

## A Relationship Between Allergic Rhinitis and ABO Blood Group and Related it with Genetics in Population Based Cohort Study in Kut

Oras N. Hamad

Assist lecturer in University of Wasit/Collage of Medicine, IRAQ.

### Article History

Received: 13 Feb 2016

Revised: 19 Feb 2016

Accepted: 24 Feb 2016

### \*Correspondence to:

Oras N. Hamad  
Assist lecturer in  
University of  
Wasit/Collage of  
Medicine, Iraq.

### ABSTRACT

**Objectives:** To find out prevalence of ABO blood groups and to investigate their association with allergic rhinitis and relate it with Genetics.

**Materials and Methods:** This cross sectional study was done at Kut city in Iraq from January 2015 to December 2015. 109 Participants including both sexes (18-60 years of age) were enrolled for the study during Hematology module. ABO blood group of study population was done by antisera method. A detailed history of study population regarding age, sex, family history and others was recorded on a preformed proforma.

**Results:** In our study population, O blood group came out to be the most common (46.8%). History of allergic rhinitis was reported by 55.9% of our study population. Allergic rhinitis were found high among individuals with Rh+ blood group (94.5%) but the ratio was close in female and male in (55% , 53%) respectively. A significant association between allergic rhinitis (AR) and incident rheumatic arthritis (RA) was found in this population-based cohort study. RA can occur in > 31.2% of patients with AR. Blood group B was found to be at lowest risk level for allergic rhinitis (11.01%). The study showed association between blood groups and allergies rhinitis as 0.072 statistically significant p value.

**Conclusion:** In the study population blood group O being the most common is at high risk level for developing allergic rhinitis while blood group B being the most protected one. This statistically significant association of various blood groups with allergic rhinitis development could help in identifying people at risk as an aid to preventive measures.

**KEYWORDS:** ABO blood-group system, Allergic Rhinitis, Blood group antigens, Seasonal.

### INTRODUCTION

The antigens of the ABO blood group system (A, B and H determinants, respectively) are complex carbohydrate molecules on the extracellular surface of red blood cell membranes.<sup>1</sup> However, along with their expression on red blood cells, ABO antigens are also highly expressed on the surface of a variety of human cells and tissues, including the epithelium, sensory neurons, platelets, and the vascular endothelium.<sup>2</sup>

Thus, the susceptibility to a number of diseases has been linked with a person's ABO phenotype. Such correlations remain controversial and include the observation that gastric cancer appears to be more common in group A individuals<sup>3</sup> whereas gastric and duodenal ulcers occur more often in group O individuals.<sup>4</sup>

The ABO locus is located on chromosome 9 at 9q34.1-q34.2. It contains 7 exons that span more than 18 kb of genomic DNA. Exon 7 is the largest and contains most

of the coding sequence. Exon 6 contains the deletion that is found in most O alleles and results in a loss of enzymatic activity.<sup>5</sup> Allergic rhinitis (AR) is one of the most common chronic disorders, with reported prevalence's ranging from 3% to 19% in various countries<sup>6</sup>. Allergic Rhinitis represses a global health problem affecting 10 to 20% of the population.<sup>7</sup> It is mediated by immunoglobulin E (IgE) antibodies which are produced after exposure to and sensitization by environmental allergens. AR is a heterogeneous disorder that includes seasonal AR (SAR) symptoms like nasal congestion, watery rhinorrhea, sneezing and itching and can be reversed spontaneously or by treatment.<sup>8</sup> A recent survey conducted in Brazil reported that this disease is highly prevalent among male children and adolescents receiving medical attention in emergency care services.<sup>9</sup> It is a complex multifactorial allergic disease with environmental and genetic components. Environment

plays a major role in the etiology and pathogenesis of AR that ultimately lead to variability reported in its presentation at different places.<sup>10,11</sup> One hypothesis to explain the steep rise in allergic diseases in recent years is 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. 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.<sup>12</sup>

A genetic background in terms of a family history of atopic disease has been the strongest risk factor for the development of allergic symptoms. The most convincing evidence for genetic effect in the development of atopy is derived from twin studies. The earliest study by Edfors-Lubs, dating back to 1971, showed the hereditary character of allergic rhinitis in twin.<sup>13</sup> Many candidate genes for AR have been identified over the past decade as summarized by Dávila et al.<sup>14</sup> which describes the various chromosomes and the corresponding genes which might be implicated in AR. Genome-wide association studies (GWAS) is a rapid way of identifying candidate single nucleotide polymorphisms (SNPs) and/or genes associated to complex diseases and has seen some success in identifying potential novel allergy-associated candidate.<sup>15&16</sup> Many candidate genes have been suggested in rhinitis and allergic diseases in Singapore. The most important linkages include the genes for 5q31-33, TLR4, CD14, IL4, IL18, Beta 2 Adrenergic Receptor, UGRP1, BDNF, 19p13.2 and 10q24.2.<sup>17</sup> However, no genome wide association study has been performed specifically for allergic rhinitis in Iraq, therefore the need was felt to carry out this study. This segment of ABO blood groups and allergy rhinitis is only occasionally cited in the literature.

**MATERIALS AND METHODS**

This cross-sectional study was carried out at College of Medicine, Kut city, Iraq from January 2015 to December 2015. It included 109 adults of 18-60 years of age including both males and females. Informed consent was taken from the participants of the study.

The diagnosis of allergic rhinitis followed the criteria proposed by the Second Brazilian Consensus for Rhinitis.<sup>18</sup> The clinical history of the patient, any family

history of the disease; a physical examination and the patient's report (symptoms of rhinitis more than four days a week for five consecutive weeks) were recorded. The cardinal symptoms considered were nasal congestion, watery rhinorrhea, paroxysmal sneezing and pruritus of the nose and/or palate or eyes.

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.

**Statistical analysis**

Statistical analysis was performed with SPSS software. Mean and standard deviation was calculated for Quantitative data and frequencies with percentages are presented as qualitative data. T- test was applied to find out association between qualitative variables. The p-value 0.072 showed association between blood groups and allergies in our study population.

**RESULTS**

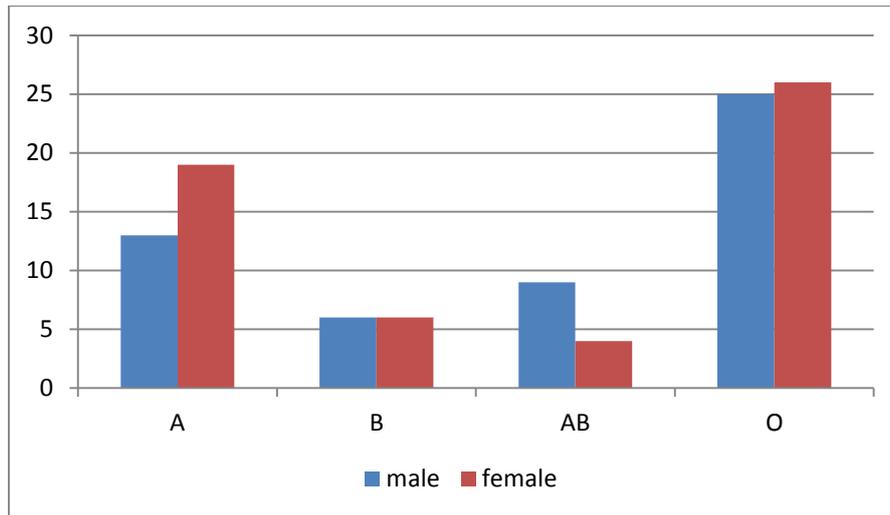
The distribution of ABO blood groups as illustrated in Table 1, showed that blood group O was predominant group in our study population. Rh based prevalence was shown in table 1, depicts that Rh<sup>+</sup> is most common in both of gender. Gender based prevalence also shown in (Fig 1) depicts that blood group O is the most common in both the genders. However, the ratio of blood group A and O was high in females more than males at variance blood group AB the ratio was high in males more than females, while blood group B equal in two genders.

Our study included different ages and although allergic rhinitis can develop at any age. It is the most common in 35 to 37 year.

Allergic rhinitis appears to have a genetic component. People with a parent who has allergic rhinitis have an increased risk of developing allergic rhinitis themselves. The risk increases significantly if both parents have allergic rhinitis. History of allergy rhinitis was reported by 55.9 % of our study population, the clinical. A significant association between allergic rhinitis (AR) and incident rheumatic arthritis (RA) was found in this population-based cohort study. The statistically significant p value occur in 0.049.

**Table 1: Prevalence of Blood groups among study population.**

| A blood group       | B Blood group       | AB Blood group      | O Blood group       |
|---------------------|---------------------|---------------------|---------------------|
| n=33(30.3%)         | n=12(11.01%)        | n=13 (11.9%)        | n=51(46.8%)         |
| Males= 13           | Males=6             | Males= 9            | Males=25            |
| Females=19          | Femelles=6          | Females=4           | Females=26          |
| Rh <sup>+</sup> =32 | Rh <sup>+</sup> =11 | Rh <sup>+</sup> =12 | Rh <sup>+</sup> =48 |
| Rh <sup>-</sup> = 1 | Rh <sup>-</sup> = 1 | Rh <sup>-</sup> = 1 | Rh <sup>-</sup> =3  |



**Fig 1: Gender based prevalence of blood groups**

## DISCUSSION

Information was taken from 109 allergic patients who were randomly distributed over the city of Kut. In our study, the commonest ABO blood group was O followed by A, AB and B. Regarding association between ABO blood group and allergic Rhinitis, the significant p value of 0.049 shows that there is correlation between these two variables.

Several studies resemble our results for ABO blood groups showing O to be the most prevalent blood group in the different countries.<sup>19-22</sup> While other studies in Pakistan showed different results as B blood group prevalence.<sup>23-25</sup>

But none of these studies showed AB to be the most common. There is local study in Mosul community in Iraq<sup>26</sup> showed A<sup>+</sup> are more susceptible to being allergic to all allergenic studies in both male and female and this results contrast to our study. The importance of the ABO histo-blood group system as a risk factor for allergic rhinitis is still unknown. The ABO histo-blood group system is characterized by the expression of carbohydrate antigens in different tissues.<sup>27</sup>

There is no doubt that some sort of association was investigated between ABO blood groups with other disease such as cancer of stomach, diabetes and urinary infections but association of ABO blood groups with allergy rhinitis had never been investigated extensively specially in Iraq.

Our study has tried to find out the association on the basis of history of allergy rhinitis in different blood groups and it is showed clinical significance as well as statistically significant p value.<sup>28</sup> Gelardi M et al. agreement with our study. It appears that most of the local and international studies point to the fact that family history has a positive effect on developing allergy. Significant associations between common allergic diseases and incident R A was found in this

population-based cohort study.<sup>29,30</sup> Lai NS et al. agreement with our study that findings provided support to the hypothesis that allergic diseases and RA might share a similar underlying etiologic pathway related to chronic inflammatory responses.

## CONCLUSION

The prevalence of blood groups in our study population has concluded that certain blood groups have more tendencies to develop allergic rhinitis while some are protected. The strong association between ABO blood groups and allergic rhinitis 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 allergic rhinitis at molecular level.

## ACKNOWLEDGEMENT

I would like to acknowledge assistant lecturer Roaa M. H. in pharmacology department and assistant lecturer Eman E Physiological department in collage of medicine/Wasit University to help me in statistical guidance in this study.

## REFERENCES

1. Storry JR and Olsson ML. The ABO blood group system revisited a review and update. *PubMed Immunohematology* 2009;(25):48–59.
2. Eastlund T. The histo-blood group ABO system and tissue transplantation. *Transfusion* 199;(38):975–88.
3. Reid ME and Bird GW. Associations between human red cell blood group antigens and disease. *PubMed Transfus Med Rev* 1990; (4):47–55.
4. O'Donnell J and Laffan MA. The relationship between ABO histo-blood group, factor VIII and von Willebrand factor. *PubMed Transfus Med* 2001;11(4):343–51.

5. Yamamoto F, Clausen H, White T, Marken J and Hakomori S. Molecular genetic basis of the histo-blood group ABO system. *Pub Med Nature* 1990. (345):229–33.
6. Skoner D P. Allergic rhinitis, Definition, epidemiology, pathophysiology, detection, and diagnosis. *J Allergy Clin Immunol* 2001;(108):S2–8.
7. Bousquet JN, Cruz AA, Denburg J, Fokkens WJ, Togias A et al. Allergic Rhinitis and its Impact on Asthma (ARLA) update (in collaboration with the World Health Organization, GA(2) and Aller Gen. *Allergy* 2008; (86):8-160.
8. Solé D, Mello Junior JF, Weckx LL, Rosário Filho NA, coordenadores. II Consenso Brasileiro sobre Rinites. *Rev Bras Alerg Immunopatol.* [Internet] 2006 [Accessed 2011 Mar 30] 29(1): 1-30 Available from: <http://www.asbai.org.br/revistas/Vol291/consenso.pdf>
9. Lasmar LM, Camargos PA, Ordones AB, Gaspar GR, Campos EG, Ribeiro GA. Prevalence of allergic rhinitis and its impact on the use of emergency care services in a group of children and adolescents with moderate to severe persistent asthma. *J Pediatr (Rio J)* 2007;83(6): 555-61.
10. Arlian LG, Platts-Mills TA. The biology of dust mites and the remediation of mite allergens in allergic disease; *J Allergy Clin Immunol* 2001;107(3):S406-13.
11. Majeed T, Hayee A. Prevalence of ABO blood groups and subgroups in a population of Lahore. *Biomedica* 2002;(18): 11-5.
12. *Rev Bras Hematol Hemoter.* Allergic rhinitis and association with the O blood group. *NCBI* 2011; 33(6): 406–407.
13. Edfors-Lubs ML. Allergy in 7000 twin pairs. *Pub Med Acta Allergol* 1971; (26):249–85.
14. Dávila I, Mullol J, Ferrer M, Bartra J, del Cuvillo A, Montoro J, Jáuregui I, Sastre J, Valero A. Genetic aspects of allergic rhinitis. *J Investig Allergol Clin Immunol* 2009; 19(Suppl 1):25–31.
15. Michel S, Liang L, Depner M, Klopp N, Ruether A, Kumar A, Schedel M, Vogelberg C, von Mutius E, von Berg A, Bufe A, Rietschel E, Heinzmann A, Laub O, Simma B, Frischer T, Genuneit J, Gut IG, Schreiber S, Lathrop M, Illig T, Kabesch M. Unifying candidate gene and GWAS approaches in asthma. *PLoS One* 2010; (5):e13894.
16. Andiappan AK, Wang de Y, Anantharaman R, Parate PN, Suri BK, Low HQ, Li Y, Zhao W, Castagnoli P, Liu J, Chew FT. Genome-wide association study for atopy and allergic rhinitis in a Singapore Chinese population. *PLoS ONE* 2011; (6):e19719.
17. De Yun Wang. Genetic predisposition for atopy and allergic rhinitis in the Singapore Chinese population. *Asia Pac Allergy* 2011; Oct 1(3): 152–156.
18. Solé D, Mello Junior JF, Weckx LL, Rosário Filho NA., coordenadores. II Consenso Brasileiro sobre Rinites 2006. *Rev Bras Alerg Immunopatol.* [Internet] 2006[Accessed 2011 Mar 30]29(1): 1-30 Available from: <http://www.asbai.org.br/revistas/Vol291/consenso.pdf>
19. Clara Carpeggiani. Allergic rhinitis and association with the O blood group 2011; 33(6): 406–407
20. Nelson Falsarella, Ana Iara da Costa Ferreira, Fabiana Nakashima, Cinara de Cássia Brandão de Mattos and Luiz Carlos de Mattos. Evidence of an association between the O blood group and allergic rhinitis 2011; 33(6): 444–448.
21. Bhatnagar DP, Bhutani B. Study of blood groups and rhesus isoimmunization in antenatal cases. *Anthropol Anz* 1980;(38): 148-53.
22. Bhatti R, Sheikh DM. Variations of ABO blood groups gene frequencies in the population of Sindh. *Ann King Edward Med Coll* 1999;(5): 328-31
23. Omotade OO, Adeyemo AA, Kayode CM, Falade SL. ABO & Rhesus Blood Groups, *Professional Med J* 2005; Dec .12(4): 368-371.
24. Gaertner H, Lyko J, Lyko S. The antigens ABO and Rh (D) in Nigeria population. *Hamdard Medicus* 1994; 37 (1): 81-91
25. Del Peon-Hidalgo L, Pacheco-Cano MG, Zavala-Ruiz M, Madueno- Lopez A, Garcia-Gonzalez A. Blood group frequencies and ABO and Rh (D) incompatibilities in La Paz, Baja California Sur, Mexico 2002; (44): 406-12.
26. Basma B Zakaria and Basima A Abdullah. Effect of different factors on Atopic Allergy In Mosul Community. *International Journal of Advanced Research* 2013;1(10), 927 -936
27. Oriol R ABO, Hh, Lewis and secretion: serology, genetics and tissue distribution In: Cartron JP, Rouger P, editors.( 1995).Blood cell biochemistry. molecular basis of human blood group antigens. New York: Plenum. p.37-73
28. Gelardi M, Iannuzzi L, Tafuri S, Passalacqua G, Quaranta N.( 2014).Allergic and non-allergic rhinitis: relationship with nasal polyposis, asthma and family history. *PubMed Feb.* 34(1):36-41
29. Lai NS, Tsai TY, Koo M, Lu MC. Association of rheumatoid arthritis with allergic diseases: A nationwide population-based cohort study. *Pubmed, Sep-Oct.* 36(5):99-103
30. Karsh JI, Chen Y, Lin M, Dales R.(2005).The association between allergy and rheumatoid arthritis in the Canadian population. *PubMed.* 20(9):783-7.

**Source of Support:** Nil.

**Conflict of Interest:** None Declared.

**Copyright:** © the author(s) and publisher. IJM RP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.

This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Cite this article as:** Oras N. Hamad. A Relationship between Allergic Rhinitis and ABO Blood Group and Related it with Genetics in Population Based Cohort Study in Kut. *Int J Med Res Prof.* 2016, 2(2); 71-74.