PREVALENCE OF ABO AND RHESUS BLOOD GROUPS IN BLOOD DONORS. A STUDY FROM A TERTIARY CARE TEACHING HOSPITAL S.V.R.R.GOV. GENERAL HOSPITAL IN RAYALASEEMA REGION OF ANDHRA PRADESH, TIRUPATI.

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Abstract

Back ground: The ABO and Rhesus –D blood group are the major blood group systems. The frequency of four main blood group systems varies in population throughout the world and even in different parts of the country. ABO & Rh blood group antigens play a Vital role in immunologic safety of whole blood and blood component transfusion and also useful in population genetic studies, in resolving medico legal issues.

Aim: This study is aimed to document the frequency and distribution pattern of ABO and Rh among blood donors in S.V.R.R.Govt. General Hospital, Tirupati.

Study Design: It is a retrospective record based study carried out at Model blood bank S.V.R.R.Govt. General Hospital Tirupati from January 2014 to December 2015.

Material and Methods: The study was conducted on 13,040 donors. ABO and Rh typing was done by using slide agglutination method with antisera ABO and Rh (tulip Diag). Doubtful cases were confirmed by tube agglutination method and reverse grouping by using pooled A& B cells. The age group and sex of donors and frequency of ABO and Rh blood groups were reported in simple percentages.

Results: In the present study the most common blood group was 'O' 5505 (42.2%) and least common being AB 778 (5.96%). The prevalence of Rh positive and negative distribution in the study population is 12267(94.07%) and 773(5.93%) respectively. Predominant donors belonged to age group between 18-35 years (85.37 %).Male donors (97.88%) are common than female donors (2.12%) with ratio. Blood group frequency with respect to ABO and Rh was found to be O>B>A>AB.

Conclusion: O positive blood group is significantly high in our population while AB is least.. Blood donation by females appears to be low provably because of illiteracy, malnutrition and social taboo. So

female donor need to be motivated for blood donation. Knowledge of frequencies of different blood groups is very important for blood banks and transfusion service policies for better use and good inventory of blood units.

Key words: Blood groups ABO, Rh

Introduction:

The ABO blood group system is widely credited to have been discovered by Austrian scientist Karl Landsteiner in 1901. He described A,B,O, Blood Groups for which he was awarded Nobel prize in the year 1930.¹ Thereafter Rh blood group was defined by Karl Landsteiner and Weiner in 1941.²

The genes of ABO and Rh are located on chromosome 9 and 1 respectively. The classification of blood groups into type A, B, AB, and O in ABO system, Rh positive and Rh negative is based on the presence or absence of inherited antigenic substances on the surface of the red blood cells. The antigens may be proteins, carbohydrates glycoproteins and glycolipids depending on the blood group system.³ According to ABO system the blood of each individual carries an antibody directed against the antigen which is absent from the person's red blood cells. In order to avoid danger of mismatched transfusion it is important to determine the blood groups of those involved prior to transfusion.⁴

ABO and Rh blood group antigens are hereditary characters and are useful in the field of immunohematology blood transfusion, irrespective of natives, unmatched pregnancy legal medicine, anthropology and the discovery of other blood group systems.⁵ The knowledge of distribution of ABO and Rh blood groups at local and regional levels is helpful in the effective management of blood banks and safe blood transfusion services.⁶ Hence the present study was conducted to determine the frequency of ABO and Rh blood group systems in a teaching institute S.V.R.R.Govt. General Hospital.

Materials and Methods: A retrospective record based study was carried out at Model Blood Bank S.V.R.R. Govt. Hospital, Sri

Venkateswara Medical College, Tirupathi during the period January 2014 to December 2015. The blood collections were taken from voluntary donors at outdoor blood donation camps and in house blood bank as well as from replacement donors at blood bank. A total of 13040 donors were considered medically fit and accepted for blood donation. All of them were of age between 18-60 years.

ABO and Rh groups were determined by using slide agglutination method by using anti sera A,B, and Rh (D). Tulip diag). For typing of Rh only anti D is used which is most immunogenic doubtful cases were confirmed by tube agglutination method and reverse grouping by using pooled A & B cells. The age group, Sex of donors and frequency of ABO and Rh blood groups were reported in simple percentages. The data were recorded tabulated, analyzed and represented the data in frequencies and proportions and compared with other similar studies.

Results: In the present study a total of 13040 donors were examined, of which 6260 (48.1%) were collected from blood bank and 6780 (51.9%) were collected from camp. Out of which 12763 (97.8%) were males and 277 (2.1%) were females respectively. Among the participants majority 6839 (52.4%) (Table-1) were belong to 18 to 25 years followed by 4293 (32.9%) and the remaining were belongs to more than 36 years. In table-2 the most common blood group was 'O' 5505 (42.22%) followed by 'B' 4089 (31.36%), 'A' 2668 (20.46%) and least common being AB 778 (5.96%). The prevalence of Rh positive and negative distribution in the study population is 12267(94.07%) and 773(5.93%) respectively. Predominant donors belonged to age group between 18-35 years (85.37 %). Male donors (97.88%) are common than female donors (2.12%). Blood group frequency with respect to ABO and Rh was found to be O>B>A>AB.

Table 1: Distribution of age groups and ABO blood grouping among study population.

Age Group	No. of Donors	%
18-25 yr	6839	52.4
26-35yr	4293	32.9
36-45yr	1580	12.1
46-55yr	316	2.4
56 and above	12	0.9
Total	13040	100
Frequency of ABO blood group among population in the present study (n=13,040)		
Blood group	Total Study Subjects	%
A	2668	20.4%
B	4089	31.3%
AB	778	5.9%
O	5505	42.2%
Total	13040	100%

Table 2: Distribution of ABO &Rh blood group among donor in the present Study

Blood Group	A	B	AB	O	Total
Rh Positive	2457(18.8%)	3881(29.7%)	736(5.6%)	5193(39.8%)	12267 (94.07)
Rh Negative	211(1.6%)	208(1.6%)	42(0.3%)	312(2.4%)	773(5.93%)
Total	2668 (20.4)	4089 (31.3)	778 (5.9)	5505 (42.2)	13040 (100)

Figure 1: Distribution of ABO &Rh blood group among donor in the present Study

Discussion:

Due to its medical importance in relation to different diseases, pursuing a line of investigation on the ABO and Rh blood group systems has been of significance for years. It is well known that these blood group systems is great importance in blood transfusion and organ transplantation.⁷ ABO and Rh genes and phenotypes vary widely across races and geographical boundaries despite the fact that the antigens involved are stable throughout life.^{8,9}

Table 3: Comparison of frequency percentage of ABO and Rhesus blood group in different areas of India.

Population	A	B	AB	O	Rh Positive	Rh Negative
Present Study	20.46	31.36	5.96	42.22	94.3	5.7
Eastern India						
Durgapur (steel City) ¹⁰	23.90	33.60	7.70	34.80	94.70	5.30
Southern India						
Bangalore ¹¹	23.85	29.95	6.37	39.82	94.2	5.8
Vellore ¹²	21.86	32.69	6.70	38.75	94.5	5.5
Davangere ¹³	26.15	29.85	7.24	31.76	94.8	5.2
Shimoga-Malnad ¹⁴	24.27	29.43	7.13	39.17	94.93	5.07
Western India						
Western Ahmedabad ⁶	21.94	39.40	7.86	30.79	95.05	4.95
Surat ¹⁸	24.10	34.89	8.69	32.32	94.18	5.82
Maharashtra ¹⁹	23.38	31.89	8.72	30.99	95.36	4.64
Northern India						
Lucknow ¹⁵	21.73	39.84	9.33	29.10	95.71	4.29
Punjab ¹⁶	21.91	37.56	9.3	31.21	97.3	2.7
Jodhpur ²¹	22.2	36.4	9.4	31.7	91.75	8.25

We compared our study with other studies carried out in different geographical areas. Study done in Eastern part of India by Nag I et al¹⁰ at Durgapur, in Southern part of India by Periyavan A et al¹¹ at Bangalore, Das PK et al¹² at Vellore, Mallikarjuna S et al¹³ at Devangari & by Girish CJ et al¹⁴ at Shimoga-Melnad found that the commonest blood group was 'O' followed by B, A & AB. Our study also showed similar findings that is 'O' blood group was more frequent than B followed by A & lastly by AB.

Study done in the Northern part of India by Tulika C et al at Lucknow¹⁵, Sidhu S et al at Punjab¹⁶ & Behra R et al at Jodhpur²¹, shows that the blood group 'B' was the commonest followed by O, A & AB. In Western part of India like in Eastern Ahmedabad by Wadhwa MK et al¹⁷, Western part of Ahmedabad by Patel Piyush et al⁶, study done at Surat by Mehta Nidhi et al

¹⁸ and at Maharashtra by Giri PA et al¹⁹ showed that blood group 'B' was the commonest followed by O, A & AB, which is different from our study.

In Rhesus system our study shows frequency of Rh positive is 94.3% and Rh negative 5.7% Nag I et al¹⁰ at Durgapura showed the frequency of Rh positive is 94.70% and Rh negative 5.30% , Western part of Ahmedabad by Patel Piyush et al⁶ showed the frequency of Rh Positive is 94.20% and Rh negative 5.80 % which is comparable with our study.

In our study Gender –wise garter proportion of the blood donors were majority 97.88 % then female 2.12% counterpart. This finding are comparable with study conducted in western A Ahmedabad where 95.48% male and 4.52% female⁶ and in Hyderabad where 97.73% male and 2.27 female²⁰. This is because of fact that in

developing country like India, because of social taboo, cultural habit, lack of motivation and fear of blood donation female donors are very less. In addition large numbers of females are anemic with low weight so declared unfit for blood donation. Hence, general health of females need to be improved by good nutritional diet and iron supplements. The fear regarding blood donation in females need to be driven out by making them aware about the advantage of blood donation.

Conclusion:

The 'O' blood group is significantly higher in our population while 'AB' blood group is comparatively lower. The Rh+ve blood groups are more common than the Rh-ve blood groups. Blood donation by the females was very low and it needs to be increased by improving health status and awareness about blood donation. So it is advisable to do the blood grouping study in each region for drafting proper national transfusion policy supplying blood to the needy patients during emergency.

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