Original Article

Prevalence of ABO and Rhesus blood group among blood donors and patients in Evercare Hospital Chattogram: An observational study

Umme Mezbah Akter[1], Tamanna Afroz[2], Abu Jafar Mohammed Saleh[3]*

1. Specialist, Transfusion Medicine, Evercare Hospital Chattogram
2. Associate Consultant, Transfusion Medicine, Evercare Hospital Dhaka
3. Sr. Consultant and Coordinator, Hematology and Stem Cell Transplant, Evercare Hospital Dhaka

**** Address for Correspondence:***
Dr. Umme Mezbah Akter
Specialist,
Transfusion Medicine,
Evercare Hosptial Chattagram
Email: mezbah.akter@evercarebd.com

Date of submission: *26.07.2025*
Date of acceptance: *30.08.2025*

ABSTRACT

The distribution pattern of ABO blood group and Rhesus-D type varies in different parts of the Bangladeshi population. This study was carried out to determine the frequency of ABO and RhD blood group among all the donors and patients both (OP and IP) attending Evercare Hospital Chattogram. Blood grouping has been conducted in the Department of Transfusion Medicine. Blood group reports of 7,226 donors and 14,866 inpatients (both OPD and IPD) were analyzed retrospectively, starting from April 2021 to March 2025. Blood grouping was performed by column agglutination technique using gel card and traditional hemagglutination technique using slide/tube test. Both forward and reverse typing was done to confirm ABO blood group, and Du test was performed to confirm RhD blood group when required. The most common ABO blood group was found to be O (36.8%) followed by B (30.7%), A (24.8%) and AB (7.8%). Regarding RhD type, RhD positive group was 96.6%, RhD negative 3.4% and Du positive 0.11%

Key words: *Blood grouping, Blood Donor, Blood transfusion.*

INTRODUCTION

ABO blood grouping and Rh typing are vital parts of transfusion practice. Determination of ABO blood group is done by presence or absence of ABO blood group antigens on red cell membrane and presence or absence of corresponding naturally occurring antibodies in plasma[1]. According to Landsteiner's law, if an antigen is present onto the red cell membrane, corresponding antibody must be absent in plasma[1,2]. For example, in a B blood group individual, B antigen is present on red cell membrane, anti-B antibody must be absent in plasma (instead anti-A antibody is present). Similarly, in O blood group individual, both A and B antigens are absent on red cell membrane, however both anti-A and anti-B antibodies are present in plasma. So, ABO blood group system is the only blood group system in which an individual has antibodies in their serum that are absent from their RBCs,

However, Rh blood group system has no such antibodies. The terms, Rh positive and Rh negative indicate the presence or absence of a particular antigen, D antigen, for which routine tests are done. In addition to that, sometimes it is necessary to detect weak D antigen by a test named D^u test. The importance of D^u test lies in the fact that D antigen is the most immunogenic after ABO system antigens and exposure of a few milliliters of D positive cells in a D negative individual can produce immune response, which can cause delayed hemolytic transfusion reaction in next and subsequent transfusions.

This study was carried out to determine the frequency of ABO and RhD blood group among all the donors, OPD and IPD patients attending Evercare Hospital Chattogram.

MATERIALS AND METHODS

Study population and data collection

This retrospective study was conducted at Transfusion Medicine Department in Evercare Hospital Chattogram (EHC) from April 2021 to March 2025. Individuals who came for blood donations and all outpatients and inpatients were included. Data was collected from Hospital Information System (HIS).

Method of ABO blood grouping and Rh typing

ABO blood grouping was done by performing both forward (detection of ABO blood group antigens in red cell) and reverse grouping (detection of ABO blood group antibodies in plasma); any discrepancies between forward and reverse grouping has been solved before finalizing reports. For Rh blood group confirmation, D^u test was done whenever required.

ABO blood grouping and Rh typing have been done by both column agglutination technique using gel card and traditional hemagglutination technique using glass slide /test tube. Forward blood grouping in traditional hemagglutination techniques has been done by using commercially available anti-A, anti-B, anti-AB and anti-D antisera; however, in the column agglutination technique, ABD Ortho-bio-Vue cassettes were used. In-house pooled A cell, B cell and O cell have been used to perform reverse blood grouping in both the column agglutination technique and traditional slide/tube test technique. D^u test was done by Column agglutination technique using Ortho BioVue poly cassettes containing anti-C3d and anti-IgG.

RESULTS

A total 22,092 ABO blood grouping and Rh typing has been performed among the inpatients, outpatients and blood donors attending EHC. Out of these 14,866 blood grouping were done in patients (both OP and IP) of any age group, whereas 7,226 blood grouping done in donor group (Fig 1). Among all ABO grouping, O group was most common 36.8% (Table 1)

Out of total 22,092 blood groups, RhD positive were 21,337 (96.6%), RhD negative were 730 (3.3%) and D^u positive were 25 (0.11%). Among all the 730 Rh-D negative blood groups (OP, IP and donors) it has been observed that O negative is highest in number 250 (34.2%) followed by B negative 224 (30.7%), A negative 200 (27.4%) and AB negative 56 (7.7%) (Table 2). 25 subjects (OP, IP, donors) have been found to be D^u positive. Among them, O D^u positive is highest 10 (40%) (Table 3).

DISCUSSION

Distribution pattern of ABO blood group observed in this study is O (36.8%)> B(30.7%) > A(24.8%) >AB(7.7%), which is similar to other studies conducted earlier. The distribution of ABO and Rhesus blood group systems in Bangladeshis was studied in South East zone of the country during 1984 to 1988; the predominant blood group was O followed by B group[3]. In Eastern part of Bangladesh, O group was predominant and distribution of O and B was almost same in Western Part[4].

In 2015 a study regarding distribution pattern of ABO and Rhesus blood group system among common people of Chittagong City Corporation was done, where blood group B was found to be more predominant (34.15%) and frequency of RhD positive individual was 90.72% and RhD negative was 9.28%[5]. Another study conducted in the rural and urban areas of Bangladesh showed the similar results of predominant blood group B (35.54%) followed by blood group O (32.57%)[6,7]. These findings are not consistent with the present study. Duration of our study and number of study population is less than the other studies which had similar results to present study.

Data from neighboring country Nepal, revealed different structure of higher frequency of group A[8]. In Australia[9], Britain[10], and USA[11], group 'O' and 'A' were the commonest followed by B and 'AB'. In African subcontinent phenotypic frequency order is as follows; O>A>B>AB. The phenotypic frequency order is quite similar in Europe and Africa[12,13,14]. Our results were similar to the reports of some Indian subcontinent countries; India[15] and Gujrat (Pakistan)[16,17]. But it differs from the reports of the middle-east[18], Africa and Europe[19] countries. The present investigation demonstrated similarities with the findings of previous large scale research results done in Bangladesh. The implication of this study finding is that Blood group O and B are readily available among the population of Bangladesh, and it is advantageous for the population in the event of blood transfusion.

In this study, it was found that RhD positive blood group 96.58%, which is almost similar to the

study[20]. This study also showed RhD negative group 3.30% and D^u positive was 0.11%(Figure. 2). However, among all the D^u positive individuals, O D^u positive was most common. Although D^u status was not observed in any other of these studies, it is important in transfusion dependent patients who need multiple blood transfusions, it is also important to identify D^u positive blood donors as D^u positive donors should not donate blood to any RhD negative patient

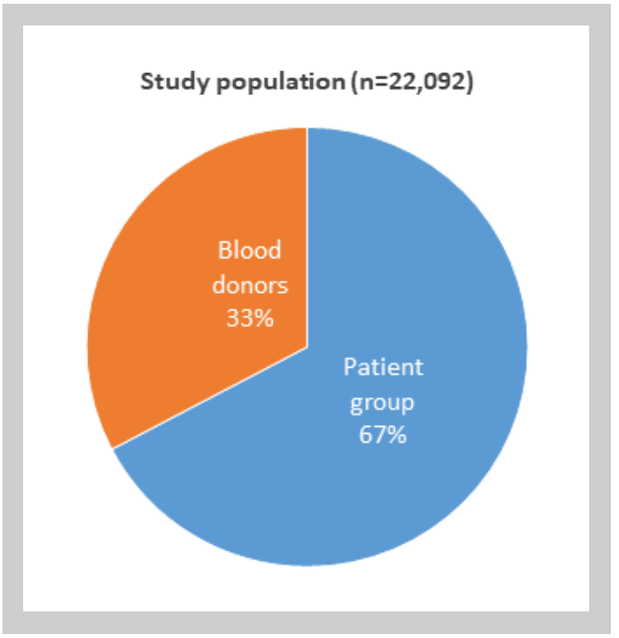

Figure 1 : Distribution of blood grouping among patients and donors

Table 1: ABO blood group distribution among all the observed blood groups

ABO blood group	Total number	Percentage (%)
A	5,475	24.8
B	6,780	30.7
AB	1,709	7.7
O	8,128	36.8
Total	**22,092**	**100**

Table-2: Percentage distribution of ABO blood group among all RhD negative blood types

ABO blood group	Total number	Percentage (%)
A negative	200	27.4
B negative	224	30.7
AB negative	56	7.7
O negative	250	34.2
	730	100

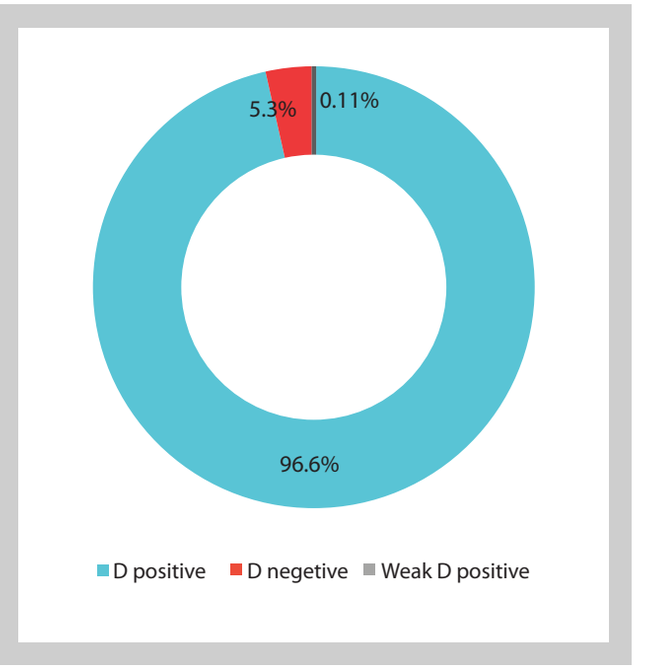

Figure 2 : Distribution of RhD blood group

Table-3: Distribution of ABO Blood Group Among D^u Positives

ABO blood group	Total number	Percentage (%)
A D^upositive	5	20
B D^upositive	4	16
AB D^upositive	6	24
O D^upositive	10	40
	25	100

CONCLUSION

The result of this study shows higher frequency of O followed by B, A and AB; which is similar to the results of the study done in South-East and Eastern parts of Bangladesh. However other studies done in Central part of Bangladesh shows predominance of blood group B followed by O, A and AB. Also, it was observed that frequency of RhD positive blood group was highest compared to RhD negative type which correlates with the results of other studies done in Bangladesh. In this study, D^u status was also observed. Although frequency of D^u positive individuals was very negligible (0.11%), it is an important aspect of blood transfusion and transplantation.

REFERENCES

1. Davis FA, Modern blood banking and transfusion practices, 7th edition, F A DAVIS Company. 2019
2. Makroo RN. Principles and practice of transfusion medicine,2nd edition, New Delhi: KONGPOSH Publication Pvt Ltd. 2018.
3. Hussain M, Nandy CK, Kabir KM, Haque KMG. The distribution of ABO and Rhesus (D) blood group systems in greater Chittagong, Noakhali and Comilla (South East zone of Bangladesh). Med. Today 2:33-36.
4. Rahman M, Incidence of important blood groups in Bangladesh. Bangladesh Med. Res. Counc. Bull. 1(1):60-63.
5. Zaman R, Parvez M, Jakaria Md, Sayeed MA. Study of ABO and Rh-D blood group among the common people of Chittagong city corporation area of Bangladesh. J. Public Health Epidemiol.Vo l. 7(9), pp . 305-310
6. Pathan AH, Apu AS, Jamaluddin ATM, Asaduzzaman M, Rahman ZM, Rahman A, Rahman MJ. Prevalence of ABO blood groups
and Rh factor in Bangladesh. Bangladesh J. Life Sci. 20(2):131-35.
7. Nandy CK. Frequencies of the ABO blood groups in Jessore (Bangladesh). J. IPGMR 1:40-4
8. Pramanik T, Praminic S. Distribution of ABO and Rh blood
groups in Nepalese medical students: a report. East Mediterr Health J. 6(1):156-58.
9. Australian Red Cross Blood service. About blood. Available from: http://www.donateblood.com.au/about-blood/types
10. Mourant AE, Kopec AC, Domaniewska-Sobczak K. The distribution of the human blood groups and other polymorphisms. 2nd ed. London: Oxford University Press p 1.005.
11. Harmening MD, Firestone D. The ABO blood group system. In: Harmening MN, editor. Modern Blood Banking and Transfusion Practices.5th ed. USA: FA Davis Company, Philadelphia, USA pp 108-32.
12. Lyko J, Gaertner H, Kaviti JN, Karithi MW, Akoto B. The blood group antigens ABO and Rh in Kenyans. Hamdard Medicus 35:59–67.
13. Khalil IA, Phrykian S, Farr AD. Blood group distribution in Sudan. Gene Geogr. 3:7–10.
14. Falusi AG, Ademowo OG, Latunji CA, Okeke AC, Olatunji PO, Onyekwere TO, Jimmy EO, Raji Y, Hedo CC, Otukonyong EE, Itata EO (2000). Distribution of ABO and Rh genes in Nigeria. Afr. J. Med. Sci. 29:23–6.
15. Majumder PP, Roy J. Distribution of ABO Blood groups on the Indian subcontinent: A cluster-analytic approach. Curr. Anthropol. 23(5):539-66.
16. Anees M, Shabir Mirza M. Distribution of ABO and Rh blood group alleles in Gujrat region of Punjab, Pakistan. Proc. Pak. Acad. Sci. 42(4):233-8.
17. Khattak ID, Khan TM, Khan P, Shah SM, Khattak ST, Ali A. Frequency of ABO and Rhesus blood group in district Swat, Pakistan. J. Ayub Med. Coll. 20(4):127-29.
18. Amin-ud-Din M, Fazeli N, Rafiq MA. Malik S. Serological study among the municipal employees of Tehran, Iran: distribution of ABO and Rh blood groups. Haema 7(4):502-504.
19. Akbas F, Aydin M, Cenani A. ABO blood subgroup allele frequencies in the Turkish population. Anthropol. Anz. 61:257-60.
20. Sultana R, Rahman Z, Helali AM, Yusuf R, Mustafa S, Abdus S, Mainul H. Study of ABO and Rh-D blood groups among the common people of capital city of Bangladesh. International journal of Pharmacy and Pharmaceeutical Sciences. 5. 814-816