



ASSOCIATION OF ABO BLOOD GROUP AND RH FACTOR WITH PERIODONTITIS AMONG PATIENTS ATTENDING TAGORE DENTAL COLLEGE AND HOSPITAL: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective: To determine the distribution pattern of the ABO and Rh blood groups among the patients attending outpatient department of Tagore dental college and hospital, Chennai, India. **Materials and Methods:** The study was conducted on 400 patients aged between 20 to 65 years. The ABO blood grouping and Rh factor investigation was carried out by slide method. The results were analyzed by descriptive statistics and chi-square test using SPSS version 19. All tests were set at a 0.05 significance level. **Results:** A total of 400 subjects were examined, of which 219(54.8%) were males and 181(45.2%) were female with mean age of 38.11 ± 2.79 and 37 ± 3.45 years respectively. The prevalence of blood group A, B, AB, and O were 081 (20.2%), 135 (33.8%), 35 (08.8%), and 149 (37.2%) respectively, Rhesus positive and rhesus negative distribution in the studied population were 374 (93.5%) and 26 (06.5%) respectively. No statistical significant ($\chi^2 = 4.1791$, $P = 0.2427$) relationship were obtained between ABO groups and periodontal status. **Conclusion:** The present study concludes that most common blood group type is 'O' and least common type is 'AB' and there were a relatively higher percentage of 'O' blood group in patients with periodontitis.

KEYWORDS: ABO Blood groups, India, Periodontitis, Rhesus factor.

INTRODUCTION

Periodontitis is one of the most ubiquitous diseases and is characterized by the destruction of the hard tissue and soft connective tissue constituents of the periodontium. Its key features include periodontal pocket formation, loss of connective tissue attachment, alveolar bone resorption, and gingival inflammation, if left untreated, these processes frequently result in tooth loss.^[1] Smoking and types 1 and 2 diabetes are considered to be well-established risk factors for periodontal disease, whereas the etiologic microorganisms *P. gingivalis*, *T. forsythia* and *A. actinomycetem-comitans* are risk indicators.^[2] Although bacteria are the main causative agent for 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 also influences the progression of periodontal disease.^[3]

The existence of blood groups in humans dates back to 20th century when Karl Landsteiner in 1901 described the existence of serologic differences between individuals, segregating people into one of the four groups depending upon whether their red cells contained agglutininogen "A," agglutininogen "B," neither A nor B (O) or both A and B (AB).^[4] The ABO blood group system is based on expression of two antigens, A and/or B on the surface of the red blood cell; because expression of these antigens is co-dominant, patients may have type A, type B or type AB expression patterns and lack of expression of either antigen results in the O phenotype. Blood group frequencies vary globally with type O common in populations of Central and South America, being most common, followed by type A, more common in central and eastern Europe, type B more common in China and India and type AB more common in Japan, China and Korea.^[5]

The knowledge of distribution of ABO and Rh blood groups are not only helpful in the effective management

of blood banks and safe blood transfusion services, they also play a vital role in population based genetic studies, population migration patterns, resolving medico-legal issues.^[6,7] Moreover, relative liability of ABO blood group phenotypes with certain diseases has been investigated and found to be associated with a number of diseases. For example, blood group A was found to be related to development of leukoplakia,^[8] oral submucous fibrosis,^[8] ischaemic heart disease,^[9] cancer of pancreas and ovary.^[10] Type B blood group reported to be an independent risk factor for developing myocardial infarction,^[11] oral cancer,^[12] and coronary atherosclerosis.^[13] Diabetes mellitus was common among blood group O (-) and A (+).^[14]

These systemic relation possibilities of association between ABO blood groups and periodontal disease was first explored by Weber and Pastern in 1927.^[15] Later some authors^[8-18] evaluated this relation and found contradictory relationships. Thus in view to this existing conflicting results, the present study was undertaken to precisely analyze the relationship between ABO blood grouping and Rh factor with periodontitis among the patients attending outpatient department of Tagore dental college and hospital, Chennai, India.

MATERIALS AND METHODS

The present cross-sectional study was carried out on 400 participants aged 20 to 60 years. The participants were randomly selected using convenient sampling technique from outpatient department of Tagore dental college and hospital, Chennai, India. The participants were recruited from month of October 2016 to December 2016 until the final sample was achieved. A pilot study done among 50 patients to calculate the sample size and were calculated using the following formula: $n = z^2 pq/d^2$ where, estimated prevalence (p) and alternate proportion (q) were calculated as 0.33 and 0.77 respectively with an acceptable error of 5%. This calculation led to a sample size of 390 participants which was rounded off to 400 participants.

The research protocol was initially submitted to the institutional ethical committee and review board of Tagore Dental College and Hospital and the ethical clearance was obtained before commencing the study. The participants of both sex, with at least 20 teeth excluding the third molars were included, while subjects suffering from systemic diseases or conditions, smokers, alcoholics, previous history of antibiotic therapy and subjects with previous history of periodontal treatment with 6 months prior to examination, pregnant women's and lactating mothers were excluded from the study. All participants were informed about the nature of the study protocol and a written informed consent was obtained from each participant prior to the study.

A standardized case proforma consisting of details of each subject name, age, gender, past dental history, medical history was recorded. The venous blood samples

were collected to identify the ABO blood groups and the Rh factor. Blood samples were collected by a sterile finger prick with a disposable needle. The ABO blood grouping and Rh factor investigation was carried out by slide method.^[19]

To assess periodontal status, the World Health Organization community periodontal index (CPI) was used and recorded under five scores: score 0 (healthy), score 1 (bleeding), score 2 (calculus), score 3 (shallow periodontal pockets), and score 4 (deep periodontal pockets).^[20]

For the purpose of analysis, the study subjects were grouped into two categories based on CPI scores, individuals with CPI score between 0-2 were categorized as non-periodontitis group and those with CPI score between 3-4 were categorized as periodontitis group.^[21,22] All oral examinations were performed by a single examiner who was trained and calibrated for measuring CPI in the department of public health dentistry, Tagore dental college, Chennai, India and examiner was blinded to BMI measurements. Intra examiner reliability for periodontal status assessment was weighed using Cohen's kappa statistics, which showed a good intra-examiner agreement.

Statistical analysis was carried out using statistical packages for social sciences software (SPSS Inc., version 19, US). The characteristics of participants were assessed using frequency distribution for categorical variables and mean (standard deviation, $\pm$) for continuous variables. Chi-square tests were used to find the association between ABO blood groups and periodontitis. A significance value of $p < 0.05$ was accepted as statistically significant.

RESULTS

A total of 400 subjects were examined, of which 219(54.8%) were males and 181(45.2%) were female with mean age of 38.11 ± 2.79 and 37 ± 3.45 years respectively. A relatively higher percentage of study participants were with type 'O' blood group 149 (37.2%) and a smaller percentage of type 'AB' blood group 35 (8.8%) were observed among the study participants. [Table 1] Out of 400 study participants, Rh positive blood groups were seen among 374 (93.5%) and Rh negative blood groups were seen among 26 (06.5%). The prevalence of blood group A, B, AB, and O were 081 (20.2%), 135 (33.8%), 35 (08.8%), and 149 (37.2%), respectively.

[Table 2] depicts the percentage distribution of blood groups with periodontitis and results were not statistically significant. ($\chi^2 = 4.1791$, $P = 0.2427$).

Relationships between Rh factors and periodontitis were shown in [Table 3]. It was observed that subjects with blood group 'B+' 28(93.3%) followed by 'O+' blood group 39(86.7%) showed more periodontal involvement

and no significant difference were found between distribution of Rh factors. ($\chi^2 = 2.5$, $P = 0.475291$)

Table 1: Distribution of the study sample according to blood group and Rh factor.

Blood group	N (%)
A	081(20.2%)
B	135(33.8%)
AB	035(08.8%)
O	149(37.2%)
Rh factor	
Positive	374(93.5%)
Negative	026(06.5%)

Table 2: Relationship between ABO Groups with periodontal status.

Periodontal status	A (%)	B (%)	AB (%)	O (%)	Total n (%)	Chi square value	P value
No periodontitis CPI 0 - 2	63(21.3%)	105(35.6%)	23(07.8%)	104(35.3%)	295(100%)	4.1791	0.2427
Periodontitis CPI 3 - 4	18(17.1%)	30(28.6%)	12(11.4%)	45(42.9%)	105(100%)		

Table 3: Relationship between Rh factors in subjects with periodontitis.

ABO groups	Periodontitis n (%)	Rh (+) n (%)	Rh (-) n (%)	Chi square value	P value
A	18(17.1%)	14(77.8%)	04(22.3%)	2.5	0.475291
B	30(28.6%)	28(93.3%)	02(06.7%)		
AB	12(11.4%)	10(83.3%)	02(16.7%)		
O	45(42.9%)	39(86.7%)	06(13.3%)		
Total	105(100%)	91(86.7%)	14(13.3%)		

DISCUSSION

The paradigm of pathogenesis of periodontitis is shifting as periodontal diseases are now been recognized as an eco-genetic disease, which highlights their multifactorial nature. [23] Being a multifactorial disease origin and the etiopathogenesis not been established completely, only few studies have documented the relationship between ABO blood grouping and Rh factor with periodontitis in western countries. Hence this present study was conducted precisely to analyze the relationship between ABO blood grouping and Rh factor with periodontitis among the patients attending outpatient department of Tagore dental college, Chennai, India.

This present study showed blood group 'O' (37.2%) to be the most common blood group followed by 'B' 135 (33.8%), 'A' 81 (20.2%) and 'AB' 35(8.8%). Das PK et al [24] conducted a study among 150,536 blood donors over a period of 11 years and reported the most common blood group was group 'O' (38.75%), followed by group 'B' (32.69%), group A (18.85%) and this results were in concordance with the present study. Our results were also in concordance with studies reported by Suresh B et al, [25] Nag I et al, [26] Periyavan A et al, [27] Mallikarjuna S et al, [28] Girish C J et al. [29] This blood group 'O' is also the most commonest blood type in populations around the world, including the USA, [30] Saudi Arabia [31] and Nairobi. [32]

Blood group 'B' were reported to be predominant by Garg P et al, [7] Anup P et al, [33] Chandra T et al, [34] Nazli R et al [35] and these were contrast to our study. The results of our study didn't matches with other studies reported by Pramanik T et al [36] were predominance of blood group 'A' was found. These comparisons suggest that the heterogeneity in blood groups observed in the different populations may be due to genetic and environmental factors. Rh negativity status was 5.51% in our study and is in accordance with the studies conducted at other places in India and is in contrast with studies done in western countries, where it was reported it as 15-17%. [37,38]

In the present study it was found that study subjects with blood group 'B' 105 (35.6%) followed by 'O' 104 (35.3%) predominantly had no periodontal involvement and subjects with blood group 'O' 45 (42.9%) followed by 'B' blood group 30(28.6%) had periodontal involvement [Table 2].

Our finding were in concordance with observation made by Pradhan AC et al [18] where they reported that blood groups 'AB and O' showed more inclination toward diseased periodontium. Demir T et al [39] and Gawrzewska et al [40] also found individuals with blood group 'O' had greater severity for periodontal diseases.

Pai GP et al^[17] reported a contrasting findings, were subjects with blood group 'O' and 'AB' predominated with no periodontal involvement and blood group 'B' followed by blood group 'A' predominated in periodontal involvement. Similarly Barros and Witkop^[41] stated that there were no significant differences between subjects with or without periodontal diseases regarding ABO blood group.

One of the main limitations of present study was data collection confined to a single center, which might affect the generalizability of the study; hence multicentric studies are needed in future. Other limitation was the cross-sectional design of the study, which limits the ability to identify causality. Therefore, longitudinal design is needed in future to explore cause and effect relationships in this regard. Finally it is difficult to explain a hypothesis on why participants with particular blood group are found in increased frequency in healthy, periodontitis groups. However, periodontal disease is caused by multiple factors, and the genetic influence demonstrates a small facet of multifactorial etiology of the disease. Hence it will be too early to conclude the definite association between the blood group and periodontitis, until universal figures are made available.

CONCLUSION

The present study concludes that most common blood group is 'O' and least common is 'AB' and there was a relatively higher percentage of 'O' blood group in patients with periodontitis.

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