

Association of ABO Blood Grouping and Periodontal Disease: A Literature Review

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Abstract

Although the correlation between the ABO blood group and certain systematic diseases is a well-documented fact. Few studies have explored the relationship of ABO with oral disorders including periodontal diseases (PD). This literature review aimed to assess the possible association between ABO blood grouping and PD. For this purpose, we searched online databases like PubMed and google scholar with the following terms in different combinations PD, ABO blood groups, gingivitis, the prevalence of periodontitis, aggressive periodontitis, risk factors of periodontitis, Association of PD and ABO, ABO Rh factor. English version papers describing the Oral health status are covered through research that includes clinical investigations, case studies, and retrospective studies on the subject. Historic reviews, articles with unpublished data, and letters to the editors were omitted from the survey following publications. The author thoroughly checked the titles and abstracts of the papers. The complete text was thoroughly assessed, and the relevant articles were analyzed in accordance with qualifying criteria. For further original and review research, references were further reviewed. Since our targeted subject was answered by a restricted number of original research. We identified fourteen articles describing the association of ABO blood types with PD. findings of our study concluded the genetic basis of the association of ABO blood types for the development of PD. six of the research provided here showed that the blood type O can serve as a prognostic factor for the development of PD. ABO blood types and Rhesus factors can be a risk predictors in the development of PD.

Keywords

- ▶ periodontal disease
- ▶ PD
- ▶ gingivitis
- ▶ ABO blood groups
- ▶ aggressive periodontitis

Introduction

Periodontal disease (PD) is a broad term that refers to many chronic inflammatory conditions affecting the gingiva bone and ligament that supports the teeth. It includes alveolar bone inflammation, gingiva, and periodontal ligaments.¹

Primarily, bacterial infection is the main cause of PD, which results in localized gingival inflammation produced by bacteria in dental plaque, a microbial biofilm that accumulates on the teeth and gingiva. When left untreated, PD can result in the deterioration of the structure around the teeth.²

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The untreated gingivitis proceeds to the loss of gingiva, bone, and ligament, chronic periodontitis (CP) develops, resulting in the deep periodontal pockets that are a characteristic of the illness and can eventually lead to tooth loss. PD may have a role in the body's total inflammatory load, and this might potentially worsen other conditions such as diabetes mellitus and atherosclerosis.³⁻⁵

Findings concerning epidemiological studies that apply continuous assessments of probing depth and clinical attachment loss have discovered that 10–15% of the worldwide population is plagued by advanced forms of periodontitis.⁶ Both severe aggressive periodontitis (AP) and severe CP are included in this predicted prevalence range.^{7,8} The number of bacteria in plaque does not appear to be highly correlated with the severity of PD, and some studies have postulated that hereditary influences may play a role.⁷⁻⁹

It was Karl Landsteiner who originally credited the ABO method in 1900. Blood type is based on the presence or absence of A and B surface antigens. According to the blood group classification, blood type is divided into groups A, B, O, and AB, each representing the presence or absence of different types of antigens red blood cells (RBCs).¹⁰ Additionally, our understanding of blood groups has expanded to include not just transfusion-related difficulties but also the possibility of an individual developing a specific disease due to RBC surface antigens. Another notable example is that individuals who belong to the group A blood type have been associated with an increased risk of gallstones, ulcerative colitis, and some types of tumor,¹¹ whereas the other blood group has been associated with certain cardiac disorders, including ischemic heart disease and atherosclerosis.¹²⁻¹⁵ Only a few researchers have studied the possible relationship of ABO with oral disorders notably PD.^{1,16,17} The purpose of the present literature review was to find out if there is any association between the ABO blood type and PD, and what processes may be responsible for the association.

Materials and Methods

The primary goal of this review was to see if there was any possible association between PD and ABO blood type. Several online databases, including Google scholar, PubMed/MEDLINE, and SciHub, were used to address this query. The desired articles found in the database were searched from 1975 to 2017 using a variety of combinations of the words listed as PD, ABO blood groups, gingivitis, the prevalence of periodontitis, AP, risk factors of periodontitis, association of PD, and ABO, ABO Rh factor. English version papers describing the oral health status were covered through research that included clinical investigations, case studies, and retrospective studies on the subject. Historic reviews, articles with unpublished data, and letters to the editors were omitted from the survey following publications.

The author thoroughly checked the titles and abstracts of the papers. For further original and review research, complete texts were thoroughly assessed, and the relevant articles were analyzed as per qualifying criteria. Reference lists were software reviewed. Since the targeted subject was

answered by a restricted number of original research, this review was designed to synthesize the appropriate information.

Results

Fourteen research have been retrieved from the online literature. The key elements of each study are summarized in **Table 1**.

Relationship of ABO with the Incidence of Aggressive Periodontitis

However, despite AP is frequently found in healthy individuals,¹⁸ a few studies have indicated that it has been linked to numerous hereditary disorders. A compromised immune response weakened by disease on the host is a critical risk factor in the development of severe types of periodontitis.¹⁹ Some systemic diseases can affect the host immune system and are typically linked to destructive PD.¹⁹ It has been speculated that human leukocyte antigen HLA A9 and/or B15 is a potential marker for AP. The risk of AP was 1.5 to 3.5 times higher comparing those who do not carry HLA antibodies.²⁰

In this review, five of the papers studied the association of the AP and ABO blood types, which analyzed an improved incidence of AP in B blood group,²¹ while in blood group O there was a decreased incidence of AP. A study, association of ABO with juvenile periodontitis (JP) in 40 adolescents in Nigeria,²² observed that all 20 patients with JP had Rhesus positive blood group B or AB. The remaining sample of non-JP shows Rh-negative of B, O, or AB blood groups. Another paper of 45 individuals discovered that 15 of the patients had AP that was most usually detected in patients with AB blood type (60%) or O blood type (40%).²¹ Correspondingly, patients with periodontitis showed the highest ratio (57.14%) in blood group AB among the total subjects of 100.²³ According to a reported study,¹⁶ more than 46.7% of the samples were affected having blood group A. A study showed a relatively high percentage of blood group B (20.97%) in AP patients.²⁴ Findings from the studies suggest that there is a possible genetic reason for the association of PD with ABO blood groups; however, from the small sample size of the study, it is not harder to conclude conclusively about the relationship of this link

Relationship of ABO with the Incidence of Chronic Periodontitis

Few studies identified the association of the ABO blood group and the occurrence of CP, while other studies were unable to find such association.^{1,16,17} These differences across research were believed to be caused by the geographic diversity among people. Four of our studied papers in this review²⁵⁻²⁸ acknowledged the link between O blood group and periodontitis, whereas three pieces of research²⁹ identified a link between blood group B and periodontitis.³⁰

The 61-kD bacterial adhesion protein is a key receptor for the blood type antigen H, which results in the increased sensitivity of blood group O to peptic ulcers.³¹ For B and A

Table 1 Studies on the relationship of aggressive or chronic periodontitis with ABO blood types

Aggressive periodontitis						
Author	Title	Year of publication	Location	Types of study	Subjects	Prominent blood group
Jain et al ²³	Blood groups: a probable link to periodontal diseases	2017	India	Cross-sectional study	100	B
Ramamoorthy et al ²⁴	Relationship between periodontal disease and ABO blood group phenotypes—a cross-sectional retrospective study	2015	India	Cross-sectional study	410	B
Eid ¹⁶	Effects of rhesus factor (Rh) and blood group type on gingival health status	2014	Egypt	Cross-sectional study	400	A
Kundu et al ²⁶	Aggressive periodontitis: a clinicohematological appraisal	2014	India	Cross-sectional study	45	AB
Arowojolu et al ²²	The relationship between juvenile and non-juvenile periodontitis, ABO blood groups, and hemoglobin types	2002	Nigeria	Cross-sectional study	40	B/AB
Kaslick et al ²¹	Investigation of periodontitis with periodontitis: literature survey and findings based on ABO blood groups	1971	USA	Cross-sectional study	11	B
Chronic periodontitis						
Demir et al ²⁵	The effect of ABO blood types on periodontal status	2007	Turkey	Cross-sectional study	1351	O
Mortazavi et al ³²	Is ABO blood group a possible risk factor for periodontal disease	2015	Iran	Systematic review	146	O
Humagain and Rokaya ¹⁷	Evaluation of the association between the prevalence and severity of periodontal diseases and ABO blood groups among Nepalese adults	2014	Nepal	Research study	553	A
Koregol et al ²⁷	ABO blood groups and Rhesus factor: an exploring link to periodontal diseases	2010	India	Cross-sectional study	1220	O
Vivek et al ²⁸	Association of ABO blood group and Rh factor with periodontal disease in a population of Virajpet, Karnataka: a cross-sectional study	2013	India	Cross-sectional study	220	O
Kundu et al ²⁶	Aggressive periodontitis: a clinicohematological appraisal	2014	India	Cross-sectional study	45	O
Pai et al ²⁹	Correlation between "ABO" blood group phenotypes and periodontal disease: prevalence in South Kanaradistrict, Karnataka state, India	2012	India	Cross-sectional study	750	B
Pradhan et al ³⁰	The relationship between periodontal disease and blood groups and secretor status	1971	India	Cross-sectional study	800	Not detected

antigens to be produced, an H antigen is a precursor for them. The precursor H antigen in persons belonging to A and B antigens (antigens belonging to A and B) is covered up to A and B antigens, whereas in the blood group O persons, it is left unexpanded. That results in the largest quantity of H antigen seen in persons with blood type O. Hence, persons with blood group O have a higher level of H antigen in their gingival tissues; these issues may be involved in the receptor process for gram-negative species.^{31,32} Expression of blood type antigens also depends on keratinized and unkeratinized epithelial differentiating patterns. Keratinized squamous epithelia occasionally express antigen A or B, while precursor H-antigen is mostly expressed by the spinal cells. Maximum spinous expressing cells are antigen A and B compared with precursor H in a nonkeratinized epithelium, including the mouth mucosa. A/B transferases and their substrates in oral tissues determine the expression of A/B antigens.^{17,33}

Future Perspective

This review showed that six of the researches provided here showed that the blood type O can serve as a prognostic factor for the development of PD. However, we propose the adoption of a multicentric collaborative study in the future that would encompass a diverse range of populations and ethnicities and determine whether there is any genetic linkage on a molecular level. Investigations of the interactions between the RBC surface antigens and gingival epithelial cells with new technology may give new insight into the relationship between ABO blood types and PD. Anecdotal evidence suggesting a probable association between blood types and PD might be confirmed by using an animal's model for the ABO gene. According to the research findings from this literature review, this link has yet to be thoroughly examined.

Conclusion

From the findings of this review, it can be concluded that the ABO blood types and Rhesus factor can be a risk factor for the development of PD. The outcomes of the review reveal a possible connection between the ABO blood group and periodontitis. The generated data can be utilized as a steppingstone to narrow the study and target the most sensitive individuals, and then to concentrate on devising specific treatment plans for those patients.

Conflict of Interest

None.

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