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FREQUENCY AND DISTRIBUTION OF ABO BLOOD GROUP AND RH (D) FACTOR IN SOUTHERN RAJASTHAN

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ABSTRACT
ABO blood group is often referred to as a histo-blood group system because, in addition to being expressed on red cells, ABO antigens are present on most tissues and in soluble form in secretions. The second type of blood group is the rhesus system. There are only two Rh phenotype such as Rh positive and Rh negative, depending on whether Rh antigen is present on the red cell or not. The ABO and Rhesus (Rh) blood group system are most important for blood transfusion purposes, parental testing, legal medicine, organ transplant and in population genetic study. This study was conducted to determine and compare the frequency of ABO and Rh blood groups in southern Rajasthan. A retrospective study was conducted at Blood Bank, Geetanjali Medical College & Hospital, Udaipur (A Tertiary Care Centre) over a period of 4 years from June 2010 to June 2014. Blood group of the blood donors was determined by commercially available standard monoclonal antisera by test tube agglutination technique. During the study period blood groups of 11814 donors were screened. The study revealed that the commonest ABO blood group was B (35.7%), followed by O (34.4%), A(22.3%) and AB (7.6%) respectively, Rh Positive 94.2% and Rh negative 5.8% were found.

KEYWORDS: ABO blood group, Rh factor, agglutination method, Rajasthan.

INTRODUCTION

About 400 red cells antigen have been identified till now and organized into 30 blood group systems by the International Society of Blood Transfusion of which ABO and Rh are important[1].The ABO blood group system is widely credited to have been discovered by the Austrian scientist Karl Landsteiner, who found three different blood types in 1901[2]. Alfred Von Decastello and Adriano Sturli discovered the fourth type AB, in 1902[3]. The second type of blood group is the rhesus system. There are only two Rh phenotype such as Rh positive and Rh negative, depending on whether Rh antigen is present on the red cell or not. The genes of ABO & Rh (D) are located on chromosome 9 & 1 respectively. Determination of ABO bl00d groups is done by detecting A and B antigens. In addition, known red cells are used to detect anti-A and anti-B in the serum, by a process called 'reverse' grouping. ABO and Rh gene phenotypes vary widely across races and geographical boundaries[4-6]. Blood groups are genetically determined.The vast majority are inherited in a simple Mendelian fashion and are stable characteristics which are useful in paternity testing[7]. Blood groups are known to have some association with diseases like duodenal ulcer, diabetes mellitus, urinary tract infection, Rh incompatibility and ABO incompatibility of newborn[8]. All human populations share the same blood group systems; although they differ in the frequencies of specific types. The incidence of ABO and Rh groups varies markedly in different races, ethnic groups, and socio-economic groups in different part of the world[9]. The knowledge of distribution of ABO and Rh blood groups at local and regional levels are helpful in the effective management of blood banks and safe blood transfusion services. Identification of Rh system is important to prevent the erythroblastosis fetalis; which commonly arises when an Rh negative mother carries an Rh positive fetus. Knowledge of distribution of ABO & Rh blood group is also essential for effective management of blood bank inventory. The present study was done to assess the prevalence of blood groups in different categories of Southern rajasthan and attached districts of other states (MP & Gujarat) to compare our results with other studies conducted in India and elsewhere in the world and its multipurpose future utilities for the health planners.

MATERIAL & METHOD

A retrospective study was carried out on 11814 blood donors (male and female) during a period of four year from June 2010 to June 2014 in the Blood Bank, Department of Pathology, Geetanjali Medical College and Hospital, Udaipur, India. The blood donors were selected after taking a detailed history and a complete examination regarding their eligibility criteria for blood donation. Donor's name, age, sex, occupation, religion, ethinicity, caste, complete postal address and contact number were taken. Donors were deferred or accepted according to their medical history regarding chronic or acute diseases. Findings were further confirmed by physical examination of the patient. Blood was taken from a donor only after fulfilling all the eligibility criteria of a healthy donor. Blood was taken for donors who were between 18-60 years of age, more than 50 kg weight with hemoglobin more than 12.5 g%. The donors have no history of any disease, infection or recent treatment. Written consent was also taken from them prior to donation regarding their acceptability for the tests to be carried out for the transfusion transmitted diseases. The Blood samples were obtained by standard procedures of venupuncture in a disposable syringe, and transferred immediately to a tube

containing Ethylene Diamine Tetra Acetic acid (EDTA) subjected to determination of ABO and Rhesus blood group using antisera (commercially available standard antiseras *i.e.* Anti A, Anti B, Anti AB and Anti D)by combined slide and test tube method. Final blood group was confirmed only if both forward & reverse groups are identical.

OBSERVATION

The total donors studied from June 2010 to June 2014 were 11814 .In gender wise distribution of ABO and Rh blood group system 94.95% were male while 5.05% were female (Table -1**)**.The distribution of blood groups of donors were, blood group A 22.3%, B 35.7%, O 34.4% and AB 7.6% (Table-2). The most common being blood group B. The distribution of Rhesus (Rh) factor was 94.2% Rh positive and 5.8% Rh negative.

TABLE 1: Age Groups and Sex Wise Distribution of Accepted donors

Age Group	Male	Female	Total
18-20	329	06	335(2.8%)
21-30	5113	247	5360(46%)
31-40	5553	339	5892(49.3%)
41-50	177	03	180(1.5%)
51-60	46	01	47(0.4%)
Total	11218(94.95%)	596(5.05%)	11814(100%)

TABLE 2: Distribution of ABO and Rhesus blood group among study population

Blood Group	Male	Female	Total
A+	2378	126	2504(21.2%)
B+	3760	198	3958(33.5%)
AB+	808	43	851(7.2%)
O+	3624	192	3816(32.3%)
A-	123	07	130(1.1%)
B-	247	13	260(2.2%)
AB-	44	03	47(0.4%)
O-	234	14	248(2.1%)
Total	11218	596	11814

TABLE 3: Comparison study on frequency of ABO and Rh phenotypes at different geographical areas (in percentage)

Place of study	A	B	AB	O	Rh+	Rh-
Present Study	22.3	35.7	7.6	34.4	94.2	5.8
Lucknow(10)	21.73	39.84	9.33	29.10	95.71	4.29
South India(11)	18.85	32.79	9.90	38.75	94.45	5.55
Eastern Ahmedabad(12)	23.30	35.50	8.80	32.50	94.20	5.80
Western Ahmedabad(13)	21.94	39.40	7.86	30.79	95.05	4.95
Surat(14)	24.10	34.89	8.69	32.32	94.18	5.82
Maharashtra(15)	27.02	33.06	8.33	31.04	95.73	4.27
Punjab(16)	21.91	37.56	9.30	31.21	97.30	2.70
Indore(17)	24.15	35.25	9.10	31.50	95.43	4.57
Durgapur(18)	23.90	33.60	7.70	34.80	94.70	5.30
Pondicherry(19)	39.50	20.50	6.50	34.00	93.50	6.50
ABROAD						
Countries	A	B	AB	O	Rh+	Rh-
Nepal(20)	34	29	04	33	96.70	3.30
Pakistan(21)	23.80	38	10	28.20	89.10	10.90
Australia(22)	38	10	03	49	NA	NA
Britain(23)	41.70	8.60	03	46.70	83	17
USA(24)	41	09	04	46	85	15
SaudiArabia(25)	24	17	04	52	93	07
Nigeria(26)	21.60	21.40	2.80	54.20	95.20	4.80

DISCUSSION

As we know that India is a vast country with lot of diversity in race, religion, ethnicity, caste & creed. The same diversity has been observed in geographical distribution of blood groups in population within country. Geographical distribution of Blood Groups in India from above studies shows that in Northern & Western part of India, B is the commonest blood group whereas in Eastern, Southern and Central part, O is the most prevalent blood group. But overall in India O is the most common blood group encountered in the donors. In our present study B (35.7%) is the most frequent blood group encountered but there was not much significant difference with the occurrence of O (34.4%) blood group which is followed by A (22.3%) and AB (7.6%). Similarly study from Northern parts of India (Lucknow and Punjab) showed

blood group B was the commonest, followed by O, A and AB. Study from South India showed that blood group O was commonest (38.75%) followed by group B (32.69%), group A (18.85%) and AB (5.27%). Internationally, a study of Pakistan showed that the frequency of blood group B (32.04%), followed by O (30.5%), A (22.4%) and AB (8.4%); while other studies [from USA, Britain, Australia *etc*.] showed O blood group to be the most prevalent. In Rhesus system, our study shows frequency of Rh-positive was 95.36%, while only 4.64% was Rh-negative. These figures are similar to the other studies carried out in different part of India[10-19] and internationally[20-26]. Rh-positive groups are predominant group and the frequency more or less the same.

CONCLUSION

The commonest ABO blood group was group B in Southern Rajasthan with not much difference in frequency with O blood group as it involves the population of adjacent parts from other states like M.P. and Gujarat followed by A and AB blood groups. Regarding Rhesus blood group system, Rh positive donors were 94.2% and Rh negative were 5.8%.The study has a significant implication in the management of blood bank and transfusion services. Beside this it is also important for, parental testing, legal medicine, organ transplant and in population genetic study and identification of Rh system to prevent the erythroblastosis foetalis which will decrease the maternal and other mortality rates. Such studies need to be carried out at all the regional levels of India.

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