Relationship between ABO blood group and aggressive periodontitis among male students aged 12-18 years in Kermanshah schools, Iran

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Abstract

Periodontal diseases are among the most common diseases in all communities and along with dental carries, comprise a substantial portion of cases with tooth loss. This study was performed to determine the relationship between ABO blood group and aggressive periodontitis among male students aged 12-18 years in Kermanshah schools, Iran. In this cross-sectional analytic study, 1,872 male students aged 12-18 years in the city of Kermanshah, Iran were studied. The checklist used for gathering the required data consisted of three sections including demographic data, ABO blood group, and findings of dental examination. The data were analyzed by the SPSS software using the chi-squared test. There was significant relationship between ABO blood group and aggressive periodontitis ($p<0.05$). The ABO blood groups AB, B, and O in order had the most significant relationships with aggressive periodontitis. The results showed that ABO blood group has relationship with aggressive periodontitis. This relationship was most prominent with blood group A. We suggest screening of patients with high risk blood groups and implementing specific preventive measures in these patients.

Keywords: periodontal disease; blood group; student

Introduction

Periodontal diseases are among the most common diseases in all communities and along with dental carries are considered the main causes of tooth loss (Newman Michael et al., 2006; Saebi and Dowlatshahi, 2007). Periodontal diseases are those that affect the supporting tissues of the teeth such as the gingiva, ligament fibers, bone and bony tissues around the teeth. This disease affects the gingiva and cause gingival inflammation and then with involving the supporting fibers and bone, the tooth becomes loose and finally the tooth is lost (Page and Schroeder, 1976). Aggressive periodontitis (AGP) which formerly called periodontosis, juvenile periodontitis, or early-onset periodontitis (Nibali et al., 2013) is a familial condition which involves a group of progressing periodontitis. This form of periodontitis has a lower prevalence compared to other forms of periodontitis but has a more severe and aggressive presentation. This disease...
presents itself in younger ages and firstly presents itself with local involvement of the molars and incisors (Shaddox et al., 2012). The prevalence of AGP during teenage group is different and reported as 0.6% (Ereş et al., 2009) to 9.9% (Corraini et al., 2009). Sadeghi (2010) studied 15-18 years age group of Tehran students and reported the frequency of AGP as 0.13%.

The dominant etiology of most periodontal diseases are bacteria, but studies show that genetic factors also have a major role in periodontal diseases and possibly a major contributor to different prevalence rates of this condition among various nations. The study of de Carvalho et al. (2009) showed that genetic factors contribute to the development of AGP and some chromosomal locations can independently or in interaction with environmental factors affect the occurrence of this condition. In addition, Rapp et al. study (2011) and Ernst et al. study (2010) showed that genetic factors play in development of AGP and some families are susceptible to this condition (Ernst et al., 2010; Rapp et al., 2011). Another factor which can play a role in progression of periodontal diseases is blood group. ABO blood groups are used in blood transfusion and forensic medicine. Various studies have demonstrated the relationship between ABO blood group and development of some diseases (Jaff, 2010). Some patients with particular ABO blood groups are more susceptible to some systemic diseases. Yuzhalin and Kutikhin (2012) reported that AB blood group and O blood group had respectively the most and the least significant relationship with ovarian cancer (Yuzhalin and Kutikhin, 2012). Other studies have investigated the relationship between blood groups with osteoporosis (Lu and Li, 2011), coronary heart diseases (Biswa et al., 2013) some infectious diseases such as H. pylori infection and related gastrointestinal diseases (Jaff, 2011), and infection with Norwalk virus (Hutson et al., 2002). Although there are several studies about the relationship between ABO blood groups and systemic disorders, limited research studies have investigated the relationship between blood group and periodontal diseases. In addition, there are controversies among these limited reports in the literature. Some studies have advocated that some specific blood groups raise the risk of periodontal diseases (Demir et al., 2007; Pai et al., 2012).

For instance, in a culture media, rate of bacterial growth of bacteria that cause periodontal diseases is different among various blood groups (Demir et al., 2009). In contrast, no significant relationship between blood group and periodontal diseases was observed in Frias and Lopes study (Frias and Lopez, 1994). In addition, Vahbi and Aslani (2013) in their study on pregnant women reported that the presence of A or B antigens has no relationship with gingival inflammation or periodontal diseases. Therefore, with respect to limited studies regarding the relationship between blood groups and periodontal diseases and some controversies among various studies, this study was carried out with the objective of studying the relationship between blood group and periodontal diseases among male students aged 12018 years in the city of Kermanshah, Iran.

Materials and Methods

In this cross-sectional analytic study, the study population consisted of all male students aged 12-18 years
(first and second periods of high school) studying at schools of the city of Kermanshah in the academic years 2013-14. The sample size, according to the Cochran formula with considering random error of 5 and the population of 36,000 students, was calculated as 1,872 students. This sample was recruited by using systematic randomized cluster sampling method. Inclusion criteria were age range of 12 to 18 years and having good overall health. Exclusion criteria were having systemic disorders (diabetes mellitus, epilepsy, leukemia, coagulopathies), chronic periodontitis, taking medicines which an affect periodontal tissues (phenytoin, dilantin, nifedipine, cyclosporine), receiving treatments for periodontal diseases during the preceding three months, and receiving antibiotics for dental or other indications during the last 3 months. For all selected students, a written informed consent was prepared and was provided to them by the schools authorities. For sampling, a list with the names of all schools (first and second periods of high school) with the number of students at these schools were prepared by the Kermanshah Education office. Then, by contacting with schools and presence of the research team, the sample was selected and a three-section checklist consisting demographic data, blood group, and dental examination was completed for them. The blood group of the students was recorded in their Health Record. Also, cigarette smoking in their parents and loss teeth in the family members were documented. Periodontal examination, which was conducted at health room of the schools included measuring probing depth (PD) and gingival margin level (GML). Probing depth was determined by measuring the distance from the gingival margin to the base of the pocket or gingival sulcus depth. GML was determined by measuring gingival margin to CEJ (cemento-enamel junction). PD and GML were determined in six areas for each tooth (mesiobuccal, buccal, distobuccal, mesiolingual/palatal, palatal/lingual, and distopalatal/lingual) using periodontal probe. According to these measurements, the clinical attachment loss (CAL) was determined as follows:

A. Gingival recession (gingival margin apical to CEJ): Cal equal to sum of the PD and GML
B. CEJ covering by the gingiva (gingival margin coronal to CEJ): Cal equal to the difference between PD and GML
C. Normal gingival margin (gingival margin a little coronal to CEJ): Cal equal to the PD. AGP was defined as having at least two teeth with CAL of equal to or greater than 4 mm and at least one of the teeth was the first molar or incisor (Cho et al., 2011). Otherwise, the student was considered as not having AGP. The gathered data were analyzed by the SPSS software for Windows. The Chi-squared test was used to compare the frequency of blood groups, Rh status, and background variables between those with AGP and without AGP. The significance level was set at 0.05.

Results

Of the 1,821 studied students, 21 students had AGP (1%). Mean age of the sample was and mean age of those with AGP was 15.14 (±1.49) years (age range of 12-17 years). The most common tooth with the PD of more than 4 mm was the first permanent molar. The most frequent involved levels were mesiolongual, mesiobuccal, distolinguinal, and distobuccal levels. Regarding the blood
group, most of the students with AGP had blood group A (10 patients, 47.6%). The least frequent blood group was OO (9.5%). There were 20 students with AGP whose Rh status was positive (95.23%) and the remainder were Rh-negative (Table 1). The results of the Chi-squared test showed that this value was, 7.381 for relationship between the blood groups and AGP ($p>0.05$). Also, a significant relationship was observed between the AGP and Rh status ($p<0.05$) Table 1. It can be stated that the AGP had the most significant association between the blood group A and Rh-positive patients. The dental health of the family members of students with AGP showed that of 63 family members, 31 subjects (49.20%) had tooth loss. The Chi-squared test did not show a significant relationship between AGP and dental health of the family members ($p>0.05$) (Table 2).

**Table 1. Blood group distribution and Rh status and the results of the Chi-squared test in students with aggressive periodontitis**

<table>
<thead>
<tr>
<th>Blood groups</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Chi-square</th>
<th>df</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10</td>
<td>47.6%</td>
<td>7.381</td>
<td>3</td>
<td>0.041</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>14.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td>6</td>
<td>28.6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OO</td>
<td>2</td>
<td>9.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rh status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>20</td>
<td>90.5%</td>
<td>13.762</td>
<td>2</td>
<td>0.001</td>
</tr>
<tr>
<td>Negative</td>
<td>1</td>
<td>9.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2. The Cho-square results regarding dental health and smoking status of the parents of students with aggressive periodontitis**

<table>
<thead>
<tr>
<th>Dental health of family members</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Chi-square</th>
<th>Df</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost teeth</td>
<td>31</td>
<td>49.2</td>
<td>7.23</td>
<td>10</td>
<td>0.333</td>
</tr>
<tr>
<td>No lost teeth</td>
<td>32</td>
<td>50.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking by parents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoker</td>
<td>8</td>
<td>19.04</td>
<td>6.54</td>
<td>8</td>
<td>0.103</td>
</tr>
<tr>
<td>Non-smoker</td>
<td>34</td>
<td>80.96</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Also, eight parents of students with AGP were smokers. No significant relationship was observed between smoking status of the parents with the presence of AGP ($p>0.05$); (Table 2).
Discussion

The design and implementation of prevalence studies for comprehensive programs and preventive purposes have always been important. Correct knowledge regarding the prevalence of a particular health condition enable proper programming for prevention and control of that disease. Some studies have suggested that periodontal diseases are more common in women. However, there is debate that this finding may not be true in real practice as women are more likely to present to dentists to follow their dental health and may falsely increase the rate of periodontal disease in this gender. The results of the presented study with the objective of investigating the relationship between blood group status and AGP showed that this condition had a prevalence of 1% among male students aged 12-18 years (21 students). This condition has been reported less than 1% in the US and some other developed countries (Leo and Brown, 1991; Ranney, 2000), which are close to the finding presented here. The results showed that most students with AGP had blood group A (47.6%) and then in order blood groups AB and B had the highest frequency in patients with AGP. The blood group O with a prevalence of 9.5% had the least frequent prevalence. In contrast, Vivek et al. (2009) showed that most patients with AGP had blood group O (Demir et al., 2007, 2009; Vivek et al., 2013). The study of Al-Ghamdi (2009) showed that the highest relationship was observed between severe chronic periodontitis with blood group B in adults (Al-Ghamdi et al., 2009). The results of this study showed a significant relationship between blood groups and AGP. In Demir et al. study (2007), a significant relationship existed between blood group A and periodontitis (Demir et al., 2009). Also, Al-Ghamdi et al. (2009) showed a significant relationship between blood group B and AGP. Koregol et al. (2010) reported in their studies that respectively O, B and A, B and O had significant relationship with periodontal diseases (Pai et al., 2007, 2012; Vivek et al., 2013). Considering the obtained findings and reports in the literature, it can be concluded that relationships between all blood groups and periodontal diseases exist.

The results of the present study about Rh status and AGP showed that a significant relationship existed. Most patients with AGP were Rh-positive. These are in agreement with reports made (Pai et al., 2007; Koregol et al., 2010; Pai et al., 2012). In a similar fashion, Vivek et al. (2013) showed that patients who were Rh-positive were more likely to have periodontitis. Vahbi and Aslani (2013) in a study on pregnant women revealed that those who were Rh-positive were more likely to suffer from periodontal diseases. Demir et al. (2007) reported that Rh is a risk factor for periodontal diseases. Koregol et al. (2010) reported that those who were Rh-negative were at risk of developing periodontal diseases. No significant relationship was seen here between AGP and smoker parents or the family members with lost teeth. This can be justified as genetics may play a role in development of periodontal diseases. However, more studies are prudent to elucidate this relationship.

Conclusion

The results of this study showed that periodontal disease can have a significant relationship with blood group, especially blood group A. It is also suggested that patients
with high risk blood groups undergo screening programs and specific preventive and treatment plans defined for them.

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