

The Relationship of Chronic Pulmonary Diseases and Asthma With Blood Groups in Hospitalized Patients

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Abstract

Introduction: Considering the high prevalence of respiratory diseases, it is important to identify factors affecting them, especially the role of genetics and blood antigens. By identifying people with a high risk of developing asthma and chronic pulmonary diseases, it is possible to take diagnostic measures and perform proper screening to observe the improvement of patients' quality of life and the increase of proper screening. Therefore, the aim of this study was to determine the relationship between blood group types and the occurrence of chronic pulmonary diseases.

Methods: The present retrospective study was conducted on patients with asthma and chronic obstructive pulmonary disease (COPD) in 2018. Overall, 30 patients with asthma, 70 patients with COPD, and 100 patients in the control group were evaluated in this study. Finally, the obtained data were entered into SPSS version 22 software and subjected to statistical analysis with t-test, Chi-square, and Fisher's exact tests.

Results: The results of the present study revealed that the most frequent blood types in asthma, COPD patients, and the control group were A (38.09%), B (40.42%), and O (41.66%), respectively, which were statistically significant ($P=0.003$). Blood group A had a significant relationship with the gender of asthmatic patients, and blood groups A and B had a meaningful relationship with positive family history in asthmatic patients.

Conclusion: In this study, a significant relationship was observed between blood group A and asthma, as well as blood group B and COPD, compared to the control group.

Keywords: Chronic pulmonary diseases, Asthma, Blood groups

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Introduction

Asthma and pulmonary diseases are the most common chronic childhood diseases that cause significant complications.¹ There are more than 300 million asthmatic patients worldwide.² The prevalence of asthma in the rural and urban areas of Iran is approximately 5% and 10%, respectively, and in some large cities, it is nearly 35%.³ Asthma is the chronic inflammation of the airways during which the infiltration of inflammatory cells, such as T lymphocytes, mast cells, and eosinophils, occurs in the airways. Due to the specific inflammatory environment that is created, airway irritation occurs and causes airway obstruction to a certain extent.⁴ Asthma-causing factors include allergens, pollutants, and factors such as occupational factors, exercise in cold weather, irritant particles, and psychological stress.⁵⁻⁷

Recently, studies have been conducted on the effect of blood groups on various diseases.⁸ For instance, people

with blood type A were more susceptible to gallbladder stones, colitis, hyperthyroidism, stomach, pancreas, gallbladder, hypopharynx, thyroid, lung, endometrial, and ovarian cancers.⁹

The relationship between asthma and lung disease and blood groups has been investigated in recent years. Lal et al conducted an observational study and evaluated the relationship between blood groups and asthma and wheezing. They found that the O blood group was predominant in both cases (46.9%) and controls (36.1%). They also reported a statistically significant higher percentage of this blood group in patients. More studies on the combined effects of different genetic systems and histopathology are needed, especially for asthma.¹⁰ Meanwhile, in a study focusing on the relationship between blood types and chronic pulmonary diseases and asthma, Mroczek et al showed that there was no significant relationship between blood types and respiratory



diseases.¹¹

Therefore, considering the high prevalence of respiratory diseases, it is important to identify factors that affect them, especially the role of genetics and blood antigens. This can help identify people with a higher risk of developing asthma and chronic pulmonary disease, and patients' quality of life will improve by taking appropriate diagnostic and screening measures. The present study investigated the relationship of chronic pulmonary diseases and asthma with blood groups in patients admitted to Amir-al-Momenin hospital in Zabol, Iran, in 2018.

Materials and Methods

This retrospective study evaluated patients with chronic pulmonary diseases and asthma admitted to Amir-al-Momenin hospital, Zabol, Iran, in 2018. The inclusion criteria included patients with a complete medical record and a willingness to participate in research. On the other hand, the exclusion criteria included patients without consent to enter the study, incomplete medical records, and accompanying diseases other than respiratory diseases.

All patients with chronic pulmonary diseases and asthma admitted to Amir-al-Momenin hospital in 2018 were visited by a pulmonologist, and a differential diagnosis was made. Then, a definitive diagnosis was given based on clinical symptoms, and patients were included in the study. Overall, 100 respiratory patients with asthma or chronic obstructive pulmonary disease (COPD) meeting the inclusion criteria who were admitted to Amir-al-Momenin hospital in 2018 participated in the study. The control group was made up of randomly selected patients who referred to the hospital clinic on an outpatient basis, suffered from no specific disease, and were matched with the case group in terms of age and gender.

Gender, age, body mass index, familial history, disease severity, and blood type of each patient were recorded. Questionnaires, including demographic information (age, gender, and marital status), previous history of hypertension, diabetes mellitus, hyperlipidemia, medication use, and smoking status (active, passive, or quit smoking), were completed.

The collected data were entered into SPSS software (version 22), and statistical analysis was performed in two descriptive and analytical sections. To analyze the studied variables, chi-square and Fisher's exact statistical tests were used for qualitative variables, and the student *t* test or Mann-Whitney test was used if the statistical assumptions were not met. In this study, the level of statistical significance was considered < 5%.

Results

In the present study, 200 participants were included in the case (30 patients with asthma and 70 patients with

COPD) and control (100 people) groups. The average age of the participants was 64.90 ± 17.15, and the maximum and minimum ages of the patients participating in this study were 92 and 34 years, respectively. In this study, 53% of the participants were females, and the remaining cases were males. The average age of patients with asthma was significantly lower than that of the COPD group (*P* < 0.001). In this study, 33.33% of asthmatic patients and 48.57% of patients with COPD were males, and no significant statistical relationship was found between gender and the incidence of pulmonary disease (*P* = 0.29). **Table 1** provides detailed age- and gender-related statistics in the studied population.

The results of the present study demonstrated that the most common blood groups in the studied population were blood groups O (32.03%), B (31.25%), A (24.21%), and AB (12.5%), respectively. Further, the most common blood types in asthma, COPD patients, and the control group were A (38.09%), B (40.42%), and O (41.66%), respectively, which were statistically significant (*P* = 0.003). These data are shown in **Figure 1**.

In the current study, 40% of COPD patients and all asthmatic patients participating in the study who had blood type A were women; thus, the results showed a significant relationship between the gender of asthmatic patients and blood type A (*P* = 0.02). However, no relationship was found between the gender of COPD patients and any of the blood groups.

Based on the data in **Table 2**, blood groups AB and O were more common in asthmatic patients who did not have a family history of asthma, while patients with a family history of asthma had blood groups A and B

Table 1. Age- and Gender-Related Characteristics of the Studied Population

Variable	Asthma (n = 30)	COPD (n = 70)	Control Group (n = 100)
Age	97.16 ± 8.44	76.78 ± 10.73	83.17 ± 15.63
Gender	Male: 10 (33.33%) Female: 20 (66.66%)	Male: 34 (48.57%) Female: 36 (51.43%)	Male: 50 (50%) Female: 50 (50%)

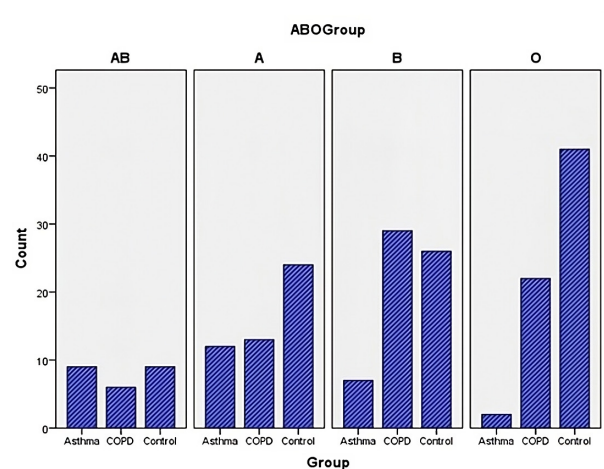


Figure 1. The Frequency of Blood Groups in the Studied Patients

Table 2. Relationship Between Blood Types and Familial History of Asthma and COPD

Blood Type	Asthma		COPD	
	Positive Familial History (%)	Negative Familial History (%)	Positive Familial History (%)	Negative Familial History (%)
AB	10	20	4.28	4.28
A	30	10	11.42	7.14
B	16.66	6.66	27.14	14.28
O	0	6.66	21.42	10
<i>P</i> value	0.024		0.29	

Note. COPD: Chronic obstructive pulmonary disease.

more frequently. In this study, a statistically significant relationship was observed between a positive family history of asthma and a patient's blood type ($P=0.024$). Moreover, patients with a positive family history of COPD had more A, B, and O blood groups than other patients, while the AB blood group was the same in both groups. However, no significant statistical relationship was found between a positive family history of COPD and blood type ($P=0.29$).

Discussion

The results of the present study revealed that the most common blood groups in the studied population were O (32.03%), B (31.25%), A (24.21%), and AB (12.5%). In addition, the most common blood types in asthma, COPD patients, and the control group were A (38.09%), B (40.42%), and O (41.66%), respectively, which was statistically significant ($P=0.003$).

Li et al implemented a retrospective cohort study in a population infected with SARS-CoV-2 and reported that people with blood group A had a significantly higher risk of SARS-CoV-2 infection, whereas people with blood group O had a significantly lower risk of SARS-CoV-2 infection. They suggested that people with blood type A should strengthen protection to reduce the risk of infection; however, people with blood type O should not take the virus seriously.¹² The results also demonstrated the importance of blood groups in the SARS-CoV-2 infection, which involves the lungs.

The results indicated that there was a significant relationship between the gender of asthmatic patients and blood type A ($P=0.02$), while the gender of the patients in the COPD and control groups was not related to the blood types.

Yung et al found that there was a gender disparity in asthma, which changes at puberty from males having the highest prevalence to females having the lowest prevalence. Further, fluctuations in hormones during menstruation, pregnancy, and menopause were reported to be associated with changes in asthma symptoms.¹³

Honkamäki et al concluded that among adult patients with physician-diagnosed asthma, 58.4% were men and 67.8% were women. Additionally, the incidence of asthma diagnosis was calculated in 10-year age groups,

and it peaked in young boys (0–9 years) and middle-aged women (40–49 years). In addition, adult-diagnosed asthma became the dominant phenotype among those with physician-diagnosed asthma by the age of 50 years and 38 years in men and women, respectively.¹⁴

In a systematic review and meta-analysis, Ntritsos et al observed that COPD prevalence was 9.23% in men and 6.16% in women. Gender prevalences varied widely in the World Health Organization Global Burden of Disease subregions.¹⁵

The results confirmed a statistically significant relationship between the positive familial history of asthma and blood group type ($P=0.024$), so that blood groups A and B were significantly more frequent in asthma patients who had a positive familial history. Further, patients with a positive familial history of COPD had more A, B, and O blood groups than other patients, while the AB blood group was the same in both groups. However, no significant statistical relationship was found between a positive familial history of COPD and blood type.

Dahalan et al conducted a scoping review and showed the relationship between ABO blood groups and allergic diseases. They concluded that patients with blood group O had greater susceptibility to asthma than patients with other blood groups. Additionally, blood group A was the predominant type in asthma patients.¹⁶

Conclusion

In this study, a significant relationship was found between blood group A and the occurrence of asthma and blood group B and the occurrence of COPD compared to the control group. In addition, in patients with asthma, a significant relationship was observed between blood group A and the female gender.

Authors' Contribution

Conceptualization: Halime Aali.

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Writing–review & editing: Dadkhoda Soofi.

Competing Interests

There was no conflict of interests

Ethical Approval

This project was approved by the Student Research Committee of Zabol University of Medical Sciences. Regarding ethical considerations, items 1 to 20 of the General Ethics Guide in Medical Science Research with Human Subjects in the Islamic Republic of Iran were taken into consideration. All the studied patients declared their informed consent.

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