NUJHS Vol. 4, No.3, September 2014, ISSN 2249-7110
Nitte University Journal of Health Science

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

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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.

Key words : 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]

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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

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

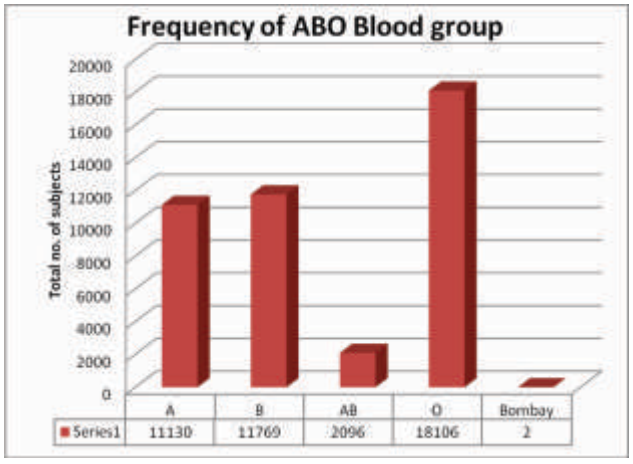


Figure 2: Frequency of Rhesus (D) blood group

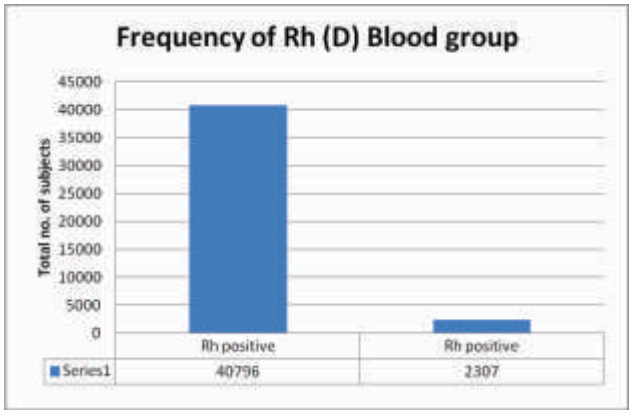
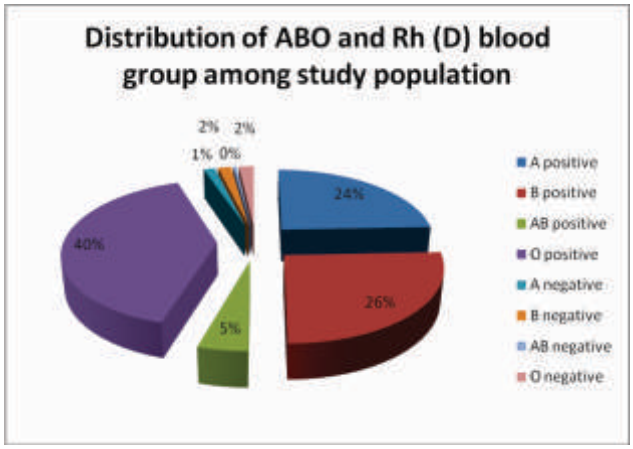


Figure 3: Prevalence of ABO and Rhesus (D) blood groups among study population



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 Lucknow [3], Sindhu et al at Punjab[4] and Behra et al at Jodhpur [1] 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 al [5], Western part of Ahmedabad by Patel Piyush et al [6], studies done at Surat by Nidhi et al[7] and Giri et al at Maharashtra[8] , 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 al [9] and in Southern part of India by Periyavan et al at Bangalore [10], Das PK Nair et al at Vellore[11], at Davangere by Mallikarjuna S. et al[12] and at Shimoga – Malnad study done by Girish et al [13]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 Britain [14], USA [15] Nigeria [16], New Guinea [17], Saudi Arabia [18], Pakistan and Nepal. Except in Pakistan [19] and Nepal [20], 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.

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