

Distribution of ABO and Rhesus 'D' Blood Groups among Pregnant Women in a Tertiary Hospital in Rivers State, Southern Nigeria

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Abstract: **Background:** In recent times, the role of ABO and Rhesus grouping in clinical practice has increased widely. There is a paucity of literature on blood group distribution, and its distribution has not been studied in our centre. This study aimed to determine the distribution of ABO, Rh D blood groups and haemoglobin genotype among pregnant women initiating antenatal care in Rivers State University Teaching Hospital (RSUTH). **Methods:** This was a cross-sectional study among antenatal clinic attendees in RSUTH, over 6 months. At booking 3ml of venous blood was collected in Ethylenediaminetetraacetic acid (EDTA) vacutainer from the pregnant women, and ABO and Rh D typing was done by tile methods forward and reverse grouping methods and confirmed by microscopy. Haemoglobin genotype was done by electrophoresis. Data collected were analyzed using IBM Statistical Product and Service Solution (SPSS), version 25.0 (Armonk, New York). **Results:** One thousand one hundred and forty -seven patients were recruited for the study. Their mean age and mean gestational age at booking were 31.6 SD 4.6 years (95% CI: 31.3,31.8), and 21.1 SD 18.6 weeks respectively. Modal parity was para 1. The predominant blood group among pregnant women at the RSUTH was O [667 (58.2%)], followed by A [286 (24.9%)], B [171(14.9%)], and AB [23(2%)]. The prevalences of Rhesus D positive and Rhesus D negative blood group were 95.2% and 4.8% respectively. Concerning genotype, the most predominant was AA 898 (78%) followed by AS [245 (21.4)], SS [4 (0.4%)], and AC [2 (0.2%)]. **Conclusion:** The predominant blood group and genotype among pregnant women in our centre is O Rh D positive and AA respectively. The findings from this study would help plan transfusion services antepartum and post-partum. This will be relevant in transfusion and coagulation management of obstetric haemorrhage.

Keywords: Blood group, Rhesus, ABO system, Transfusion, Genotype.

INTRODUCTION

Since the inception of transfusion services, the determination of ABO blood groups has remained one of the commonest tests performed in blood banks [1, 2]. In 1901 Karl Landsteiner discovered the ABO blood group during his early studies in Transfusion medicine [3]. Thirty years later he received a Nobel prize for his work [1-4]. The Rhesus (Rh) blood group was also discovered by Karl Landsteiner and his Colleague Alexander Wiener in 1937. In recent times, the role of ABO and Rhesus grouping in clinical practice has increased widely. The ABO and rhesus blood groups are the most investigated among the numerous blood group systems

recognized by the international society of blood transfusion [5-7]. This may be attributed to the ease of identifying their phenotypes. Clinically the ABO and Rhesus systems are the most significant they play a vital role in blood transfusion, organ transplantation, and application in genetic research as well as anthropology, and forensic pathology [2-8].

The classification of blood groups is based on the presence and absence of inherited antigens on the red blood cells. According to the ABO system, blood groups can be classified into A, B, AB and O [9, 10]. Individuals with blood group A has antigen A in their red blood cell and antibody B in their plasma and can receive blood

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from red blood cell choice of A and O and give only to A provided the Rh factor is compatible [9]. Blood groups B and AB have antigens B, and AB respectively in their red blood cell and antibodies anti-A and no antibody in blood group AB while people with blood group O have no antigen in their red blood cells. Concerning blood donation and transfusion services the red blood cell (RBC) choices for blood groups A, B, AB and O are A, O; BO; A, B, AB, O; and O. While the plasma choice for blood groups A,B,AB and O are A,AB; B,AB; AB; and O,A,B,AB respectively [9].

According to rhesus classification, blood groups can be Rh positive and Rh negative [1-9]. Although the rhesus system contains five main antigens (C, c, D, E and e), the most immunogenic is antigen D [9]. The letter d indicates the absence of a discernible allelic product and there is no specific antiserum for 'd' antigen. The ABO phenotypes vary in different populations and ethnic groups. There is paucity of literature on blood group distribution, and blood group distribution has not been studied among pregnant women in our centre. Thus, this study was aimed to determine the distribution of ABO, Rh D blood groups and haemoglobin genotype among pregnant women initiating antenatal care in Rivers State University Teaching Hospital (RSUTH).

MATERIALS AND METHODS

The study was carried out at the Rivers State University Teaching Hospital (RSUTH), Port Harcourt, Rivers State, Nigeria. RSUTH is one of the tertiary health facilities in Rivers State and located at the heart of Port Harcourt the capital of Rivers State. The Hospital receives referral from within and neighbouring states.

The study was a prospective cross-sectional study carried out at the Rivers State University Teaching Hospital (RSUTH) among Antenatal clinic Attendees over 6 months period from first February,2020 to 31st July,2020. One thousand one hundred and forty-seven pregnant women initiating antenatal care were recruited for the study. At booking 3ml of venous blood was collected in Ethylenediaminetetraacetic acid (EDTA) vacutainer from the pregnant women, and ABO and Rh D typing was done by tile methods forward and reverse grouping methods and confirmed by microscopy. A study proforma was designed and used to collect data on age, parity gestational age, educational status, religion, ABO blood group, Rhesus blood group and hemoglobin genotype.

Data collected were entered into Microsoft word Excel office 2019 and transferred to IBM, Statistical Product and Service Solution (SPSS) previously known as Statistical Package for the Social Sciences version 25.0, Armonk, NY, for analysis. Continuous variables were summarized using mean and standard deviations with 95% confidence intervals around the point estimates while categorical variables were summarized in frequencies and percentages. Ethical clearance for the study was obtained from the Hospital.

RESULTS

There were 1147 participants and their data analysed. Table 1 shows the sociodemographic /obstetric characteristics of study participants. The mean age of the participants was 31.6 ± 4.6 , 95% CI: 31.3,31.8; mean gestational age at recruitment 21.1 ± 21.56 . Majority of the participants were primipara 608(53.0%), and 659(57.4%) had tertiary level education.

Table 1: Sociodemographic/obstetric characteristics of study participants

Variables	Number (n=1147)	Percentages
Age group (years)		
≤19	12	1
20-24	68	6
25-29	294	25.6
30-34	470	41.0
35-39	244	21.3
40-44	50	4.4
45-49	9	0.7
Mean 31.6	SD 4.6	95% CI: 31.3,31.8
Parity		
Nullipara	85	7.4
Primipara	608	53.0
Multipara	435	37.9
Grand multipara	19	1.7
Gestational age (weeks)		
≤13	210	18.3
14-26	621	54.1
27-40	316	27.6
Mean GA 21.1	SD18.6	95%CI 20.4,21.56
Religion		
Christianity	1137	99.1
Islam	4	0.4
Others	6	0.5

Majority of the participants 659 (57.4%) had tertiary level education and 460 (40.1) had secondary education (Figure1).

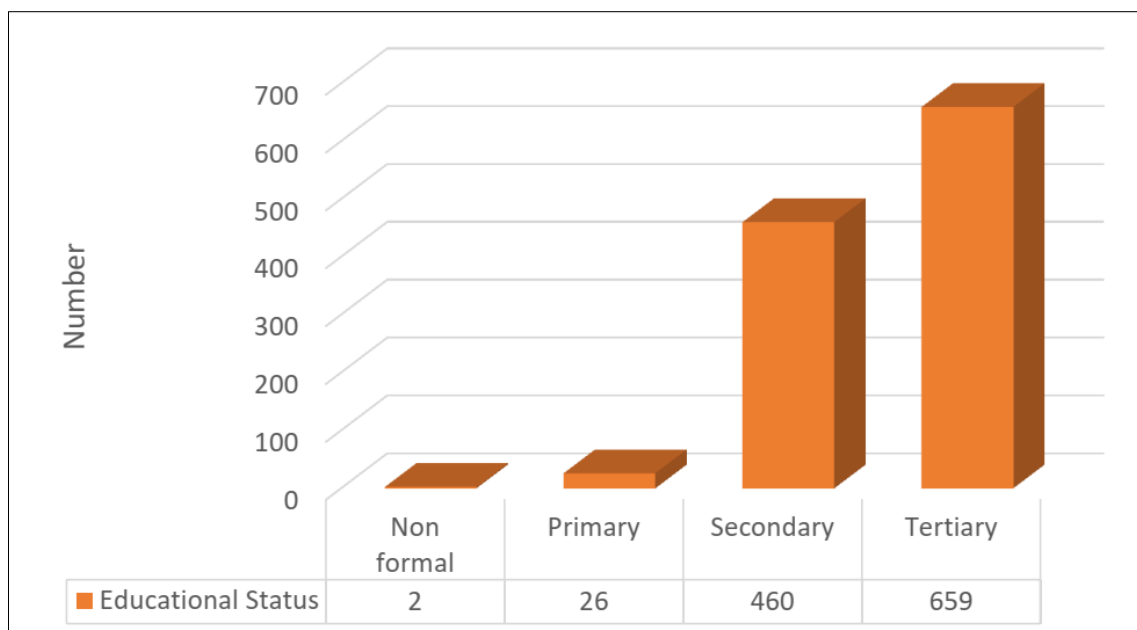


Figure 1: Educational status of study participants.

Table 2 shows the ABO and Rhesus blood group distribution among participants. The majority 667(58.2%) of the participants were of blood group O,

followed by blood group B 286(24.9%). Most of the participants 1092(95.2%) had Rhesus D positive blood while 55 (4.8%) had Rhesus D negative blood (Table 2).

Table 2: Distribution of ABO and Rhesus blood group System

Blood group	Rhesus D Positive (%)	Rhesus D Negative (%)	Total (%)
O	637 (58.3)	30 (54.6)	667 (58.2)
A	271 (24.8)	15(27.3)	286 (24.9)
B	163(14.9)	8 (15.5)	171(14.9)
AB	21 (2.0)	2(3.6)	23 (2.0)
Total	1092 (95.2)	55 (4.8)	1147 (100)

Eight hundred and ninety-eight (78%) of the participants had haemoglobin genotype AA, followed by

AS 245(21.4%). The least haemoglobin genotype was SS 4(0.4%) (Table 3)

Table 3: Distribution of Haemoglobin genotype

Haemoglobin Genotype	Number	Percentage
AA	898	78.0
AC	2	0.2
AS	245	21.4
SS	4	0.4
Total	1147	100

DISCUSSION

The commonest blood group among pregnant women initiating care at RSUTH is blood group O 58.3%. The finding of blood group O Rh positive as the most prevalent is similar to the findings of previous studies [11-14], but contrary to the finding of Gundem *et al.*, [15], in Turkey, and Barot *et al.*, [16], in Central Gujarat, India where blood group A Rh D positive and B Rhesus D positive were the commonest blood group in the study population respectively. Though the Indian study was among blood donors. Generally, blood group

O is the predominant blood group in different populations. Knowing the prevalences of the different blood groups in a population is of importance in blood transfusion services in medical practice. Additionally, the finding is very useful in management of cases of obstetric haemorrhage as well as others where blood transfusion is indicated. Previous study in our centre has revealed increased blood transfusion requirement among patients whose pregnancies were complicated with antepartum haemorrhage. With high rate of antepartum and postpartum haemorrhage and its associated increased

rate of blood transfusion requirement, knowledge of the distribution of ABO and Rhesus blood groups is key for prompt intervention leading to reduced maternal and foetal morbidity and mortality.

The prevalence of Rhesus D negative blood group among pregnant women at the RSUTH was 4.8%. This is in keeping with the prevalence rate of 5.1% reported by Anifowoshe *et al.*, [11], in a large Nigerian but higher than 3.8% in Kano and lower than 7.0% reported by Chanko *et al.*, [17], in Ethiopia 10.8% reported in previous study by Ayenew *et al.*, [12], in Ethiopia and 11.0% reported by Gundem *et al.*, [15], in Turkey. Rhesus D positive blood system accounted for 95.2 % among pregnant women at the RSUTH. This finding is similar to those of previous studies. [11-15]. Concerning distribution of haemoglobin genotype, AA was the commonest -78%. This was followed by haemoglobin genotypes AS 21.4% and SS (0.4%); AC was the least 0.2%. This finding is in keeping with those of previous studies [18, 19].

The variation in the rates of different blood groups corroborates the fact that blood groups vary among different population and ethnic groups. Never the less the different blood groups are to be available in the blood bank always to enhance blood transfusion when it is indicated to safe life.

CONCLUSION

The predominant blood group and genotype among pregnant women in our centre is O Rh D positive and AA respectively. The prevalence of rhesus d negative blood at the RSUTH is 4.8%. knowledge of these would be helpful in effective 24 hours transfusion services.

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CONFLICT OF INTEREST: Authors have no conflict of interest to declare.

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