Distribution of ABO and rhesus blood groups among selected tribes in Adamawa State, Nigeria

Introduction

Classification of blood into groups is based on the presence or absence of inherited oligosaccharides antigenic substances on the surface of the red blood cells. Blood groups are genetically determined and it exhibit polymorphism in different populations. Up to 30 blood groups have been identified in human beings based on the type of antigen present on the surface of the red blood cells. The human red blood cell membrane is complex and contains many blood groupings. ABO cell and serum grouping was carried out within two tube technique.

Materials and methods:

ABO and Rhesus phenotyping was carried out using standard tube technique.

Result:

Of the 654 subjects tested, 368 (56.2%) were of blood group O, 139 (21.3%) were blood group B, while 116 (17.7%) and 31 (4.7%) were group A and AB respectively. 577 (88.32%) were Rhesus D positive while 77 (11.79%) were Rhesus D negative. When comparing ABO blood group distribution among tribes, O blood group was higher among the Kilba tribe (4.74%) at P<0.05 compare to other tribes. Bura tribe had the highest AB blood group of 1.53%, the A blood group was more in Tangale tribe with 2.60% while B blood group was predominant in Wurkun tribe (3.67%) P<0.05. Kanuri tribe had the highest percentage (5.97%) of Rhesus ‘D’ negative blood group while Fulani, Vere, Hausa and Waja tribes had 2.14%, 2.60%, 0.31% and 0.77% of Rhesus D negative blood respectively.

Conclusion:

In Adamawa state, Gene frequencies with respect to the ABO system shows a formula O>B=A>AB indicating high prevalence of ‘O’ blood group and a predominance of allele B over allele A. Information obtained in this study will help in the optimum selection of blood type and blood products in Blood banking as well as facilitate the formulation of relevant blood banking and transfusion policies in this locality.

Keywords: ABO, rhesus, blood group, adamawa state, indirect antiglobulin test
added a drop of 5% red blood cell suspension in saline. The content were gently mixed together and allowed to stand at room temperature for 1hr after which they were examined for agglutination. For the serum grouping, a drop of 5% A cells, B cells, and O cells were placed in a clean test tubes labeled 1, 2, and 3 and to each tube was added a drop of subject’s serum. The contents were gently mixed together and allowed to stand at room temperature for 1hr after which they were examined for agglutination. All negative results are confirmed microscopically. For the Rhesus grouping, A drop of seraclone anti-D (RH1) was placed in clean labeled test tube and a drop of 5% RBC suspension in saline of the subject was then added and incubated at 37°C. At the end of the incubation periods, the contents of the tube were mixed gently and centrifuged for 30seconds at 1000g. Agglutination was read macroscopically and microscopically. All negative or weakly reacting results were confirmed using the indirect antiglobulin test (IAT) procedure.

Results

Of the 654 subjects tested, 56.2% were of blood group O, 21.3% were group B, 17.7% were group A and 4.7% were in group AB as in Table 1. In addition, 88.2% of the studied population was Rhesus D positive while 11.8% were Rhesus D negative as shown in Table 2. When comparing the distribution of ABO blood groups based on tribes in Table 3, Prevalence of O blood group was significantly higher among the Kilba tribe (4.74%) P<0.05 compare to other tribes. The Bura tribe had the highest number of people with AB blood group of 1.53%, the A blood group was more in Tangele tribe (up to 2.60%). B blood group was predominant in Wurkun tribe (3.67%) P<0.05. Similarly Rhesus blood group distribution was compared among the tribes. Kanuri tribe had the highest percentage of Rhesus negative blood group of 5.97% while Vere, Fulani and Waja tribes had 2.60%, 2.14% and 0.77% of Rhesus negative blood respectively as shown in Table 4. 0. 31% of the Hausa tribe was Rhesus D negative.

Table 1 Prevalence of ABO blood group among the studied population in Adamawa state

| ABO blood group | 'O' | 'B' | 'A' | 'AB' |
|----------------|-----|-----|-----|------|
| Prevalence     | 368(56.2%) | 139(21.3%) | 116(17.7%) | 31(4.7%) |

Table 2 Prevalence of rhesus antigen among the studied population in Adamawa state

| Rhesus 'D' positive | Rhesus 'D' negative |
|---------------------|---------------------|
| 577(88.2%)          | 77(11.8%)           |

Table 3 Prevalence of ABO blood among tribes in Adamawa State

| Tribes/prevalence blood group | 'O' blood group | 'B' blood group | 'A' blood group | 'Ab' blood group(%) |
|------------------------------|----------------|----------------|----------------|---------------------|
| Fulani                       | 12(1.84%)      | 04(0.66%)      | 15(2.30%)      | 07(1.07%)           |
| Kilba                        | 31(4.74%)      | 03(0.46%)      | 05(0.77%)      |                    |
| Chamba                       | 27(4.13%)      | 05(0.77%)      | 07(1.77%)      |                    |
| Kanuri                       | 23(3.52%)      | 03(0.46%)      | 05(0.77%)      | 7(1.07%)            |
| Gude                         | 29(4.44%)      | 04(0.61%)      | 06(0.92%)      |                    |
| Vere                         | 27(4.13%)      | 04(0.61%)      | 08(1.22%)      |                    |
| Tangale                      | 10(1.53%)      | 12(1.84%)      | 17(2.60%)      |                    |
| Wurkun                       | 10(1.53%)      | 24(3.67%)      | 05(0.77%)      |                    |
| Michika                      | 27(4.13%)      | 08(1.22%)      | 03(0.46%)      |                    |
| Bura                         | 10(1.53%)      | 12(1.84%)      | 07(1.07%)      | 10(1.53%)           |
| Tera                         | 28(4.28%)      | 04(0.61%)      | 07(1.07%)      |                    |
| Waja                         | 23(3.52%)      | 07(1.07%)      | 8(1.22%)       |                    |
| Sawa                         | 24(3.67%)      | 07(1.07%)      | 07(1.07%)      |                    |
| Mafa                         | 29(4.44%)      | 04(0.61%)      | 01(0.15%)      | 5(0.77%)            |
| Margi                        | 19(2.91%)      | 15(2.30%)      | 04(0.61%)      |                    |
| Hausa                        | 19(2.10%)      | 15(2.30%)      | 04(0.61%)      |                    |
| Yungur                       | 20(3.06%)      | 08(1.22%)      | 07(1.07%)      | 2(0.30%)            |
| Total                        | 368(56.2%)      | 139(21.3%)     | 116(17.7%)     | 31(4.7%)            |

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Table 4: Prevalence of rhesus antigen among tribes in Adamawa state

| Tribes   | Rhesus positive | Rhesus negative |
|----------|-----------------|-----------------|
| Fulani   | 92 (14.08%)     | 14 (2.14%)      |
| Kilba    | 40 (6.12%)      |                 |
| Chamba   | 34 (5.20%)      |                 |
| Kanuri   | 35 (5.36%)      | 39 (5.97%)      |
| Gude     | 29 (4.44%)      |                 |
| Vere     | 12 (1.84%)      | 17 (2.60%)      |
| Tangale  | 40 (6.12%)      |                 |
| Wurkun   | 52 (7.96%)      |                 |
| Michika  | 12 (1.84%)      |                 |
| Bura     | 40 (6.12%)      |                 |
| Tera     | 17 (2.60%)      |                 |
| Waja     | 35 (5.36%)      | 5 (0.77%)       |
| Sawa     | 12 (1.84%)      |                 |
| Mafa     | 29 (4.44%)      |                 |
| Margi    | 23 (3.52%)      |                 |
| Hausa    | 40 (6.12%)      | 2 (0.31%)       |
| Yungur   | 35 (5.36%)      |                 |
| Total    | 577 (88.32%)    | 77 (11.79%)     |

Discussion

Among the tribes in Yola, it was observed that, there is variation in the ABO and Rhesus blood group distribution. Gene frequencies with respect to the ABO system for this present study has shown a general formula of O>B>A>AB indicating large prevalence of group O blood and a preponderance of allele B over allele A in the studied population. From the result obtained, a large percentage (56.2%) of the studied population lacks both the A and B antigen on the surface of the red cell. This implies that, among the tribes in Yola the gene that codes for the A and B red cell surface antigen is absent in 56.2% of the population. Kilba tribe had the highest prevalence of blood group O which indicates that most people from Kilba tribe lacks the gene that codes for A and B antigen of the red cell surface and therefore in looking for group O blood especially in emergency, persons from Kilba tribe could be considered first and people from Kilba tribe in Yola are likely to reject transfusion of A and B blood because they have anti-A and anti-B antibody in their blood stream since the lack both antigen A and antigen B on the surface of their red cells. However, the result obtain from this study indicates that unlike Kilba tribe, people from the Bura tribe were predominantly of the blood group AB. This indicates that people from Bura tribe have both the A and B antigens on the surface of their red blood cell and therefore they lack anti-A and anti-B antibody in their blood stream and people from Bura tribe are more likely to survive transfusion ‘A’ or ‘B’ blood group. From this study also, it was observe that the A red cell antigen was predominant in Tangele tribe compare to other tribes and this goes to show the gene that codes for A antigen on the surface of the red cell is more in Tangele tribe and that people from Tangele tribe are more likely to reject blood group B for transfusion because of the presence of anti-B antibody in their blood, but they may be successfully transfuse with A or O blood in case of emergency since they lack anti-A antibody. However, of the 654 subject that was tested, the Wurkun tribe in Adamawa state had the highest prevalence of B antigen on the surface of the red cell. This indicates that the gene that codes for the B antigens on the surface of the red cell is more among Wurkun tribe when compare to other tribes in Adamawa state. The high prevalence of group O observed in this present study among the tribes of yola in North eastern Nigeria has an advantage particularly in terms of optimizing the use of blood resources stock in emergency situations because blood group O individuals lack ABO blood group antigens on their red cell and thus are termed universal donors. Such blood can be transfused to patients of blood groups A, B and AB in emergency. However, there is a caveat to this rule and some level of caution need to be exercised because, the serum of some blood group O blood individuals may contain α and β haemolysins. Ideally only group O blood which is negative for high titer haemolysin should be given to groups A, B, and AB individuals in emergency situations, when ABO group specific units are not immediately available.

Our finding is however at variance with previous reports in other parts of Nigeria. A prevalence pattern of (O >A>B=AB) have been reported among residents of African descent in Port Harcourt, Niger Delta, among the Yoruba and Hausa ethnic groups, in five zone of Nigeria and in Ibadan respectively. In this study, Rhesus positive blood was predominant in most the tribes in Adamawa state. 11.8% of Rhesus D negative observed in our study and there are several obstetric connections associated with the prevalence of Rhesus D-negative blood among tribes in Adamawa state because antibody produced by Rhesus D negative individuals as a result of exposure to Rhesus D antigens has serious clinical implications including hemolytic disease in the newborn and/or transfusion reactions. The finding in the present study with respect to pattern of distribution of Rhesus D antigen is similar to previous reports obtained among tribes in other parts of Nigeria. For instance in the Niger Delta region of Nigeria is observed that 93% of subjects were Rhesus positive while the remaining 7% of the study population were negative. Similarly, 96.7% Rhesus D positive rate has been recorded among the Ibos ethnic group of Eastern Nigeria.

Conclusion

In this present study we observed that the prevalence of ABO blood groups varies from tribe to tribe and gene frequencies with respect to the ABO system has shown a general formula of O>B>A=AB indicating high prevalence of O blood group and a predominance of allele B over allele A in Adamawa state. 88.2% were Rhesus D positive while 11.8% were Rhesus D negative. Information obtained in this study will help in the optimum selection of blood type storage and blood products in Blood banking in Adamawa state as well as facilitate the formulation of relevant blood banking and transfusion policies in Northeastern Nigeria.

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Conflict of interest

The author declares no conflict of interest.

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