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Research Article

STUDY OF ABO AND RH-D BLOOD GROUPS AMONG THE COMMON PEOPLE OF CAPITAL CITY OF BANGLADESH

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ABSTRACT

Objective: This study was aimed to identify the distribution patterns of ABO and Rh-D blood group among the population of capital city of Bangladesh in order to promote social awareness and safe blood transfusion among the population.

Method: It was an observational cross sectional study conducted in the Department of Physiology, Dhaka Medical College, Bangladesh from July 2008 to June 2009. After proper ethical consideration a total of 784 people of Dhaka city were included in this study. They were selected irrespective of age and sex by systematic random sampling. ABO and Rh-D blood groups were determined by the antigen antibody agglutination test of slide method.

Results: Sixty percent respondents were above the age group 20 years old and 56% respondents were female. Majority (39.8%) were identified as having blood group B while 27.6% were blood group O 23.5% and 9.2% were blood group A and AB respectively. Rh-D positive were 97.4% and Rh-D negative were 2.6%.

Conclusion: Most common blood group among the population of Dhaka city was B and Rh-D positive. Study of blood grouping is not only generating a simple database but also create a great social awareness about self-blood grouping and safe blood transfusion among the population of a country.

Keywords: ABO, Rh-D, Blood group system, Social awareness, Bangladesh.

INTRODUCTION

Karl Landsteiner discovered the first and most important blood group system, the ABO blood group system, in 1901. Rh blood group system was the fourth system to be discovered and yet it is second most important blood group from the point of view of transfusion. The ABO and Rh antigens are recognized as the major clinically significant blood group antigens [1]. Blood group or blood type is based on the presence or absence of inherited antigenic substance on the surface of red blood cells that can be determined by specific antibodies [2]. More than 600 surface antigens have been found on red blood cells [3] and several of these antigens that stem from one allele or very closely linked genes are collectively form a blood group system [4]. The importance of blood group discovery lies in the transfusion of blood amongst different populations irrespective of their ethnic origin, in organ transplantation and in the development of legal medicine, genetic research and anthropology [5].

Human red blood cells contain on their surface a series of glycoproteins and glycolipids, which constitute blood group antigens. Development of these antigens are genetically controlled and they appear early in fetal life and remain unchanged till death [2].

The major ABO blood group system is divided into four blood types on the basis of presence or absence of A and B surface antigens. The blood groups are A, B, O and AB. The frequency of four main ABO blood groups varies in the population throughout the world. ABO blood group system derives its importance from the fact that A and B are strongly antigenic and anti A and anti B naturally occurring antibodies present in the serum of persons lacking the corresponding antigen and these antibodies are capable of producing intravascular hemolysis in case of incompatible transfusion [6].

Rh antigens are highly immunogenic and till now 49 Rh antigens are identified. D antigen is most significant and D negative individuals produce anti-D if they encounter the D antigen through transfusion or pregnancy and causes hemolytic transfusion reaction, or hemolytic disease of fetus and newborn. For this reason, the Rh status is routinely determined in blood donors, transfusion recipients, and in mothers-to-be [7].

Blood group investigations in this subcontinent started during 1st World War with Hirschfled in 1919 who determined blood groups in large number of soldiers including Indians and found high frequency of blood group B. Though records were not maintained separately for endogamous population groups, the studies revealed large regional and ethnic differences in blood group frequencies [8].

The distribution of ABO and Rhesus blood group systems in Bangladeshis was studied in South East zone of the country during 1984 to 1988; the predominant blood group was O followed by B group [9]. In Eastern part of Bangladesh, O group was predominant and distribution of O and B was almost same in Western part [10].

The present study was conducted among the common population of Dhaka city with the objective to observe the distribution pattern of ABO and Rhesus blood group system among them. This study will document a blood group data base as well as create social awareness among them, allow safe blood transfusion and prevent hemolytic disease of new born and fetus by knowing ABO and Rh typing.

MATERIALS & METHODS

This observational cross sectional study was conducted in the Department of Physiology, Dhaka Medical College, Bangladesh during the period of 1st July 2008 to 30th June 2009. Study populations were the people of Dhaka, the capital city of Bangladesh. A total sample of 784 participants irrespective of age and sex were included in the study. Samples were determined using random sampling technique. The sample size was calculated by using the formula n = z2.p.q/d2 with the help of computer program EPI info-6.

Laboratory Investigations

Determination of ABO blood group and Rh (D) blood group was done by slide method. For ABO grouping, commercial monoclonal anti-sera anti-

A, anti-B, anti-AB and Rh D grouping was done using monoclonal/polyclonal anti-D anti sera. A drop of anti-A, anti-B, anti-AB and anti-D was added to a drop of finger prick blood on clean slide and mixed well. Agglutination was recorded as positive reaction.

Data collection

All the participants were explained about the aims and objectives of the study and the blood grouping procedures were briefed to them. Written consent was taken from the participants aged more than 18 years and parents' consent was taken for those who were less than 18 years old. Particulars of the each participant were taken in a data collection sheet.

Collection of specimens

After aseptic washing with 70% ethyl alcohol, blood samples were collected on grease free clean slide from left ring finger tip with the help of a sterile lancet. Blood groups were determined in a single slide to minimize any errors.

Statistical analysis

All statistical analyses were done by SPSS software package version 12**.** The result was calculated as frequency of each blood group expressed as percentage.

RESULTS

Table 1 showed the age and gender distribution of the participants. Out of 784 respondents, 5.6% were 1 – 5 years old, 6.6% were 6 – 10 years old, 12.8% were 11 – 15 years old, 14.8% were 16 – 20 years old and 60% were more than 20 years old. The gender distribution revealed that male population was 45.4% and female population was 54.6%.

Table 1: Distribution of age and gender profile of the study population (n=784)

Variable		Number	Percent
Age	1-5 years	44	5.6
	6-10 years	52	6.6
	11-15 years	100	12.8
	16-20 years	116	14.8
	> 20 years	472	60.0
Gender	Male	356	45.4
	Female	428	54.6

Table 2 showed the number and percent distribution of ABO and Rh D grouping of the participants. ABO blood grouping revealed that group 'B' was predominant with 39.8%, followed by group O with 27.6%, group A with 23.5% and group AB with 9.2%. Rh-D positive were 97.4% and Rh-D negative were 2.6%.

Table 2: Distribution of ABO and Rh D blood group of the study population (n=784)

Blood Group		Number	Percent
ABO	B	312	39.8
	O	216	27.6
	A	184	23.5
	AB	72	9.2
Rh (D)	Positive	764	97.4
	Negative	20	2.6

DISCUSSION

The present study has been carried out to determine the distribution pattern of ABO and Rh-D blood groups in common people of Dhaka city. The collected data on blood group system can be used for development of donor data base for collection of blood and blood products which will be helpful for establishment of blood bank as well as transplant services. Currently a number of studies have been suggested that the use of stem cell product hold a huge prospective for treating damage or diseased tissues of the body [11]. These data will also help in organ transplantation, development of legal medicine and anthropological study of a group or society [5].

Traditional slide method was used to determine blood group of the participants which was also used in other published studies [12-16] and the advantage of this method includes easy screening of blood groups in large number of samples within short period of time [3].

This study showed that among the common people of Dhaka city, blood group B was the commonest followed by O. The distribution pattern of A, B, O, and AB were 23.5%, 39.8%, 27.6% and 9.2% respectively. The study regarding the distribution of ABO and Rhesus Blood Group systems among the people of central part of Bangladesh was first done in1975 by Rahman [12], where blood group B was found most predominant among the population**.** This study showed the frequency of B, O, A and AB groups were as 35.2%, 33.97%, 22.44% and 8.39% respectively [12]**.** Another study [17] conducted in the rural and urban areas of Bangladesh showed the similar results of predominant blood group, B (35.54%) followed by blood group O (32.57%) . These findings are almost similar to that of common people in the current study. However, study in South East and Western part of Bangladesh demonstrated the most frequent blood group was O. [9,13]. Study in Northern district of Dinajpur also indicated the group O predominance with a frequency of 40.6% followed by group A 26.6%, group B 23.2% and group AB 9.6% [17].

There is a wide variation of blood group frequency in different parts of the world due to the influence of genetic and environmental factors. Comparison of data among the different studies in the Indo-Pak sub-continent revealed that there was an equal dominance of group B and O [19]. Studies in Pakistan explored that B blood group predominated in many regions of Punjab and Multan [20, 19], Swat [21], Gilgit [22], and Rawalpindi/Islamabad [23], while in Sindh and in Baluchistan, group O was predominated [24]. Study in India showed group O is the predominant followed by B, A and AB [25-27].. However, in contrast, other studies showed group B is the most prevalent followed by group O, A, and AB [28-29]. Study in neighboring country Nepal showed different picture of higher frequency of group A [30]. In Australia [31], , Britain [32], and USA [33], group 'O' and 'A' were the commonest followed by B and 'AB'.

The prevalence of Rh-D positive remains very high compared to the Rh-D negative blood throughout the world. Our study also followed the global trend of much higher Rh-D positive then Rh-D negative. Frequencies of Rh-D positive among the Caucasians, Blacks and Asian were 85%, 92% and 99% respectively [7]. Another work [12], regarding Rh-D blood group found Rh-D negative blood group was 2.56% which was comparable to that of common population in this study (2.6%). Rh negative frequency in our study is comparable to that of India [28]. Higher frequency of Rh negative blood was observed in USA as 17% [34], in the UK as 17% [35] or even in Iran as 10.08% [36]. In Pakistan, Rh negative frequency varied from 5.40 to 10.73% [19] depending on the various regions that was higher than our study. The present investigation demonstrated similarities with the findings of previous research done in Bangladesh.

CONCLUSION

This study showed higher frequency of group B followed by group O, A and AB which reflects the same blood group pattern with the previous studies conducted in Bangladesh. Rh blood group system is also similar to other previous studies. Study of blood grouping not only generates a simple database but also create a great social awareness about self-blood grouping and safe blood transfusion among the population of a country.

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