

Distribution of ABO and Rh Blood Groups among Blood Donors of Dinajpur District of Bangladesh

*Talukder SI,¹ Das RK²

A series of glycoprotein and glycolipids on red blood cell surface constitute blood group antigens. These are AB, A, B and O in ABO blood group system and Rh in rhesus blood group system. These antigens are genetically controlled. Certain diseases have been shown to be associated with certain blood groups. We analyzed result of blood group of persons attending in a health center at Dinajpur district town. Out of 500 subjects 293(58.6%) were male and 207(41.4%) were female. In ABO system their blood groups were AB 48 (9.6%), A 133 (26.6%), B 116 (23.2%) and O 203 (40.6%). Rh-positive were 484 (96.8%) and Rh-negative were 16 (3.2%). The results were compared with studies of other countries. Some variation in frequencies were observed. That raised a suspicion of difference incidence of blood group related diseases in Bangladesh. More study may be done to disclose the suspicion.

[Dinajpur Med Col J 2010 Jul; 3 (2):55-58]

Key words: Blood group, Dinajpur, Bangladesh

Introduction

Red blood cells contain a series of glycoproteins and glycolipids on their surface which constitute the blood group antigens. Production of these antigens is genetically controlled. There are many blood group systems on the basis of different blood group antigens – only ABO and Rh systems are important in clinical practice. ABO system consists of four main groups, AB, A, B and O which are determined on the basis of presence or absence of A and B antigens. These antigens are under control of three allelic genes, A, B and O, situated on

the long arm of chromosome 9. In Rh system blood groups are Rh-positive or Rh-negative on the basis of presence or absence of Rh-antigens on red cell surface. Rh antigens are determined by three pairs of closely linked allelic genes located on chromosome 1. In clinical practice blood grouping is important because an antigen may, in certain circumstances, react with its corresponding antibody and cause harmful clinical effects like haemolytic transfusion reactions and haemolytic disease of newborn.¹

1. *Dr. Md. Sadequel Islam Talukder, Assistant Professor of Pathology, Dinajpur Medical College, Dinajpur.sadequel@yahoo.com
2. Dr. Ruhini Kumar Das, Assistant Professor of Pathology, Dinajpur Medical College, Dinajpur

*For correspondence

Certain diseases have association with different blood group antigens. Elevated serum soluble E-selectin levels have been associated with a number of diseases. E-selectin levels have been associated with the ABO blood group phenotype. Highly significant evidence for association was observed for rs579459 near the ABO blood group gene, accounting for 19% of the variance in E-selectin levels. Levels of E-selectin were higher in O/O than O/A heterozygotes, which were likewise higher than A/A genotypes.² ABO blood group frequencies of 1000 vitiligo patients were studied and compared with those of blood donors. The relative risk of O was significantly reduced in patients in comparison with blood donors.³ A review article suggested that individuals of blood group O are relatively resistant to severe disease caused by *P. falciparum* infection. It was established that parasitized erythrocytes form rosettes more readily with red blood cells (RBCs) of A, B, or AB groups than with blood group O and this parasite-triggered RBC rosette formation is associated with the severity of clinical disease and with the development of cerebral malaria.^{4,5}

In British population the frequency of AB, A, B and O are 3%, 42%, 8% and 47%, respectively. Approximately, 83% of them are Rh-positive and 17% are Rh-negative.¹ The frequency of ABO and Rh blood groups may vary from population to population.^{6,7} We do not know relative frequency of Blood group antigens in our population. This study was designed to find out the frequency of antigens of ABO and Rh system in individual tested for blood group in a centre in Dinajpur District of Bangladesh.

Methods

This study was done on individuals attended for blood grouping as a recipient or donor in pathology laboratory of a diagnostic centre in

the Dinajpur town. Blood grouping was done by commercial reagent kit supplied by recognised reagent supplier. This kit contains Anti-A, Anti-B and Anti-D. Tests were performed by agglutination method. Patients' age, sex and blood groups with Rh factors were recorded in tabulated form in register book. These tests were done in 3 months period from September 2009 to December 2010. A total of 500 cases were analysed for this study. Data were analysed by computer program SPSS.

Results

Out of 500 subjects male were 293 (58.6%) and female were 207 (41.4%) with M:F ratio 1.4:1. Relative frequency of ABO blood group in 500 cases is shown in the table I. Blood group O is found to be most common followed by A, B and AB. There is no significant difference in frequency of AB and A between male and female but B is more common in male and O is more common in female (odd ratio 1.2 and 1.1 respectively). Presence of Rh factor is shown in the table II. Frequency of Rh-negative is a bit higher in male than in female (odd ratio 1.6). Rh-factor positive in different type of ABO group is shown in table III. It is observed that Rh negative is more in B blood group subject than in other groups.

Table I: Frequency of ABO blood group in 500 individuals

Blood group	All cases (n=500)	Male (n=293)	Female (n=207)
AB	48(9.6%)	28(9.6%)	20(9.7%)
A	133(26.6%)	79(27.0%)	54(26.1%)
B	116(23.2%)	73(25.0%)	43(20.8%)
O	203(40.6%)	113(38.6%)	90(43.5%)

Table II: Presence of Rh factors

Sex	Rh-Positive	Rh-Negative
Male (n=293)	282(96.3%)	11(3.8%)
Female(n=207)	202(97.6%)	5(2.4%)
All cases(n=500)	484(96.8%)	16(3.2%)

Table III: Rh-factor in different ABO blood groups

ABO Blood Groups	Rh-positive	Rh-Negative
AB (n=48)	48(100%)	0(0%)
A (n=133)	129(97.0%)	4(3.0%)
B (n=116)	108(93.1%)	8(6.9%)
O (n=203)	199(98.0%)	4(2.0%)

Table IV: Comparison of frequency in percentage of blood group in different studies

Country	AB	A	B	O	Rh-Positive	Rh-Negative
Britain ¹	3	42	8	47	83	17
Nepal ⁶	4	34	29	32.5	96.7	3.3
Nigeria ⁷	2.8	21.6	21.4	54.2	95.2	4.8
Guinea ⁸	4.7	22.5	23.7	48.9	95.9	4.0
Present study	9.6	26.6	23.2	40.6	96.8	3.2

Discussion

The objective of this study was to find out frequency of different blood group antigen in the individual tested for blood grouping with Rh factor in Dinajpur District. We have found the frequency. Now, we like to compare our result with that of other study in different countries. From MedLine literature search we found that study on blood grouping has been done in some other country like Britain, Nepal, Nigeria, Guinea, Iran, India etc.^{1,6,8,9,10} A comparison of frequency of blood group with this study to other is shown in the table IV. Marked difference of incidence of AB group is observed between Nigeria and

Bangladesh (2.8% vs 9.6%). Difference is also marked in case A group between Britain and Bangladesh (42% vs 26.6%). In Britain B blood group is 8% whereas it 23.2% in Bangladesh. There is no marked difference in incidence of O blood group in Britain, Nepal, Nigeria, Guinea and Bangladesh as shown in the table IV. ABO and Rh blood group study was also done in Iran among people of Ahwaz, Khuzistan and Iran. The people of Ahwaz were characterized by high frequency of blood group O (41.2%) which was similar to our people. Rh-positive were 90.0% which was a bit lower than our people.⁹

The difference of frequencies of different blood group antigen in our population raise the suspicion of difference in prevalence of some disease associated with blood group antigen. Further study may be done to find out association of diseases with specific blood group antigen.

References

1. Firkin F et al (eds). De Gruchy's Clinical haematology for Clinical Practice. 5th Edition. pp 475.
2. Paterson AD, Lopes-Virella MF, Waggott D et al. Genome-wide association identifies the ABO blood group as a major locus associated with serum levels of soluble E-selectin. *Arterioscler Thromb Vasc Biol.* 2009 Nov;29(11):1958-67
3. Kareemullah L, Taneja V, Begum S et al. Association of ABO blood groups and vitiligo. *J Med Genet.* 1977 June; 14(3): 211-213.
4. Uneke CJ. Plasmodium falciparum malaria and ABO blood group: is there any relationship? *Parasitol Res.* 2007 Mar;100(4):759-65.
5. Rowe JA, Handel IG, Thera MA. Blood group O protects against severe Plasmodium falciparum malaria through the mechanism of reduced rosetting. *Proc Natl Acad Sci U S A.* 2007 Oct 30;104(44):17471-6.

6. Pramanik T, Pramanik S. Distribution of ABO and Rh blood groups in Nepalese medical students: a report. *East Mediterr Health J.* 2000; Jan(1):156-8.
7. Mwangi J. Blood group distribution in an urban population of patient targeted blood donors. *East Afr Med J.* 1999;76(11):615-8.
8. Loua A, Lamah MR, Haba NY et al. Frequency of blood groups ABO and Rhesus D in the Guinean population. *Transfus Clin Biol.* 2007; 14(5):435-9.
9. Marzhan M, Kamali MS, Hosseinbasi T. Blood groups of people of Ahwaz, Iran. *Antropol Anz.* 1998;46(1):83-9.
10. Khan MN, Khaliq I, Bakhsh A et al. Distribution of ABO and Rh D blood groups in the population of Poonch District, Azad Jammu and Kashmir. *East Mediterr health J.* 2009;15(3):717-21.