

# Relationship of blood groups to pemphigus: Do blood group antigens have a biological role? A Case-control study

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## INTRODUCTION

Pemphigus is clinically characterized by chronic mucocutaneous blistering that leads to severe

**Background:** ABO blood group antigens may play a role in the pathophysiology of certain diseases. Several studies have investigated the relation between blood group and autoimmune disorders. In this research, we evaluated the associations between ABO blood types and rhesus (Rh) factor in pemphigus patients.

**Methods:** In this case-control, hospital-based study, we evaluated the prevalence of blood group on 110 pemphigus patients and 126 controls. The chi-square test was used to compare qualitative variables and examine the relationship between blood groups and Rh in pemphigus patients and a control group.

**Results:** Blood group (O) was found in 46.3% (O<sup>+</sup> 38.2%) of patients with pemphigus, followed by blood type A (30.0%; A<sup>+</sup> 27.3%), and blood groups B and AB. Compared to the control group, we noted that the distribution of blood groups, with Rh ( $P=0.73$ ) or without Rh ( $P=0.52$ ), did not significantly differ.

**Conclusion:** Although some associations between blood group antigens and specific diseases have been reported in the literature, this study did not find any statistically significant relationship between blood groups and pemphigus disease.

**Keywords:** pemphigus, blood group antigens, Rh-Hr blood group system

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morbidity and increased mortality <sup>1-4</sup>. Blister formation is directly or indirectly caused by autoantibodies that bind to structural proteins of the skin or mucosa <sup>5,6</sup>. The incidence of pemphigus

disease is reported to be between 0.6 to 6.8 cases per million people annually <sup>7</sup>. The role of genetics appears to be very complicated in pemphigus disease <sup>8,9</sup>. Recently, genetic polymorphism has been identified inside the desmoglein3 gene, which has a pathogenic role in some disorders <sup>10</sup>. It seems that a person who has a genetic background affected by certain hereditary or environmental factors can possess a lower tolerance to the desmoglein antigen, and produce antibodies against it that lead to acantholysis <sup>11</sup>.

Antigens of the ABO blood group are the genes that determine the A and B phenotypes. They are located on chromosome 9 and express in a Mendelian codominant manner <sup>12</sup>. Previous studies have mentioned a relationship between blood group (A, B, O) and certain disorders <sup>13-17</sup>. For example, the association between blood group A and gastric cancer was reported 50 years ago <sup>12,18</sup>. Recently, a number of studies have mentioned the relationship between blood group and dermatologic diseases such as Behcet's disease, lichen planus, pemphigus, and psoriasis <sup>18,19</sup>. The identification of any relation between blood groups and various diseases can assist with early detection of high-risk persons, especially in diseases like pemphigus that have an unclear exact etiology, and in cases where early diagnosis could improve the prognosis. Due to conflicting reports about the prevalence of certain blood groups in various dermatoses such as pemphigus disorder <sup>12</sup>, more studies in this field are required.

The aim of the current study was to determine the association between ABO blood groups and pemphigus in a defined Iranian population.

## MATERIALS AND METHODS

In this hospital-based case-control study, sampling was performed by census amongst all patients who referred to the Dermatology Department of one leading hospital in Tehran, Iran between 2006 and 2013. Patients with a diagnosis of pemphigus disease confirmed by histopathology and immunofluorescence enrolled in this study. The control group was selected through a random sampling of healthy volunteers who attended the Dental Clinic of Shahid Beheshti University of Medical Sciences in Tehran between 2013-2014. Cases and controls were matched according to

age and sex after participants provided informed consent for study participation. In total, we selected 110 patients and 126 controls. There was at least one matched control for each case.

Information obtained from patient records included age, sex, date of birth, blood group, and type of pemphigus disease. In the control group, we gathered the data from existing medical records kept in the Dental Clinic. Patient information remained confidential and data were de-identified prior to analysis.

The data were analyzed with Statistical Package for the Social Sciences 18 (SPSS 18). Blood groups and rhesus (Rh) factor of pemphigus patients, as well as the control group, were investigated by analytical statistics by the chi-square test. Statistical significance was set at 95%. *P*-values <0.05 were considered significant.

This research was conducted in full accordance with the World Medical Association Declaration of Helsinki. Shahid Beheshti University of Medical Sciences Ethics Committee approved this study.

## RESULTS

In the pemphigus group, there were 59 females and 51 males with an average age of 46.5±13.6 years for females and 45.8±12.5 years for males. The control group was matched for age and sex.

Table 1 lists the frequency of each blood group in patients and controls. Although the number of pemphigus patients with blood type O (46.3%) was

**Table 1.** Blood group relationship in the patient and control groups.

Blood group	Patient or Control Group	
	Control	Patient
O		
Number	55	51
Percentage	43.7	46.3
A		
Number	40	33
Percentage	31.7	30
B		
Number	22	15
Percentage	17.5	13.7
AB		
Number	9	11
Percentage	7.1	10
Total		
Number	126	110

**Table 2.** Relation between blood groups of the healthy and patient groups.

Blood group	Patient or Control Group	
	Control	Patient
O+		
Number	49	42
Percentage	38.9	38.2
O-		
Number	6	9
Percentage	4.8	8.1
A+		
Number	36	30
Percentage	28.6	27.3
A-		
Number	4	3
Percentage	3.1	2.7
B+		
Number	17	15
Percentage	13.5	13.7
B-		
Number	5	0
Percentage	4	0
AB+		
Number	8	10
Percentage	6.3	9.1
AB-		
Number	1	1
Percentage	0.8	0.9
Total		
Number	126	110

higher than the other groups, the difference was not significant (chi-square,  $P=0.737$ )

Considering Rh, O<sup>+</sup> blood group was the most frequent blood group, followed by A<sup>+</sup>, B<sup>+</sup>, AB<sup>+</sup>, O<sup>-</sup>, A<sup>-</sup>, and AB<sup>-</sup> (Table 2). These differences, however, were not statistically significant (chi-square,  $P=0.526$ ).

## DISCUSSION

Blood group antigens are expressed on the surface of many epithelial cells. These antigens participate in several biologic processes, such as tissue differentiation, cell movement, inflammation, and bacterial adhesion<sup>20</sup>. Previous studies have identified associations between the ABO phenotypes and an increased susceptibility to some diseases<sup>12,13,15</sup> such as the association of blood group O with peptic ulcers. An association has been reported between group A and gastric cancer. However, associations between ABO phenotypes

and dermatological diseases have not been widely evaluated. Pemphigus disease has a hereditary tendency and HLA association is proven in the pathogenesis of this disease. On the other hand, the inheritance of blood group is not confounded by environmental factors. In this regard, there is one theory that type of blood group may be a predictable factor for tendency for the development of pemphigus<sup>12</sup>.

In pemphigus, specific IgG autoantibodies act against the tanofilament epithelial complex, specifically desmoglein3, and lead to loss of the intercellular connections and cellular attachments in this autoimmune disorder<sup>21,22</sup>.

According to results of this study on 110 pemphigus patients, females had an average age of 46.5 years and males had an average age of 45.8 years. The mean age of pemphigus patients in other Iranian studies supported the current study. Noorbala et al. reported a mean age of 44.1 years in central Iran<sup>23</sup> and a study by Esmaili et al.<sup>24</sup> had an age distribution of 36.29 years.

However, the average age of pemphigus patients is approximately 50–60 years worldwide<sup>25</sup>. It seems the onset of this disease is observed earlier in Iran, for an unknown reason.

According to the current study, blood group O<sup>+</sup> was the most common, followed by A<sup>+</sup>, B<sup>+</sup>, AB<sup>+</sup>, O<sup>-</sup>, A<sup>-</sup> and AB<sup>-</sup>. However, there were no statistically significant differences between the case and control groups. Similar to our results, Altobella<sup>26</sup> found that 60% of pemphigus vulgaris patients had blood group O, but no comparison was performed with a control group. Grob and Inderbitzin<sup>27</sup> reported the same results. Shahkar et al.<sup>28</sup> also found that most pemphigus patients had the O blood group, followed by A, B, and AB. There was no significant relation between frequency of blood type and incidence of pemphigus. The study by Valikhani et al.<sup>29</sup> on 573 patients with pemphigus led to the same results.

Rather et al. conducted a study of patients with pemphigus<sup>12</sup>. They reported that 40% had blood group O and 40% had blood group B, with no statistically significant differences from the control group.

Tirado-Sánchez and Ponce-Olivera<sup>30</sup> investigated the relationship between Rh factor, in addition to blood group ABO, in pemphigus vulgaris patients. Their results showed no significant

relation between specific blood groups in patients with pemphigus vulgaris compared to the normal control group. However, O blood group was the most frequent. Blood types A, B, and AB were less frequently seen. Shahidi *et al.*<sup>19</sup> reported no significant association between ABO blood group and pemphigus vulgaris or psoriasis. In addition, they evaluated Lewis blood group antigens and sector status in pemphigus vulgaris. The results showed Le/b-negative non-secretor individuals had increased susceptibility to pemphigus vulgaris.

## CONCLUSION

Blood group O<sup>+</sup> was the most common blood group in the pemphigus patients in this study. However, this finding was not statistically significant compared to the controls. Further studies of different populations and geographic regions to obtain more definitive results in this field are recommended.

**Conflict of Interest:** None declared.

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