Original Article

FREQUENCY OF ABO AND RHESUS (D) BLOOD GROUPS IN DAKSHINA KANNADA DISTRICT OF KARNATAKA - A STUDY FROM RURAL TERTIARY CARE TEACHING HOSPITAL IN SOUTH INDIA

Chandrika Rao¹ & Jayaprakash Shetty²¹Assistant Professor & Blood Bank Officer, ²Professor & HOD, Department of Pathology
K. S. Hegde Medical Academy, Nitte University, Mangalore - 575 018, Karnataka, India.

Correspondence :

Chandrika Rao

Assistant Professor & Blood Bank Officer, Department of Pathology, K. S. Hegde Medical Academy
Mangalore - 575 018, Karnataka, India. E-mail : chandrika_valal@yahoo.com**Abstract:**

Background : ABO and Rh blood groups are most important blood groups in human beings. The frequency of four main blood group systems varies in population throughout the world and even in different parts of country. Objective if this study was to identify distribution of ABO and Rh blood group system.

Materials and methods : The study was conducted in rural tertiary care hospital from January 2008 to December 2012. Data were collected from Blood Bank grouping records. All blood samples processed during period of observation were included in study.

Results : During the period of observation total 43,103 numbers of blood groups were performed. Patient's samples were 28,305 and donor's samples were 14,798. The frequency of blood group O in our population was 42.0% (40.1% O Rh positive and 1.8% O Rh negative). The frequency of blood group B in our population was 27.3% (25.6% B Rh positive and 1.62% B Rh negative) followed by blood group A was 25.8% (24.3% A Rh positive and 1.4% A Rh negative) and blood group AB was 4.8% (4.4% AB Rh positive and 1.4% AB Rh negative) and a two Bombay blood group donors (0.0046%). Rh positive were 94.64% and Rh negative were 5.35%.

Discussion : O positive blood group is significantly high in our population. Every transfusion centre should have a record of frequency of blood group system in their population. It helps in inventory management. Knowledge of blood group distribution is important for clinical studies, for reliable geographical information and for forensic studies in the population.

Keywords : Blood group, ABO, Rh

Introduction :

People have different blood types, known as blood groups. Antigens are hereditary determined and plays a vital role in

transfusion safety. The discovery of the ABO blood groups by Karl Landsteiner was an important achievement in the history of blood transfusion followed by discovery of Rh antigen.¹

There are differences in the distribution of ABO, and Rh (D) blood groups amongst different populations. The study of blood groups plays an important role in various genetic studies, in clinical studies for reliable geographical information and in blood transfusion practice, which will help in reducing morbidity and mortality rate. Knowledge of distribution of ABO and Rhesus (Rh) blood group is also essential for effective management of blood bank inventory.^{1,2}

The present study was aimed to identify distribution of

Access this article online

Quick Response Code

ABO and Rh (D) blood groups in patients and donor population from a tertiary care hospital.

Materials and methods:

A retrospective study was carried out at a tertiary care teaching hospital, Blood Bank, from January 2008 to December 2012. The blood groups of donors and patients of either sex were studied. Total of 43,103 subjects were screened for their blood groups. The blood samples were collected by venepuncture in EDTA containing vacutainer. ABO and Rh blood grouping were done by agglutination test using anti-A, anti-B and anti-D human sera. Blood group (ABO) and Rhesus factor was done by the antigen antibody agglutination test. The antisera used were obtained from Tulip Diagnostics. Antisera used for ABD were monoclonal anti-A, monoclonal anti-B, monoclonal anti-D (IgM). Antisera used for Du test is monoclonal anti-D (IgG) and for Bombay blood group anti-H lectin.

Statistical analysis

Frequency, percentage and proportions for each variable were calculated and 95% confidence interval (CI) was taken to define normal range.

Results:

Out of total 43,103 subjects, patient's samples were 28,305 and donor's samples were 14,798. The frequency of blood group O in our population was 42.0% (40.1% O Rh positive and 1.8% O Rh negative). The frequency of blood group B in our population was 27.3% (25.6% B Rh positive and 1.62% B Rh negative) followed by blood group A was 25.8% (24.3% A Rh positive and 1.4% A Rh negative) and blood group AB was 4.8% (4.4% AB Rh positive and 1.4% AB Rh negative) and a two Bombay blood group donors (0.0046%). Rh (D) positive were 94.64% and Rh (D) negative were 5.35%. [Table I & II][Figure 1, 2 & 3]

Table I: Frequency of ABO and Rh blood group systems

Blood groups	Total study subjects	Prevalence (%)	Confidence limits (95%)
ABO blood group			
A	11,130	25.8	25.41% - 26.24%
B	11,769	27.3	26.89% - 27.73%
AB	2,096	4.8	4.662% - 5.069%
O	18,106	42.0	41.54% - 42.47%
Bombay	02	0.0046	0.00087% - 0.0157%
Rhesus (D) blood groups			
Rh positive	40,796	94.64	94.43% - 94.86%
Rh negative	2,307	5.35	5.143% - 5.568%

Table II: Distribution of ABO and Rhesus (D) blood group among study population (n=43,103)

Blood group	Total study subjects	Prevalence (%)	Confidence limits (95%)
A positive	10,508	24.3	23.98% - 24.79%
B positive	11,067	25.6	25.26% - 26.09%
AB positive	1,898	4.4	4.213% - 4.6%
O positive	17,321	40.1	39.72% - 40.65%
A negative	622	1.4	1.333% - 1.559%
B negative	702	1.62	1.512% - 1.751%
AB negative	198	0.4	0.3988% - 0.5266%
O negative	785	1.82	1.698% - 1.95%

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

Population	A	B	AB	O	Rh positive	Rh negative
Northern India						
Lucknow ³	21.73	39.84	9.33	29.10	95.71	4.29
Punjab ⁴	21.91	37.56	9.3	31.21	97.3	2.7
Jodhpur ¹	22.2	36.4	9.4	31.7	91.75	8.25

Population	A	B	AB	O	Rh positive	Rh negative
Western India						
Western Ahmedabad ⁶	21.94	39.40	7.86	30.79	95.05	4.95
Eastern Ahmedabad ⁵	23.30	35.50	8.80	32.50	94.20	5.80
Surat ⁷	24.10	34.89	8.69	32.32	94.18	5.82
Maharashtra ⁸	23.38	31.89	8.72	30.99	95.36	4.64
Eastern India						
Durgapur (steel city) ⁹	23.90	33.60	7.70	34.80	94.70	5.30
Southern India						
Bangalore ¹⁰	23.85	29.95	6.37	39.82	94.2	5.8
Vellore ¹¹	21.86	32.69	6.70	38.75	94.5	5.5
Davangere ¹²	26.15	29.85	7.24	31.76	94.8	5.2
Shimoga – Malnad ¹³	24.27	29.43	7.13	39.17	94.93	5.07
Present study	25.8	27.3	4.8	42.0	94.64	5.35

Table IV: Comparison of frequency and percentage of ABO and Rhesus blood group in different countries of the world

Population	A	B	AB	O	Rh positive	Rh negative
Britain ¹	42.0	8.0	3.0	47.0	83.0	17.0
USA ¹⁵	41.0	9.0	4.0	46.0	85.0	15.0
Nigeria ¹⁶	21.60	21.40	2.80	54.20	95.20	4.80
New Guinea ¹⁷	22.50	23.70	4.70	48.90	95.90	4.10
Saudi Arabia ¹⁸	24.0	17.0	4.0	52.0	93.0	7.0
Pakistan ¹⁹	22.40	32.40	8.40	30.50	93.0	7.0
Nepal ²⁰	34.0	29.0	4.0	32.50	96.70	3.30

Figure 1: Distribution of ABO blood groups

Figure 2: Frequency of Rhesus (D) blood group

Figure 3: Prevalence of ABO and Rhesus (D) blood groups among study population

Discussion :

The study of distribution of blood groups is important as it plays a vital role in blood transfusion, organ transplantation, genetics research, human evolution, forensic pathology and some groups have shown associations with diseases like duodenal ulcer, diabetes mellitus, urinary tract infection and Rh and ABO incompatibilities of newborn.

We compared our results with other studies carried out in

different geographical areas. The studies done in Northern parts of India by Chandra et al at Lucknow³, Sindhu et al at Punjab⁴ and Behra et al at Jodhpur¹ showed blood group B was the commonest, followed by O, A and AB, which is different from our study. In Western parts of India like in Eastern Ahmedabad by Wadwa MK et al⁵, Western part of Ahmedabad by Patel Piyush et al⁶, studies done at Surat by Nidhi et al⁷ and Giri et al at Maharashtra⁸, showed blood group B is the commonest followed by O, A and AB. Our study showed commonest blood group as O followed by B, A and AB. Study done in Eastern part of India, Durgapur by Nag et al⁹ and in Southern part of India by Periyavan et al at Bangalore¹⁰, Das PK Nair et al at Vellore¹¹, at Davangere by Mallikarjuna S. et al¹² and at Shimoga – Malnad study done by Girish et al¹³ found that commonest blood group was O followed by B, A and AB. The same prevalence was found in our study i.e. O was more frequent than B, followed by A and AB. [Table III]

Outside India, studies were carried out in different countries of the World like Britain¹⁴, USA¹⁵

Nigeria¹⁶, New Guinea¹⁷, Saudi Arabia¹⁸, Pakistan and Nepal. Except in Pakistan¹⁹ and Nepal²⁰, there is increased frequency of O blood group in these countries. In Pakistan the study done by Rahman M et al the commonest blood group is B and in Nepal, A blood group is commonest. [Table IV]

The incidence of Rhesus (D) positive blood group in most of the part of India varies from 94% to 98% and 2% to 6% were Rh negative. The present study results are within this range.

Conclusion :

The O blood group is significantly high in our population and comparatively low AB blood group. Every transfusion centre should have a record of frequency of blood group system in their population. It helps in inventory management. Knowledge of blood group distribution is also important for clinical studies, for reliable geographical information and for forensic studies in the population.

References :

- Behra R, Joshi YR. Distribution of ABO blood group and RH(D) factor in western Rajasthan. National J Medical Res 2013;3:73-5.
- Eweidah MH, Rahiman S, Ali H, Dhas Al-shamary AM. Distribution of ABO and Rhesus (RHD) blood groups in Al-Jouf province of the Saudi Arabia. Anthropologist 2011;13:99-102.
- Tulika C, Gupta A. Frequency of ABO and Rhesus blood groups in blood donors. Asian J Trans Sci 2012;6:52-3.
- Sidhu S. Distribution of the ABO blood groups and Rh(D) factor among the scheduled caste population of Punjab. Anthropologist 2003;5:203-4.
- Wadhwa MK, Patel SM, Kothari DC, Pandey M, Patel DD. Distribution of ABO and Rhesus D groups in Gujrat, India-a hospital based study. Indian J Ped Oncol 1998;19:137-41.
- Patel PA, Patel SP, Shah JV, Oza HV. Frequency and distribution of blood groups in blood donors in western Ahmedabad - A hospital based study. National J Med Res 2012;2:207-10.
- Mehta N, Swadas B. Prevalence of ABO blood groups at Mahavir Heart Institute Surat. Asian J Trans Sci 2012;6:74.
- Giri PA, Yadav S, Parhar GS, Phalke DB. Frequency of ABO and Rhesus blood groups: A study from a rural tertiary care teaching hospital in India. Int J Biol Med Res 2011;2:988-90.
- Nag I, Das SS. ABO and Rhesus blood groups in potential blood donors at Durgapur steel city of the district of Burdwan West Bengal. Asian J Transfus Sci 2012;6:54-5.
- Periyavan A, Sangeetha SK, Marimuthu P, Manjunath BK, Seema. Distribution of ABO and Rh-D groups in and around Bangalore. Asian J Transfus Sci 2010;4:41.
- Das PK, Nair SC, Harris VK, Rose D, Mammen JJ, Bose YN, Sudarsanam A. Distribution of ABO and Rh-D blood groups among blood donors in a tertiary care centre in South India. Trop Doct 2001;31:47-8.
- Mallikarjuna S. Prevalence of ABO and Rhesus blood group among blood donors. Ind J Pub Health Research and Development 2012;3:106-9.
- Girish CJ, Chandrashekhar TN, Ramesh Babu K, Kantikar SM. ABO and Rhesus blood group distribution among Malnad region blood donors. Research and reviews in Biomedicine and Biotechnology 2011;2:25-30.
- Firkin F, Chesterman C, Penington D, Rush B. De Gruchy's Clinical haematology in medical practice. Blackwell Science Publisher, 5th Edition 2008;pp-475.
- Frances TF. Blood groups (ABO groups). In: common Laboratory and diagnostic tests. 3rd Edition, Philadelphia:Lippincott, 2002;p.19-5.
- Mwangni J. Blood group distribution in an urban population of patient targeted blood donors. east Afr Med J 1999;76:615-8.
- Loua A, Lamah MR, Haba NY, Camara M. Frequency of blood groups ABO and Rhesus D in the Guinea population. Tranfus Clin Biol 2007;14:435-9.
- Bashwari LA, Al Mulhim AA, Ahmad MS, Ahmed MA. Frequency of ABO blood groups in Eastern region of Saudi Arabia. Saudi Med J 2001;22:1008-12.
- Rahman M, Lodhi Y. Frequency of ABO and Rhesus blood groups in blood donors in Punjab. Pak J Med Sci 2004;20:315-8.
- Pramanik T, Pramanik S. Distribution of ABO and Rh blood groups in Nepalese medical students: a report. East Mediter Health J 2000;1:156-8.