

# Blood group pattern and its distribution among blood transfusion recipients in a semi-urban setting in North-West Nigeria

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## Abstract

**Background:** The blood group refers to the blood grouping system and their specificity which is genetically determined; however, the “blood phenotype” describes the reactivity of blood to specific testing antiserum. Although racial and regional variations have been established in the prevalence of the blood groups, most of these studies were done among blood donors, but the blood transfusion recipients who actually need these transfusions have been poorly studied. This study seeks to determine the common blood groups encountered among blood transfusion recipients in Federal Medical Centre (FMC), Birnin Kudu. **Materials and Methods:** This study was a retrospective analysis of the blood grouping pattern among blood transfusion recipients in FMC, Birnin Kudu over a 2-year period from January 2011 to December 2013. Blood grouping is determined commonly using venous blood through tile agglutination method. Standard commercially produced anti-A, anti-B monoclonal grouping reagents and anti-D sera are used for the tests and performed at room temperature. Evidence of agglutination is substantiated microscopically after waiting for 2 min. **Results:** There were 4129 blood requests during the study period; however, 28 of the entries were excluded due to grossly incomplete data. Among the 4101 entries analyzed, there were 1206 (29.4%) males and 2895 (70.6%) females; male/female ratio of 1:2.4. Blood group O (44.1%) was the most common blood group whereas blood group AB (5.9%) was the least; however, majority (96.2%) of the recipients were rhesus positive. **Conclusion:** Group O and rhesus positive antigens remain the most common blood group distribution among blood transfusion recipients.

**Key words:** Blood group, blood transfusion, donors, Nigeria, recipients

## INTRODUCTION

The blood group refers to the blood grouping system, but “blood phenotype” describes the reactivity of blood to specific testing antiserum. The ABO and the rhesus system

form the bedrock of transfusion medicine. The ABO was the first described system discovered by Karl Landsteiner in 1901.<sup>[1,2]</sup> This consists of the A, B, and O antigens which are codominantly inherited. Blood group O lacks any antigen on the surface of their erythrocytes; hence, they are called universal donors while blood group AB is universal recipient.<sup>[3]</sup> Similarly, the rhesus blood group system is determined by genes which are closely linked and also codominantly expressed-Fisher-Race gene complex.<sup>[4]</sup>

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Although the ABO and rhesus blood group system are among the earliest discovered, there are other 33 blood group systems such as Duffy<sup>[5-7]</sup> but they are of limited clinical application.

The ABO system has made blood transfusion easy; therefore, abating complications such as hemolysis and other transfusion-related adverse reactions resulting from incompatible blood transfusion. Although racial and regional variations have been established in the prevalence of the blood groups, most of these studies were done among blood donors;<sup>[8-13]</sup> however, the blood transfusion recipients who actually need these blood have been poorly studied.<sup>[14-17]</sup> This study seeks to determine the common blood groups encountered among blood recipients in Federal Medical Centre (FMC), Birnin Kudu. This will further facilitate the proper understanding, planning, and storage of the commonly required blood group types.

## MATERIALS AND METHODS

This study was a retrospective analysis of the blood grouping pattern among blood transfusion recipients in FMC, Birnin Kudu, Jigawa State, Nigeria, over a 2-year period from January 2011 to December 2013. Birnin Kudu is a semi-urban area in Jigawa state; they are predominately of the Hausa and Fulani ethnic groups, and farming is their major occupation. However, the hospital also serves the surrounding towns and state such as Ningi in Bauchi state, Nigeria.

Relevant information was extracted from the blood bank transfusion register; such as their sex, common blood groups such as A, B, AB, O, and the rhesus D antigen status of the recipients, and date/year of receiving transfusion; however, those with grossly incomplete records were excluded from the study. We also ensured that repeat entries were avoided.

Blood grouping is determined commonly using venous blood sampling through the tile agglutination method. Standard commercially produced anti-A, anti-B monoclonal grouping reagents and anti-D sera are used for the tests and performed at room temperature, and evidence of agglutination is seen macroscopically which can also be substantiated microscopically after waiting for 2 min.

Permission to conduct this study was obtained from the Institution's Ethics Committee.

### Data analysis

Statistical Package for the Social Sciences version 16 for Windows (SPSS Inc., Chicago, Illinois, USA) software was

used to analyze this data, and frequency distribution of variables was displayed as percentages.

## RESULTS

There were 4129 blood requests during the study period; however, 28 of the entries were excluded due to gross incomplete data. Among the 4101 entries analyzed, there were 1206 (29.4%) males and 2895 (70.6%) females; male/female ratio of 1:2.4.

Blood group O (44.1%) was the most common blood observed, whereas AB was the least reported (5.9%); however, majority (96.2%) of the recipients were rhesus positive [Table 1].

Most of the recipients were of the blood group O rhesus positive combination, whereas the least combination was group AB rhesus positive. This pattern was similar among both sexes – males were 13 (43.8%) and females were 1222 (51.2%) [Table 2].

## DISCUSSION

This study showed more females (70.6%) received blood transfusion over the study period; this may be partly attributed to the fact that more female health-related events may require blood transfusion such as per vaginal bleedings following abortions and also pregnancy-related events such as antepartum and postpartum hemorrhages. This observation is similar to those of Musa *et al.*<sup>[18]</sup> Similarly, nongynecologic health-related illnesses have been associated with more need for blood transfusion in women than men; Sherwood *et al.*<sup>[19]</sup> in their study also reported more females who underwent percutaneous coronary intervention required more blood transfusion than men; why this is so is not completely understood. However, a borderline hematocrit resulting from regular menstrual

**Table 1: Frequency distribution of the blood type among the blood transfusion recipients**

	Frequency (%)
ABO	
A	988 (24.1)
B	1064 (25.9)
AB	240 (5.9)
O	1809 (44.1)
Total	4101 (100)
Rhesus	
Positive	3946 (96.2)
Negative	155 (3.8)
Total	4101 (100)

**Table 2: Major blood groups combination among the blood transfusion recipients**

ABO	Rhesus				Total (%)
	Male		Female		
	Positive (%)	Negative (%)	Positive (%)	Negative (%)	
A	281 (24.0)	12 (33.3)	669 (24.2)	26 (21.9)	988 (24.1)
B	298 (25.5)	6 (16.7)	734 (26.4)	26 (21.9)	1064 (25.9)
AB	78 (6.7)	5 (13.9)	151 (5.4)	6 (5.0)	240 (5.9)
O	513 (43.8)	13 (36.1)	1222 (44.0)	61 (51.2)	1809 (44.1)
Total	1170 (100)	36 (100)	2776 (100)	119 (100)	4101 (100)

blood loss may easily predispose them to anemia, hence requiring blood transfusion.

The blood group O was the most common among blood recipients in our report, followed by group B, A then AB was the least; this pattern is similar to the previous report among blood donors;<sup>[12,20]</sup> however, the frequencies differed, whereas 44.1%, 25.1%, and 24.9% were recorded in groups O, B, A, and AB, respectively, in our study and Ahmed *et al.*<sup>[12]</sup> recorded 64.4%, 18.5%, 15.1%, and 1.8%, respectively. This slight disparity may be related to the fact that the individuals involved in blood donation are widespread and heterogeneous, especially with the concept of voluntary blood donation, institutions are involved in massive widespread campaigns for blood donation; this at times may involve traveling to distant places in solicitation. Therefore, donors are more likely to be more heterogeneous when compared to health-seeking blood recipients who are predominately residents of the locale. Furthermore, findings in this study varied slightly from that reported by Ikponmwen *et al.*<sup>[10]</sup> among the Bini ethnic group though blood group O and AB (56.5% vs. 2.2%) were the most common and least, respectively, they found that blood group A was more common than group B (26.3% vs. 15%). Similarly, Enosolease *et al.*<sup>[21]</sup> in their study reported the same pattern among blood recipients in Benin, Nigeria, whereas the frequency of group A (24.9%) reported in our study is in agreement with that reported by Enosolease and Bazuaye<sup>[21]</sup> (23.74%) and Worlledge *et al.*<sup>[22]</sup> and it differed from the 27% reported by Ahmed *et al.*<sup>[23]</sup> in Northeastern Nigeria.

Rhesus positivity was mostly documented in this study. This is similarly to previous studies in Nigeria.<sup>[12,21,23]</sup> However, the frequencies differed, whereas Ahmed *et al.*<sup>[12,23]</sup> reported a lower frequency of 0.6% and 1.44% among donors in Birnin Kudu and Maiduguri Northeastern Nigeria, respectively, we found a higher frequency of 4% in our study; this is almost similar to those reported among major ethnics (Yoruba, Bini, and Hausa-Fulani) in Nigeria<sup>[20-23]</sup> but lower than the 15% reported among Caucasians.<sup>[24]</sup>

Rhesus antigen positivity was the most common among those in blood group O and lowest in the blood group AB; rhesus negativity also had similar distribution; this pattern was also reported by Chima *et al.*<sup>[11]</sup>

## CONCLUSION

Group O and rhesus positive antigens remain the most common blood group distribution among blood transfusion recipients; however, we observed an increased frequency of blood group B and A when compared to previous reports.

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## Conflicts of interest

There are no conflicts of interest.

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