



Original Research Article

## Distribution Frequency of ABO and Rhesus Blood Groups among Medical Students - A Study from Narayana Medical College and Hospital in South India

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### ABSTRACT

The distribution frequency of main blood group system ABO and Rh varies in population living in different parts of India as well as in the world. Objective of this study is to find out the distribution pattern of ABO blood groups and Rh factor among Medical students of Narayana Medical College.

**Method:** This study aimed to find out the frequency of ABO blood groups among the students studied in Narayana medical college. For this study 614 medical and paramedical students were included. Data was obtained by questionnaire about their blood group and simple blood test method by which Blood was collected by finger prick method. A drop of monoclonal anti-A, anti-B and anti – D was added to a drop of cell suspension prepared from finger prick blood and normal saline on clean white tile and mixed well. Results of agglutination were recorded immediately.

**Results:** Amongst ABO system, blood group O was the most common (43.48%) in our study group. And the frequencies of the blood groups A, B, AB were found in order as 27.68%, 22.96%, and 5.86% respectively. The frequency of Rh +ve (81.43%) was more among the medical students than the Rh –ve (18.56%).

**Conclusion:** The current study documents ABO blood group and Rh factor distribution pattern amongst students. The data of the study showed that blood group O and the Rh +ve were more common where as the AB blood group is the least common among the students.

**Key words:** ABO Blood Group, ABO Antigens, Rh factor, Medical Students.

### INTRODUCTION

On the surface of human red blood cell membranes a series of glycoproteins and glycolipids which constitute a variety of blood group antigens. Development of these antigens during fetal life is under genetical control and remains unchanged till death. [1]

In 1900, Australian scientist Karl Landsteiner described the most known blood

grouping systems are an ABO and Rh blood group systems. [2] In addition to ABO there are other systems such as Rhesus blood group system, MNS system, Kell, Kidd, Lewis system etc, are existed. However, the most common blood group systems in human are ABO blood group system and Rhesus blood group systems. [3] The most familiar antigens are the A and B antigens

which are inherited as Mendelian allelomorphs. [4] Type 'A' individual has the 'A' antigen, type 'B' individual has 'B' antigen, individual with type 'AB' has both antigens, and individual with type-'O' has no antigen. Blood group antigens are also called as agglutinogens which are also found in many tissues in the body like amniotic fluid, kidney, liver, lungs pancreas, salivary glands, saliva, semen and testis. [5] The antibodies against red blood cell antigens are called agglutinins. [6]

Type A and B antigens are actually complex oligosaccharides that differ in their terminal sugar. [4] The genes related to blood group systems ABO and Rh (D) are located on Chromosome 9 and 1. [7] The ABO antigen expression is controlled by three separate genes located on chromosome 9 x FUT1. H and FUT2 (Se) which are located on chromosome 19. [8] The gene codes for different enzymes, i.e., glycosyltransferase are attached to specific monosaccharide onto precursor disaccharide chains. Mutation of the A leads to arose of the O and B genes. The B gene differs from A by adhering to nucleotide substitution. The O gene does not encode for the production of a function of a functional enzyme. [9] There are over 700 erythrocyte antigens are possible known. [10]

And many of these antigens that stem from one allele or very closely linked genes are collectively formed a blood group system. [11] 30 blood group systems are organized by the International Society of Blood Transfusion. [10]

All human populations in the world share the same blood group systems; although the frequencies of four specific phenotypes A, B, O, and AB vary markedly differ throughout the world. [12]

## MATERIALS AND METHODS

The study was conducted in the Department of Physiology at Narayana Medical College and Hospital, Nellore, AP

State, India from December 2014 to April 2015. A total of 614 healthy young medical and paramedical students between the ages of 18 to 25 years were included in the study. Subjects from northern, eastern and western part of India and non residents of India were excluded. The ABO blood group was determined in a practical in Physiology laboratory by standard method and also by questionnaire about their blood group. Blood groups were determined on the basis of agglutination. The Cell suspension was prepared from Blood samples collected from all students by finger prick with a sterile lancet under aseptic conditions. Antisera used for ABO were monoclonal anti-A, monoclonal anti-B, monoclonal anti-D (IgM). A drop of antisera, anti A and anti B was placed on a white tile in three places. A drop of cell suspension was added and mixed with each anti sera's individually with the help of separate glass rods. Then, the mixture was rocked gently for 60seconds to observe for agglutination. The agglutination in blood drop A was observed as group A, and agglutination in the blood drop B as group B. The agglutination in both drops was observed as group AB, and if both blood drops were not agglutinated, it was considered as group O. In case of doubt, the test was examined under a microscope.

## RESULTS

The data was collected from 614 medical students. The frequency distribution of the ABO blood groups is shown in Table 1.

Table I: Showing Distribution of ABO Blood Group System in Students.

S.NO	BLOOD GROUP	SUBJECTS	PERCENTAGE
1.	A	170	27.68%
2.	B	141	22.96%
3.	AB	36	5.86%
4.	O	267	43.48%
5.	TOTAL	614	100%

The frequency distribution of the medical students showed that blood group O

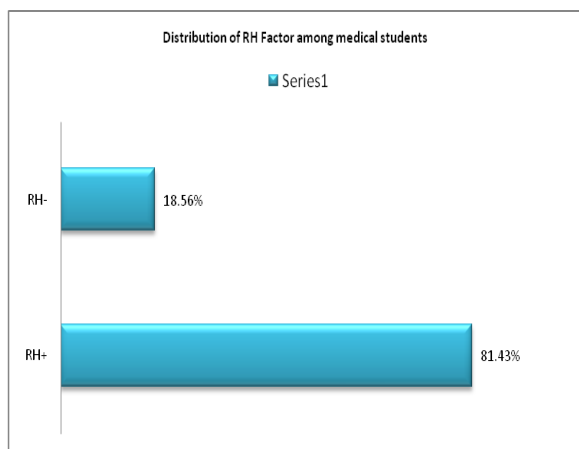
is most common which has the highest frequency (43.48%), where as the blood group AB has the lowest frequency (3.2%) which is the least commonest blood group among medical students as shown in Table 1 above.

**Table 2: Showing distribution of ABO blood Groups and Rh factors Among Medical Students.**

BLOOD GROUP	SUBJECTS	PERCENTAGE
A+	155	25.24%
A-	15	2.44%
B+	107	16.93%
B-	34	5.3%
AB+	24	3.90%
AB-	12	1.95%
O+	214	34.85%
O-	53	8.63%
TOTAL	614	100%

**TABLE 3: Showing Distribution of Rh factor Among Medical Students.**

BLOOD GROUP	SUBJECTS	PERCENTAGE
RH+	500	81.43%
RH-	114	18.56%
Total	614	100%



## DISCUSSION

The study of blood groups and their distribution among different population is an interesting topic since decades because of its great clinical importance not only for safe blood transfusion, organ transplantation and also play vital role for various genetics research studies, human evolution, blood group related diseases, environment, to find

out medico legal cases in forensic pathology, anthropology and training ancestral relation of human, to prevent hazards linked to Rhesus Incompatibility. [13] Knowledge of the distribution of ABO and Rhesus (Rh) blood group is also essential for effective management of blood bank. [14] Due to the influence of factors like genetics and environment, there is a wide variation of blood group frequency in different parts of the world. [15]

Many other studies have been found that common blood group is O. There are differences in the distribution of ABO, and Rh (D) blood groups amongst different populations. Previous studies showed that Countries like Australia, [16] Britain [17] and USA, [18] Saudi Arabia, [19] India, [15] blood group 'O' is the commonest blood group. In Africans [19] predominant blood group is B. Lapps and in Europeans there is a higher predominance of blood group A. [19] In our study the distribution of blood group O was the highest and the commonest with percentage of 43.48% followed by A, B and AB. The frequency of A is 27.68%, B is 22.96% and AB is 5.86%.

Our study also shows the frequency of Rh factor +ve was 81.43% and the Rh -ve was 18.56%. It was found that in south Indian population the predominant blood group is O+ve and the frequency of Rh+ve factor more than Rh -ve. The low frequency of Rhesus negative in population is advantageous in reduction of Rh incompatibility.

Knowledge of blood group and routine practice of blood typing and cross matching may reduce complications caused by the mismatched transfusion reactions.

Our data are consistent with data of many previous and present studies done around the world on distribution frequency of major blood groups that was reporting 'O' blood group is the most common and the

frequency of Rh + factor is more than Rh – ve.

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