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## DISTRIBUTION OF ABO - RHESUS BLOOD GROUPS AND PARTICIPATION OF WOMEN IN VOLUNTEER BLOOD DONATIONS IN KISANGANI, NORTHEAST OF DEMOCRATIC REPUBLIC OF CONGO (DRC)

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### ABSTRACT

**Introduction:** Knowledge of the distribution of ABO and Rhesus blood groups at the local and/or regional level is of imperative importance in the management of blood banks and transfusion safety services. The objective of this study is to determine the frequency of ABO and Rhesus blood groups among volunteer blood donors monitored at the Provincial Blood Transfusion Center (PBTC) and the frequency of participation of women.

**Methods.** This is a cross-sectional descriptive study, carried out on 198 volunteer blood donors at the PBTC during the month of March 2022. The blood group was determined by the agglutination technique by looking for the antigens carried by the red blood cells of the subject tested using anti-A, anti-B, anti-AB and anti-D antisera. The calculation of percentage and mean  $\pm$  standard deviation (SD) was used for qualitative and quantitative variables respectively. The results were presented in tables and graphs.

**Results.** The majority of respondents (88.8%) were aged from 20 to 34 years. The average age was  $27.02 \pm 7.45$  years, with a minimum of 20 years and a maximum of 65 years. Blood group O+ represented 49.5%, A<sup>+</sup> group:26.8%, B<sup>+</sup> group:16.7% and AB<sup>+</sup> group: 5.6% of donors. Three cases were Rh negative and all of them were all male. Only 3 out of 198 donors or 1.5% were female. **Conclusion.** the PBTC of Kisangani is functioning normally. However, the proportion of female donors is very low compared to other countries. Awareness campaigns for women are important in order to increase their numbers in donating blood.

**KEYWORDS:** ABO and Rhesus blood groups, transfusion center, voluntary blood donors, DRC.

## INTRODUCTION

Blood group antigens are hereditarily determined and play a vital role in blood transfusion safety, studies of human genetics, research on migratory movements of people, medico-legal issues such as paternity disputes. Certain blood groups are associated with certain diseases such as duodenal ulcer, diabetes mellitus, urinary tract infections, Rhesus incompatibility and ABO incompatibility in the newborn [1-7]. According to WHO estimates, approximately 80 million units of blood are collected each year worldwide, of which only 38% are collected in developing countries, where 82% of the world's population lives [2]. In Mali, transfusion therapy is increasingly used in hospital structures because the number of units of blood consumed increases from year to year. During 2017 the national center of blood transfusion was able to collect 66,973 bags of blood including 48508 bags in Bamako [3]. Although it helps to save human lives, blood transfusion presents numerous risks linked to the accidents and incidents that it can cause, thus compromising the vital prognosis of the recipient patient.

Approximately 700 erythrocyte antigens have been described, organized into 30 blood group systems by the International Society of Blood Transfusion, among which the ABO and Rhesus systems are the most important [8]. One of the major challenges in transfusion safety in our country is the availability and access to safe and sufficient quantity of screened blood. Thus, knowledge of the distribution of ABO and Rhesus blood groups at the local and/or regional level is of imperative importance in the management of blood banks and transfusion safety services. This constituted our research concern, given the scarcity of data on this subject in Kisangani, capital of the Tshopo Province. The objective of this study is to determine the frequency of ABO and Rhesus blood groups among volunteer blood donors monitored at the Kisangani Blood Transfusion Center as well as the distribution of these groups according to age, sex and different populations.

## MATERIAL AND METHODS

**Research design:** The present study was carried out at the provincial blood transfusion center (PBTC) of Kisangani, Tshopo province in the DRC. Transfusion activities are organized there with the aim of being able to satisfy all requests coming from health structures in the city of Kisangani.

**Type and period of study.** This is a descriptive cross-sectional study, carried out on subjects who consulted the PBTC during the month of March 2022.

**Study population and sampling:** Our study concerned voluntary blood donors aged 20 to 65 years old, residing in Kisangani for at least 12 months and who have agreed to volunteer their blood. Was included in the study, any donor who complied with the protocol used at the PBTC for donors, namely: having been designated a voluntary donor and having given informed consent, having undergone a screening examination before donating blood, having a form individual selection completed correctly, be aged 20 to 65 years, have a minimum weight of 50kg, have a systolic blood pressure between 100 and 130 mm Hg, have no clinical sign that could contraindicate blood donation, have a hemoglobin level  $\geq 12g\%$  for men and  $\geq 11g\%$  for women and having consulted the center for blood donation during the month of March 2022. Volunteer donors with an incomplete protocol sheet, with notion of previous use of antibiotics.

Using non-probability sampling, our study included 198 blood donors of both sexes. These candidates have not been transfused in the last three months following the day of blood donation.

**Data collection:** the interview clarified the socio-demographic characteristics of the donors, notably age, sex and profession. Other data was collected from information collected in the registers and forms of voluntary blood donors. For the description of the sample, we used the mean for quantitative variables with a symmetrical distribution and for the description of qualitative variables, proportions were used.

The following technical equipment was used: an aneroid sphygmomanometer, a double-cup stethoscope, a wristwatch, a scale with height chart, a campaign bed, pairs of scissors, a tourniquet, alcohol, lancets, vacuum tubes, hemolysis tubes, transfer pipettes, racks, a rhesoscope to visualize fine agglutinations on the slides, a centrifuge and an incubator, donor selection sheets, blood and serum samples, reagents: anti-A serum (blue), anti-B serum (yellow), anti-AB serum (clear, colorless) and anti-D serum (colorless).

### Blood grouping

For the determination of the ABO and Rhesus blood groups, we used the tube technique using the commercial blood grouping kit from Cypress Diagnostics (Cypress Diagnostics: Nijverheidsstraat 8.2235 Hulshout. Belgium). We followed the procedure outlined in the instructions provided. ABO grouping was carried out by looking for the presence or absence of A and/or B antigens by the agglutination test using anti-A, anti-B, anti-AB antisera. For Rhesus D grouping, the direct slide agglutination technique was used.

## RESULTS

Table no 1 presents the sociodemographic characteristics of blood donors, namely: age, gender, main activity.

**Table I: Sociodemographic characteristics of respondents**

Characteristics	Numbers	%
<b>Age class (years)</b>		
20 - 34	176	88,9
35 - 49	18	9,1
50 - 65	04	2
$\bar{x} \pm SD$	$27.02 \pm 7,45$	Min 20—Max. 65
<b>Sex</b>		
Male	195	98,5
Female	03	1,5
<b>Mean activity</b>		
Pupils/Students	78	39,4
Resourceful	58	29,3
Employees	11	5,6
Unemployed	51	25,7

This table shows that the age group of 20 to 34 was in the majority (88.8%). The average age was  $27.02 \pm 7.45$  years, with a minimum of 20 years and a maximum of 65 years. Almost all donors were male and only 1.5% were female and most were either high school or college students.

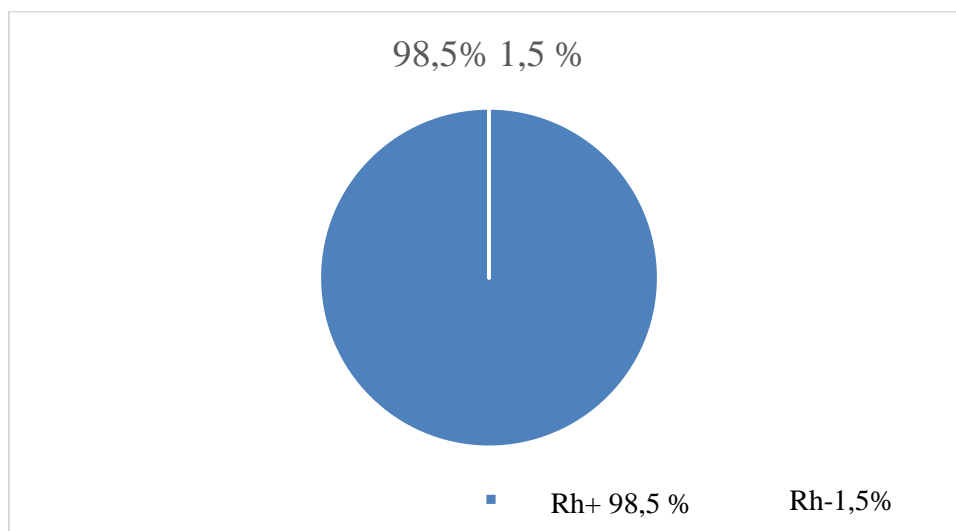
**Table II: Frequency of ABO blood groups n = 198**

Group	Numbers	%
A	53	26,7
B	35	17,6
AB	11	5,5
O	99	50

Reading Table 2 reveals that 50% of volunteer donors were from group O followed by groups A, group B and AB respectively with 26.7%, 17.6% and 5.5%.

Rhesus factor

**Figure 1 shows the donors according to whether they were rhesus positive (Rh+) or rhesus negative (Rh-)**



**Figure 1: Rh factors.**

Out of a total of 198 volunteer donors from our respondents, there were 195 Rhesus positive blood samples, i.e. 98.5% compared to 3 Rh- subjects, i.e. 1.5% following the order of frequency below: O+, A+, B+, AB+, B-, O-.

**Table III: Frequency of rhesus blood groups among blood donors**

A+	A-	B+	B-	AB+	AB-	O+	O-	Total
53	0	33	2	11	0	98	1	198
(26,8 %)	(0%)	(16,7%)	(1%)	(5,6%)	(0%)	(49,5%)	(0,5%)	(100%)

According to the results in Table 3, the most common rhesus blood group was group O+ (49.5%), followed by group A+ (26.8%), B+ (16.7%) and finally AB+ (5.6%). We recorded three cases of Rhesus negative group: 2 cases B- (1%) and 1 case O- (0.5%).

**Table IV: Distribution of rhesus blood groups according to sex**

Sexe	A+	A-	B+	B-	AB+	AB-	O+	O-	Total
M	52 (26,7%)	0 (0%)	33 (16,9%)	2 (1%)	10 (5,1%)	0 (0%)	97 (49,7%)	1 (0,5%)	195 (100%)
F	1 (33,3%)	0	0	0	1 (33,3%)	0	1 (33,3%)	0	3 (100%)
Total	53 (26,8%)	0	33 (16,7%)	2 (1%)	11 (5,6%)	0	98 (49,5%)	1 (0,5%)	198 (100%)

The distribution of rhesus blood groups in the male gender reflected the overall pattern of 49.7% O+ cases, 26.7% A+ cases, 16.9% B+ cases, 5.1% AB+ cases, 1% of B- cases and 0.5% of O- cases of men, either. 98.5%, compared to 33.3% A+, 33.3% AB+ and 33.3% O+ of women either 1.5%.

## DISCUSSION

### Overall blood group frequency

In this study the frequencies of ABO blood groups were respectively “O” 50%, “A” 26.7%, “B” 17.6%, and “AB” 5.5%. In France, the French blood establishment provided the following results: A- 7%, O- 6%, B- 1%, AB-1%, or 15% in total [15]. In India, Singh et al. found among volunteer blood donors, a high frequency of blood group “B” (35.15%), followed by “O” (34.73%), “A” (22.09%), and “AB” (8.03%) [1]. and in Pakistan B+ (32.4%), O+ (29.1%), A+(27.92%), AB+(10.58%).

In our series, the order of frequency of blood groups in the ABO rhesus system was as follows: O+(49.5%), A+(26.8%), B+(16.7%) and AB+(5.6%). (Table II). In our research, the O+ blood group is more dominant unlike in France, India and Pakistan respectively with A+, B+ and AB+.

Concerning the Rhesus negative group, it was only identified in three cases either 1.5% (Figure 1) including B- (1%) as well as O- (0.5%) and in none investigated. The absence of the negative rhesus factor in the female sex in this series would be due to very poor sampling of this sex.

Blood group differences are sometimes huge between countries, for example, the frequency of blood group O in Pakistan and India compared to that in France and Kisangani. This difference could be explained by the very small number of our sample which was recruited for one month [9,11].

### **Sociodemographic and donor characteristics**

Among the volunteer donors who attended the Kisangani PBTC, there were more men than women respectively 98.5% and 1.5%, more young people than elderly subjects 88.9% compared to 11.1% and 39.4% of pupils/students (Table I). Several African studies have shown that blood donors in Africa are often young. In Kenya, Rajab et al reported a mean age of  $28.9 \pm 8.5$  years among their blood donors [16]; in Rwanda, Tayou et al observed that more than 75% of blood donors were under 30 years old [17]. These average ages observed in Africa were 10-15 years lower than those observed in European countries, particularly in France, Belgium and the United Kingdom where the proportion of donors under 35 was less than 50%, and less than 45% in Switzerland as well as in Finland [18]. The difference can be explained by the fact that in Africa, voluntary blood donation programs are primarily aimed at secondary school students and university students whose average age varies between 20 and 25 years. Concerning the participation of women in blood donation, several factors probably constituted a significant barrier to blood donation; among them: fear, fragile health, numerous childbirths, culture, poverty, ignorance and religion. This phenomenon has also been found in other poor countries in India and Africa where the proportion of women among voluntary blood donors was low: 8.27% in India [1]; in Africa, 30% in Togo, 10% in Ghana and 9.9% in Nigeria [17]. In these countries, this may be due to socio-cultural reasons, lack of motivation and fear of falling ill and dying [17, 18], and sometimes discouragement among female donors. In the African context, there is a general belief that men have better health than women [16] and that women's blood is "weaker" than men's due to certain physiological conditions such as pregnancy, lactation and menstruation [18]. On the other hand, the participation of women in blood donation is truly significant in developed countries with records in Norway, Belgium, Finland and Great Britain (40 to 50%) [19].

Concerning mean occupation, we believe that pupils and students constitute potential volunteer candidates for blood donation due to their young age and their education, and that the differences observed according to profession were purely descriptive and could be subject to further investigation other more in-depth studies.

### **CONCLUSION.**

At the end of this study which focused on the frequency of ABO and Rhesus blood groups among volunteer blood donors in Kisangani, we found that, the group O represented half of the donors and group AB+ represented only 5.6%, almost all donors were rhesus positive and also male. Women represented only 1.5% of all donors, which is quite different from other developed countries where 30 to 40% of women participate in blood donation. It would therefore be important to carry out an awareness campaign among women in order to increase their number of blood donors.

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