–INTERNATIONAL JOURNAL OF PHARMACEUTICAL, CHEMICAL AND BIOLOGICAL SCIENCES

Available online at www.ijpcbs.com

Research Article

CORRELATION BETWEEN ABO BLOOD PHENOTYPE AND PERIODONTAL DISEASE AMONG PATIENTS AGED BETWEEN 18-55 YEARS IN AYDER COMPREHENSIVE SPECIALIZED HOSPITAL, MEKELLE, TIGRAY, ETHIOPIA

Bhumika Sehdev[1*], Keflegan Girma[2], Rajeshwar Singh[3], P. Prasanna Kumar[4] and BS. Sridhar[5]

[1]Department of Periodontics,
Mekelle University, Ayder Referral Hospital, Ethiopia.
[2]Intern Department of Dentistry,
Mekelle University, Ayder Referral Hospital, Ethiopia.
[3]Department of Orthodontics and DentofacialOrthopaedics,
Mekelle University, Ayder Referral Hospital, Ethiopia.
[4]Department of Oral and Maxillofacial surgery,
CIDS, Virajpet, Karnataka, India.
[5]Department of Oral and Maxillofacial surgery,
Bangalore, Karnataka, India.

ABSTRACT

Background: Periodontal disease comprises a heterogeneous group of infectious disease that lead to pathologic destruction of the periodontium. This disease affects the gingiva and cause gingival inflammation and with involving the supporting fibers and bone, the tooth becomes loose and finally the tooth is lost. Periodontitis, being one of the most prevalent diseases in the oral cavity can be supposed to be influenced by the blood grouping pattern among patients. **Aim:** The aim of present study was to determine association between periodontal disease status and the ABO blood groups. **Materials and methods:** In this cross sectional study 60 patients aged between 18-55 years of both sexes with an equal percentage of males and females were selected at random in ACHS, Mekelle, Ethiopia. This study was assessed based on blood group, complete medical and dental history and periodontal examination, consisting of PBI, PPD, and CAL, the study population was divided in to three groups as those with; Group I (patient with healthy gingiva), Group II (patients with gingivitis), and Group III (patients with periodontitis). The effects of blood subgroups on periodontal health, gingivitis and periodontitis were investigated separately. **Result:** A relatively higher percentage 35% of "A" blood group patients were found in gingivitis group, and 55% of "O"group patients were found in periodontitis group. "B" blood group patients 40% were found in relatively higher percentage in healthy gingiva. A significant relationship was also found between Rh factor and periodontitis. **Conclusion:** These data are suggestive of broad correlation between periodontal diseases and blood groups which may act as risk predictors for periodontal diseases. This will 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.

Keywords: ABO blood grouping, Rh factor, Gingivitis and Chronic periodontitis.

INTRODUCTION

Landsteiner first described the existence of serologic differences between individuals, allowing him to classify people into one of four groups depending on whether their red cells contained agglutinogen A, agglutinogen B, neither A nor B (i.e., O) or both A and B (AB)[1]. This discovery led to a series of serologic, genetic and immunochemical studies that are still being researched upon till date.

The history of investigations on the relation between blood typing and dental diseases dates back to 1930.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[2], salivary gland tumors[3], oral cancer[4] had significant association.

Although several studies have been carried out to investigate the relationship between ABO blood groups and the incidence of certain diseases in general, the dental research has still not focused on the correlation between the blood typing and periodontitis. Periodontal disease is a chronic inflammatory response associated with both alteration of host immune response and influence of microbial plaque. For the past few decades research has been focused on systemic conditions and its role in pathogenesis of periodontitis. Most studies showed positive correlation between periodontal disease and systemic conditions, especially cardiovascular diseases such as myocardial infarction and atherosclerosis, respiratory infections such as chronic obstructive pulmonary diseases and pneumonia as well as diabetes. They act individually in additive fashion or synergistically to contribute to periodontal disease.[5,6,7]

Weber and Pastern were the first to study the association of ABO blood group with periodontal disease[8]. Later, Kaslick et al studied the association of ABO blood group and aggressive periodontitis. They found significantly less patients with blood group O and more patients with blood group B[9].

Recently, in a retrospective study of 2015, patients who reported to Saveetha Dental College and Hospital and diagnosed with chronic periodontitis, both localized and generalized forms were included. Among the 410 individuals, 245 were diagnosed with localized chronic periodontitis whereas 165 subjects had suffered from generalized chronic periodontitis. A high fraction of the localized periodontitis population (20.97%) was of the blood group 'B.' Similarly (12.92%) of the generalized periodontitis cases belonged to either 'B' or 'O' blood groups. The least affected blood group was 'AB.'[10]

Much recently, Snehapuri conducted a study on 350 subjects (180 females and 170 males) of which 160 were healthy, 90 were with gingivitis and 100 were with periodontitis. The blood grouping and Rh factor investigation was carried out by slide method. A relatively higher percentage 67.8% of 'A' blood group patients were found in gingivitis group, and 75% of' O' group patients were found in periodontitis group. 'B' blood group patients 76.9% were found in relatively higher percentage in healthy gingiva. A significant relationship was also found between Rh factor and periodontitis.[11]

According to a research conducted in College of Dentistry, University of Baghdad, Iraq,2018,
a total of 150 participants were enrolled in this study and those were systemic healthy placed into three groups, GI consist of 50 participants withhealthy periodontium considered as control group, GII consist of 50 participants with plaque induced gingivitis, GIIIconsist of participants with chronic periodontitis. This study estimates blood group percentage for each group, for GI the percentage of blood group was (28%, 32%, 24%, and 16%) for A, B, O, and AB respectively. For GII the percentage was (28% of type A blood group, 20 % of B blood group, 40% for O, 12% for AB blood group and forGIII the percentage of blood group was (12%, 20%, 60%, 8%) for A, B, O and AB respectively. Participants with the blood group O are more prone to periodontal diseases, while those with AB blood group are less prone to periodontaldiseases.[12]

An epidemiological study was carried out on 1351 subjects who were randomly selected from individuals referred to Atatürk University, Faculty of Dentistry, Erzurum, Turkey, for periodontal treatment or for other reasons regarding dental health. In 1351 blood samples surveyed, A blood group (48.5%), O blood group (30.3%),AB blood group (6.9%), and B blood group (14.3%) with more common ,89.9% Rh factor positive and 10.1% Rh factor negative had been collected. This study estimates blood group percentage for each group, For GI the percentage of blood group was (48.1%, 14.1%, 30.8%, and 7%) for A, B, O, and AB respectively. For GII the percentage was (61.5% of type A blood group, 7.5 % of B blood group, 26.1% for O, 4.7% for AB blood group. For GIII the percentage of blood group was (38%, 14.7%, 41.4%, 5.9%) for A, B, O and AB respectively. A relatively higher percentage of A group patients was found in gingivitis group andrelatively higher percentage of O group patient was found

in periodontitis group[13].

Another study was carried out on 537 subjects attending Faculty of Dental Sciences OPD in BHU, India. Subjectswere divided into three groups: healthy subjects, subjects with gingivitis, and subjects with periodontitis. During the investigation, 537 patients attending for a period of 6 months were examined for the prevalence of blood group and to find if any association exists between the occurrence of periodontitis and specific blood groups. The frequency distribution of the ABO blood groups in 537 participants and prevalence of blood group and Rh factor. Blood Groups A, B, AB, and O consisted of a total of 132 (24.58%), 168 (31.29%), 60 (11.17%), and 177 (32.96%) participants, respectively, in each group. For GI the percentage of blood group was (26.13%, 28.83%, 30.63, and 14.41%) for A, B, O, and AB respectively. For GII the percentage was (30.60% of type A blood group, 23.88 % of B blood group, 36.57% for O, 8.96% for AB blood group. For GIII the percentage of blood group was (18.23%, 39.78%, 33.15%, 8.86%) for A, B, O and AB respectively. From the above, it can be seen that there is a relatively high percentage of blood Group O (36.57%) and A (30.60%) patients in gingivitis and relatively high percentage of blood Group B (39.78%) and O (33.15%) patients with periodontitis. There was a statistically significantassociation between blood group and the periodontal status of the study participants[14]. Therefore, the present study was undertaken to determine the prevalence of periodontal diseases amongst different blood groups using ABO system and to correlate periodontal disease severity with different blood groups.

METHOD AND MATERIALS

The present study was carried out in 60 subjectsaged between 18-55 years consisting of equal percentage of males and females were selected at random in ACHS, Mekelle, Ethiopia. The subjects with at least 20 teeth, excluding third molars, systemically healthy, and with similar socioeconomic status were recruited in the study. Subjects who were suffering from any diseases such as leukemia, diabetes, metabolic bone diseases, epilepsy etc. that could aggravate periodontal manifestations, subjects having adverse habits such as smoking, alcohol consumption etc. and subjects with any previous history of antibiotics and periodontal treatment within 6 months prior to examination were excluded from the study.

Prior to initiating this study, the purpose and the designs of the study was explained to all the patients and informed consent was signed by each patient. Information regarding dietary status, mouth cleansing habits, systemic background, gingival and periodontal status along with routine clinical details were recorded in a specially designed chart. Also, study protocol was approved by Mekelle University College of Health Science department of dentistry Ethical Review board.Official letter of co-operation was written to selected health facilities; Central laboratory for the estimation of blood groups.

Prior to blood investigation the subjects were categorized into three groups based on their periodontal status- Healthy gingival group- papilla bleeding score <1 and no obvious changes in color, contour, surface texture of gingiva. Gingivitis group- papilla bleeding score >1, displaying clinical signs of gingivitis (change in color, contour, and surface texture of gingiva) and sulcus depth < 3 mm. Periodontitis group- exhibited mean clinical attachment loss (CAL) ≥5mm and periodontal pocket depth (PPD) in the range of 5-7 mm. Patients for healthy gingival group were randomly selected from patients who visited our faculty with reasons other than periodontal diseases, such as orthodontic purpose and dental caries.

All the clinical measurements were made using Marques periodontal probe on all teeth in each patient. The clinical measurements recorded were papillary bleeding index (PBI)[15], periodontal pocket (PPD) and clinical attachment loss (CAL).

Blood examination

The venous blood samples were collected using steriledisposable lancets and finger prick method. The blood grouping and Rh factor investigation was carried out for each participant by slide agglutination method (visual method) after obtaining the consent form from each subject.Based on periodontal status the subjects were divided into 3 groups: GROUP I consisted of 20 patients with healthy gingiva(12 males and 8 females); GROUP II consisted of 20 patients with gingivitis (17 males and 3 females) and GROUP III consisted of 20 patients with chronic periodontitis (12 males and 8 females). The number of subjects in each study group and ABO blood group were tabulated.The frequency of ABO blood group and Rh factor was calculated in study group.

STATISTICAL ANALYSIS

The gathered data were analyzed by Statistical Package for the Social Sciences (SPSS software, Version 16, IBMAnalytics) and Systat 8.0. Chi-square test was used to compare the frequency of blood groups and Rh status. The significance

level was set at 0.05.

RESULTS

A total of 60 subjects (19 females and 41 males) were examined, of which 20 belonged to healthy group, 20 under gingivitis group and 20 of periodontitis group. The mean age in healthy subjects was 24.4±2.62 years, in gingivitis group it was 28±5.57 years whereas, in periodontitis group it was 45.5±10.03 years as shown in table 1. (**Table 1: Number of Subjects, Age and Sex per periodontal status category).**

Table 2 shows that a relatively higher percentage 35% of 'A' blood group patients were found in gingivitis group, and 55% of '0' group patients were found in periodontitis group while 'B' blood group patients 40% were found in relatively higher percentage in healthy gingiva. (**Table 2: Percentage distribution of ABO blood groups in study group).**

In addition, a significant relationship was found between Rh factor and periodontitis as shown in table 3. **(Table 3: Percentage Distribution of Rhesus Factor in the study groups).**

DISCUSSION

Periodontal diseases are considered to be Eco genetic diseases with multifactorial nature. The main cause of periodontal diseases is the bacterial dental plaque. Also, a wide range of background factors such as age, sex, education, economic status, oral hygiene habits, genetic factor and smoking habits have been considered as a risk factors for the occurrence of periodontal diseases[15,16].

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[17]. Scanty literature is available to infer the association between blood groups and prevalence of periodontal diseases. Therefore, the present study was undertaken to determine the effect of blood group phenotypes and Rh factor on periodontal tissues.

In the present study, it was determined that there was a relatively higher percentage of A blood group in patients with gingivitis and a relatively higher percentage of O blood group in patients with chronic periodontitis. While the B blood group represent the higher percentage in the group with the healthy periodontium. These findings points towards a possible genetic basis. Similar observations have been made in previous studies[11,13]. They reported gingivitis in 61.5% of blood group A population and periodontitis in 41.4% of blood group O population. Koregol et al. concluded in their study that the blood group O showed a higher percentage in the periodontitis group, and that AB phenotype showed the least percentage in periodontal diseases[18].Furthermore, Demir et al (2009) found that different ABO blood groups may show significant differences in the rates of colonization of a number of periodontal pathogens that are the main etiologic agents of periodontal diseases[19].

In addition, Rh systems have a major clinical significance and they are determined by nature of different amino acid substitutes present on the surface of Red Blood Cells. On comparison of percentage distribution of Rh factor in all study groups, there was significantly higher distribution of Rh positive factor than Rh negative factor. This finding is correlation with other studies[11,13].

CONCLUSION

Findings in the present study are suggestive of a correlation between periodontal diseases and blood groups, which may act as risk predictors for periodontal diseases. For definitive establishment of such an etiogenic role, further studies using diverse population groups with exploration towards genetic basis are required to elucidate this relationship.

RECOMMENDATION

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.

Table 1: Number of Subjects, Age and Sex per periodontal status category

PERIODONTAL STATUS	NUMBER AND PERCENTAGE OF SUBJECTS		MEAN AGE IN YEARS	SEX	
	N	%	YEARS	M	F
HEALTHY	20	33.33%	24.4±2.62	12	8
GINGIVITIS	20	33.33%	28.0±5.57	17	3
PERIODONTITIS	20	33.33%	45.5±10.03	12	8

Table 2: Percentage distribution of ABO blood groups in study group

GROUP	A N (%)	B N (%)	AB N (%)	O N (%)
HEALTHY(n= 20)	4(20%)	8 (40%)	2 (10%)	6(30%)
GINGIVITIS (n= 20)	8(35%)	5(25%)	4(20%)	3(15 %)
PERIODONTITIS (n= 20)	5 (25%)	2 (10%)	2 (10%)	11 (55%)
TOTAL (n= 60)	17 (28.3%)	15 (25%)	8 (13.3 %)	20 (33.3%)

Table 3: Percentage Distribution of Rhesus factor in the study groups

Group	Total Subjects	Rh Positive N (%)	Rh Negative N (%)
HEALTHY	20	16 (80%)	4 (20%)
GINGIVITIS	20	15 (75%)	5 (25%)
PERIODONTITIS	20	18 (90%)	2 (10 %)
TOTAL	60	49 (81.6 %)	11 (18.3%)

REFERENECES

1. Watkins WM.(2001). The ABO blood group system: a historical background.
2. Holbrook WP and Blackwell CC. Secretor status and dental caries in Iceland. FEMS microbial Immunol. 1989;1:397-9.
3. Pinkston JA and Cole P. ABO blood groups and salivary gland tumors. Caner Causes Control 1996;7:572-5.
4. Vijay Raghavan MR, Bailoor DN and Jhansi Rani P. Incidence of ABO blood groups in oral cancer in South Kanara District. J Indian Dent Assoc 1986;58:305.
5. Garrison RJ, Havlik RJ, Harris RB, Feinleib M, Kannel WB. ABO blood groups and cardiovascular disease- the Farmingham study. Atherosclerosis: 1976;25:311-318.
6. Moeintaghavi A, Hayrian-Ardakani A, Talebi-Ardakani M and Tabatabaie I. Hyperlipidemia in patients with periodontitis: J Contemp Dent Pract 2005;6:78-85.
7. Paju S and Scannapieco FA. Oral biofilms, periodontitis and pulmonary infections. Oral Dis 2007;13:508-12.
8. Weber R and Pastern W. On the question of constitutional readiness for so-called alveolar pyorrhea. DtschMachrZahnerlk. 1927;45:704-709.
9. Kaslick RS, Chanes AI, Tuckman MA and Kaufman B. Investigatin of periodontosis with periodontitis: Literature survey and findings based on ABO blood groups. J Periodonto. 1971;42:420-7.
10. BalajiRamamoorthy, Sheeja S Varghese and Asha Ramesh. Relationship between periodontal disease and ABO blood group phenotypes- A cross sectional retrospective study. Int J of Pharmacy and Pharm Sci.2015;7(11);386-388.
11. Sneha S Puri. Relatioship between human ABO blood groups and periodontal diseases. Int J of Sci and

App Res. 2018;5(4):08-13.
12. Suzan Ali Salman, Dina Ali Zuhair and DuaaMazin. The percentage of (ABO) blood groups in Iraqi participants with different periodontal diseases. Int J of Adv Bio Res. 2018;8(2):201-203.
13. Demir, Adnan Tezel, DDS, RecepOrbak, Abubekir Eltas Cankat Kara and FahriKavrut. The effect of ABO blood types on periodontal status. Eur J Dent. 2007;1:139-43.
14. Gautam A, Neelam Mittal and Pushpendra Kumar Verma. Correlation of ABO blood group phenotype and Rhesus factor with periodontal Disease: An observational study.
15. Mulhemann HR. Psychological and chemical mediators of gingival health. J Prevo Dent. 1977;4:6.
16. Lindhe J, Karring T and Lang NP. Clinical periodontology and implant dentistry. Blackwell Munksgaard. 4. 2003.
17. Kinane DF. Causation and pathogenesis of periodontal disease. Periodontal 2000. 2001;25:8-20.
18. Campi C, Escovich L, Valdes V, Garcva Borras S, Racca L and Racca A. Secretor status and ABH antigens expression in patients with oral lesions. Med Oral Patol Oral Cir Bucal. 2007;12:E431-4.
19. Koregol AC, Raghavendra M, Nainegali S, Kalburgi N and Varma S. ABO blood groups and Rhesus factor: An exploring link toperiodontal diseases. Indian J Dent Res. 2010;21:364–368.
20. Demir T, Uslu H, Orbak R, Altopararlak U and Ayyilidiz A. Effects of different blood groups on reproduction of periodontal pocket bacteria. Int Dent J. 2009;59:83-6.