BEST: International Journal of Humanities, Arts, Medicine and Sciences (BEST: IJHAMS)
ISSN (P): 2348-0521, ISSN (E): 2454-4728
Vol. 4, Issue 11, Nov 2016, 85-90

PATTERN AND DISTRIBUTION OF ABO AND RH (D) BLOOD GROUPS WITHIN PATERNAL AND MATERNAL FAMILY SUBSETS OF AN INDIVIDUAL: AN OBSERVATIONAL STUDY

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ABSTRACT

Recognition of blood group of an individual is of utmost importance even today for maintaining blood banking records and for safe transfusion practices. This observational study was carried out among the Paternal and Maternal family members of an individual to find out the percentage distribution of ABO and Rh (D) blood groups in them. The blood groups of seventy nine participants, between the age group of eight years and seventy nine years, from twenty five nuclear families were recorded. The collected data were analysed and results expressed in percentage. The data were also compared with the data obtained from earlier studies on percentage distribution of patterns of blood groups. The highest percentage frequency was observed for the blood group O (62%), followed by B (21.5%), A(12.7%) and the least percentage frequency was AB (3.8%).In the case of Rh (D) positive, the frequency observed was 96.1% and that for Rh (D) negative, it was 3.9%. The distribution of ABO and Rh (D) blood groups of this study showed similar trends with the published data from previous studies on blood group patterns

KEYWORDS: ABO Groups, Blood Group Pattern and Distribution, Rh (D) Group, Paternal and Maternal Family Members

INTRODUCTION

The A,B and O groups in the ABO blood group system was discovered by Karl Landsteiner in 1900 and he was awarded Nobel prize in 1930 for this[(1,2)]. The AB group was later discovered in 1902 by Alfred Von Decastello and Adriano Sturli[2]. Of the thirty three blood group systems, the most important one is the ABO system[3] and the second being Rh system[4].In the ABO system, according to the presence of antigens and agglutinins, there are four major blood groups, namely A, B, AB and O. Group A blood has type A antigens and Anti-B antibodies . Group B blood has type B antigens and Anti-A antibodies and Group O blood has neither A nor B antigens but has both anti A and anti B antibodies. AB blood group has both A and B antigens but is devoid of anti A and anti B antibodies[5].The studies on the pattern of distribution of blood groups within a population are essential in modern medicine as they are useful in selecting the appropriately matched blood group during blood transfusion, organ transplantation, finding out association of blood groups and diseases, researching population migration patterns, disputed paternity issues, population genetic research, anthropology, identifying ancestral relation of humans etc[6].

Usually blood groups are informed to the parents during birth of a child. So most of the individuals are aware of their blood groups. The present study was designed with an aim to collect the blood groups of the members within the

maternal and paternal family subsets of an individual. Such a data can be used to maintain a record of the blood groups of all members in a family which will enable us to contact individuals from within the family itself without wasting time searching for donors with similar blood groups of the affected individual at times of medical emergencies when blood transfusion is required. There are many studies on frequency distribution of blood groups in various populations but studies done within family members are rare. Hence, the present studies was planned with the aim of determining the distribution of ABO blood groups and Rh (D) blood groups within the Paternal and Maternal subsets of an individual and compare the data obtained with data available from previous studies on blood group distribution.

MATERIALS AND METHODS

This was an observational study carried out among the Paternal and Maternal family members of the first author to find out the percentage distribution of ABO and Rh (D) blood groups in them. A total of 79participants from 25 nuclear families (between the age groups of 8 years and 75 years) were chosen as the study population. Of these 25 families, 15 families belonged to the paternal side and 10 were from the maternal side of the individual. After explaining the purpose and methodology of the study, only those members who were voluntarily willing to reveal their blood groups were included in the study. The members who did not know their blood groups were excluded from the study. After obtaining consent of family members, data regarding their name, age, sex, address; blood group and occupation of the participating family members were collected. The collected data were analysed and results expressed in percentage. The results were also compared with the data obtained from earlier studies to assess the pattern of blood group distribution.

RESULTS

Data from 79 participants, between the age group of 8 years and seventy five years, were obtained with their consent upon request. 45.6% were males and 54.4% were females. Sex wise Percentage distribution of Blood Groups with Rh (D) positive and negative is represented in Table 1. Among the males and females , in the Rh(D) positive groups, O group was more commonly distributed followed by B, A and AB. Analysis of Rh (D) negative subjects in males revealed O,B and AB groups to be equally distributed (2.8%). But in females all were Rh positive. . Overall, blood group O was predominant (58.3% in males, 65.1% in females) followed by B (19.4% in males, 23.3% in females), A (16.7% in males. 9.3% in females) and AB (5.6% in males, 2.3% in females).

Percentage Distribution of ABO and Rh (D) Blood Groups among the Paternal and Maternal Family Members and in the Study population as a whole is depicted in Table 2.Within the Maternal subset, in the Rh (D) positive groups, O group (74.3%) was predominantly more distributed than paternal subset followed by A (20%), B (5.7%) and there was no AB group. Within the Paternal subset of the family, in the Rh (D) positive groups, blood group O (50%) was commonly distributed, followed by B (31.8%), A (6.8%) and AB (4.5%). Within the Maternal subset of the family no Rh negative cases were seen. . Analysis of Rh (D) negative subjects in paternal subset revealed equal distribution in O, B and AB groups. There were no Rh (D) negative subjects in A group. Overall, the percentage frequencies of distribution of blood groups in both subsets together were as follows: O (62%), B (21.5%), A (12.7%) and AB (3.8%) with 96.1% being Rh (D) positive and 3.9 % Rh (D) negative.

Table 1: Sex Wise Percentage Distribution of Blood Groups with Rh (D) Positive and Negative

ABO Blood Groups	Rh Blood Groups	Males		Females	
		N (%)	Total(ABO) N(%)	N (%)	Total(ABO) N (%)
O group	O Positive	20 (55.5)	21(58.3)	28(65.1)	28 (65.1)
	O Negative	1(2.8)		0(0)	
A group	A Positive	6(16.7)	6(16.7)	4 (9.3)	4 (9.3)
	A Negative	0(0)		0(0)	
B group	B Positive	6(16.7)	7(19.4)	10(23.3)	10 (23.3)
	B Negative	1(2.8)		0(0)	
AB group	AB Positive	1(2.8)	2 (5.6)	1(2.3)	1(2.3)
	AB Negative	1(2.8)		0(0)	
	Total	**36 (100)**	**36(100)**	**43(100)**	**43(100)**

Table 2: Percentage Distribution of ABO and Rh (D) Blood Groups Among The Paternal and Maternal Family Members and in the Study Population as a Whole

ABO Blood Groups	Rh Blood Groups	Paternal	Maternal	Total	Overall ABO Group	Overall Rh (D) (%)	
		N (%)	N (%)	N (%)	N (%)	Rh +ve	Rh-ve
O group	O Positive	22(50)	26(74.3)	48(60.7)	49(62)	60.7	1.3
	O Negative	1(2.3)	0(0)	1(1.3)			
A group	A Positive	3(6.8)	7(20)	10(12.7)	10(12.7)	12.7	0
	A Negative	0(0)	0(0)	0(0)			
B group	B Positive	14(31.8)	2(5.7)	16(20.2)	17(21.5)	20.2	1.3
	B Negative	1(2.3)	0(0)	1(1.3)			
AB group	AB Positive	2(4.5)	0(0)	2(2.5)	3(3.8)	2.5	1.3
	AB Negative	1(2.3)	0(0)	1(1.3)			
Total		**(44)**	**(35)**	**79(100)**	**79(100)**	**96.1**	**3.9**

DISCUSSIONS

Blood grouping is an important parameter for social, professional and medical needs. In the present study, there was a predominance of females in the study population (54.4%) when compared to males (45.6%). The frequency of blood group 'O' positive was the highest among both males (58.3%) and females (65.1%).In both sexes, the percentage distribution of blood group B (19.4% in males and 23.3% in females) was more than blood group A (16.7% in males and 9.3% in females).The least predominant was blood group AB in both sexes.

Among the Paternal and Maternal subsets also, blood group O was the most predominant one (52.3% in Paternal side and 74.3% in Maternal side). However, the second predominant blood group among the paternal family members was blood group B (34.1%) when compared to the Maternal side, where it was blood group A (20 %).This difference might be because of the relatively smaller sample size of the Maternal study population when compared to the Paternal one. Blood group AB was the least prevalent in both subsets.

Overall, in this study, Blood group O was seen in 62%, blood group B was seen in 21.5 %, blood group A was seen in 12.7% and blood group AB was seen in 3.8 %.There was a predominance of Rh positive cases (96.1 %)in the study population as a whole and only 3.9% were Rh negative. The results of this study showed similar trends with previous studies published on the percentage of distribution patterns of blood groups with regards to O, AB and Rh (D) blood groups. However, there were minor variations with regards to A and B blood groups. O was the most predominant blood

group and AB was the least prevalent blood group in different studies done in India. In studies conducted in Nellore, Andhra Pradesh (33.58% B, 19.61% A)[7], Vellore (32.69% B, 18.85% A)[8] and Secunderabad (35.86% B, 18.32% A)[9], the second predominant blood group was B. However, percentage distribution of blood group A was more than blood group B in studies done in Tumkur, Karnataka (A26.7%, B26.2%)[10]and Nepal (A 34.3%, B27%)[11]. In a study done in the silte zone of Ethiopia, O group was the most predominant (43.08%), followed by A (28.11%), then B (23.35%) and AB (5.44%)[2]. Similarly, Rh (D) positive cases were predominant when compared to Rh (D) negative cases in all these studies [2,7,8,9,10,].

CONCLUSIONS

Consistent with published data in India and abroad, in this study also, the most predominant blood group was O group and Rh (D) positive group. The least percentage distribution was seen for AB group. Such a study helped us to prepare a databank on the blood group patterns of the family members of the first author which can be utilized during medical emergencies for safe blood transfusion. Similar well designed studies can be done in small work groups like office staff, hospital staff, students in a school / college or other families etc to prepare a databank of their blood groups and kept for reference in their institutions or houses for medical emergencies requiring blood transfusion.

ACKNOWLEDGEMENTS

The authors thank all the participants for their cooperation during the entire study.

Funding: Nil

Conflict of Interest: Nil

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