ORIGINAL ARTICLE e-ISSN: 2349-0659 p-ISSN; 2350-0964

Correlation of ABO Rh and Cholelithiasis: A Prospective Observational Study in a Zonal Hospital, North India

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Abstract

Background: Karl Landsteiner discovered the ABO blood group system in 1901 and Rh factor in 1940, since then, scientists searched for an association between different pathologies and the ABO blood group system of patients. ABO blood groups have been shown to be associated not only with various diseases but also with metabolic process. **Objective:** This study was done to determine if there is any significant correlation between ABO-Rh and cholelithiasis. **Materials and Methods:** This is hospital-based prospective observational study in which 360 patients with ultrasonography proven symptomatic cholelithiasis, belonging to different socioeconomic conditions and various geographical locations of India, underwent laparoscopic cholecystectomy formed the study population. The ABO Rh of the 360 patients was done by standard agglutination technique in blood bank of department of pathology. For statistical analysis data were enter into the MS Excel sheet. **Results:** Cholelithiasis was predominant in females (85%) than males. Age group of 51–60 years has the maximum number of patients. Blood group "O" has maximum number of cholelithiasis patients (69.6%) followed blood group "B" (37.2%). Among blood group "O" Rh positive had numerous stone of cholesterol type, followed by blood group "B" Rh positive. **Conclusion:** In this study, incidence of cholelithiasis was maximum in the blood group "O" Rh positive with the cholesterol stones as the predominant type of stone. These results has not corroborated with the existing literature, suggesting variability. A large prospective study could potentially reveal if any correlation exists and this could open the doorway to future research on the etiologies of gall stone diseases.

Keywords: ABO Rh, Cholelithiasis, Ultrasonography

Asian Pac. J. Health Sci., (2021); DOI: 10.21276/apjhs.2021.8.2.04

Introduction

Landsteiner[1,2] discovered the ABO blood group system in 1901 and the Rh factor in 1940. Since then, scientists, such as Helmbold and Prokop[3-7], Böckmann,[8] Küpferling,[9] Vogel and Kruger,[10,11] and Bernd and Pietschker,[12] have searched for an association between different pathologies and the ABO blood group system of patients. The ABO system occurs as a result of polymorphism of complex carbohydrate structures of glycoproteins and glycolipids expressed at the surface of erythrocytes or other cells, or present in secretions, as glycan units of mucin glycoproteins. The blood types are inherited through autosomal genes on chromosome 9.[13] Frequency of blood group varies worldwide based on different geographical location, ethnicity, and socio-economic conditions.[14-19] Similarly, the prevalence of different blood group also varies in different parts of India. The frequency of blood group B is highest among the Brahmins and Rajput's of Himachal Pradesh, followed by O, A, and then AB[18] and also in North India,[20] whereas in South India O group was found to be most common followed by blood group B, A, and AB.[19] In West Bengal, on the other hand, it is reported that among the studied population the B blood group is most common followed by blood group O, A, and then blood group AB.[21] ABO blood groups have been shown to be associated not only with various diseases but also with metabolic process. Various risk factors for cholelithiasis is established such as age, sex obesity, parity, diet, socio-economic condition, geographical location, and genetics which is responsible for cholesterol metabolism.[22] Many studies are available that shows ABO blood groups and Rhesus typing as risk factor for cholelithiasis, in addition to the established factors. The findings of different studies are, however, not uniform. Some studies revealed definite relationship between gall stones and particular blood group. Although the findings of these studies were not uniform, it created interest for us to take up this for prospective observational study on 360 patients of ultrasonography proven symptomatic cholelithiasis underwent laparoscopic cholecystectomy.

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How to cite this article: Chhikara A, Kumar RR, Gupta A, Mohan H, Trehan V, Antony T, Kishore KN, Kumar SS. Correlation of ABO Rh and Cholelithiasis: A Prospective Observational Study in a Zonal Hospital, North India. Asian Pac. J. Health Sci., 2021; 8(2):26-29.

Source of support: Nil

Conflicts of interest: None.

Received: 21/12/2020 **Revised:** 15/1/2021 **Accepted:** 25/02/2021

Objective

The objective of the study was to determine if there is any significant correlation between ABO Rh and cholelithiasis.

Materials and Methods

Study Type

This was a prospective observational study.

Study Population

A total of 360 patients included in the study.

Inclusion Criteria

Adult patient of both sex, belonging to different socioeconomic conditions, and various geographical locations of India and who had ultrasonography proven symptomatic cholelithiasis, underwent laparoscopic cholecystectomy.

Exclusion Criteria

Obese, diabetic, pregnant women, menopausal patients on hormonal replacement therapy, and acute calculus cholecystitis were excluded from the study.

Place of study

This study was conducted at 7 A F Hospital Kanpur, India,

Duration of study

The study duration was from January 1, 2018, to December 31, 2019.

Methodology

ABO grouping and Rh typing of all patients were done by standard agglutination technique at the blood bank in the department of pathology. Preoperative workup and fitness for general anesthesia were done. Informed written consent was obtained from all the patients before the operative procedures. The hospital ethical committee had approved the study. All patients underwent laparoscopic cholecystectomy under general anesthesia. Perioperative findings were recorded.

Statistical Analysis

Data were collected from medical records which were entered into the MS Excel sheet for analysis. Continuous variables were presented as categorical data, as number, percentage, pie chart, and bar diagram.

Results

Age and Gender

In the present study of 360 patients of cholelithiasis, maximum number of patients was clustered in to the age group of 51–60 years followed by age group of 31–40 years which are presented in Table 1 and shown in Figure 1. The incidence of cholelithiasis was more in females ($n = 306$, 85%) as compared to males ($n = 54$, 15%). The female-male ratio worked out to be of 5.7:1.

Blood Group and Rh Factor

Blood group "O" has maximum number of cholelithiasis patients (69.6%), among them 93.3% Rh positive and 6.8% Rh negative. Cholelithiasis among the blood group "B" was in 37.2% patients, out of them 96.7% Rh positive and 3.3% Rh negative, presented in Table 2 and shown in Figure 2.

Multiplicity and Type of Stone

Blood group "O" Rh positive had numerous stone of cholesterol type followed by blood group "B" Rh positive which are resented in Table 3.

Table 1: "Age and sex distribution"

Age (Years)	*Female*	*Male*	*Total*
20–30	45	9	54
31–40	72	6	78
41–50	63	9	72
51–60	72	21	93
61–70	39	6	45
71–80	15	3	18
	306 (85%)	54 (15%)	360

Table 2: "ABO Rh Distribution"

Blood group	*Rh positive*	*Rh negative*	*Total*
A	60 (83.4%)	12 (66.7%)	72 (28.8%)
B	90 (96.7%)	3 (3.3%)	93 (37.2%)
O	162 (93.2%)	12 (6.8%)	174 (69.6%)
AB	21 (100%)	0	21 (8.4%)

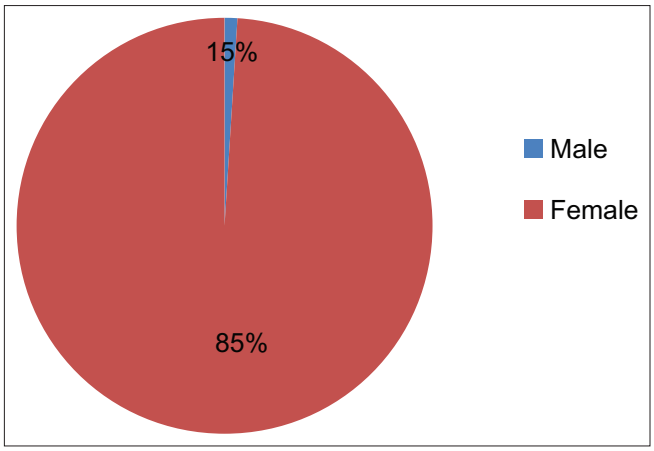

Figure 1: "Gender wise distribution"

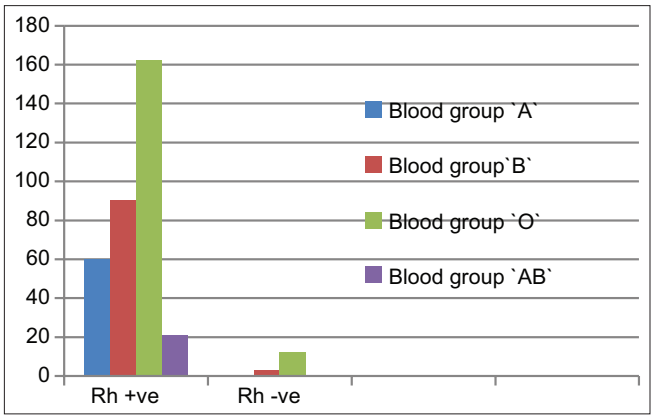

Figure 2: "ABO blood group and Rh distribution"

Discussion

Frequency of blood group varies worldwide based on different geographical location, ethnicity, and socio-economic conditions. ABO blood groups have been shown to be associated not only with various diseases but also with metabolic process. Various risk factors for cholelithiasis are established such as age, sex obesity, parity, diet, socio-economic condition, geographical location, and genetics which are responsible for cholesterol metabolism. Plenty of research has been performed for the correlation of ABO-Rh

Table 3: "Number and types of gall bladder stone and ABO-Rh blood group"

No. of stone in gall bladder and type	*Blood group A*		*Blood group O*		*Blood group AB*		*Blood group B*	
	Positive	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*
1. Single	27	6	54	3	18	0	30	0
a. Cholesterol	15	3	27	3	6	0	27	0
b. Pigmented	6	0	9	0	6	0	0	0
c. Mixed	6	3	18	0	6	0	3	0
2. Multiple	33	6	108	9	3	0	60	3
a. Cholesterol	15	3	75	6	3	0	45	3
b. Pigmented	9	3	9	3	0	0	9	0
c. Mixed	9	0	24	0	0	0	6	0

and cholelithiasis. In the study by Jesch *et al*.[23] of 237 patients in which defined pathologies and their association with ABO blood group was correlated, cholelithiasis was present in 47 patients, with blood group "O" having highest (25.7%) and blood group "B" (17.8%). Juvonen and Niemela[24] in his study on 171 patients with symptomatic cholelithiasis, revealed a predominance of blood group "A" (44%), followed by "O" (31%) and "B" (17%). Kratzer *et al*.[25] have done a study on 1030 blood donors which show that blood group "AB" was highest (12.1%), however blood group "A" had more stones. Chakravartti and Chakravartti[26] did a study on 321 patients and 688 controls, which showed blood group "A" subjects have somewhat higher risk for gallstones but have more numerous gallstones of smaller size. However, Chen *et al*.[27] in the study of 236 patients with cholelithiasis did not show any corelation between blood group and cholelithiasis. A group of 174 hospital patients was studied by Monaci *et al*.[28] to discover the incidence of blood group in comparison, with a similar analysis of a representative sample (1872 people) of the Amiata Community as a whole and it was felt that there is no statistical proof that one or more of these blood groups is more prone to gall stone, at least in Maibam *et al*.[29] in his study of 150 patients of cholelithiasis 62 patients (41.33%) had blood group "O" and 46 (30.67%) blood group "A." In present study of 360 patients, cholelithiasis was predominant in females (85%) than in males. Age group of 51–60 years has the maximum number of patients. 174 patient (69.6%) of cholelithiasis belonged to the blood group "O" (Rh positive-162 and Rh negative-12), followed by blood group "B" in 93 patients (37.2%) which was similar to the study by Jesch *et al*.[23] Among blood group "O," Rh positive patients had numerous stone of cholesterol type followed by Blood group "B" Rh positive patients. However, the conclusions of different studies were not uniform; it has definitely opened an area of interest where further research can be done to ascertain whether the relationship of ABO blood group and cholelithiasis is probable or coincidental.

Conclusion

In this study shows maximum incidence of cholelithiasis in the blood group "O" Rh positive with the cholesterol stones as the predominant type of stone. These results has not corroborated with the existing literature, suggesting variability. A large prospective study could potentially reveal if any correlation exists and this could open the doorway to future research on the etiologies of gall stone diseases.

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