



Original Research Article

## Distribution of ABO and Rh (D) Allele Frequency among COPD (Chronic Obstructive Pulmonary Disease) Patients

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### ABSTRACT

**Aim:** The present study was undertaken to investigate the distribution patterns of ABO and Rh-D allele frequency among COPD (Chronic Obstructive Pulmonary Disease) patients.

**Materials & Methods:** A total of 159 subjects (101 COPD patients and 58 controls) were evaluated for ABO and Rh (D) blood group typing and allele frequencies were calculated using chi square test.

**Result:** The present study revealed that frequency of blood group O was found to be highest (35.64%) in COPD patients as compared to controls (20.68%). The frequency of allele O (0.0597) was highest among COPD Patients followed by allele B (0.249) and A (0.154). In both COPD patients as well as healthy subjects, Rh (D)+ phenotype was more abundant (91.08% and 94.82% respectively) than the Rh (d)- phenotype. D allele was more frequent in both the groups (0.702 in COPD patients and 0.772 in controls). The Chi Square values for ABO blood group were found to be non significant in COPD patients and healthy individuals.

**Conclusion:** The present study suggests that there is no association between distributions of ABO blood types in COPD patients.

**Keywords:** COPD, ABO, Rh blood groups, allele frequency.

### INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a disease characterized by chronic airway inflammation and destruction of the lung parenchymal tissue, which causes obstruction in the expiratory airflow.<sup>[1]</sup> COPD is a major cause of mortality and morbidity and is estimated to be the third leading cause of death worldwide by 2030.<sup>[2]</sup> The formation of

reactive oxygen species (ROS) in lungs due to cigarette smoke and biomass exposure leads to the irreversible decrease in forced expiratory volume in one second (FEV1) of lungs and loss of muscle mass.<sup>[3,4]</sup> The ABO blood group system was the first genetic polymorphism to be determined in human beings and was described by Karl Landsteiner in 1900.<sup>[5]</sup>

The ABO blood group system consists of A, B and H carbohydrate antigens which are synthesized by a series of enzymatic reactions catalyzed by glycosyl-transferase and antibodies against these antigens. [6] The allele frequency of ABO and Rh groups varies considerably in different races, and socio-economic groups in distinct part of the world. [7] In India, blood group B frequency ranges from 6% in Negritos to Andamans, and 48% in Birijas of Bihar and group A is 20-30% in Western and Eastern Himalayas. [8] The blood group frequency in North India is B >O>A>AB. [9] The ABO blood groups have association with diseases like duodenal ulcer, urinary tract infection and diabetes mellitus. [10] The present study deals with the distribution of the ABO and Rh allele frequency among COPD patients and healthy individuals.

## **MATERIALS AND METHODS**

### ***Subjects***

For the present study, a total of 159 Individuals were evaluated. Individuals were chosen randomly for ABO and Rh blood typing out of these, 101 were COPD patients and 58 were healthy matched for age, gender and socio-economic status. An informed consent was taken from each person before sampling. Ethical clearance was obtained from Institutional Ethics Committee, Kurukshetra University.

### ***Sampling and Laboratory Investigations***

The blood samples were collected from each subject using sterilized disposable syringes with the help of a registered medical practitioner and were collected in EDTA containing vacutainers and transported to the laboratories for analysis. ABO and Rh blood grouping was performed concurrently. Red blood cell agglutination method was followed for ABO blood group analysis. On a clean, glass slide a drop of antisera-A, antisera-B and antisera-D was

placed then a drop of blood was added to each and mixed. Agglutination with antisera-A showed A blood group and with antisera-B showed B blood group, with both A and B showed AB and with neither of these showed O blood group. Agglutination with D showed positive test for D antigen.

### ***Statistical Analysis***

The allele frequencies of A, B and O alleles were calculated according to Yasuda (1984). [11] Square root method was used to calculate the d allele frequency. Chi-square test was used to estimate the probability of difference distributions occurring by chance.  $p < 0.05$  was considered to be statistically significant.

## **RESULTS**

The phenotype and allele frequency of ABO blood group of COPD patients and controls is presented in Table 1. The frequency of blood group O is more in COPD patients (35.64%) than controls (20.68%). Blood group B frequency is also found to be higher in COPD patients (33.66%) than controls (24.13%). But in blood group AB, controls (17.24%) frequency are more than COPD patients (9.90%) and blood group A frequency (37.93%) was also found to be higher as compare to the COPD patients (20.79%). The allele frequency of O allele was highest in the COPD patients (0.597) followed by allele B (0.249) and allele A (0.154). O allele frequency (0.455) was found to be highest and B allele frequency (0.235) was found to be lowest in controls. The chi square value was observed to be non-significant ( $p > 0.05$ ) in the COPD patients as well as healthy controls showing homogenous distribution (Table 2). In case of Rh (D) blood groups, 91.08% COPD patients were Rh (D)+ while only 8.91% were Rh (D)-. Allele frequency for D allele was 0.702 in COPD patients and 0.772 among controls (Table 3).

**Table 1: Phenotype and Allele Frequency of ABO Blood Groups among COPD Patients and Healthy Controls**

Population Group	N	ABO Phenotype				ABO Allele Frequency		
		A	B	AB	O	A	B	O
COPD Patients	Obs.	21(20.79)	34(33.66)	10(9.90)	36(35.64)	0.154	0.249	0.597
	Exp.	18.584	36.259	7.746	35.997			
Controls	Obs.	22(37.93)	14(24.13)	10(17.24)	12(20.68)	0.31	0.235	0.455
	Exp.	21.924	15.615	8.450	12.007			

Values in parenthesis show the percent frequency. Obs. - observed, Exp. - expected

**Table 2: Chi- Square Value of ABO Blood Groups among COPD Patients and Healthy Controls**

Population Group	df	Chi-Square value	Probability	Remarks
COPD Patients	3	1.11	P > 0.05	Non-significant
Controls	3	0.561	P > 0.05	Non-significant

**Table 3: Phenotype and Allele Frequency of Rh (D) Blood Groups among COPD Patients and Healthy Controls**

Population Group	Rh (D) Phenotype		Rh (D) Allele Frequency	
	Rh (D)+	Rh (D)-	D	D
COPD Patients	92(91.08)	9(8.91)	0.702	0.298
Controls	55(94.82)	3(5.17)	0.772	0.228

## DISCUSSION AND CONCLUSION

The study of blood group plays an important role in the organ transplantation, blood transfusion, genetic research, and forensic pathology. [12] Some blood groups have been reported to be associated with diseases like peptic ulcer, [13] type-2 diabetes mellitus [14] and Rh and ABO incompatibility of newborn. [15] The distribution of ABO blood group in gastric cancer and peptic ulcer patients was studied by various researchers. [16-23] The present study suggests that there is no association between distributions of ABO blood types in COPD patients. In the present study, COPD patients showed homogenous distribution of A, B and O alleles. Some studies reject the association between ABO blood groups in case of skin cancer and radical cystectomy. [24] Recent studies show an association between ABO blood groups and pancreas, esophagus, cardia, surgically resected colon cancers or even Crimean-Congo hemorrhagic fever of children. [25-29,24] Significant association between blood group O and asthma has been reported by Saini *et al.* (2014). [30] The ABO blood group system

is characterized by the expression of carbohydrate antigens in different tissues. [31] The glycosyltransferase coded by the ABO genes modifies the glycoconjugate expression. The glycoconjugates those expressed in the O blood group act as potential receptors for microorganisms these may bind with allergens and influence the immune response [32-34] which leads to the improper lung functioning with O blood group. [35] It is concluded from the finding of the present study that there is no association between distributions of ABO blood types in COPD patients.

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**Conflict Of Interest:** There are no conflicts of interest.

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