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Dr. J Vaishali
Associate Professor,
Department of Pathology and
Microbiology, Dr. Hahnemann
Homoeopathy Medical College
and Research Centre,
Koneripatti, Rasipuram,
Namakkal, Tamil Nadu, India

G Jeevakarunambal
CRRI, Dr. Hahnemann
Homoeopathy Medical College
and Research Centre,
Koneripatti, Rasipuram,
Namakkal, Tamil Nadu, India

Corresponding Author:
Dr. J Vaishali
Associate Professor,
Department of Pathology and
Microbiology, Dr. Hahnemann
Homoeopathy Medical College
and Research Centre,
Koneripatti, Rasipuram,
Namakkal, Tamil Nadu, India

A clinical study to evaluate the correlation between the prevalence and severity of allergic rhinitis in abo blood group: A retrospective study

J Vaishali and G Jeevakarunambal

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Abstract

Allergic rhinitis is a common, chronic, inflammatory disorder of the nasal lining triggered by immunoglobulin E (IgE)-mediated reactions to environmental allergens such as pollen, dust, animal dander, and moulds. It is characterized by nasal congestion, watery discharge from nose, sneezing, nasal itching, and watery eyes, which may affect the quality of life. Though it is not life-threatening, Allergic rhinitis is a major global health concern due to its increasing prevalence for the past few decades due to environmental changes, lifestyle factors and genetic predisposition. Approximately 10-30% of the population suffers from Allergic rhinitis. Despite its high prevalence, leading to persistent symptoms and complications, the severity of allergic rhinitis can range from mild, intermittent symptoms to moderate-to-severe persistent disease. Classification systems such as the Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines classified patients on symptom duration and impact on daily activities, sleep, quality of life. Understanding both the prevalence and the severity of allergic rhinitis within specific populations is essential for guiding public health, improving clinical management and reducing disease affection and to improve the preventive measures. This thesis aims to access whether the phenotypes of ABO have predisposition to cause allergic rhinitis and to compare the prevalence and severity of allergic rhinitis among the individuals.

Keywords: Allergic rhinitis, severity, ABO blood group, prevalence, predisposition

Introduction

Allergic rhinitis is an inflammation of nasal airway which is characterized by sneezing, watery discharge from nose, nasal obstruction, itching of eyes, nose and pharynx and lacrimation and triggered by allergens to which the affected individual is sensitive ^[1]. The disease is otherwise known as hay fever or pollinosis ^[2]. This is a complex multifactorial disease with environmental and genetic components ^[3]. Genetic factors play a key role in AR susceptibility. Several genes, including IL-4, IL-13, HLA-DRB, TNF, LTA, and FOXP3 have been connected to immune imbalance and atopic conditions ^[4].

Epidemiology

It is one of the most common chronic conditions, affecting approximately 600 million individuals worldwide similar to other atopic condition ^[5]. Globally, the prevalence of Allergic Rhinitis ranges between 10% and 40%, with higher rates observed in urbanised and industrialised regions ^[3]. The incidence has been rising over recent decades, potentially due to environmental changes, lifestyle modifications, and reduced early-life exposure to pathogens, as proposed by the hygiene hypothesis ^[6].

The 'Hygiene Hypothesis': The excessive 'cleanliness' of the environment has led to a decline in the infectious stimuli that are necessary in the development of the immune system ^[7]. Many other factors have been suggested to play a role in the development and expression of atopic diseases including changes in lifestyle, pollution, dietary changes with diminished nutritive value and stress ^[6]. The strongest risk factors include family history of allergies, exposure to cigarette smoke and male gender ^[8].

Pathology: In allergic rhinitis, a variety of inflammatory cells such as mast cells, CD4⁺ T cells, B cells, macrophages, and eosinophils accumulate in the nasal lining.

These allergens such as dust mite, cockroach residues, animal dander, moulds or pollens^[9].

In people with allergies, the T cells that infiltrate in the nasal mucosa are mainly T helper 2 (Th2) cells. These cells release cytokines, including interleukins (IL-3, IL-4, IL-5, and IL-13), which stimulate plasma cells to produce immunoglobulin E (IgE)^[10]. The IgE antibodies then attach to mast cells. When allergens come into contact with these IgE-coated mast cells, they trigger the release of substances like histamine and leukotrienes. These mediators cause widening of blood vessels, increased permeability, itching, nasal discharge, mucous formation, and sometimes tightening of the smooth muscles in the airways^[9].

The chemicals and cytokines released during this early immune reaction can also cause a delayed or "late-phase" response, usually 4-8 hours later. This secondary inflammation leads to recurrent nasal symptoms, especially congestion, which may persist for hours^[3].

Types of allergic rhinitis

- Seasonal Rhinitis
- Perennial Rhinitis

Seasonal Rhinitis

Seasonal allergic rhinitis appears during specific times of the year^[3, 11]. It is most often triggered by pollens from grasses, flowers, weeds, or trees. The most common seasonal allergy in northern Europe, peaking between May and July^[11]. However, this problem is seen all over the world and may become worse during harvest seasons^[3]. Symptoms include sudden bouts of sneezing, watery discharge from nose, and nasal blockage. These episodes often last for several hours and are accompanied by itching, watery eyes, and irritation of the conjunctiva.

Perennial Rhinitis

Perennial allergic rhinitis occurs throughout the year^[3]. It is usually due to constant exposure to allergens such as house dust mites, fungal spores, or animal dander. Sometimes, irritants like strong odours, perfumes, smoke, cold air, or dry environments can also worsen the symptoms^[11].

People with perennial rhinitis experience similar symptoms-sneezing, watery nasal discharge, nasal obstruction, itching, and watery eyes but these tend to be more continuous and slightly less severe than those seen in seasonal rhinitis^[12].

Investigations

- **Skin Hypersensitivity Tests:** Usually positive in cases of seasonal allergic rhinitis but may not be as helpful for perennial types^[13].
- **Skin Tests for Inhalant or Food Antigens:** Help identify the exact triggers responsible for allergic symptoms^[14].
- **Nasal Smear:** Often shows an increased number of eosinophils; if neutrophils are present, it may indicate an infection^[15].

- **Serum IgE Measurement:** Both total and allergen-specific IgE levels (tested through immunoassays) are often found to be elevated^[3].

Materials and Methods

This retrospective study was conducted on 30 patients diagnosed with allergic rhinitis from the outpatient and inpatient departments of Dr. Hahnemann Homoeopathy Medical College Hospital, Rasipuram, Tamil Nadu. The cases were recorded in standardized case format. Based on the Inclusion criteria, patients with clinical signs of Allergic Rhinitis such as sneezing, nasal discharge, and obstruction etc., All age groups and Both males and female patients are selected. And in Exclusion criteria, individuals with sinusitis or other chronic nasal diseases and any other chronic disease.

Observation: Among 30 patients, 47% were O positive, 33% B positive, 13% A positive, and 7% AB positive. No Rh-negative individuals were observed. The most affected age group was 16-30 years (40%), and females represented 57% of the study population.

Severity analysis revealed that O positive individuals demonstrated the highest scores (29-33), indicating severe allergic rhinitis, followed by B positive with moderate-to-severe symptoms. A positive and AB positive groups had lower severity scores. These results suggest an association between O blood group and increased susceptibility to Allergic Rhinitis.

Discussion

Younger adults (16-30 years) are the most affected age group for allergic rhinitis. Females (57%) are more commonly affected compared to males. O positive blood group shows the highest prevalence and severity, including the most severe cases, B positive group also demonstrates significant association with moderate-to-severe diseases, A positive and AB positive groups show limited severity, suggesting a lower risk profile compared to O+ and B+. No negative blood group cases were reported in this study. Thus, the study suggests a possible correlation between blood group and disease severity, with O positive being the most at risk, both in terms of prevalence and disease severity. the most common exciting factor was dust exposure. The most of the common presentation with the symptom of sneezing, watery discharge from nose and nasal obstruction. This study highlights a significant pattern between ABO blood group and allergic rhinitis severity. The predominance of O positive blood group aligns with existing research linking ABO polymorphisms to allergic and immunologic conditions. Females were found to be more affected, potentially due to hormonal or environmental influences. The findings support the hypothesis that glycoprotein variations in ABO antigens might influence mucosal immune response, thereby affecting Allergic rhinitis susceptibility and intensity.

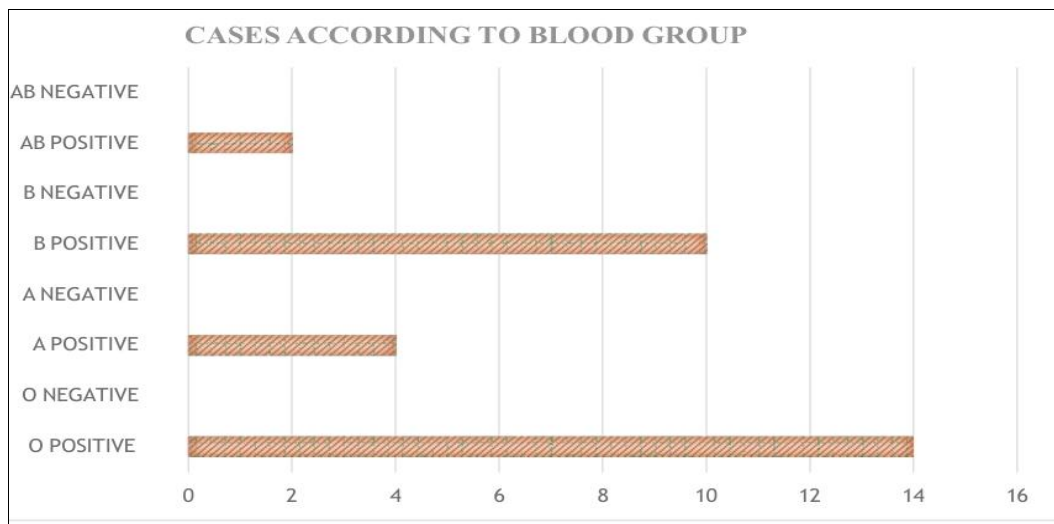


Fig 1: Prevalence of cases according to blood group

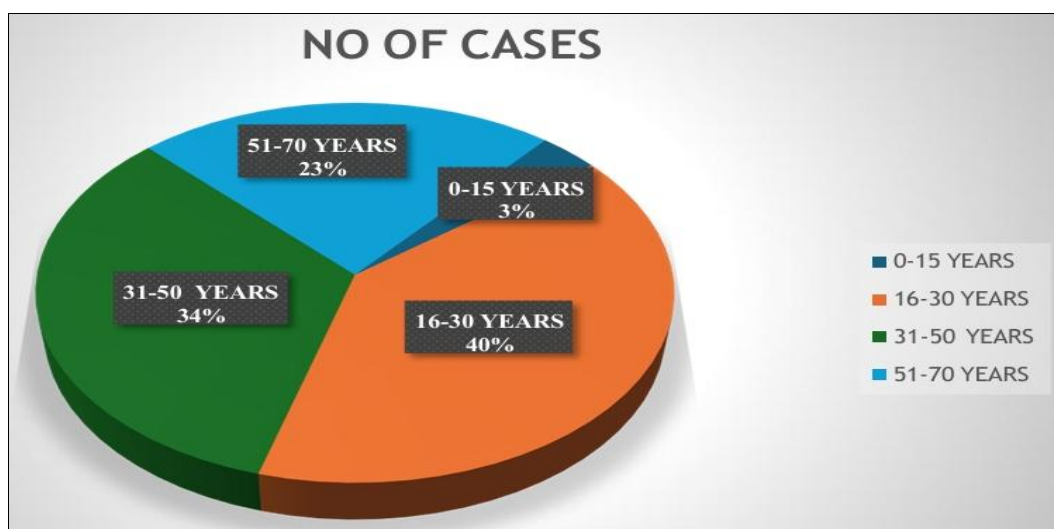


Fig 2: Prevalence of cases according to age group

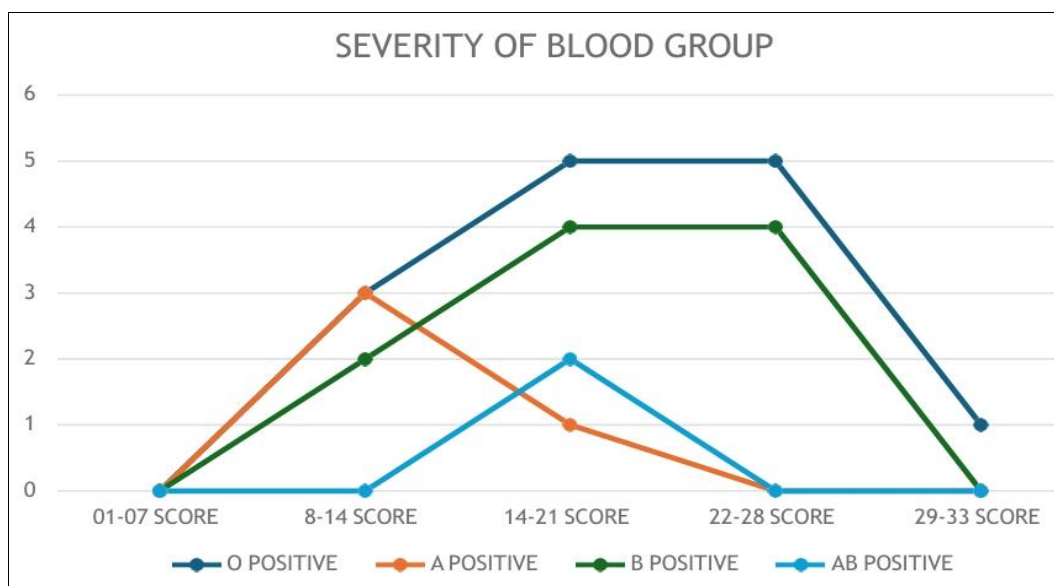


Fig 3: Severity of blood group

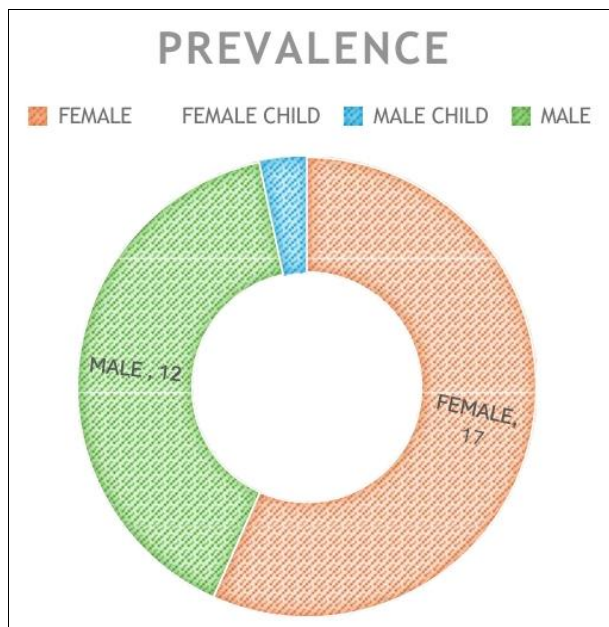


Fig 4: Prevalence of cases according to gender

Conclusion

Thus, the study suggests a possible correlation between blood group and disease severity, with O positive being the most at risk, both in terms of prevalence and disease severity. The study emphasizes the importance of considering genetic markers like blood group in assessing allergy susceptibility. Further large-scale, multi-centric research is required to confirm and elaborate on these findings.

Conflict of Interest

Not available.

Financial Support

Not available.

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