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## The Correlation Between ABO Blood Group and Rhesus Factor in Patients with Periodontal Diseases: Review Subject

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### Abstract

Periodontal diseases can be defined as a wide range inflammatory condition due to the infection with pathogenic bacteria grow in oral cavity affecting the supporting structure of the teeth. Local plus systemic conditions are affected the initiating and progressing of periodontal infections. Blood groups and Rh factor may play important role in periodontal illness. The aim of present study was to find if there are relation between ABO blood groups and Rhesus factor with periodontal status and if they are possible risk factors or not according to many studies that were done throughout the world.

## Introduction

The periodontium is the supportive apparatus around a tooth, including gums (gingiva), cementum, alveolar bone and periodontal ligament. When inflamed called gingivitis in early stage whereas the more serious form called periodontitis (1). Gingivitis is the inflammation due to the

precipitation of bacteria and debris between line of gingiva and tooth, account for up to 90% of cases (1). While the periodontitis is an inflammatory condition of the supporting elements of the tissues of teeth due to specific organisms, causing progression and destruction of ligament of

the periodontium as well as alveolar bone with raising formation of probing depth and recession or both (2). Consequence interaction of local factors (dynamically & multiplex) of immune-mediated host responses and factors can lead to periodontitis like smoking, poor plaque control and unstable diabetes.(3)

### **Classification of periodontitis**

Previously periodontitis were classified in to gingivitis, chronic periodontitis and aggressive periodontitis. But this classification now change to new one which contain four different stages from stage I to more sever stage IV in order to distinguish between severity, complexity , extent and distribution of periodontitis (4,5)

Stage I (mild disease): 1-2 mm clinical attachment loss (CAL) with probing depth 4 mm or less, radiographic show horizontal bone loss  $\leq 15$  percent, and will not need for surgical treatment in addition is not expect for tooth loss after compete the treatment which indicates a good maintenance care (5,6)

Stage II (moderate disease): CAL is about 3-4 mm, probing depth less than 5 mm, radiographic evidences shows 15-33 horizontal bone loss so it will need either to non-surgical or surgical treatment. In this evidence it is expected there is not tooth loss post-treatment which indicates that patient has a good prognosis into maintenance (4,5,6)

Stage III (severe form disease): in which the CAL shows more than 5mm with depth of probing equal or more than 6 m as well as the radiography evidences show vertical and/or horizontal beyond 33% bone loss and it may have furcation involvement of Class II or III.

Tooth loss may be 4 teeth or less .This will require surgical or may be regenerative treatments. Stage IV (very severe form of disease): It includes all features of stage III associated with remaining of less than 20 teeth and there may be a potential for losing of five or more teeth (4,5,6). The patient will require complex treatment due to secondary occlusal trauma, masticatory dysfunction, bite collapse as well as severe ridge defects as well as in addition to pathologic teeth migration (5,6)

Etiological risk factors for periodontal disease is multifactorial which divided into modifiable and non-modifiable (7)

### **The modifiable risk factors**

These factors can be improvable or changeable which may cause decreasing the protective response of the host and these factors are:-

#### **1- Tobacco Smoking**

There is a strong associated of periodontal development and smoking. Attachment tissue loss and alveolar bone loss were raising in smokers. However, low gingival bleeding associated with lower plaque indexes can be seen in smokers (7)

#### **2- Diabetes mellitus**

There are several pathologic processes enhance periodontal breakdown associated with DM including impaired process of wound healing. (1)

#### **3- Microorganisms and periodontal disease**

Three microorganisms are so important with development of periodontal disease they include (porphyromonas gingivalis, Bacteroides and Actinobacillus actinomycetecomitans) (7). At the first formation bacterial biofilm will initiate gingival inflammation; however the development of periodontitis and it progress will depend on response to the inflammation of gingival tissue, breakdown of the tissue due to the anti-microbial mechanism response that attempt to contain the reaction inside the gingival sulcus (8)

#### **4- Socio-economic status**

Low socioeconomic peoples are at a high risk of developing periodontal diseases. (7)

#### **5- Psychological factors and stress**

There is a hypothesis of an elevated risk for destructive periodontal disease because of psychological distortion. (7)

#### **6- Diet**

Nutrients effect the growth, metabolic activities and development of the periodontium. (7)

#### **7- Poor self-care**

Improper oral hygiene resulting in bacteria build-up and plaque forming on the teeth, which lead to gingivitis and periodontitis. (1)

### **8- Pregnancy**

The fluctuations in hormone concentrations during pregnancy are promote an inflammatory response that is connected to periodontitis and gingivitis. (1)

### **9- Medication**

Several drugs can cause different side effects when used. The most common drugs are phenytoin, cyclosporine, tetracycline and calcium-blockers which are related to gingival disease like gingival overgrowth. (9)

### **The unmodifiable risk factors**

#### **1- Aging**

Older patients have been recorded more severe inflammatory response to deposition of plaque. The clinical attachment loss (CAL) elevate in age over 60 to 90. (1)

#### **2- Genetic factors**

Many studies reported 50% of the susceptibility to periodontal disease is due to Interleukin-1(IL-1). (7)

#### **3- Osteoporosis**

Alveolar bone density loss is influence in osteoporotic peoples. (7)

#### **4- Gender**

Periodontitis reported high in male (~57%) as compared to female (~39%). (10)

#### **5- Systemic diseases**

The deficiencies of neutrophil function as in Down syndrome may has a role in development of periodontal disease. (7)

### **ABO blood and Rh group system**

Various blood grouping systems were found but the most used one around the world is blood grouping (ABO). This system was discovered in 1900 by Landsteiner and Weiner. They reported three different blood types which they are (A), (B) and (O). Later in 1902, Alfred Von DE Castello and Adrian Sturli found the fourth type (AB) and on 1940 both of Landsteiner and Weiner recorded Rh (D) antigen. (11, 12)

Rh group system is one of human blood group systems. It consist of 49 defined group antigens and the most important are D, C, c, E and e (13)

All human beings sharing similar ABO and Rhesus factor but they are differ in their distributions and frequencies according of specific subtypes due to races, ethnics, and socio-economic status. (12, 13)

### **ABO and Rh in periodontal diseases**

Many researches throughout the world try to investigate possible correlation between ABO and systemic conditions. (14, 15, 16, 17, 18) A lot of discrepancies were obtained from several previously studies about the relation ABO with periodontal diseases that may has importance in developing of early strategies in treatment and it may helpful in identification the reason of non-responding to periodontal therapy in susceptible individuals.

A report of 684 subjects done by Patil Anup and his team in India reported an increased predominance of healthy periodontium with 'B' blood group while gingivitis was elevated in A blood group and periodontitis in O blood group. Also, there is more predominance in Rh positive group than Rh negative. (19) Koregol et al, showed the same result about blood group but they did not find a relation between Rh-factor and periodontal diseases. (20)

In contrast, work included 1009 subjects, their ages between 20-65 years, showed that the presence of gingivitis was higher in subjects with A blood group while periodontitis had higher prevalence in blood group type (O). In addition Rhesus factor seem to have an important role in an incidence of both periodontitis and gingivitis. The response level to scaling and root planning doesn't differ among patients basedon their blood groups. (21)

Kaslick et al, documented a correlation between the severe periodontitis form and ABO blood groups. The researcher and his team reported a high prevalence of this severe form in individual with B blood group while it was lowering in O blood group. (22)

Patel and colleagues showed that the developing of periodontitis was higher in patients with blood group B and O and those who are Rh positive . (23) However, Francis et al, reported a no significant relation was found between ABO , Rh factor and periodontal diseases (24). In

2017, Al-Askar collected databases from 1977 to 2016, using ABO blood groups, dental health, risk factors, gingivitis, periodontitis and Rhesus factor as searching terms and he found a difference according to geographical diversity. (25) In a cross sectional study included 1126 individuals was done Riyadh, Saudi Arabia found that O blood group are more risk to development of generalized chronic periodontitis (GCP) than the other types of blood group.(26)

In Baghdad, a study included 150 participants were enrolled in 2018, described the percent of each blood groups within healthy periodontium, gingivitis and periodontitis. It found that both of gingivitis and periodontitis are have high prevalence with (O) blood group. Whereas the (B) blood group in a high percent in healthy periodontium. (27) . Also in Baghdad but in 2021 the researchers described the distribution of periodontitis with different ABO blood group and they found blood group O was more associated with development of periodontal disease followed by B, A, AB respectively (28).

Another study in Najaf, enrolled 129 subjects, reported incidence of gingivitis was higher in patients with blood group (O) and Rh positive. (29) In Duhok, a study carried on 303 patients, found that there was not significantly different of ABO blood groups, and Rh factor with the presence of periodontal illnesses. (30)

#### **ABO blood groups antigens in periodontal disease**

The ABO system antigens are represent an integral portion of the membrane of the RBC. They are locate in several body fluids of the body like plasma. Immunohistochemical studies recorded the present of A/B antigens on spinous cells in epithelium of the non-keratinized oral tissue of patients with A and B blood groups. While the basal cells can express precursor structures and the more-

differentiated spinous cells can express the A or B antigens. The blood group (O) does not had the A and B gene-coded glycosyltransferase, they can express a fucosylated variant (Ley) of the precursor part. (31)

The secretion of ABO antigens blood groups in the saliva may block the ability of different microorganisms to adhere to the surface of the teeth. These organisms have surface lectins, which are used to adhere to the surface. The genetic factors may also alter the oral ecology such as genetic dissimilarities in response to the immune system and antigens presentation may indicating the susceptibility to develop periodontal illnesses. (32)

#### **Conclusion:**

ABO patterns and Rh systems distribution are complex throughout the world also within one country there are variations in different areas. Some studies found there was relationship between ABO blood group and periodontitis. In contrast different other studies reported no associations between periodontal illnesses and ABO groups. Other studies found that periodontitis is common with (O) blood group rather than other groups. Regarding Rh factor, most periodontal diseases found to be associated with Rh- Positive. That diversity may be due geographic variation or differences in population groups

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