



## Clinical Evaluation of Correlation between Periodontal Diseases and ABO Blood Grouping

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### Abstract

Periodontal disease, is a set of inflammatory conditions affecting the tissues surrounding the teeth. Several studies have focused on the relationship between ABO blood and Rh factor groups and periodontal diseases. However, the results showed a lot of discrepancies. Aim of the study: to evaluate the relationship between ABO, Rh blood groups and distribution of periodontal diseases. Material And Method: This study involved 560 subjects aged between 20 to 55 years; selected on random basis from the outpatient department of Periodontology at AL -mammon specialized dental center in Baghdad. The patients sample have been classified in a 3 groups in relation to their clinical presentation and the periodontal scores on a basis of Ramfjord's Periodontal index. Result: out of 560 patients there were 312 male, 248 female patients. According to sample classification in relation to clinical condition and periodontal score, Group I 115 patients with healthy gingiva; group II 225 patients with gingivitis; and group III 220 patients with periodontitis ,the highest prevalence of periodontitis are among blood group O(34.1%), while higher gingivitis percentage are associated with blood group A (34.2%). The prevalence of gingivitis was higher in Rh positive group 43.1%, while periodontitis show higher prevalence in Rh negative group 40%. Discussion and conclusion: We concluded that there was significant relationship between ABO, Rh blood group system and periodontal disease. Blood group 'A' could be a factor of risk for gingivitis and blood group 'O' could be a factor of risk for the developing of periodontitis. Similarly Rh positive group considered a risk factor for gingivitis, while Rh negative group is a risk factor for periodontitis.

## Introduction:

Periodontal disease, also known as gum disease, is a set of inflammatory conditions affecting the tissues surrounding the teeth <sup>(1)</sup>. Periodontal disease; starts as gingivitis, which is a chronic inflammation of the gum <sup>(2)</sup>. The gum become swollen, red, and may bleed <sup>(1)</sup>. Gingivitis may progress to periodontitis which is a serious condition that destroys tooth-supporting tissues and can progress in some cases, leading to rapid tooth loss <sup>(2,3)</sup>. Bad breath may also occur <sup>(4)</sup>. Gingivitis is the most common form of periodontal disease, occur in response to bacterial biofilms (plaque) adherence to the tooth surfaces, and it is termed plaque-induced gingivitis. In the absence of treatment, gingivitis may progress to periodontitis <sup>(5)</sup>. Periodontitis is a prevalent disease that affects a huge proportion of populations all over the world <sup>(6)</sup>. Periodontal disease may contribute to the body's overall inflammatory burden, worsening conditions such as diabetes mellitus and atherosclerosis <sup>(7,8,9)</sup>. In 2017 it was agreed on a classification framework for periodontitis further characterized based on amultidimensional staging and grading system that could be adapted over time as new evidence emerges periodontal diseases. This classification system classified periodontal diseases into:

- 1- Periodontal health and gingival diseases.
  - a-Periodontal health and gingival health.
  - b-Dental biofilm induced gingivitis.
  - c-non-dental biofilm induced gingivitis.
- 2- Periodontitis.
- 3- Other conditions affecting the periodontium.
- 4- Periimplant disease and conditions <sup>(10)</sup>.

Karl Landsteiner in 1901, introduced the ABO blood groups, segregating people into three groups A, B and O depend on the possibility of the red blood cells to be clustered when they are mixed with serum from other people. Then, a fourth group AB was discovered. The blood group

system is dependent on whether an erythrocyte expresses on its surface one, two, or neither antigen. The antigen A, B, or both carried on Erythrocytes, fall into the blood groups of A, B, AB respectively, while the lack of manifesting either antigens results in O phenotype. Individuals who do not carry A or B antigens on their erythrocytes have antibodies to the antigens they lack in their serum. In addition to being expressed on the surface of red blood cells, these antigens can be distributed in the body of most people in the form of glycoproteins dissolved in the secretors of the body like saliva <sup>(11,12)</sup>.

The Rhesus (Rh) system is another important blood group system. In this system, erythrocytes may be either positive (Rh +) if they present Rh antigen, or negative (Rh-) if they lack this antigen. It was reported that 99% of Asians and 85% of European are (Rh- +) <sup>(13)</sup>. Several studies have focused on the relationship between ABO blood groups and periodontal diseases. However, the results obtained from these studies showed a lot of discrepancies. Some studies showed that gingivitis was more prevalent in subjects with blood group A, and periodontitis was more prevalent in subjects with blood group O, these studies also concluded that there was a relationship between gingivitis and Rh positive patients <sup>(14,15)</sup>. Furthermore, the study by Koregol AC et al., reported similar results, but they found there is no relationship between Rh factor and periodontal diseases <sup>(16)</sup>. A study by Patel R et al., showed that subjects with blood group B and O and those who are Rh positive have a higher tendency to develop periodontitis <sup>(17)</sup>. In contrast, a study carried out by Francis DL et al., reported that there is no significant relationship between ABO blood groups and Rh factor with periodontal diseases <sup>(18)</sup>. Because of the conflicting studies that are mentioned above it was decided to conduct a clinical study, the purpose of which was to evaluate the relationship between ABO, Rh blood groups and distribution of periodontal diseases depending on 1999 classification of periodontal disease.

## Materials and Methods

This study involved 560 subjects aged between 20 to 55 years; selected on random basis from the outpatient department of Periodontology at AL - mammon specialized dental center in Baghdad. The inclusion criteria according to which the samples were selected include the next points:

1. At least 20 teeth should be available in the selected subjects.
2. No systemic diseased subjects as a metabolic bone disease, diabetes, hypertensive, leukemia, or epilepsy.
3. Subjects do not taking any periodontal management or antibiotics to treat any condition dentally or medically at least three months before the study.
4. Nonsmokers and subjects not addict on alcohol.

An informed consent were taken from the subject who included in this study. Detailed histories Medically and dentally have been taken from all patients involved in the study, after that apresized oral examination was done. The parameters used in the periodontal assessment include the following:

1. plaque Index System(PIS).
2. Gingival Index.
3. Bleeding on probing (BOP).
4. Probing pocket depth (PPD) was done according to Ramfjord's Periodontal index<sup>(19)</sup>. using (Williams' periodontal probe) at the teeth gingival margin for all patients. The patients sample have been classified into a three groups in relation to the clinical condition and the periodontal scoring, which depended on 1999 classification system for periodontal disease, That was based on an infection and host response concept. It recognized both dental plaque-induced gingival diseases and nonplaque-induced gingival lesions along with seven categories of periodontal diseases and conditions: chronic periodontitis, aggressive periodontitis, periodontitis as a manifestation of systemic disease, necrotizing periodontal diseases, abscesses of the periodontium, periodontitis associated with endodontic lesions, and developmental or acquired deformities and conditions<sup>(20)</sup>. The gingivitis subjects

shown sign (Gingival bleeding, color, gingival contour, position and surface texture in the gingiva), periodontal pockets depth less than 3 mm, attachment loss less than 3 mm of and no radiographic bone loss. Periodontitis subjects exhibited at least one site evidence of radiographic bone loss, attachment loss more than 3 mm, periodontal pockets depth more than 4 mm. Healthy subjects displayed less than 3 mm of attachment loss, periodontal pockets depth less than 3 mm, no radiographic bone loss and no gingivitis sign. Group (I) represents; a Healthy periodontium (normal supportive tissues clinically) , Group (II) represents; a Chronic gingivitis , while a Group (III) represents; a Chronic periodontitis the (beginning periodontal disease), the (established ) and the( terminal periodontal disease), depending on 1999 classification. We referred our subjects included in the study to Al Yarmouk hospital, laboratory department to determine their ABO and RH blood subgroup, in order to correlate the result of the oral examination with the blood grouping. We depended chi-square to analyze our result as hypothesis tests about whether the data in our result is as that expected. This test is used basically to compare observed values in result data to the expected values that would be seen if the null hypothesis is true. Also a P-value was used in our statistics which depend on measurements of probability that observed difference could occurred by random chances. p-value is the probability of obtaining results at least as extreme as observed results of a statistical hypothesis test, assumes that null hypothesis is correct. A smaller p-value means stronger evidence in favor of alternative hypothesis.

## Results:

Out of 560 patients there were 312 male, 248 female patients. According to the sample classification in relation to clinical condition and periodontal score, Group I involved 115 subjects who showed a healthy periodontium; group II involved 228 subjects have chronic gingivitis; and a group III involved 217 patients

represented with periodontitis. Table(1), Fig.(1).

According to blood grouping type survey , A group (32%) the most common; followed by O blood group (29%), B (28%) and AB (11%) blood groups. Fig.(2)

In relation to the distribution of ABO blood groups among healthy ,periodontitis and gingivitis patients groups, we found blood group A (34.8 %) has higher incidence in a healthy periodontium subject ( group I) followed by blood group B (32.2 %), O (22.6 %) and AB (10.4%).

In patients with gingivitis (group II), also a blood group A(34.2%) showed higher incidence, followed by blood group B(28.1%), O(27.2%) and AB(10.5%). Periodontitis (group III) has a higher incidence in blood group O patients (34.1%) followed by blood group A (27.6%), B (25.3%) and AB(12.9%) blood groups. Table (2), Fig.(3)

There is more predominance of subjects with Rh positive group 91% than those with Rh negative group 9% and the prevalence of gingivitis was higher in Rh positive group 43.1%, while periodontitis show higher prevalence in Rh negative group 40%. Table (3), Fig.(4).

## Discussion:

In this study Chi-square was used to compare between the study groups, which showed significant difference between healthy and periodontal disease as shown in Table(2). Periodontal diseases found to be an ecogenetic disease, that reflect their multifactorial background. The presence of microorganisms is a crucial factor in inflammatory periodontal disease, the progression of disease is also related to host-based risk factors <sup>(21,22)</sup>.The ABO blood group system is the most explored erythrocyte antigen system, and because of the ease of recognizing their phenotypes, they have been involved as genetic markers in their association studies with different diseases <sup>(22)</sup>.The Periodontal diseases recognized as a host-based infection, according to host response individually, that affect the disease nature

susceptibility <sup>(23,24)</sup>. ABO blood types are known to exhibit variations according to race in terms of their proportion. The O blood type has been confirmed to be most common in Canadian and American subjects, A blood group type in Eskimos and B type of blood group in Indian and Chinese subjects <sup>(24)</sup>. In our study the A blood group was most commonly type found (32%), followed by blood group O (29%), A (28%) and AB (11%). As in Fig.(2).

We found also that the periodontal diseases reveals aproportional variations between races in their distribution. The question developed wether blood subgroups distribution; is effective with respect to the periodontal disease; distribution in different communities. Scanty literature is available to conclude the association between ABO blood groups and the occurrence of periodontal diseases <sup>(23)</sup>.The first study by Weber and Pastern show the association of periodontal diseases with various ABO blood groups <sup>(25)</sup>. In our study, the highest prevalence of periodontitis are among blood group O (34.1%), followed by A, B and AB blood group sample respectively, while higher gingivitis percentage are associated with blood group A (34.2%). The lowest prevalence of periodontitis 12.9% and gingivitis 10.5% are associated with Ab blood group samples Table (2), Fig.(3) In a Contrary to our finding , Kaslick et. al. (1971) found that, blood group B is highly related with aggressive periodontitis , but it is significantly less with O blood group <sup>(26)</sup>.A study by Al-Ghamdi (2009); found a significant different among individual without or with a periodontal diseases; regarding blood groups type <sup>(27)</sup>. Similarly Arati et. al. (2010); in a study on 1220 subjects found that; A Blood type reveald significantly high percentage in the patient group of gingivitis , and the O blood type reveald high percentage in the patients group of periodontitis While AB blood type; reveald the least percentage of periodontal diseases <sup>(28)</sup>.

The result in our study disagree with astudy conducted by Sulafa K.Banoosh 2018, who stated that there were no

significant differences in Gingival Index (GI) among blood groups <sup>(29)</sup>. The distribution of Rh factor in the present study subjects showed a significantly higher percentage of Rh-positive than Rh-negative factor table (3). Periodontal parameters were significantly better in Rh positive group than Rh negative group, we disagree with Similar findings that reported by Arati et al 2010 and Turgut et al 2007 whom concluded that there were no significant differences in the periodontal parameters between (Rh - ve) and (Rh +ve) groups <sup>(28,30)</sup>.

**Conclusion:**

We concluded that there was significant relationship between ABO , Rh blood group system and periodontal disease. Patients with blood group ‘A’ may be

factor of risk for gingivitis. Blood group ‘O’ could be a factor of risk for periodontitis. Similarly Rh positive factor group is considered a risk factor for gingivitis, and Rh negative group is a risk factor for periodontitis.

**Suggestion:**

Larger sample size study is needed in order to make more comprehensive assessment for the ABO blood groups effect on periodontal diseases. In order to validate and examine the biological plausibility of the link between the ABO and Rh blood group system and periodontal disease, more multicenter collaboration research involving large demographic groups are needed to explore the genetic basis.

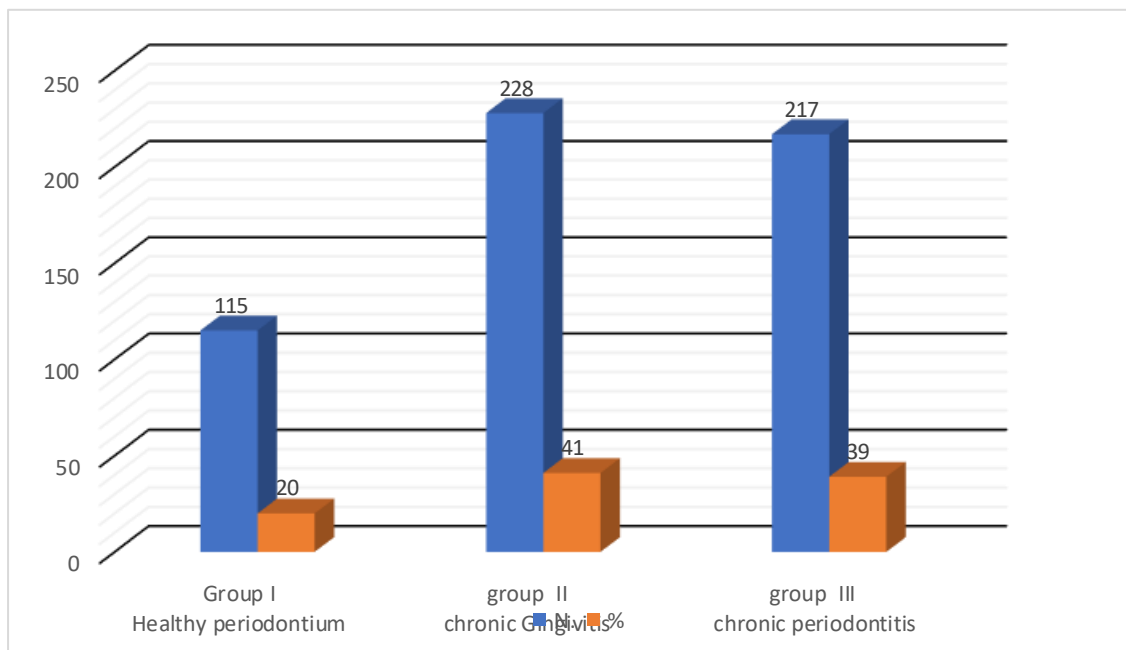


Fig.(1): Percentage distribution of subjects samples according to the clinical condition and periodontal scores

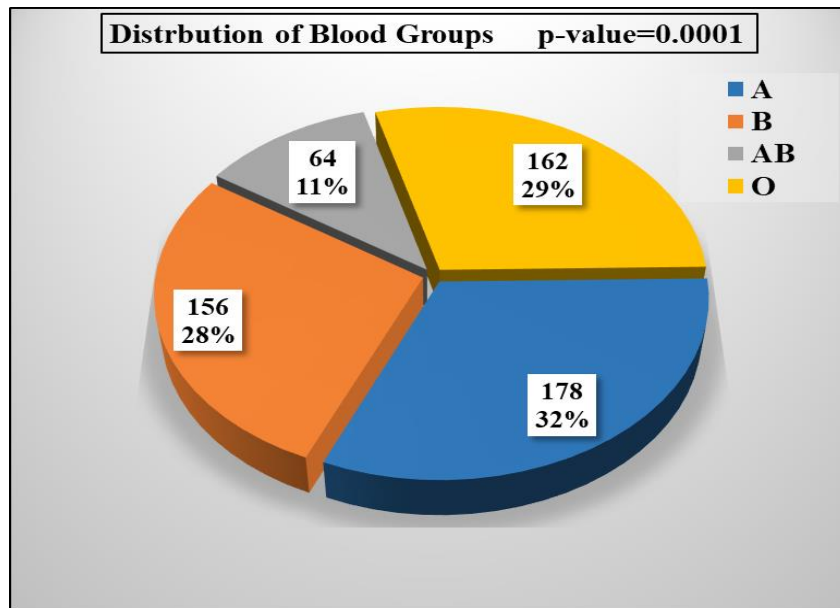


Fig.(2): blood group distribution in the sample groups

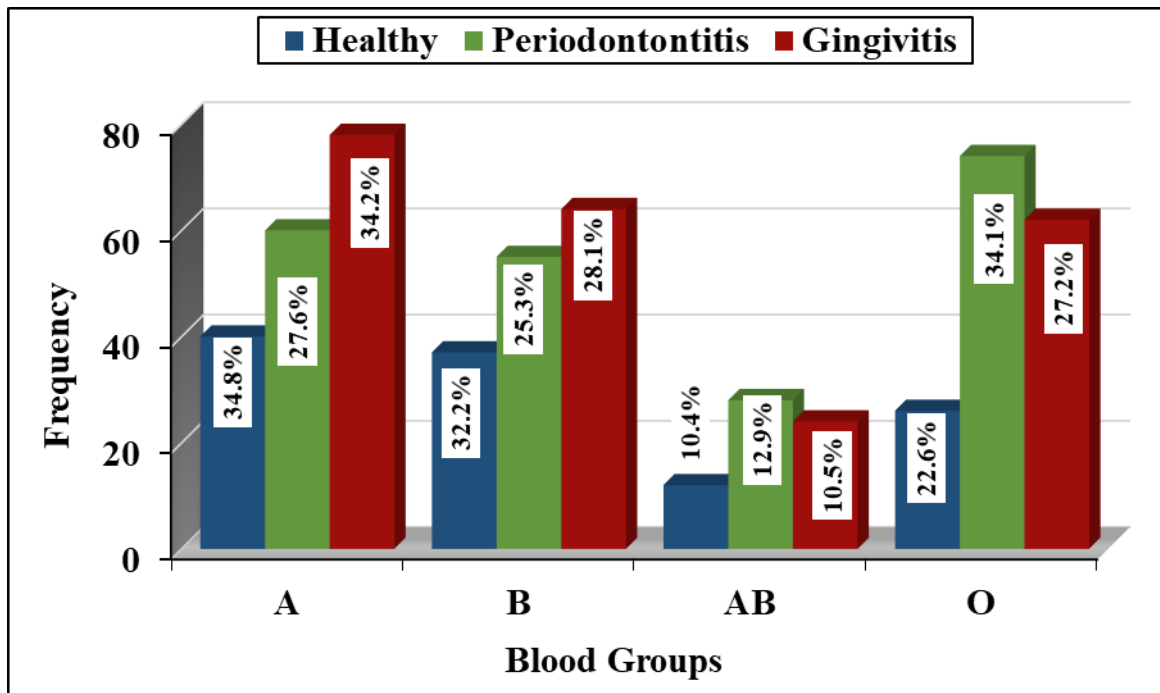


Fig.(3): Bar-chart presenting the distribution of blood groups among healthy, periodontitis and gingivitis.

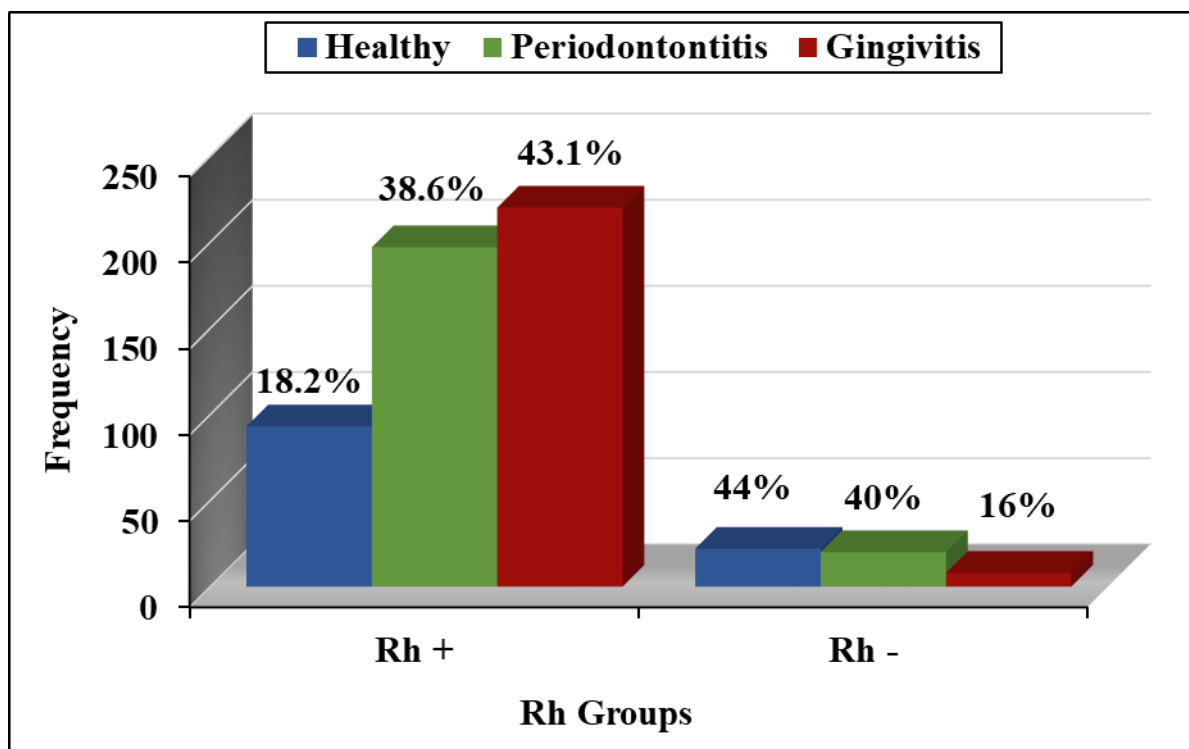


Fig.(4): Bar chart Distribution of Rhesus factor between the study groups.

Table (1): Percentage distribution of subjects samples according to periodontal scores and the clinical condition.

Subjects		Group (I) Healthy periodontium		Group (II) Chronic Gingivitis		Group (III) Chronic periodontitis	
N.	%	N.	%	N.	%	N.	%
560	100%	115	20%	228	41%	217	39%

Table(2): Distribution of ABO blood groups among Healthy ,Periodontitis and Gingivitis patients groups.

Patient (groups)	Group (I) Healthy periodontium		Group (II) Gingivitis		Group (III) Periodontitis		Total		Chi-Square	p-value
	N	%	N	%	N	%	N	%		
A	40	34.8%	78 <sup>a</sup>	34.2%	60 <sup>a</sup>	27.6%	178	31.8%	12.180	0.002
B	37	32.2%	64 <sup>a</sup>	28.1%	55 <sup>a</sup>	25.3%	156	27.9%	7.269	0.026
AB	12	10.4%	24 <sup>ab</sup>	10.5%	28 <sup>a</sup>	12.9%	64	11.4%	6.500	0.039
O	26	22.6%	62 <sup>ab</sup>	27.2%	74 <sup>a</sup>	34.1%	162	28.9%	23.111	0.0001
Total	115	100%	228	100%	217	100%	560	100%		

a Significant difference between Healthy and Patient groups at p-value <0. 05

b Significant difference between (Periodontitis and Gingivitis) groups at p-value <0. 05.

Table (3): Distribution of Rhesus factor in the study groups.

Rhesus factor	Healthy		Gingivitis		Periodontitis		Total		Chi-Square	p-value
	N	%	N	%	N	%	N	%		
<b>Rh +</b>	93	18.2%	220	43.1%	197	38.6%	510	91%	55.141	0.0001
<b>Rh -</b>	22	44.0%	8	16.0%	20	40.0%	50	9 %	6.880	0.032
<b>Total</b>	115	20.5%	228	40.7%	217	38.7%	560	100%		

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