

Distribution of ABO and Rh blood groups in patients with tuberculosis in Rohilkhand region of Uttar Pradesh

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Abstract

Background: Tuberculosis is an infectious disease and cause of ill-health among millions of people each year. 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. Several studies conducted have shown significant association between ABO blood groups of people and pulmonary tuberculosis (PTB).

Objective: To determine an association between ABO blood grouping and rhesus (Rh) typing in patients with PTB (both sputum positive and negative) and extrapulmonary tuberculosis.

Materials and Methods: A prospective hospital-based study was conducted among patients attending OPD of Department of Pulmonary Medicine, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India. The ABO grouping and Rh typing were done among 300 patients with tuberculosis and 1,200 healthy controls using the standard slide agglutination reaction. The patients had clinical, radiological, microbiological, and biochemical evidence of tuberculosis.

Result: Among controls, the majority of patients were of B positive group, followed by O positive. However, in the test group, the majority of patients were of B positive group followed by A positive and then O positive. However, no significant association was observed between tuberculosis and ABO-Rh.

Conclusion: Though stated by various authors in studies from different parts of the India, the association between chronic diseases like tuberculosis with ABO-Rh varies in different region of India. In this study, no significant ($p > 0.05$) association was observed between ABO-Rh and tuberculosis.

KEY WORDS: ABO blood grouping, rhesus typing, tuberculosis

Introduction

Tuberculosis (TB) remains a major global health problem. It is an infectious disease caused by the bacillus *Mycobacterium tuberculosis*. It affects more commonly the lungs (pulmonary tuberculosis, PTB) but can affect other sites as well (extrapulmonary tuberculosis, EPTB). It causes ill-health

among millions of people each year and ranks as the second leading cause of death from an infectious disease worldwide, after the human immunodeficiency virus. According to latest estimates, over 8.6 million new TB cases were seen in 2012 and a whopping 1.3 million deaths due to TB in the world. The number of deaths due to TB is unacceptably large given that most are preventable.^[1]

Among the various factors that contribute to a person's individuality are antigens that are attached to the surface of red blood cells (RBCs) and naturally occurring antibodies that circulate in the serum. The various combinations of antigens and antibodies determine various blood groups.^[2]

The antigens of the ABO blood group system (A, B, and H determinants, respectively) are complex carbohydrate molecules on the extracellular surface of RBC membranes.^[3] However, along with their expression on RBCs, ABO antigens

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Table 1: Control and cases (sputum positive, sputum negative, and EPTB) with *p*-value

Blood group	Rh	Control	Case (Sp+)	Case (Sp-)	Case (EPTB)	Case (total)	<i>p</i> -Value
		Total Rh+ & Rh-	Total Rh+ & Rh-	Total Rh+ & Rh-	Total Rh+ & Rh-	Total Rh+ & Rh-	
A	Rh+	256 (21.3%)	52 (25.12%)	12 (24.49%)	14 (31.82%)	78 (26%)	>0.05 NS
	Rh-	12 (1%)	3 (1.45%)	0	0	3 (1%)	>0.05 NS
B	Rh+	404 (33.7%)	75 (36.23%)	21 (42.86%)	16 (36.36%)	112 (37.3%)	>0.05 NS
	Rh-	22 (1.8%)	5 (2.42%)	1 (2.04%)	0	6 (2%)	>0.05 NS
AB	Rh+	128 (10.7%)	24 (11.29%)	2 (4.08%)	2 (4.5%)	28 (9.3%)	>0.05 NS
	Rh-	9 (0.75%)	4 (1.93%)	0	0	4 (1.3%)	>0.05 NS
O	Rh+	353 (29.4%)	40 (19.32%)	12 (24.49%)	12 (27.27%)	64 (21.3%)	>0.05 N.S
	Rh-	16 (1.3%)	4 (1.93%)	1 (2.04%)	0	5 (1.7%)	>0.05 NS
Total	Rh	<i>n</i> = 1200	<i>n</i> = 207	<i>n</i> = 49	<i>n</i> = 44	<i>n</i> = 300	

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.^[4] Thus, the clinical significance of the ABO blood group system extends beyond transfusion medicine, and several reports have suggested an important involvement in the development of cardiovascular, oncological, and other diseases.^[5,6]

Several studies conducted have shown significant association between ABO blood groups of people and PTB. The minor forms of TB with more benign course occur more frequently in blood groups O and A, whereas patient with B blood group shows a high aggressive pathology.^[7]

This study was conducted to determine the presence of any relationship between TB and ABO-Rh of people.

Materials and Methods

This study was carried out to determine any association between ABO grouping and Rhesus (Rh) typing in patients with PTB (both sputum positive and negative) and EPTB.

This study was conducted in the Department of Pulmonary Medicine, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India. It caters mainly to the population of Bareilly district and adjoining areas. It was approved by institutional ethical committee and informed written consent was taken from all subjects.

All patients in the age group of 15 years and above with PTB and EPTB attending the outpatient department and those admitted in the wards of Department of Pulmonary Medicine, Rohilkhand Medical College and Hospital, Bareilly, were the subjects of this study.

A total of 1,200 healthy individuals were also investigated for the distribution of ABO blood group and Rh antigen, which formed the control group. These included healthy attendants and staff without any kind of history of TB.

Among patients with PTB, TB was diagnosed on the basis of clinical features, sputum smear for acid-fast bacilli (AFB), culture for mycobacterium, and chest X-ray. On the other hand, among patients with EPTB, the diagnosis was based on

clinical features, radiological (X-rays, ultrasound, CT scan), microbiological (AFB stain, cultures for mycobacterium), serological (PCR), and histological (fine-needle aspiration cytology, biopsy) tests.

The ABO grouping and Rh typing were done in all the cases diagnosed with TB.

χ^2 -Test was applied for analyzing the association between case and control groups in ABO-Rh and TB. A *p*-value of <0.05 was considered statistically significant.

Results

Total 300 patients (cases) and 1,200 healthy controls, nearly equal in mean age (i.e., 41.68 years in test group and 40.18 years in control group) and percentage of sex (i.e., 68.7% men and 31.3% women in test group and 67.8% men and 30.4% women in control group), were included in this study. ABO-Rh was determined for all cases along with other investigations.

Table 1 deals with the frequency distribution of blood groups and Rh typing among general population and patients with TB. The table shows the proportions of controls and cases showing no significance (*p* > 0.05) in ABO blood grouping and Rh typing in cases with PTB and EPTB of Rohilkhand region. The distribution of ABO-Rh was found to be similar in both cases and controls.

This study deals with frequency distribution of ABO-Rh among general population as well as among diagnosed tubercular cases (sputum positive, sputum negative, and EPTB) of Rohilkhand region of Uttar Pradesh. Of 1,200 controls, maximum cases were of group B (35.5%), Rh+/Rh- (33.7%/1.8%), followed by O (30.8%), Rh+/Rh- (29.4%/1.3%). But in 300 cases, maximum cases were of group B (39.3%), Rh+/Rh- (37.3%/2%), followed by A (27%), Rh+/Rh- (26%/1%), and then O (23%), Rh+/Rh- (21.3%/1.7%). Incidence of TB is slightly high in A-Rh+/Rh- then in O-Rh+/Rh- of cases as compared to control, but as a whole no significance has been observed between ABO-Rh and patients with TB of the Rohilkhand region.

Discussion

Buchannan and Hingley^[8] had similar observations in a series of 2,446 subjects where they concluded that there was no relation between blood group and any disease.^[8] No influence of blood group on PTB was observed by Shenoy and Daftary.^[9] Regional basis, Reddy and co-workers in their two studies conducted in Chittoor district of Rayalaseema in Andhra Pradesh^[10] and Warangal district of Telangana region^[11] found no association between ABO-Rh and PTB.

However, there are many studies that reported a relationship between ABO-Rh and TB. Viskum^[12] reported a significant increase of PTB in persons with blood groups O and AB. Rao et al.^[13] found an association between PTB with persons of blood groups O and A. Gondaliya et al.^[14] showed significant association among persons with blood group AB and PTB. Preponderance of blood group B was reported among Punjabis^[15] and Bengalis.^[16] But group O was more frequently observed among people of Kashmir, southern Rajasthan,^[17] and northern Rajasthan.^[2] Group A was in preponderance among patients with PTB of Sikkim. Jain^[18] observed higher incidence of AB group among PTB cases. Saha and Banerjee^[19] reported less incidence of TB among Chinese people with group O.

There are also reports indicating that Rh negative persons are more susceptible to TB than Rh positive people.^[20] However, Rao et al.^[13] observed a significant association between the incidence of TB and a positive Rh antigen in blood group A. Lewis and Woods^[21] and Shenoy and Daftary^[9] have failed to confirm these observations.

Thus, it is seen that various authors have shown different blood group incidences, which vary from region to region. Also, different studies have shown association of TB with different blood groups. Many authors disagree and found no correlation among blood groups, as in our study.

Mixed results have been reported in different studies, hence further more studies in large scale are required to prove a significant relationship between ABO-Rh and TB.

Conclusion

Though stated by various authors in studies from different parts of the India, the association between chronic diseases such as TB and ABO-Rh varies in different regions of India. In this study, no significant association was observed between ABO-Rh and TB.

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