Prevalence of Periodontal Disease in Various Abo Blood Groups – An Epidemiological Study

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Abstract

Background: Periodontal disease is considered to have a multifactorial etiology. It is interesting to emphasize the significance of genetic factors in patients with periodontal disease and to find out whether any innate factor is also associated with it[2]. If such a relationship is found, it can be concluded that the presence of particular blood group antigen can increase the susceptibility to the disease.

Material & Method: The study included patients who fulfilled all the inclusion criteria which were required to be the part of the study. The nature and design of the study was explained to the patients and written consent was obtained for their participation. Patients blood group typing was done using the ABO blood group kit. The patients were then screened using the gingival index and probing depth.

Results: Chi square (χ^2) test and Fisher's two-way analysis of variance were the statistical design utilized. The results showed 'O' blood group was more prevalent among healthy subjects and A in gingivitis, while O was more prevalent in Periodontitis subjects. A statistically significant association was found between "ABO" blood group system and probing depth in group III.

Conclusion: The present study hereby concludes that an association exists between blood group and periodontal disease**.**
Keyword: Blood group, ABO, Periodontitis, Gingivitis.

INTRODUCTION

ABO blood grouping was first described by Karl Landsteiner in 1900, based on the presence or absence of specific antigens on the human red blood cells (RBC) membrane. Blood type is classified as group A, B, O or AB depending on whether the RBC membranes contain antigen A, antigen B, neither antigen, or both antigens respectively. The discovery of ABO system and findings of red cell agglutination in serum and recognition of blood groups laid the scientific basis for safe practice of blood transfusion.ABO blood grouping influences other physiological characteristics. For example, group A has been associated with increased risks of gallstones, colitis, and certain tumor types, whereas non-O blood groups have been associated with cardiovascular diseases, including ischemic heart disease and atherosclerosis.[1]

Periodontal disease (PD) comprises a group of heterogeneous conditions involving inflammation of the alveolar bone, periodontal ligament, and gingiva. In addition to the infectious etiology, increasing evidence suggests that PD may involve a chronic immune-inflammatory response. PD has been associated with various environmental and host factors, including diabetes mellitus and smoking habit. So Periodontal disease is considered to have a multifactorial etiology, genetic factors play an important role.[1]

Hence, it is interesting to emphasize the significance of genetic factors in patients with periodontal disease and to find out whether any innate factor is also associated with it[2]. However, if such a relationship between the blood group and periodontal disease can be established ,it can be concluded that the presence of particular blood group antigen have somehow increased the susceptibility to the disease [2,3]

Ford[4] (1942), believed blood groups phenomenon to be an example of balanced polymorphism, which indicates that natural selection takes an interest in blood group differences and hence different combinations of genotypes will have slightly different survival values. There are however, many ways in which health and survival values can be influenced by the blood group system.

Weber and Pastern[14](1927) were the first to study the association of "ABO" blood groups with periodontal disease and ***Polevitzky[15] (1929)*** was second to study the association. ***Kaslick[16] et al (1971)*** studied the association between Juvenile periodontitis and "ABO" blood groups. They found significantly less patients with blood group "O" and more patients with blood group "B"

Therefore, the aim of the present study is to find out the prevalence of periodontal disease among different blood groups using ABO system and to correlate periodontal disease with different blood groups.

Materials and Methods

1425 patients, both males and females in age group of 25 – 65 years were selected from the outpatients who visited the department of periodontics, Jaipur dental college , Jaipur.

The nature and design of the study was explained to the patients and written consent was obtained for their participation. They were checked for their blood group using the blood group kit (sparz clone) followed by periodontal examination to categorize as healthy, chronic gingivitis and chronic periodontitis groups. Patients who had not received any periodontal treatment in the past 1 year and with no significant systemic disease were included in the study.

Chronic smokers and alcoholics, pregnant women and those who were on oral contraceptives were excluded from the study subjects who were on antibiotics /analgesic therapy for medical reasons were also not included in the study.

Clinical Procedure

The blood grouping for the study subjects was done by using slide agglutination method (Visual method) using spanz clone blood group kit. The right index finger of the patient was wiped with sterilized cotton and pricked with a sterile lancet. Two drops of blood were placed on the same slide with distance apart, to which a drop of anti A and

anti B serum was added prior and waited for agglutination (clumping) to take place. If agglutination (Clumping) occurs with antiserum A then the blood group is "A". If agglutination (Clumping) occurs with antiserum B then the blood group was identified as "B". If agglutination (Clumping) occurs with both anti-A and anti-B serum the blood group was "AB". If No agglutination (clumping) occurs with both anti A and anti B serum the blood group was "O".

A drop of antiserum D was placed on another slide to which One drop of blood was added and allowed for agglutination (clumping) to take place. If agglutination (Clumping) occurs when anti-D sera is added blood is Rh+ve and if no clumping is seen blood is Rh–ve.

After determining the blood group, patients were screened for gingivitis using gingival index (loe and silness) and were examined for periodontal status (probing pocket depth) using Williams graduated periodontal probe.

Patients were divided as per the following criteria:

Group I:

Patients having clinically healthy gingiva with gingival score of 0.1 - 0.4 (Loe and Silness).

Group II:

Patients having generalized chronic gingivitis with gingival score 1.1 - 2.0 (Loe and Silness)

Group III:

Patients having chronic generalized periodontitis, with ≥30% sites with probing depth of ≥4 mm.

RESULT

The percentage and frequency distribution of ABO blood group among the various age groups showed that 425 subjects belonged to age group 25-35years. The study population was divided into group I (healthy) group II (gingivitis) and group III (periodontitis) according to the clinical parameters namely gingival index(Loe and Silness)and pocket depth.

Comparison of mean percentage value of probing depth and ABO blood group in group III (periodontitis) was statically significant($p<0.05$).

When comparing the percentage and frequency distribution of ABO blood group in group I (healthy), group II (gingivitis) and group III (periodontitis), group I (healthy) subjects with blood group O 42.78% (148) showed a significant relationship ($p<0.05$). In the group II (gingivitis) subjects with blood group A 41.89% (191), showed a significant relationship ($p<0.05$). In group III (periodontitis) subjects with blood group O 43.18%(269), showed a significant relationship($p<0.05$)

The Rh factor distribution status was compared among 1425 subjects in the study group. Among 346 subjects in group I(healthy) 317 were Rh +ve and 29 were Rh-ve. In group II (gingivitis) 412 were Rh+ve and 44 were Rh-ve. 549 subjects in group III (periodontitis) were Rh+ve and 74 were Rh-ve. No relative significance was found regarding the distribution of Rh factor ($p>0.05$).

Statistical Analysis

Statistical analysis was done in P.C statistical package SPSS 7.2

Chi square (χ^2) test

This test was used to find the association between the "ABO" blood groups with Group I (Healthy), Group II (Gingivitis), Group III (Periodontitis).

Two way analysis of variance

The purpose of two-way ANOVA is to find out whether data from several groups have a common mean. In two-way ANOVA the groups have two categories of defining characteristics instead of one.

DISCUSSION

The ABO blood group system and Rh system distribution show marked variation around the world. In the present study maximum subjects belonged to blood group O 37% (528), followed by blood group A 31% (443), blood group B 19% (266) and blood group AB 13% (188). Similar results were obtained in the study done by ***L. Beckman(2008)[3].*** However in the studies done by ***Nanu A et al (1997)[4]***, ***Afzal M et al(1977),[5]*** the maximum number of subjects belonged to blood group O followed by blood group B, A and AB.

Studies have been done to explore the ABO blood group and the incidence of oral and dental disease. The earliest investigation done was by ***Suk et al (1930)[6]*** who did not found any correlation between blood groups and caries. However ***Aitchison and Carmichael (1962)[7]*** revealed a relationship between the patient's susceptibility to caries and their blood group. ***Nikawah et al (1991)[8]*** found that denture wearers of blood group O were found to be

more susceptible to denture stomatitis. ***Gheisari R et al (2008)***[9] found that the Maxillofacial deformities were the least with blood group A and were greater with blood group B, suggesting ABO blood group as one of the etiologic factors for these deformities.

In this study the mean gingival index and ABO blood group did not show any statistically significant relationship in group I, group II and group III. Similar results were obtained in the study done by ***Ali S. T. Al Ghamdi (2009)***[10]**.** Mean of probing depth and ABO blood group showed a statistical significant relationship in group III. This finding is contradictory to that of the study done by ***Ali S.T. Al Ghamdi (2009)***[10]**.** They did not find any relationship between periodontitis and probing depth. Also ***Turgut Demir et al (2009)***[11] did not find statistically significant difference in the reproduction of the pathogenic bacteria in different ABO blood groups.

The relationship between gingival index and gender was not significant in group I, group II and group III ($p>0.05$). These findings are in par with those of **Turgut Demir et al(2009)**[11]**.** Males showed a higher mean gingival index and mean pocket depth when compared with the females, These results are similar to those of the study done by ***Ali S. T. Al Ghamdi (2009)***[10]**.**

In the present study blood group A and gingivitis showed a statistically significant relationship. ($p<0.05$). This is similar to the studies done by ***Koregol AC (2010)***[12] and ***Turgut Demir(2007)***[13] who have shown statistically significant relationship between blood group A and gingivitis. These findings were however contradictory to those of ***Daryl E. Malena (1972)***[14]**,** ***kaslick(1971)***[15] and ***Tendon(2009)***[16] **.**

Blood group O showed a significant relationship ($p<0.05$) **i**n periodontitis patients. This result goes in hand with the studies done by ***Ghalyani Estaheni(2000)***[17]**,** ***Turgut Demir(2007)***[13] and ***Koregol AC (2010)***[12]**,**who found a significant correlation of blood group O with periodontitis.

Differential secretion of blood group antigens ABO (H) in the tissue may be a factor influencing the development of systemic oral diseases. Differentiation and maturation of cells in the satratified epithelium influence the expression of different histo-blood group antigens. Basal cells express A/B precursor carbohydrate chains, whereas A and B antigens are more commonly found in the spinous cell layer. Expression of blood group antigens also depends on the differentiation patterns of keratinized versus non-keratinized epithelium. Keratinized squamous epithelium rarely expresses A and B antigen, with most spinous cells expressing the precursor H antigen. In non keratinized epithelium, including the buccal mucosa, most spinous cells express A and B antigens, rather than precursor H antigen. In the oral tissues, the presence of A/B transferases and their substrates determines the expression of A/B antigens.

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FUTURE CONSIDERATION

Knowledge of the ABO blood groups of patients and their association, if any, with the severity of periodontal disease may be important in the development of early treatment strategies, and it would help to target non-responding areas to periodontal therapy of highly susceptible individuals.

CONCLUSION

Considering the current observations, the conclusion drawn are:

1) The prevalence of subjects with blood group 'O' were more in group I(healthy)
2) Blood group A showed a statistically significant in groupie (gingivitis)
3) Maximum number of patients blood group 'O' were found to be more in group III (periodontitis).
4) A statistically significant association was found between "ABO" blood group system and probing depth in group III.

BIBLIOGRAPHY

1. Lindhe J, Karring T, Lang NP. *Clinical periodontology and implant dentistry, Blackwell Munksgaard.* 2003.
2. Newman MG, Takei HH, Carranza FA. *Clinical Periodontology.* 9. W.B.Saunders Co.; Philadelphia, London, New York, St Loise, Sydney, Toronto: 2002.
3. L. Beckman .**Racial & ethnic distribution of ABO blood types,** a contribution to the physical anthropology and population genetics2008.
4. Nanu A, Thapliyal RM. Blood group gene frequency in a selected north Indian population. Indian J Med Res. 1997 Sep;106:242-6.
5. Afzal M, Ziaur-Rehman , Hussain F, Siddiqi R.J Pak Med Assoc 1977; 27:426-8.
6. Suk V. Über die beziehung zwischen gesunden Zähnen und den Zerfall und die Pflege der Zähne bei den weissen. Spisy lék Fak Masaryk Univ. 1930:125. (Cited by Pradhan et al, 1971)
7. Aitchison J, Carmichael AF. The relationship between the ABO blood mutations and dental caries. Dent Pract. 1962;13:93–95.
8. Nikawa H, Kotani H, Sadamori S, Hamada T. Denture stomatitis and ABO blood types. J Prosthet Dent 1991;66:391-4.
9. Gheisari R, Ghoreishian M, Movahedian B, Roozbehi A. The association between blood groups and maxillofacial deformities. Indian J Plast Surg 2008;41:138-40.
10. Ali S. T. Al Ghamdi, Association Between ABO Blood Groups and Severity of Chronic Periodontitis. JKAU: Med. Sci., Vol. 16 No. 3, pp: 31-41
11. DEMIR Turgut . Effects of different blood groups on the reproduction of periodontal pocket bacteria, International dental journal 2009, vol. 59, 83-86
12. Koregol AC, Raghavendra M, Nainegali S, Kalburgi N, Varma S. ABO blood groups and Rhesus factor: An exploring link to periodontal diseases. Indian J Dent Res 2010;21:364-8
13. Demir, ,Tezel, A., Orbak, R., Kavrut, F. The Effect of ABO Blood Types on Periodontal Status, Eur J Dent. 2007 July; 1(3): 139–143.
14. Daryl E. Malena . ABO Phenotypes and Periodontal Disease .J DENT RES 1972 51: 1504
15. Kaslick RS, Chasens AI, Tuckman MA, Kaufman B. Investigation of periodontosis with periodontitis: literature survey and findings based on ABO blood groups. J Periodontol. 1971 Jul;42(7):420-7.
16. S. Tandon , O. P. Tandon , I. D'Silva , A. Kaur. Association of periodontal disease with ABO blood groups .Biomedicine 2009; 29 (2): 154-158
17. Ghalyani Esfahani P.,Bahmani Mohammad Ali,Bani Talebi M. Study Of The Frequency Of Gingivitis And Periodontitis In Four Different Types Of Blood Groups In Young Adults. Majallah-I-Dandanpizishki Fall 2000; 12(3 (34)):47-54.

Table-1: - Comparison of mean of gingiva index (Leo & Silness) and ABO blood Group Among Group I (healthy), Group II (Gingivitis) and Group III (Periodontitis)

Gingival Index %	Blood Group				p-value
	A	B	AB	O	
Group I	38.5	31.4	36.7	34.4	>0.05 (NS)
Group II	19.3	13.3	18.9	17.5	>0.05 (NS)
Group III	21.2	24.9	22.3	27.9	>0.05 (NS)

Table-2: - Comparison of mean of probing depth and ABO Blood Group among Group II (Periodontitis)

	Blood Group				p-value
	A	B	AB	O	
Group I	38.5	31.4	36.7	34.4	>0.05 (NS)
Group III (PD) mm	47.9	41.7	42.9	53.9	<0.05 (S)

Table-3: - Percentage and frequency distribution of ABO blood Group among Group I (healthy), Group II (gingivitis) and Group III (Periodontitis)

	Blood Group				Significance χ^2 test	Total
	A	B	AB	O		
Group I	81	68	49	148	<0.05	346
%	23.41 %	19.65 %	14.16 %	42.78 %	S	100 %
Group II	191	87	67	111	<0.05	456
%	41.89%	19.08 %	14.69 %	24.34 %	S	100 %
Group III	171	111	72	269	<0.05	623
%	27.45 %	17.82 %	11.55 %	43.18 %	S	100 %
Total	**443**	**266**	**188**	**528**		

Table-04: - Frequency distribution of ABO blood Group and Rh factor in Group I (Healthy), Group II (Gingivitis) and Group III

	Blood Group								
	A		B		AB		O		p-value
	Rh+	Rh-	Rh+	Rh-	Rh+	Rh-	Rh+	Rh-	
Healthy %	72	9	65	3	45	4	135	13	>0.05 (NS)
Gingivitis %	173	18	79	8	61	6	99	12	>0.05 (NS)
Periodontitis %	151	97	97	14	64	8	237	32	>0.05 (NS)

Fig 1: ARMAMENTARIUM

Fig 2: FINGER PRICK METHOD

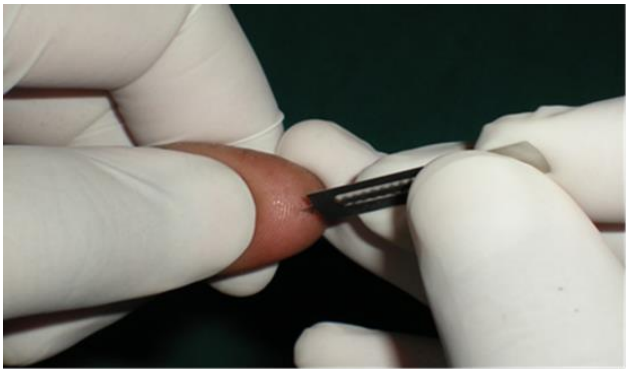

Fig 3: AGGLUTINATION WITH ANTISERA A BLOOD GROUP A

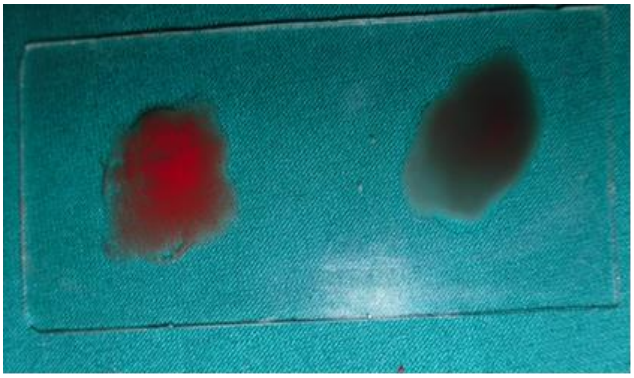

Fig 4: AGGLUTINATION WITH ANTISERA B – BLOOD GROUP B

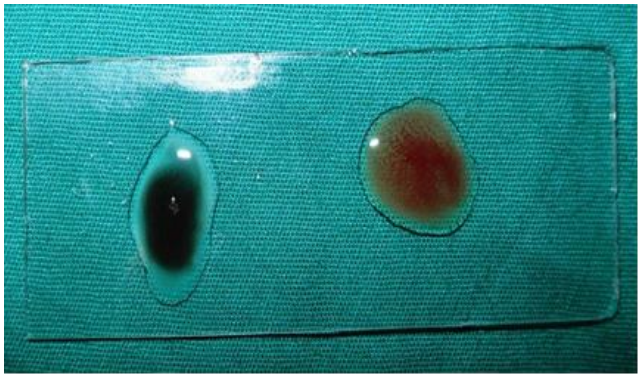

Fig 5: AGGLUTINATION WITH ANTISERA A AND ANTISERA B –BLOOD GROUP AB

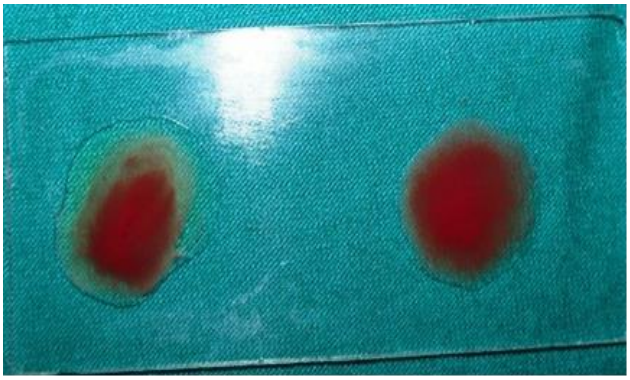

Fig 6: NO AGGLUTINATION WITH ANTISERA A AND ANTISERA B –BLOOD GROUP O

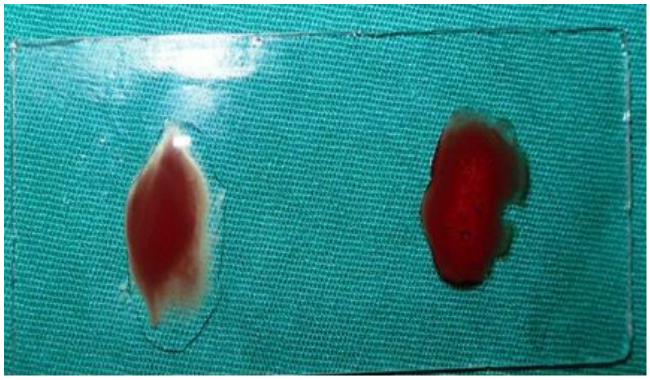

Fig 7: CLINICALLY HEALTHY GINGIVA

Fig 8: GINGIVITIS INDEX

Fig 9 - PROBING DEPTH