

Carriage rate of Human Immunodeficiency Virus (HIV) infection among different ABO and Rhesus blood groups in Adamawa state, Nigeria

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Abstract

Carriage rate of HIV infection among ABO and rhesus blood groups was conducted on one thousand five hundred and twenty subjects randomly selected from fifteen health institutions in Adamawa State. Prior to the enrollment of the subjects in the study, ethical approval of the health institutions was obtained and the informed consent of the subjects sought. One thousand and thirty apparently healthy subjects were enrolled as test group while another 490 known subjects were enrolled as control group. 5ml of blood sample was collected from each subject, out which 3ml was put in plain container to extract serum needed for HIV serotyping, while the remaining 2ml was put in EDTA container for blood grouping. Analysis of ABO blood group system showed a higher distribution (50.6%) of group O and the lowest (11.7%) of group AB individuals. Statistical analysis however showed no significant difference in the distribution of ABO blood groups in the state ($P>0.05$). The overall prevalence of HIV infection was 12.6%. Statistically, there was significant difference in the prevalence of HIV sero-types in the state ($P<0.05$). Also, Blood group AB recorded the highest rate of HIV-2 infection (71.4%) and the least prevalence of HIV-1 (7.1%) whereas seroprevalence of HIV sero-type was significantly higher among rhesus D positive subjects than their rhesus D negative counterparts ($P<0.05$).

Introduction

Human Immunodeficiency Virus (HIV) was first reported in United State of America in 1981 but the causative agent was not identified until 1983 [1-4]. The agent was later named Human Immunodeficiency Virus type-1. In 1996, another sub-type was discovered which was slightly different from the first type and was reported to have been found in men who have migrated from Guinea Bissau, an African country. This second type was named HIV-type-2 [5,6,7]. Since then, the infection has been a serious global public health problem. Africa being the hardest hit continent [8]. In Nigeria about six million people are currently infected with the virus while the prevalent rate in Adamawa State is 4.6% [9].

ABO blood group system was the first human blood group system to be discovered [10]. It consist of two antigens which when combined together determine four types of blood group in the system. The groups include: group

A for those that posses A antigen, B for those with B antigen in their blood, AB for those that posses A and B antigens, while group O people are those that have neither A nor B antigen in their blood. Similarly, Rhesus blood group system is another important blood group next to ABO system because of its crucial role in blood transfusion. In this system, there are three dominant antigens and three recessive antigens all of which assembled together to form eight different types of Rhesus blood group. The dominant antigens are designated by letters C, D, and E while their recessive forms are c, d and e. Whenever any of the dominant antigens is present in the blood of an individual, such an individual is said to be Rhesus positive and if no dominant Rhesus antigen is present, the individual, is said to be Rhesus negative. If for instance D antigen is detected in a blood specimen, the result of the grouping test will read Rhesus (D) positive.

Many studies have associated blood group system with different diseases conditions in different parts of the

world. A study in Far East reported [11] that Plumonary tuberculosis is more prevalent among AB subjects Also, in a research work in Britain, stomach cancer was reported [12] to have a higher prevalence rate among group A population than the rest ABO blood groups. Similarly blood group O individuals were also reported [10] to be more prone to peptic ulcer diseases due to lack of N-acetyl-glucosamine necessary for the development of mucosa lining of their alimentary canal.

In view of the previous links between different disease conditions and blood groups systems, this study is therefore focused on assessing the frequency distribution of HIV infection among various ABO and Rhesus blood group population. It is expected that the findings from this study would probably be of help in blood transfusion services particularly in this locality.

Materials and Methods

Study Population

Between December 2005 and April 2007 one thousand, five hundred and twenty apparently healthy subjects aged 15-64years, were randomly selected for this study from fifteen health institutions in three geographical zones (Northern, Southern and Central) of Adamawa State, Nigeria, Prior the commencement of sample collection, ethical approval was obtained from the health institutions while the informed consents of the subjects were sought. A total of 1030 test subjects and 490 positive and Negat-

ive control subjects were examined in the study.

Sample Collection and Laboratory Analysis

Blood samples were collected from both study and control group. Five milliliters of blood was collected from each of the subjects by veinpuncture of the antecubital vein. 3ml of each of the blood samples was put in plain containers, held at room temperature for about twenty minutes before centrifuging to separate the serum needed for HIV serotyping. The remaining 2ml of blood was dispensed into Ethylene Diamine Tetra Acetic acid (EDTA) container and properly mixed to prevent clotting. The anti-coagulated blood was used for ABO and Rhesus blood grouping by tile method while all Rhesus negative cases were further confirmed by tube method using Anti-human globulin (AHG). Grouping method earlier described by Dacie and Lewis [13] was followed, while commercial HIV test kits were used. Each manufacturer’s method for HIV screening procedure was strictly adhere to and only samples tested positive with capillus HIV kit (Trinity Biotec, Japan) were further differentiated using the Standard Diagnostic HIV kit (Bioline, Korea).

Results obtained from the study were analysed statistically using Chi-square test.

Results

The findings from this study were presented in tables as shown below:

Table 1: Prevalence of HIV sero-types in Adamawa State

Geogr. Zone	Number Examined	Number Positive	HIV-1 Percentage (%)	HIV-2 Percentage (%)	HIV-1+2 Percentage (%)
North	491	48	46 (9.4)	2 (0.004)	9 (1.8)
South	251	19	19 (7.6)	0 (0.0)	1 (0.003)
Central	778	124	119 (15.3)	5 (.005)	15 (1.9)
Total	1520	191	184 (12.1)	7.(004)	25 (1.6)

Table 2: Distribution of ABO and Rhesus blood groups in the state.

Geogr. Zone	Number Examined	Blood Groups				Rhesus	
		A	B	AB	O	Positive	Negative
North	491	89 (18.1)	102 (20.9)	51 (0.4)	248 (50.5)	480 (97.8)	11 (2.2)
South	251	40 (15.9)	59 (23.5)	27 (10.8)	125 (49.8)	243 (96.8)	8 (3.2)
Central	778	121 (15.9)	165 (20.7)	100 (12.9)	396 (50.8)	757 (97.3)	21 (2.7)
Total	1520	250 (16.5)	232 (21.3)	178 (11.7)	769 (50.6)	1487 (97.4)	40 (2.6)

Table 3: Frequency of HIV sero-types among various ABO blood groups

HIV sero-type	Number Positive	Test Group n=1030				Control Group n=490
		A	B	AB	O	
HIV-1	184	22 (11.9)	38 (20.6)	13 (7.1)	77 (41.8)	34 (18.6)
HIV-2	7	0 (0.0)	1(14.3)	5 (71.4)	0 (0.0)	1 (14.3)
HIV-1+2	25	2 (8.0)	3(12.0)	1(4.0)	14 (56.0)	5 (20.0)
Total	216	24 (11.1)	42 (9.4)	19 (8.7)	91 (42.1)	40 (18.5)

Table 4: Prevalence of HIV-sero-types in Rhesus blood group system

HIV sero-type	Number Positive	Test Group n=1030		Control Group n=490	
		Rh. Positive	Rh. Negative	Rh. Positive	Rh. Negative
HIV-1	184	156 (84.8)	8 (4.4)	17 (9.2)	3 (1.6)
HIV-2	7	1(4.3)	5 (71.4)	0 (0.0)	1(14.3)
HIV-1+2	25	12 (48.0)	9 (36.0)	3 (12.0)	1 (4.0)
Total	216	169 (78.2)	22 (10.2)	20 (9.3)	5 (2.3)

Discussion

Blood groups have been reported by many researchers in different parts of the world as factors predisposing some disease conditions [11,12]. We therefore attempted to bring a focus in this study the association between some blood groups and HIV infection in Adamawa State Nigeria; as we believe the pattern of blood group distribution with respect to HIV infection is vital in blood transfusion services.

Analysis of ABO blood group system in this state revealed 16.5% of blood group A, 21.3% of blood group B 11.7% of blood AB and 50.6% of group O while the overall sero prevalence of HIV infection was 12.6% representing 12.1% of HIV1, 0.004% of HIV-2 and 1.5% of HIV1+2. Statistically there was significant difference in the seroprevalence of HIV serotypes in the state ($P < 0.05$), whereas no significant difference in the distribution of ABO and Rhesus blood group ($P > 0.05$).

In this present study, only a few cases of HIV-2 was recorded (0.004%) representing seven cases out of two hundred and sixteen total infected subjects. It is however worthy of note that five out of the seven (71.4%) infected subjects with HIV-2 only belonged to blood group AB. It is also note worthy that the lowest rate of HIV-1 (7.1%) was recorded in the same blood group. The findings probably suggest that blood AB subjects were more prone to HIV-2 than HIV-1.

Although there have being scarcity of published data on the association between blood groups and viral infections,

a study reported 2.2% [14] HIV-1 infection among blood group O donors in Enugu State, Nigeria. The foregoing finding is at variance with the result of the present study in which 41.8% of HIV-1 was reported among the same blood group. The reason for the disparity could probably be attributed to difference in geographical areas of both studies. While this present study was conducted in North-Eastern part of Nigeria, the former was carried out in Southern part of the country. Also, the previous study was conducted only on blood donors whereas this study included other apparently healthy individuals.

Similarly, prevalence of HIV-serotypes is significantly higher (97.8%) among Rhesus D positive subjects than their Rhesus D negative counterparts in which 2.2% was recorded ($P < 0.05$). This finding was in consonance with the results of Omoriegie *et al.* [15] which reported that Rhesus D positive subjects were more susceptible to infections.

In conclusion, further study on the concentration of various Immunoglobulins in individuals with different blood group is suggested. We believe this could probably help to assess the resistance of some blood groups to infections. Future study on the association between blood groups and other common viral infections is also recommended.

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