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Frequencies of ABO blood groups and haemolysins in osogbo, south-western Nigeria.

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ABSTRACT

The aim of this study was to determine the frequencies of ABO Blood groups and haemolysins (α and β) in Osogbo metropolis. Seventeen thousands, nine hundred and thirty one subjects (Age ≥ 18) who consented to donating blood for transfusion and/or blood group determination were included in this study. About 5mls of blood were collected into plain bottles from each subject. Cells and sera grouping were subsequently carried out after clot retraction. Blood group O individuals have the highest frequency (53.6%) followed by B and A with 21.3% and 21.1% respectively. Blood Group AB individuals recorded the lowest frequency of 4.0%. α and β haemolysins were discovered in 4 out of 9,605 blood group O subjects (0.042%) concurrently. All blood transfusion/-banking centers in the community should always strive to stock blood units and products in this proportion to be able to respond to transfusion needs of the community adequately and appropriately too. Screening of blood units for clinically significant antibodies including α and β haemolysins is recommended to be religiously observed, while selection for cross matching should be based on the information generated from both blood grouping and antibody screening. Homologous transfusion should remain the priority.

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1. Introduction

A number of problems were encountered when blood transfusion were first attempted among men and animals alike. The first suggested case of blood transfusion was when Pope Innocent VIII was transfused in July, 1492 with blood donated by three volunteer youth, an action which later claimed lives of the donors and recipient [1]. Nothing was known about blood group systems then.

In 1900, Karl Landersteiner reported a series of test that identifies ABO Blood Group System, which is known as the most

clinically significant Blood group system till today [2, 3]. This is so because ABO antibodies are consistently, predictably, and naturally present in the serum of people who lack the antigen. ABO compatibility between donor and recipient is crucial. Thus; strong, naturally occurring anti-A and anti-B are Ig M and can readily activate complement and cause agglutination. If ABO antibodies react with antigen in-vivo, result is acute haemolysis and possibly death. The clinical relevance of ABO blood group antigens relate to the capacity to elicit the production of alloantibodies (both Ig M and Ig G) to cause destruction of transfused red cells or to cross placenta and give rise to haemolytic disease of the newborn [1, 4].

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The ABO locus, which is located on chromosome 9, has 3 main allelic forms: A, B, and O. The A allele encodes a glycosyltransferase that produces the A antigen while N-acetylgalactosamine is its immunodominant sugar; and the B allele encodes a glycosyltransferase that creates B antigen while D galactose is its immunodominant sugar. The O allele encodes an enzyme with no function, and neither A nor B antigen is produced, leaving the precursor (the H antigen) unchanged. These antigens are incorporated into one of four types of oligosaccharide chain, type 2 being the most common in the antigen-carrying molecules in RBC membranes [2, 3, 5]. ABO grouping is required therefore for blood donors, transfusion recipients, transplant candidates and donors, prenatal patients, newborns and subjects for parentage dispute testing [5].

2. Materials and Methods

2.1 Study Area and Subject

Seventeen Thousand Nine Hundred and Thirty One volunteers were recruited at the Blood Bank of Ladoke Akintola University of Technology Teaching Hospital Osogbo between September 2004 and Jan 2010. The volunteers were healthy looking blood donors, clients who had come for some routine investigation, and relatives or friends who had accomplished both during the period of study. All the subjects used were above 18 years and gave their informed consents that their blood samples be used to generate information on frequencies of ABO antigens in Osogbo and environs.

Osogbo is the capital of Osun State of Nigeria, situated in the tropical rain forest belt of Southwest and is about 500km from Abuja.

2.2. Methodology

About 5mls of blood was collected from every subject, aseptically. Each blood sample was incubated for one hour and eight hours at room temperature (25°C) and 4°C respectively for clotting and retraction. Sera were separated into plain tubes labeled appropriately. Cells harvested from the clotted blood was used to carry out blood grouping by tube method using commercially prepared antisera supplied by BIOTEC Laboratories Ltd UK. The corresponding serum from each subject was used to carry out serum grouping simultaneously with the aid of a standard cells A, B and O. Standard cells were prepared from pooled cells from 4 individuals on daily basis at Ladoke Akintola University of Technology Teaching Hospital Blood Bank and presence or absence of haemolysins was observed.

3. Results

Different types and distributions of ABO antigens as determined by cell and serum grouping among 17,931 subjects recruited are presented in Table 1 below.

TABLE 1: Frequency and Percentage of ABO Blood Groups in - Osogbo

	FREQ	PERCENT	FREQ	PERCENT	FREQ	%
Blood Group A	3019	20.60	768	23.43	3,787	21.1
Blood Group B	3193	21.79	632	19.28	3,825	21.3
Blood group AB	533	3.64	177	5.40	710	4.0
Blood Group O	7908	53.97	1701	51.89	9,605	53.6
TOTAL	14,653	100.00	3,278	100.00	17,931	100.00

The data represented in table 1 shows that 3,278 (18.28 %) of the subjects were female while men constitute the higher percent of the respondents (81.72 %).

Out of the 17,931 subjects, 9,605 were discovered to be blood group O individuals (53.6 %), which happens to be highest frequency. This is followed by blood groups B and A which are 21.3% and 21.1 % respectively. Blood group AB individuals have the lowest frequency, which is 710 out of 17,931 subjects amounting to 4.0%.

The distribution pattern of group O among male and female volunteers where 53.97 % and 51.89% were recorded for male and female respectively, does not differ from over all data generated.

Furthermore, 4 of the group O individuals demonstrate presence of potent, α and β haemolysins during serum grouping. This amounts to 0.042% risk of having dangerous group O donors.

4. Discussion

The result obtains from this study reveals prevalence of O allele to be of the highest occurrence (53.6%) in Osogbo community. Even and when each of the genders was considered separately (male 53.97%, female 51.89 %), blood Group O individuals are just above half of the population in Osogbo.

Proportions of Group A and B individuals were 21.1% and 21.3% respectively. Blood group AB subjects constitute 4.0% of the volunteers. This happens to be the lowest frequency and it has gotten the wide gap between it and other groups especially with respect to group O where it has ratio 1:13.4.

Some workers have reported figures different from ours in other parts of the Globe. It is not unexpected, because ABO groups frequencies are valid for the specific population for which they are derived [3]. Among Caucasians in the United States, the distribution is group O, 47% group A, 41%, group B, 9% and group AB, 3%. For blacks in United States, the distribution is group O, 46%, group A, 27%, group B, 2%, and group AB, 7%. Similarly, in Pakistan, blood group O is the most common (35%), blood group A is 24%, blood group B is 33% and blood group AB is 8% [6].

However, value reported by us is similar to those previously reported by other workers in South Western Nigeria on frequency of group O individuals). In Lagos, Nigeria, blood group O is 55.3%, blood group A, 25.3%, blood group B, 16.7% and blood group AB, 2.7% [7]. Also, in a research conducted in Ogbomoso, Oyo State, it was reported that 50% were blood group O, 22.9% were blood group A, 21.3% were blood group B and 5.9% were blood group AB [8,9]. Thus, the segregation of the genes responsible for the ABO blood groups has always taken a particular pattern for its distribution.

The incidental discovery of 0.042% of high titre haemolytic anti A and anti B (α and β haemolysins) reveals the presence of dangerous Group O people and their Blood should only be received in case of transfusion by O Blood group individuals only.

5. Conclusion

ABO antigens are naturally occurring and their relevance in determining compatibility of the blood donors and recipient cannot be over emphasized. It is equally important that all Blood Transfusion laboratories where blood units and products are banked be informed of prevailing ABO groups in their domain to be able to respond effectively to emergency needs of her environment when uncross- matched blood are required to be transfused.

Now that Nigeria Government is on the verge of implementing National blood transfusion policy via establishment of Zonal Blood Transfusion centers, knowledge of frequency of ABO Blood Groups is an important tool to determine the direction of recruitment of voluntary donors as required for each zone across the country.

It is equally important that every individual be ABO grouped at birth since the antigens are naturally occurring. Groups of individual indicated on national identity cards, driving licenses and school / officer identity cards will be of tremendous use in case of acute hemorrhage or anaemia in children when urgent transfusion of yet to be cross matched blood is required.

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