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Pattern of ABO and Rhesus blood group distribution among students of Ebonyi State University, Abakaliki, South Eastern Nigeria

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ABSTRACT

Aims and Objectives: The objective of this study is to have information on the distribution of ABO and Rhesus blood group among the students so as to determine the need for routine screening for hemolysin among blood group O, if found to be high, as well as to institute donor registry for Rhesus negative blood group, if found to be low. **Materials and Methods:** This was a retrospective study and record of ABO and Rhesus blood group results of students screened between May 2010 and April 2011 was obtained from the University Medical Centre. Data was analyzed using Epi info, version 5.3.4. Descriptive statistics were used to compute percentages and averages. Results were presented in tables and charts and expressed as percentages/proportions, means and standard deviation. **Results:** Three thousand, two hundred and eighty three results were obtained, made up of 1749 males and 1534 females with the ratio of 1.1:1. The age of the students ranged between 16 – 47years with mean age of 22 ± 5years. Among the population studied, blood group O had the highest percentage (57.7%), followed by blood group A (22.1%), then B (18.1%), while AB had the least (2.1%). Most of the students were found to be Rhesus positive (95.8%) while Rhesus negative was 4.2%. **Conclusion:** Blood group O was found to be highest among the study population followed by A, B and AB in that order. Most of the students were found to be Rhesus positive while only a minority were Rhesus negative. Routine screening for hemolysin among blood group O and institution of donor registry is recommended.

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Key words: ABO and Rhesus blood group, University students, Nigeria

INTRODUCTION

Several blood group systems have been identified but ABO and Rhesus blood groups are the most important in transfusion medicine. ABO blood group was discovered by Landsteiner in 1900, and was later followed, in 1939, by the discovery of the rhesus system, the second most important blood group system after ABO.[1] The determination of blood groups is base on inherited antigenic substances which are located on the surface of red blood cells.

In the ABO system, individuals are classified into four major blood groups namely, A, B, AB and O, depending on the type of antigen present on the red cell surface while in the Rhesus system, they are classified into Rhesus positive and Rhesus negative.[2] In addition to the importance of these blood groups in transfusion medicine, they have also been found useful in population genetic studies, organ transplantation as wells in resolving medico-legal issues such as disputed parentage. Moreover, there are several reports in which some associations have been found between ABO and Rhesus blood group systems and certain diseases. For instance, ABO blood group has been reported to be associated with the risk of developing gastric cancer, peptic ulcer disease as well as vascular disease.[3,4]

A wide range of studies have been conducted to determine the frequency of ABO and Rhesus blood groups with diverging phenotypic results across various

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ethnic populations in different geographical regions. In Caucasians in the United states, the distribution is 47% for group O, 41% for group A, 9% for group B and 3% for group AB. Among the African Americans, the distribution is 46% for group O, 27% for group A, 20% for group B and 7% for group AB. In the Orientals, the distribution of blood group is 36% for group O, 28% for group A, 23% for group B and 13% for group AB.[5] In Nigeria, different studies have also reported similar findings with blood group O having the highest frequency, followed by A, then B while AB has the lowest frequency.[6-8] As blood group determination is important in clinical practice, it was desirable to find out the prevalence of different blood groups among students of Ebonyi State University, who are mainly indigenes of Ebonyi State, where no earlier serological data was available. The present study was therefore carried out to determine the distribution of ABO and Rhesus blood groups among students of Ebonyi State University. The aim is to have information on the distribution pattern of these blood groups which may help to improve blood transfusion services, by routine screening for hemolysin among blood group O, if found to be high, as well as institution of donor registry for Rhesus negative blood group, if found to be low. This will help to prevent hemolytic transfusion reactions and death, hemolytic disease of the fetus and newborn as well as to make for easy accessibility to rhesus negative blood for transfusion especially in cases of emergency.

MATERIALS AND METHODS

This was a retrospective study and record of ABO and Rhesus blood group results of students screened between May 2010 and April 2011 was obtained from the University Medical Centre. Data was analyzed using Epi info, version 5.3.4. Descriptive statistics were used to compute percentages and averages. Results were presented in tables and charts and expressed as percentages/proportions, means and standard deviation.

Ethical issues

The study procedure was approved by the Management of Ebonyi state University, Abakaliki.

RESULTS

Three thousand, two hundred and eighty three results were obtained, made up of 1749 males and 1534 females with the ratio of 1.1:1. The age of the students ranged between 16 – 47 years with mean age of 22 ±5years. Among the population studied, blood group O had the highest frequency, 1898 (57.7%), followed by blood group A, 724 (22.1%), then B 593 (18.1%), while AB had the least frequency, 68 (2.1%) (Figure 1). According to the rhesus system, most of the students were found to be Rhesus positive with frequency of 3146 (95.8%) while Rhesus negative was 137 (4.2%) (Figure 2).

Among the male students, blood group O was the highest with a frequency of 1017 (58.2%), followed by blood group A with a frequency of 385 (22%). Frequency of blood group B and AB were 315 (18%) and 32 (1.8%) respectively. Likewise, among the female students, blood group O had the highest frequency, 881 (57.5%), followed by blood group A with a frequency of 339 (22.1%), then blood group B, 278 (18.2%), while blood group AB was the least, 36 (2.2%) (Table 1). Most of the male and female students were found to have rhesus positive blood group, 1679 (96 0%) and 1467 (95.6%) respectively (Table 2).

With respect to rhesus blood group system among the population studied, blood group O+ was the most common with frequency of 1819 (55.3%), followed by A+ with frequency of 696 (21.2%), then B+ 565 (17.2%) and AB+ 66 (2.0%), whereas among the rhesus negative students, blood group O- was the most frequent 79 (2.4%), blood group A- and B- were 28 (0.8%) each while blood group AB- was 2 (0.1%), as shown in Table 3.

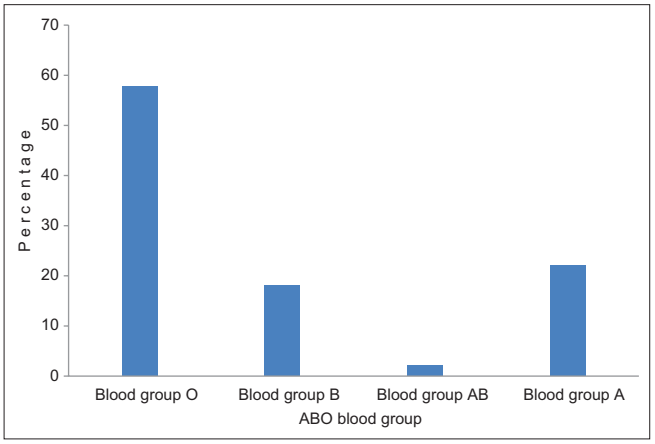

Figure 1: ABO blood group distribution pattern of the students

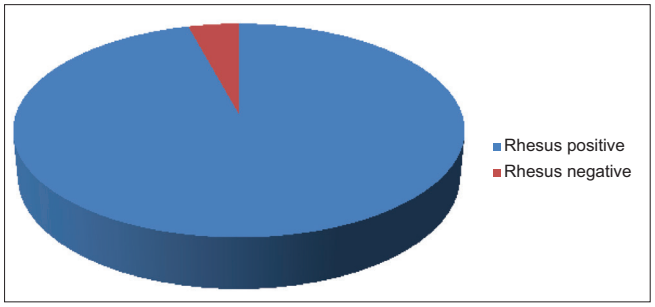

Figure 2: Rhesus blood group distribution pattern among the students

Table 1: ABO blood group distribution according to gender

ABO blood group	Females		Males	
	Frequency	Percentage	Frequency	Percentage
O	881	57.5	1017	58.2
A	339	22.1	385	22.0
B	278	18.2	315	18.0
AB	36	2.2	32	1.8
Total	1534	100	1749	100

Table 2: Rhesus blood group distribution according to gender

Rhesus blood group	Females		Males	
	Frequency	Percentage	Frequency	Percentage
Rhesus positive	1467	95.6	1679	96.0
Rhesus negative	67	4.3	70	4.0
Total	1534	100	1749	100

Table 3: Distribution of ABO and Rhesus blood group systems among the students

Blood group	Frequency	Percentage
O+	1819	55.3
A+	696	21.2
B+	565	17.2
AB+	66	2.0
O−	79	2.4
A−	28	0.8
B−	28	0.8
AB−	2	0.1
Total	3283	100

DISCUSSION

In this study, blood group O was found to be the most common, followed by group A, then B, while the least frequent was blood group AB. This agrees with the report of previous studies which also found blood group O to be the most common while blood group AB was the least frequent.[9,10] However, some studies have reported either blood group A or B to be the most prevalent blood group. Sharma et al, reported blood group B as the most prevalent one in India.[11] Similarly, Khan et al, showed the frequency of blood group B to be the highest among the Pakistan population studied.[12] Such contradictions are probably due to geographical environment and ethnic groups in the study populations. Moreover, it shows that specific ABO blood groups might be distributed in different regions of the world.

Blood group O was initially regarded as a universal donor and so can be given to anybody with any other blood group apart from group O. It has been documented that some blood group O individuals have high titre of hemolysin,[13] an anti-A and anti-B antibodies in their plasma and so can cause hemolytic transfusion reaction and death when such blood group O is transfused to anybody with any other blood type apart from group O. Since majority of the study population have blood group O, there may be need for routine screening for hemolysin among blood group O individuals.

This study also found that among the both male and female students, blood group O has the highest frequency, followed by blood group A, B and AB in that order. This corroborates with findings of previous studies that reported similar pattern of ABO blood group distribution among both sexes.[8] However, some other studies reported blood group A to be the most frequent among males, while blood group B has the highest frequency among females.[14,15] Most of the male and female students were found to have rhesus positive blood group as also reported by previous studies.[6,8] This shows that inheritance of ABO and rhesus blood groups are not sex-linked.[2]

Among the study population, most of the students were Rhesus positive while only a minority was rhesus negative. A similar finding was also reported by previous studies.[16] These findings confirmed the trend of relatively low incidence of rhesus negativity in Nigeria and beyond.[5,16]

CONCLUSION

Blood group O was found to be highest among the study population with prevalence of 57.7%, followed by A, B and AB in that order. Most of the students were found to be Rhesus positive while only a minority were Rhesus negative. This finding will be useful in health care planning, genetic counseling and running of an organized, efficient and safe blood transfusion services. Routine screening of blood group O for hemolysin is recommended to prevent hemolytic transfusion reaction. Rhesus negative blood group were found to be few. Institution of blood donor registry is also recommended for easy accessibility to rhesus negative blood for transfusion especially in cases of emergency and also to prevent hemolytic disease of the fetus and newborn.

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Authors Contribution:
Concept and design of the study, review of literature, data collection, statistically analyzed and interpreted, manuscript preparation and critical revision of the manuscript.

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