four groups depending on whether their red cells contained agglutinin A, agglutinin B, neither A nor B (O), or both A and B (AB).²

Roberts JA^{3,4} discussed the relationship between ABO blood group and susceptibility to chronic disease as an example of genetic basis for family predisposition. In India and Western countries, many workers have tried to find out the relationship between ABO blood group and various systemic diseases, and the results showed that some diseases like dental caries,⁵ salivary gland tumors,⁷ chicken pox,⁸ malaria,⁹ oral cancer,¹⁰ hematological malignancies,¹¹ ischemic heart disease,¹² cholera,¹³ etc., had significant

association. Few investigations have been made to explore the relationship between ABO blood group and the incidence of dental and periodontal diseases. Several authors showed a positive correlation between periodontal diseases and blood groups.⁶ In contrast, others did not find any differences between subjects with or without periodontal disease in terms of ABO blood groups.¹⁴ According to data available for us, literature is devoid of credible information about mentioned topic. Therefore, the aim of this study was to determine the association of different types of blood group with periodontal disease (including gingivitis and periodontitis).

2. Materials and Methods

In this clinical study the examiners were not aware of the blood group and Rh factor of the patients. The laboratory technicians were not aware of the periodontal status of the patients. Patients were advised of their role in this study and asked to provide informed consent.

The participants for the study were selected from patients reporting to the Outpatient Department of Periodontics, Al-Badar Rural Dental College and Hospital, Gulbarga, for dental health reasons. The study comprised 150 participants, inclusive of both sexes, aged between 25 and 65 years, selected on a random basis. The purpose of the study and methodology were explained to the participant.

The participants having at least 20 teeth excluding the third molars were included in the study while participants who were unable to perform routine oral hygiene, alcoholics, smokers, pregnant female, those with previous history of antibiotic therapy within the past 6 months, those who have

received periodontal treatment within 6 months before examination, participants suffering from any systemic diseases, and participants with those conditions which could aggravate periodontal manifestations were excluded from the study. periodontitis subjects who exhibited at least one site attachment loss greater than 3mm, periodontal pocket depth greater than 4mm and gingival recession were selected.

Periodontal Examinations:

The clinical and periodontal examination was carried out after the participant had been interviewed. Participants were divided into three groups: group I (healthy participant), Group II (patients with gingivitis), and Group III (patients with periodontitis) based on periodontal examination. Periodontal examination consisted of gingival index, bleeding index, probing pocket depth, and clinical attachment level. Healthy participants displayed periodontal pocket depth <3 mm, attachment loss <3 mm, and no clinical sign of gingivitis. The gingivitis patients displayed probing depth <3 mm, attachment loss <3 mm, but displayed signs of gingivitis. Periodontitis patients exhibited at least one site with probing depth more than 4 mm and attachment loss more than 3 mm.

- Group I: Consisted of 50 patients with healthy periodontium.
- Group II: Consisted of 50 patients with gingivitis.
- Group III: Consisted of 50 patients with periodontitis.

Group I consisted of the participants selected randomly from patients who reported our faculty with reasons other than periodontal diseases such as orthodontic reasons, tooth extraction, prosthodontic reasons, and dental caries.

Blood Analysis:

During the investigation, all the participants were referred to the Department of Oral Pathology, Al Badar rural dental college and hospital, Gulbarga and blood was collected there from each subject and was analysed for determination of ABO blood group and Rh factor.

Statistical Analysis:

Data were analyzed using the statistical software. Microsoft word and Excel have been used to generate graphs and tables. Post.Hoc.TUKEY.test have been used to test the significance of the prevalence of blood groups. The odds ratio has been used to find the strength of relationship between prevalence.

3. Results

The population of this study consisted of 150 participants, out of which 50 (33.33%) were healthy, 50 (33.33%) were gingivitis, and 50 (33.33%) were periodontitis patients [Table 1].

Table I: Frequency Distribution of Study Sample

Group I [Healthy subjects]		Group II [subjects with gingivitis]		Group III [periodontitis]	
No of patients	percent	No of patients	percent	No of patients	percent
50	33.33%	50	33.33%	50	33.33%

Table II: Frequency Distribution of Patients According To Gender

Gender	Group I		Group II		Group III	
	Number	percent	Number	Percent	Number	Percent
Male	30	60%	32	64%	28	56%
Female	20	40%	18	36%	22	44%
Total	50	100%	50	100%	50	100%

Table III: Frequency of RH Factor Distribution in Population

Rh Group	Total number of patient	Percent
Positive	102	68%
Negative	48	32%

Table IV: Frequency of Rh Factor Distribution in Groups

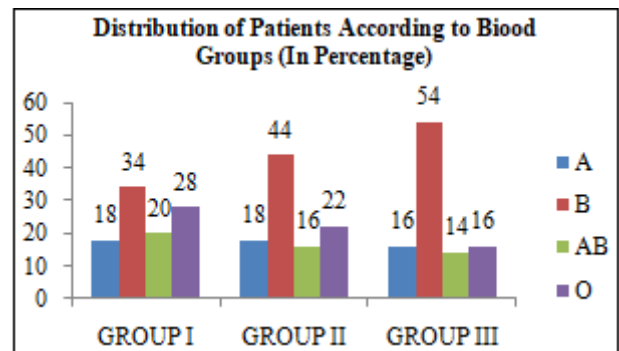
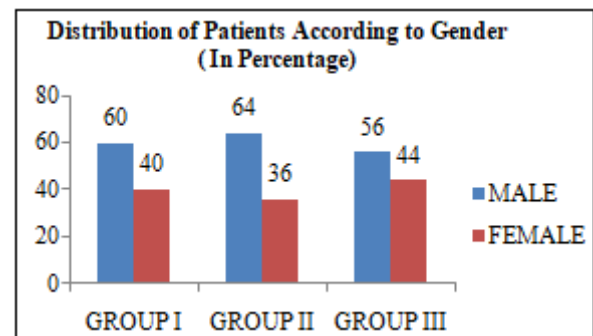
Rh Group	Group I		Group II		Group III	
	No of patient	percent	No of patient	percent	No of patient	percent
Positive	43	86%	32	64%	27	54%
Negative	07	14%	18	36%	23	46%
Total	50	100%	50	100%	50	100%

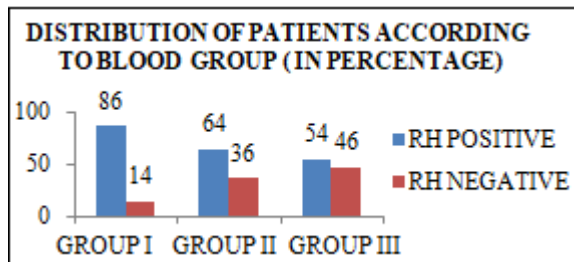
Table V: Frequency Distribution of Blood Groups in Population

Blood Group	Total number of patients	percent
A	26	18%
B	62	41%
AB	25	17%
O	36	24%

Table VI: Frequency Distribution of ABO system in 3 Groups

Blood Group	Group I		Group II		Group III	
	No of patient	percent	No of patient	percent	No of patient	percent
A	09	18%	09	18%	08	16%
B	13	34%	22	44%	27	54%
AB	10	20%	08	16%	07	14%
O	17	26%	11	22%	08	16%





	Groups	Mean	SD	p Value
PI	I	0.2826	0.2393	<0.00001
	II	0.7958	0.1671	
	III	1.6154	0.4500	
GI	I	0	0	<0.00001
	II	0.7656	0.2024	
	III	1.4174	0.4200	
CPI	I	0	0	<0.00001
	II	0	0	
	III	0.9044	0.4129	
CLA	I	0	0	<0.00001
	II	0	0	
	III	0.4770	0.3883	
BOP	I	0	0	<0.00001
	II	0.7364	0.2537	

Mean and standard deviation (SD) and p value to compare all three groups

In the present study, out of 150 [male-90, female-60], group I consisted of 30 males and 20 females with healthy gingiva, group II consisted of 32 males and 18 females with gingivitis, and group III consisted of 28 male and 22 female patients with periodontitis. [Table II]

The results of this study revealed that the higher incidence of blood group O in subjects with healthy periodontium followed by group B, group AB and group A. Group B showed higher incidence of gingivitis followed by blood group O, A and AB. The incidence of periodontitis was higher in group B followed by group A, O and AB. [Table V, VI]

4. Discussion

Periodontal diseases, including gingivitis and periodontitis, are infections that, if left untreated, can lead to tooth mobility and further tooth loss.^{15,16} The presence of microorganisms of dental plaque is a crucial factor for inflammatory periodontal disease, but the progression of disease is modified by host based risk factors such as sex, age, education, oral habits, smoking, socioeconomic status, presence of any systemic disease, and genetics.¹⁷ Genetic variations may act as risk or protective factors for certain conditions, including periodontitis. The genetic factors alter the oral ecology and the process of periodontal disease.¹⁸ That may be suggestive of a correlation between periodontal diseases and some innate factor like blood groups, which may act as risk factor for progression of periodontal diseases.

The ABO blood group and Rh system distributions show marked variation around the world. Some variation may even occur in different areas within the same country.^{19,20,21}

Very few studies have been conducted to elucidate the association between blood group, Rh factor, and periodontal disease in the Indian population. The identification of such association may open new areas in the prevention of periodontal disease. The present study has focused on the relationship between periodontal disease and blood group.

In the present study, it was found that 102 (68%) [Table III] of the study population were Rh positive and only 48 (32%) were Rh negative. A significant association of periodontitis with Rh factor was seen with more individuals being Rh positive as compared with Rh negative. Possible mechanisms regarding the effects of ABO blood antigens in developing risk of periodontal disease are included as follows: a. According to Malena, the ABO specificity of different bacteria is well-established and antibody titers to those specificities vary with the host blood type. b. Al Ghamdi 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.^{22,23,24} Singh demonstrated that the antigens of ABO system also acting as receptors for infectious agents.²⁵ Furthermore, 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.^{22,26}

Generally, it is noted that ABO blood antigens had an increased effect on development of oral cavity diseases.²⁸ On the basis of the present study, logistic regression showed that people with blood group B had 3.94 times greater risk of developing gingivitis. In our study, blood group B had the highest frequency with periodontitis patients. In addition, some investigators demonstrated that patients with blood group B were found to be at greater risk of developing periodontitis.^{24, 25, 27, 29}

In our study, patients with periodontal disease were mostly of Rh-positive factor. In agreement with this finding, it has been shown that gingivitis and periodontitis patients with Rh-positive had a higher distribution than those with Rh-negative factor. This may be related to difference in substitutes of cell membrane proteins, which is determined by a series of allelic genes at a single locus.

As the relationship between ABO blood groups and diseases might vary in different racial and ethnic groups, our study attempted to elucidate it in India population. However, more elaborate studies with greater sample size are warranted to reach conclusive results.

According to data available for us, no systematic review is accomplished about relationship between ABO blood groups and periodontal disease, and any attempts in this regard can help better understanding of disease underlying mechanisms. Our study proposed group B as a possible unchangeable risk factor for periodontitis in Indian population; therefore, people with this type of blood group should be advocated to consider oral health to diminish controllable risk factors such as dental plaque as a preventive measure. As the results of this study is contrary to some other previous one. Studies

in different countries and even in various ethnical groups in a country would shed more light on this area of conflicts.

5. Conclusion

It has been concluded that the higher incidence of blood group O in subjects with healthy periodontium. The higher incidence of blood group B in group II and III indicate that these subjects may be more prone to periodontitis. These data are suggestive of a correlation between periodontal diseases and blood groups, which may act as risk predictors for periodontal diseases. Hence, it has been concluded that genetic differences in immune cell development and antigen presentation may contribute to the susceptibility to infectious diseases. The genetic factors may alter oral ecology and the process of periodontal diseases.

Further, long term studies with larger sample size are needed to confirm this correlation and investigate the biological plausibility to explain this association.

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