

ABO Blood Groups Study among Students of Hassan Usman Katsina Polytechnic, Katsina, Nigeria

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Abstract: *There exists ignorance of blood groups among many people and surprisingly even among the literates. Despite the importance of this health parameter in blood transfusion, it is also one of the requirement of obtaining driving licence and national identity card. It is this ignorance that motivate this study, with the aim of creating awareness on importance of blood grouping and determination of the predominant blood group in the ABO system in the population of the study area. The study was carried out among the students population of Hassan Usman Katsina Polytechnic Katsina, Nigeria. A total of 228 students were selected randomly irrespective of age or sex, and have their blood groups determined using the slide method test using a clean white tile and blood sera. Three types of sera were employed anti-A serum for blood group A, anti-B serum for blood group B and anti-D serum for rhesus factor determination. All that is required is three drops of blood obtained from middle ring finger of the left hand using a sterile lancet and alcohol swab. Agglutination or clumping of blood cells in anti A indicates blood group A, and in anti-B indicates blood group B and no clumping of blood cells in both sera (A & B) indicates blood group O. Clumping of cells in both sera indicates blood group AB. Clumping in anti D serum for any blood indicates rhesus positive and no clumping in anti D serum indicates rhesus negative. The result of this study shows that 109 students have blood group O⁺, 49 have A⁺, 46 have B⁺, 18 have AB⁺, 2 have O⁻ and 4 B⁻. Group O⁺ individuals account for 97% of the individuals examined. Blood groups A- and AB- were not encountered in the study.*

Keywords: *ABO, blood groups, study, Hassan Usman, Polytechnic, students, Katsina*

1. INTRODUCTION

The ABO blood grouping is among the oldest and most important health parameter, most especially in relation to blood transfusion. It is also important in genetics and other heredity determination. Currently motor vehicle driving license and National passport are issued on the basis of one's blood group determination. It is also one of the identification of the national identification programme. Despite all these, many people are ignorant of this important health parameter. For instance, at one time in a class of over 80 students, only 15 of them knew their blood groups. It is not only among students, even some of the lecturers do not know their blood groups. It is this ignorance that motivates this study. In the ABO blood grouping system there are four types of groups: A, B, O and AB. It is the aim of this paper to conduct a study of these blood groups among the polytechnic students. It is hoped that at the end of this study, the blood groups among the students will be determined, and the predominant blood group.

Katsina is located at Latitude B/W 11° 07' 49" N 13° 02' 57" N Longitude B/W 6° 52' 03" and 99° 02' 40" E (Sani, 1997). It is the administrative headquarters and capital city of Katsina State, Nigeria. It has 34 administrative units in form of local government areas. The 2006 census put the population of the state at over 5 million people, even though still contentious. The major ethnic groups are the Hausa and Fulani, although other ethnic groups are also found in the state.

The Hassan Usman Katsina Polytechnic was established in 1983. It is situated along Katsina-Dutsinma roads in an area belonging to Batagarawa Local Government area of Katsina State. It neighbours the Federal College of Education Katsina, Katsina Islamic University and the Umaru Musa Yar'adua University Katsina. The institution train students at the level of National Diploma and Higher National Diploma in the Sciences, Engineering, Technology, Environmental Studies,

Agriculture, Administration and Management Sciences. It has a student population of about 6,000 every session (DAPP, 2014). Majority of which came from the 34 local government areas of the state. About 10% of the students came from other states of Nigeria.

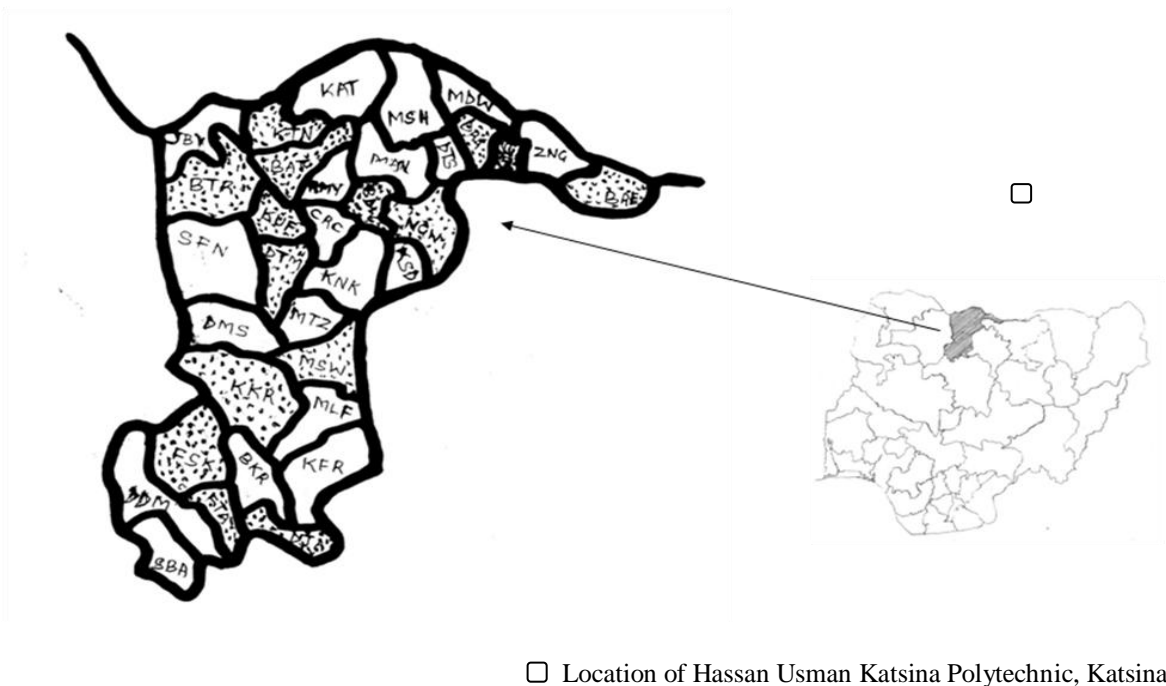


Fig 1. Map of Katsina State within the Nigerian Federation, and Katsina State blown out to show the location of Hassan Usman Katsina Polytechnic in Katsina State, scale 1cm to 20km.

2. LITERATURE REVIEW

The human blood groups, the ABO system was discovered by Landsteiner in 1901 (Waters, 1996). This discovery marked the beginning of safe blood transfusion. The ABO antigens, although most important in relation to transfusion, also have variable expression on most tissues and are important histocompatibility antigens (Waters, 1996).

The first attempt to classify races by genetic traits used the ABO system of blood groups. All people belong to one of four blood groups (A, B, AB or O), depending on which alleles of the ABO gene they inherited. The three major alleles of this gene, A, B and O, are present in almost all populations of the world but in different proportions (Cavalli-Sforza, 2009). For example, the O allele reaches its maximum frequency among Native Americans. In central Canada, type A blood is unusually frequent, type O somewhat less frequent, and types B and AB are rare or absent. On other continents one finds all blood groups, with some local variations (Cavalli-Sforza, 2009). On the basis of ABO system, races are poorly distinguished. For example, Germans and New Guineans, are two populations remotely related both geographically and biologically, but often show very similar ABO allele frequencies (Cavalli-Sforza, 2009).

The four types of blood groups known are A, B, AB and O. Blood type A contains red blood cells that have A substance on their surfaces. It also has an antibody directed against B substance, found on the red cells of persons with blood group B. Blood group B contains the reverse combination that is it contains B substance on the surface of its red blood cells, and has an antibody directed against A substance. AB blood contains none of the antibodies, but the red cells in this type of blood contains both A and B substances. In blood group O, neither A nor B substances are present on the red cells, but the individual with this blood is capable of forming antibodies directed against red cells containing substance A or B. If blood type A is transfused into a person with type B blood, anti-A antibodies in the recipient will destroy the transfused A red cells. Because O type blood has none of the substance on its red cells, it can be given successfully to almost any person. Person with blood group AB have no antibodies and can receive any of the four types of blood. Therefore, blood types O and AB are called universal donors and universal recipients, respectively (Microsoft Encarta, 2009).

Closely associated with the ABO system of blood grouping, is the rhesus system. The term rhesus is applied to any of the more than 30 substances, called agglutinogens, found on the surface of red blood cells, and are called rhesus factors denoted by the letters Rh. The Rh factors composition is unknown, and were named by the American pathologist, Karl Landsteiner and Alexander Solomon Wiener, who discovered the first of them in the blood of the rhesus monkey in 1937 (Microsoft Encarta, 2009). About 85% of people have this antigen and are said to be rhesus positive (Rh⁺). The remaining 15% have no rhesus antigen and are said to be rhesus negative (Rh⁻). Rh⁺ people do not make rhesus antibodies whereas Rh⁻ people are capable of making anti-rhesus antibodies, (Waugh and Grant, 2001). The Rh factor is often associated with haemolytic anaemia in the new born. A Rh⁻ mother carries no Rh antigen on her red blood cells, but has the capacity to produce antibodies. If she conceives a child fathered by Rh⁺ man, and the baby inherits the Rh antigens from him, the baby may also be Rh⁺ (Waugh and Grant, 2001).

During pregnancy, the placenta protects the baby from the mother's immune system, but at delivery a few foetal red blood cells may enter the maternal circulation. When this happen, the maternal system will recognize these red blood cells as foreign because they carry the Rh antigen. This will stimulate the mother's immune system to produce neutralizing antibodies to it. For the first baby there may be no danger. The red cells of the second and subsequent Rh⁺ babies are attacked by the maternal antibodies, which can cross the placenta and enter the foetal circulation. In the most severe cases, the baby dies in the womb from profound anaemia. In less serious circumstances, the baby is born with some degree of anaemia, which can be corrected with blood transfusion (Waugh and Grant, 2001).

Rh disease usually results in jaundice, anaemia, brain damage and often death, either before or shortly after birth (Microsoft Encarta, 2009). To avoid this complication, now most men and women are tested for Rh⁻ factor before having children. In addition a Rh⁻ woman is given an injection of a substance called Rhogam immediately after the birth. Rhogam is a gamma globulin containing antibodies against the Rh⁻ factor. By killing any of the Rh⁺ red cells that have migrated into the mother's circulation from foetus, Rhogam prevents the mother from building up immunity to Rh⁻ factor. Thus, subsequent Rh⁺ children are not exposed to anti Rh⁻ antibodies. This procedure has largely eliminated Rh disease (Microsoft Encarta, 2009).

As with many other genetic traits, the distribution of ABO and Rh blood groups varies significantly between populations and countries. Other blood group systems have been identified reaching up to thirty two in number. Thus in addition to ABO and Rh antigens, many other antigens are expressed on the red blood cell surface membrane. For example, an individual can be AB, Rh⁺ and at the same time M and N positive (MNS system), K positive (Kell system), Le^a or Le^b negative (Lewis system), and so on, being positive or negative for each blood group system antigen. Many of the blood group systems were named after the patient in whom the corresponding antibodies were initially encountered.

In some cultures, an individual personality is attached to blood group. A popular belief in Japan is that a person's ABO blood type is predictive of their personality, character and compatibility with others. This belief is also widespread elsewhere in Asia, notably Taiwan and South Korea (Anonymous, 2011). This belief however lack a scientific basis.

3. MATERIAL AND METHOD

The volunteers were randomly selected from the student population irrespective of sex, age or year of admission. Their blood groups were determined based on the slide method using a clean white wall tile. Three drops of blood were obtained from each volunteer from the tip of middle ring finger of left hand pricked with a sterile lancet. Surface of finger cleaned with an alcohol swab for sterilization.

The blood samples were placed on three different locations on the tile. Then a drop of each blood sera is placed on the drop of blood. Three type of sera were employed, anti-A serum for determining blood group A, anti-B serum for blood group B and anti-D serum for rhesus factor determination. Agglutination or clumping of blood cells in anti-A serum indicates blood group A, and clumping of cells in anti-B serum indicates blood B. No clumping or agglutination of cells in both anti-A and anti-B sera indicate blood group O. Agglutination of cell in both anti-A and

anti-B sera indicates blood group AB. Agglutination of blood cells of in any blood type in anti-D serum indicates rhesus positive (+) and no agglutination indicates rhesus negative (-).

4. RESULTS AND DISCUSSION

Table 1. Blood groups distribution among Hassan Usman Katsina Polytechnic students

Blood Groups							
A ⁺	A ⁻	B ⁺	B ⁻	O ⁺	O ⁻	AB ⁺	AB ⁻
49	0	46	04	109	02	18	0
Total				228			

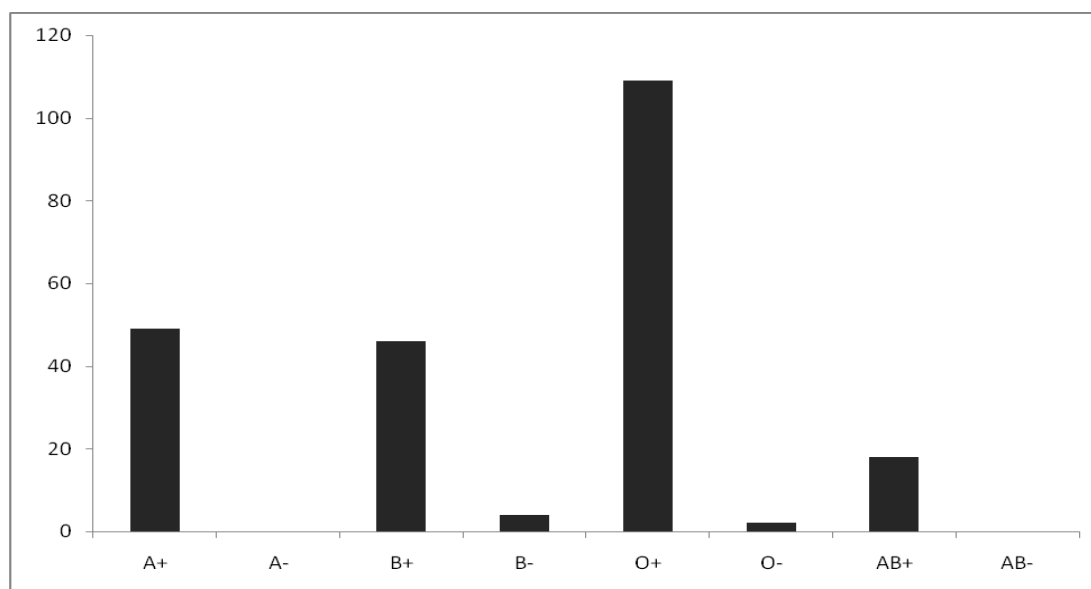


Fig 2. The distribution of blood groups among students of Hassan Usman Katsina Polytechnic, Katsina, Nigeria

Sex or age has no relationship with blood group. The Rh⁺ blood is the dominant blood in this survey and account for 97%. Blood group O⁺ is the predominant blood group (47.8%) followed by A⁺ (21.5%), B⁺ (20.2%), AB⁺ (7.9%), B⁻ (1.8%) and O⁻ (0.88%). A⁻ and AB⁻ were not encountered in the survey. Plus or minus attached to blood groups indicate Rhesus positive and Rhesus negative respectively. People having the rhesus negative blood are very few in this survey. These categories of people should be advised to lead a very cautious life as their type of blood is very difficult to come by.

5. CONCLUSION AND RECOMMENDATION

In conclusion it can be said that blood group O⁺ is the predominant blood group among the students of Hassan Usman Katsina Polytechnic Katsina, Nigeria. It is recommended especially to the Polytechnic authority to make it mandatory for students to test their blood group at point of admission. This will help in reducing this blood group ignorance. Mass campaign for the awareness of this basic health parameter should be encouraged. People with the rhesus negative blood should be advised to lead a cautious life so as to avoid blood transfusion. This is because blood with negative Rhesus factor is very difficult to come by during grouping and cross matching.

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