



PREVALENCE OF ABO BLOOD GROUPS AND THEIR ASSOCIATION WITH SKIN ALLERGY IN YOUNG ADULTS

Dermatology

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ABSTRACT

Objectives: To find prevalence of ABO blood groups and to investigate their association with skin allergy. **Materials and Methods:** This cross sectional study was done at Nalbari Medical College, Nalbari from April 2025 to May 2025. n= 163, both male and female M.B. B.S students 18-21 years of age were enrolled randomly for the study. ABO blood group was done by slide antisera method. A detailed history of study population regarding dust, pollen and skin allergies was recorded on a preformed Proforma. **Result:** In our study population O blood group came out to be the most common (66%) and least AB (7%). Blood group AB was found to be at lowest risk level for allergies. The study showed association between blood groups and allergies but statically not significant as the p-value obtained from the association is 0.309 (>.05) at df 3. Chi square test was 3.590 **Conclusion:** In the study population blood group O being the most common is at high risk level for developing allergies. Blood groups A and B were found to have nearly same level of allergies while Blood group AB being the most protected one. This association of various blood groups with allergy development could help in identifying people at risk as an aid to preventive measures.

KEYWORDS

Blood Groups, Risk, Allergy, Association.

INTRODUCTION

The membrane of human red blood cells contain a variety of blood group specific antigens, called Agglutinogens. The individuals are divided into 4 major blood groups A, B, AB and O, depending on the presence or absence of blood group specific substance. The incidence of people suffering from allergic diseases continues to rise worldwide, especially in countries with low and intermediate socioeconomic status.^{1,2} Allergic diseases develop from abnormal reactivity of the immune system, whereby the immune system becomes hyper-responsive to allergens that are not harmful to the body.³ Allergic diseases include anaphylaxis, food allergies, asthma, rhinitis, conjunctivitis, angioedema, urticaria, eczema, eosinophilic disorders (including eosinophilic oesophagitis) and drug and insect allergies.¹ According to the World Allergy Organization, allergic diseases are quite common, and an estimated one in five people suffers from some sort of allergic disease, such as allergic rhinitis (AR), asthma, conjunctivitis, atopic dermatitis (AD) and other allergic reactions.⁴ Therefore, allergic diseases are of great concern to governments and communities because they can cause serious health problems if they remain unrecognized and underestimated. The antigen of the ABO blood group system is a complex carbohydrate molecule that acts as a surface marker on the membrane of red blood cells,⁵ and it is also highly expressed in body fluids and several cell and tissue types, such as epithelial cells of the gastrointestinal tract, salivary glands and the skin.⁶ Although the biological function of blood groups is not fully understood, Chigira⁷ reported that most blood group antigens play crucial roles in cell-cell recognition and in self-declaration mechanisms by functioning as receptors or surface markers. Therefore, these antigens may behave as potential receptors for microorganisms or substances such as toxins or allergens that could influence the susceptibility of individuals to diseases.⁸

Certain genetic and environmental factors have been identified as risk factors for developing allergic diseases. The most important risk factor is family history. If a parent has allergies, the risk of their children developing allergies is approximately 15%–20%.⁹ Moreover, the risk is doubled when both parents have allergies.¹⁰ Indoor and outdoor pollutants are also significantly correlated with the development of allergic diseases.¹¹ Examples of indoor pollutants include house dust mites, animal dander, cockroaches and moulds, while examples of outdoor pollutants include tobacco smoke, transportation smoke, factories and plant pollen.¹¹⁻¹³ Blood group is transferred genetically and could affect the development, progress, and severity of certain diseases.⁶ The role of the ABO antigenic system in disease pathogenesis was associated with TNF- α and several pro-inflammatory molecules. Elevated TNF- α was associated with inflammation.⁷⁻⁹ It is known that inflammation is an etiopathogenesis factor in acne vulgaris and plays a role in acne development.¹

Possible correlations were investigated in diseases such as rosacea, lichen planus, skin cancer, vitiligo, pemphigus, and psoriasis in dermatology.¹⁰ Also recently, the correlation between acne vulgaris and

blood group was investigated but contradictory findings were reported.¹¹⁻¹³ In this study aimed to investigate the correlation between acne vulgaris severity and ABO blood groups.

MATERIALS AND METHODS

This cross-sectional study was carried out at Nalbari Medical College, Nalbari from March 2025 to June 2025. It included n= 163 young adults of 18-21 years of age both males and females. Informed consent was taken from the participants of the study. ABO blood group was determined by conventional glass slide antisera method. Blood samples were collected by finger prick with a sterile lancet, after cleaning the puncture site with 70% ethyl alcohol. A drop of anti-sera, A and B was placed on glass slides. A drop of blood from each subject was mixed with each anti-serum individually with the help of separate glass rods. Blood groups were determined on the basis of agglutination. In order to investigate any possible association of blood groups with allergy a Proforma was developed. The Proforma comprised of a questionnaire regarding history of dust, pollen and skin allergy in our study population. Later on the significance level was drawn. Rh negative blood group are excluded from study

RESULTS

The highest prevalence of the blood groups found in patients with allergic was the O blood group with 66 cases (40.5%), followed by the B blood group with 50 cases (30.7%), A blood group with 40 cases (24.5%), and AB blood group with 7 cases (4.3%).

Then, the association of the ABO blood groups with allergic was analyzed using the Pearson Chi square test, with a level of significance of 0.05 at 95% confidence interval. Based on the analysis, the p-value obtained from the association is 0.309, at df 3. Chi square test was 3.590 and thus indicating that there is no significant association between the ABO blood groups and allergy (Table 1)

Table 1: Prevalence of Blood groups among study population

Blood group	Patient	
	n	%
A	40	24.5
B	50	30.7
O	66	40.5
AB	7	4.3

The results showed that the O blood group has the highest prevalence of allergic, while the AB blood group has the least prevalence of the disease but statistically no significant association.

DISCUSSION

Allergic disorders have become a significant health concern worldwide, with approximately 25% of the global population being affected.¹⁴ In recent years, the study of blood groups has gained increased

importance in the scientific community. Blood groups, determined by specific antigens on red blood cells, are crucial for blood transfusions and organ transplants. The four main blood types—A, B, AB, and O—have significant roles in medical practice because of these antigens.¹⁵ The association between blood groups and allergies is increasingly recognized as a complex immunological inter-action. Researchers highlighted the role of IgE production, ABO antigen glycosylation, microbiota gut composition, cytokine profiles, and the potency of immunological path-ways in modulating allergic responses and susceptibility.^{16,17} There is a notable association between IgE levels and ABO blood group antigens, which impacts individuals' susceptibility to allergies. These findings emphasize the genetic factors involved in the development of allergic disease. Variations concerning the susceptibility to allergies between O and non-O blood groups persist as a significant topic of debate. Certain studies suggested that individuals with blood group O demonstrate an increased incidence of allergic diseases, possibly attributed to glycosylation changes of ABO antigens, resulting in modified immune recognition and IgE binding.^{18,19,20} In contrast, other investigations indicated that non-O blood groups, especially A and B, demonstrate enhanced allergic susceptibility because of greater antigenic complexity and more robust interactions with IgE and immune cells.^{21,22,23} These findings highlight the importance of additional mechanistic investigations to clarify the specific immunological pathways connecting blood group antigens to allergic sensitization.

Allergic diseases and the underlying pathogenesis can be strongly influenced by cytokines signaling in inflammation and immune responses. Tamayo-Velasco and colleagues²³ highlighted that cytokine profile differs based on the blood group type, immune regulations, and cytokine profiles. Another study similarly reported that blood group anti-gens impact cytokine production associating it with allergy development.²² Understanding these interactions might help in developing therapeutic interventions and addressing issues related to allergic disease dysregulation.

CONCLUSION

The strong association between ABO blood groups and allergies could be utilized in identifying people who are at risk for developing these allergies in order to exercise timely preventive measures. As future implication there is need to investigate the association of ABO blood groups and allergies at molecular level.

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