A retrospective study on ABO Blood Groups and Chronic Obstructive Pulmonary Diseases.

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ABSTRACT:
Objective: To investigate the potential association between ABO blood groups and the incidence of chronic obstructive pulmonary disease (COPD) in a population from Hyderabad, Pakistan.
Methodology: This was a retrospective comparative type of study conducted in the pulmonology OPD (Out Patient Department) of the Liaquat University Hospital Hyderabad from June 2023 to September 2023. Five hundred and thirty (n = 530) patients who visited pulmonology OPD were selected. Three hundred male and 230 female patients who visited the Pulmonology OPD for different respiratory illnesses were included in this study. COPD was diagnosed by the history of illness and x-ray chest posterior-anterior (P/A) view. Blood groups were determined by the blood agglutination method.
Results: The results show that most COPD male patients (13.20%) contain the O group, 8.45% have the A group, 5.66% have the B group, and 0.56% have the AB group. The *P* value was > 0.05, which was relatively higher in the O group patient when Fischer's exact test was applied.
Conclusion: The study concludes that there was a potential association between ABO blood group O and an increased risk of chronic obstructive pulmonary disease (COPD), warranting further research to confirm these findings.

Key words: Blood group, chronic obstructive pulmonary disease, Rhesus group, Hyderabad, Pakistan.

Introduction:

The rapid urbanization and its consequent environmental pollution have exposed the respiratory system with multiple chronic diseases. These chronic diseases are called chronic obstructive pulmonary disease (COPD). The early case of COPD was reported in 2600 B .C in Chinese and other Asian countries. COPD is characterized by sudden spasm of air ways with wheezing, shortness of breath and congestion of chest. It is usually associated with dry cough which exacerbate in the night hours.[1]

COPD is spreading very fast throughout the world. Its prevalence ratio is 1/10 i.e., every 10th person is suffering from COPD, which make it the 2nd most prevalent disease of the world.[2] It is estimated that about 392 million peoples are suffering from COPD throughout the world according to Gold definition.[3] It is a rapidly spreading disease that comes at 5th place by its proportion and it is estimated that by 2030 it would be at the 4th place. This disease is more common in the middle and the lower economic group.[4]

Chronic obstructive pulmonary diseases is a worldwide disorder characterized by chronic inflammation of lung parenchyma and infiltration of inflammatory exudate in respiratory tract. In COPD elasticity of lung wall is also decreased.[5]

Chronic obstructive pulmonary disease is caused by both extrinsic and intrinsic factors. In the extrinsic etiology different allergens and environmental pollutions are the leading cause. In the intrinsic etiology genetic causes are important. Different researches that were conducted in Australia, Taiwan and Italy showed that in genetic causes blood groups are the closely related to incidence of chronic obstructive pulmonary disease.[6] The other causes that cause COPD include recurrent infections, tobacco smoking to various domestic animals and smog. Female are more prone to non-tobacco etiologies.[7] The mortality and morbidity by COPD are increasing worldwide and it is estimated that 3 million people die per year because of this disease which is the 5% of total mortality throughout the world.[8]

The blood groups were discovered in early years of 19th century. From its detection to up to date many researches were conducted throughout the world to find out the association between blood groups and different diseases e.g. cancer, cardiovascular diseases, blood disorders and eclampsia.[9]

Blood groups are used for transplantation of different organs, tissue and blood transfusion. There are four blood groups. These include A, B, AB and O group. Landsteiner was the first person in 1941 who discovered Rh group and then the positive and negative groups were constituted.[10]

ABO blood groups are antigens made up of carbohydrate moiety, which are adherent to surface of Red blood cells and different epithelial cells. These antigens have especial capability of binding to different allergens leading to production of different diseases. e.g., COPD. The prevalence of COPD become enhanced when the parents also have the history of allergic disorder.[11]

International society of blood transfusion describe forty-three blood groups and 345 blood antigens. Blood groups were first discovered in 1900. There are four blood group A, B, AB and O which are recognized throughout the world. They are classified because of the presence of glycoprotein antigens. Other blood group included are Dell, Duffy, MNs and Kidd groups.[12] Antigens of ABO blood groups are distributed at different places in human body e.g., on Red Blood cells, Endothelium of vessels, platelets and different

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other cells of body. Blood groups antigens take part in hemostasis, cell membrane stabilization and act as receptor for allergens.[13] The antigen of one blood group may be stronger than other group that make them resistant to some specific diseases.[14]

Blood groups especially ABO system is strongly associated with some diseases. It is noted that O blood group is protective to pancreatic cancer while the non O blood groups suffer from cardiovascular diseases.[15] Blood groups are usually associated with allergic bronchospasm. It is also confirmed by increased level of eosinophils in serum level.[16] This study was conducted to find out that if there is any association involved between blood groups and chronic lung diseases.

Methodology:

This cross-sectional retrospective study was conducted in the outpatient department of Pulmonology, Liaquat University Hospital Hyderabad from June 2023 to September 2023. During study period we found record of 530 patients, resident of Hyderabad and suffering from chronic obstructive pulmonary disease complete in all respect. A prior consent was taken from the selected patients. All the patients selected were briefed about the procedure and their consent was taken. Their identity was disguised and they were informed about the result of the study. Record was searched based upon the objective of the study. Patients with co-morbidities; diabetes mellitus, cardiovascular disorder or any other diseases were excluded from the disease and those residing outside Hyderabad were also excluded.

For study purpose data retrieved included age, gender, duration of respiratory illness, nature of respiratory illness, blood group and any other comorbidities. All relevant data entered into a proforma developed specifically for current study.

The statistical analysis was done on Graph Pad Prism5. Fisher' exact test was applied to find out Odds ratio, likelihood ratio and specificity & sensitivity were calculated as appropriate. The P value less than 0.05 was considered as appropriate.

Results:

Among studied patients, male (n=300, 56.60%) outnumber female (n=230,43.39%). Most of the male patient with COPD (n=70,13.20%) were having blood group "O" followed next in frequency by blood group "A" in 45 patients with COPD. Similarly, frequency distribution of blood group "O" and "A" also found prevalent in female patients (n=60, n=40) with COPD. The least prevalent blood group in either gender was found blood group" B" (male n=30,5.66%; female n=22,4.15%). Details is shown in table no 1.

Blood groups are also classified as positive and negative based upon presence or absence of Rhesus (Rh) factor. This Rh system consists of highly polymorphic antigens embedded within membranes of red blood cells; function of these antigens is still not known. The stratification based upon Rh done, Rh+ male patients were 268, while Rh+ females were 200. Rh+ males were more affected COPD as compared to Rh+ female patients (26.03% and 13.20% respectively with p value of 0.03). Further statistical analysis showed ODD ratio 0.4, the sensitivity and specificity were 0.8/0.06 and the like hood ratio was 0.9 as shown in table no 2.

Table No 1: Distribution of COPD in ABO blood group in both genders.

	Blood Group	Normal	COPD	χ^2	df	p value
Male	A n=80	35 (6.6%)	45 (8.49%)	19	3	0.0002
	B n=89	50 (9.4%)	30 (5.66%)			
	AB n=20	17 (3.20%)	3 (0.56%)			
	O n=120	50 (9.43%)	70 (13.20%)			
	Total	152 (28.67%)	148 (27.92%)			
Female	A n=70	30 (5.66%)	40 (7.54%)	8.4	3	0.03
	B n=40	18 (3.39%)	22 (4.15%)			
	AB n=20	15 (2.83%)	5 (0.94%)			
	O n=100	40 (7.54%)	60 (11.32%)			
	Total	103 (19.43%)	127 (23.96%)			

Table no 2: The COPD in male and female patients based upon Rhesus (Rh) factor.

	Rh	Normal	COPD	p value	ODD Ratio	z statistic	Sensitivity/ specificity	Likely hood ratio
Male (n=300)	Rh + n=268	130 (24.52%)	138 (26.03%)	0.0688	0.48	1.820	0.8/0.06	0.9
	RH - n=32	22 (4.1%)	10 (1.88%)					
	Total	152 (28.67%)	148 (27.92%)					
female (n=230)	Rh + n=200	130 (24.52%)	70 (13.20%)	1.0	0.9	0.41 to 1.2	0.8/0.1	0.9
	Rh - 30	20(3.77%)	10 (1.88%)					
	Total	150 (28.30%)	80 (15.09%)					

Discussion:

Chronic obstructive pulmonary disease is a rapidly spreading diseases both in Asia and Europe. This disease is characterized by pulmonary spasm and flooding of pulmonary tract by secretion making it difficult for patient to breath. This disease has both intrinsic and extrinsic causes. This study focusses on one of the intrinsic causes i.e., blood groups. The present study concludes that blood group O male persons have more chances of having chronic obstructive pulmonary diseases (13.20%) while female of blood group O have 11.32% more chances of suffering from COPD; these finding are in contrast to the study of Moses Nnaemeka Alo et al,[17] who reported 37.0% COPD patients have blood group A. The probable explanation may be the contrasting difference in sample size This contrast result may be because the later study had a broad sample size which may be the reason behind it. However, findings are in agreement with study of Teena Lal et al,[1] who concluded that most of the patients of COPD were having O blood group. Doku GN et al;[18] identified a signifi-

cant correlation between group O and patients belonging to the O group, indicating that geographical distribution may yield different outcomes. This suggests that further comprehensive research is necessary in this area.[19] Additionally, a study by S. Su et al.[9] highlighted a strong association between patients with COPD, which aligns with the findings of the current study.

One potential explanation for this association is that ABO antigens might amplify the inflammatory response directed at lung parenchyma. Another possible mechanism involves the influence of these antigens on gas diffusion within the lungs. Additionally, these antigens may constrict blood capillaries in the lungs, resulting in reduced perfusion and a potential link to chronic obstructive pulmonary disease (COPD). Given the lack of consensus among researchers worldwide regarding the relationship between ABO blood groups and COPD, further global research is essential to reach a unified understanding on this matter.

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