

## Association of ABO Blood Group with HIV Infection

Okorie Hope Mercy<sup>1</sup>, Obeagu Emmanuel Ifeanyi<sup>1\*</sup>, Vincent CCN<sup>2</sup> and Nnekachi Prayer Nnokam<sup>3</sup>

<sup>1</sup>Department of Medical Laboratory Science, Imo State University, Owerri, Nigeria

<sup>2</sup>Department of Nursing Science, Imo State University, Owerri, Nigeria

<sup>3</sup>Ivano Frankivsk National Medical University, Ukraine

\*Corresponding Author: Obeagu Emmanuel Ifeanyi, Department of Medical Laboratory Science, Imo State University, Owerri, Nigeria.

Received Date: 06-18-2020; Published Date: 06-29-2020

Copyright © 2020 by Okorie HM, et al. All rights reserved. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### Abstract

*This cross sectional study determined the association of ABO and Rhesus blood group with HIV infection. A total of 240 participant comprising 180 Test patients (HIV positive group) attending HIV screening and counseling Department of Federal Medical Center Owerri, Imo State and 60 Control (HIV negative group) were recruited in the study. Blood samples were collected from the subjects and analyzed for blood group antigen using the tube method. The test and control subjects had all the blood group except AB "that was lacking in the test group. The blood group allotment was A (25.0%), B (23.8%), AB (5.0%), O(46.2%), Rh+ (93.7%) and Rh (6.3%). In the HIV positive patients, blood group O+ prevailed with a prevalence of 43.9% while blood group AB- was the least prevalent (0.0%). In the control subjects, blood group O+ was also the most commonly identified (43.3%) while blood group B- was the least prevalent (1.7%). In this study there was no relationship between blood group antigens and HIV infection ( $X=11.909$ ,  $P=0.104$ ). Infection with HIV was highest in age group 21-30 years; the relationship was statistically significant ( $p=0.001$ ). The infection was highest among female than the male; the association was statistically significant ( $p=0.0001$ ). In conclusion, blood group antigens were not related with HIV infection.*

### Keywords

Association; ABO blood group; HIV infection.

### Introduction

Human immunodeficiency virus (HIV) is reported as a lentivirus and belongs to the Retroviridae family that results in acquired immunodeficiency syndrome (AIDS). The infection was first documented in 1981 in the United States of America but the cause was not discovered until 1983 [1]. Since then, the disease has been a threat to the world public health challenge. The major impact was in Africa [2]. Human immunodeficiency virus types 1 and 2, derived from primate lentiviruses are the cause of AIDS. It was reported that the first episode of AIDS was recorded in 1986 in Nigeria in commercial sex workers. In 2008, it was reported that the persons in the whole world living with HIV/AIDS were 33.4 million with

Africa leading with 60% of this number. It was shown that over 2.7 million people were newly infected that year. In 2005 another research opined that more than 1.2 million people have already progressed to clinical signs and symptoms of AIDS in Nigeria. Persons living with HIV may be asymptomatic for more than 10 years but can still infect others in the asymptomatic times. A lot of persons infected with HIV may usually progress to AIDS as a result of their genetic variations that hinder the virus from destroying their immune status [3]. People are grouped into 4 main blood groups comprising A, B, AB, and O groups depending on the antigens available on their erythrocytes [4]. It was opined by [5] that apart from their relevance in blood transfusion practice, they are good in genetic researches of populations and also solving medico-legal matters like queried parentage. Also, a lot of works have linked blood group systems with different disease conditions in different parts of the world. For example, several research works have shown that stomach cancer has a higher prevalence rate among blood group A than the rest of the ABO blood groups [6]. Blood group O<sup>+/-</sup> individuals have also been reported by several workers to be more prone to peptic ulcer disease due to lack of N-acetyl-glucosamine necessary for the development of mucosa living of their alimentary canal [7]. A study in Nigeria has reported blood group AB to be associated with human immune deficiency virus 2 (HIV-2) infections [8]. Again, the rhesus blood group system is also a major blood group next to the ABO system because of its relevant function in blood transfusion. Although up to 400 blood groups have been documented, ABO and Rhesus which were the first and fourth to be identified respectively are the most relevant [9].

## **Materials and method**

### **Study area**

The study was carried out at the HIV screening and counseling department (Heart to Heart, Federal Medical Center (FMC) Owerri, Imo State, Nigeria.

### **Informed consent and ethical clearance**

Ethical clearance was obtained from the management of the hospital and informed consent (was obtained from each subject that participated in the study).

### **Study design**

The study was cross-sectional. A total of 240 participants comprising of 180 patients attending the HIV department (Heart to Heart) of Federal Medical center, Owerri, Imo State, Nigeria and 60 HIV Negative patients (control) were enrolled in this study. Both the test and control group was above 18years of age. It included male and female subjects. An HIV rapid test was carried out on the control subjects to make sure that they were HIV negative. A blood group antigen test was conducted on all the subjects and the results of the two groups were compared.

### **Sample collection and laboratory analysis**

About 7ml of the blood sample was aseptically collected by venipuncture using a sterile disposable syringe from each consenting patient with the assistance of clinicians and

laboratory technologists. 3ml was dispensed into sterile ethylene diamine tetraacetic acid (EDTA) anticoagulant container and properly mixed to. Prevent clotting. All samples collected were analyzed for ABO and Rhesus blood grouping; and also for HIV screening tests.

## **Determination of HIV status**

### **By rapid test method**

This HIV rapid test was performed using Alare Determine™ Kit, produced by Alare Medical Co Ltd, Matsuhidai Japan. It was purchased from Okay surgical store, Assumpta line old market Douglas, Owerri. Determine HIV-1/2 comb is an immune chromatographic test for the qualitative detection of antibodies to HIV-1 and HIV-2. The test device is a laminated strip that consists of a conjugated pad containing monoclonal HIV-1 and HIV-2 recombinant antigen colloidal selenium, and a nitrocellulose membrane.

### **HIV procedure**

Each of the test strips was labeled properly. The protective foil cover on the strip was removed. About 50pl of blood was collected with the aid of a Pasteur pipette and applied onto the absorbing pad on the strip. A 1 drop of chase buffer was also applied to the specimen pad. The strip was placed on the laboratory bench and allowed to stay for about 2-5 minutes.

## **Determination of ABO and Rh blood group**

The antigen test method was used for this study. The test was carried out according to methods previously described by Decie and Lewis (2012). The blood grouping was done using the tube method. Rhesus confirmatory test was done for those that tested negative.

### **Procedure for ABO and rhesus grouping using the tube method**

The tubes were arranged in a test tube rack that was labeled into columns as Anti-A, anti-B, and anti-AB and anti-D. A drop of anti-A, anti-B, anti-AB and anti-D was pipetted into each of the tubes respectively. A drop of the patient's blood was added into each of the tubes respectively. The contents were tapped gently to mix and centrifuged for 30 seconds at 1000g. The cell buttons were gently resuspended and observed for agglutination. The presence of agglutination constituted positive results, whereas the absence of agglutination constituted negative results.

### **Procedure for rhesus confirmatory test**

About 0.5ml of the patients' blood was put in a test tube. An equal volume of antisera-D was added; they both were mixed and incubated for 30 minutes period. The tubes centrifuged for 1 minute at 1000rpm. The cells were washed three times in saline and resuspended in the residual saline following the last washing. One drop of Anti-human globulin (AHG) reagent was added to the tubes, mixed and centrifuged at 1000rpm for 1 minute, the tubes were examined microscopically for agglutination.

## Statistical analysis

The data obtained were analyzed using the statistical package for social sciences (SPSS) version 20 software. Pearson chi-square ( $\chi^2$ ) was used to determine the association between the variables at 95% confidence interval and 0.05 significant levels.

**Table 1:** Frequency distribution of the ABO and Rhesus blood group phenotypes of the general studied population.

Blood Groups	Rhesus positive (Prevalence)	Rhesus Negative (Prevalence)	Total(Prevalence)
A	57(25.3%)	3(20.0%)	60(25.0%)
B	53(23.6%)	4(26.7%)	57(23.8%)
AB	10(4.4%)	2(13.3%)	12(5.0%)
O	105(46.7%)	6(40.0%)	111(46.2%)
<b>Total</b>	225(93.7%)	15(6.3%)	240

A total of 240 blood samples were collected from consenting participants (180 HIV positive patients and 60 controls) and analyzed for blood group antigens. The prevalence of A, B, AB, O, and Rhesus phenotype is shown in Table 5. In the ABO blood group system, O was the most common (46.2%), followed by A (25.0%), B (23.8%), and AB (5.0%). AB was the least prevalent blood group. In the Rhesus blood system, the majority were Rh+ (93.7%), while 6.3% were Rh-.

**Table 2:** Comparison of blood group antigens associated with HIV Positive patients and HIV negative individuals (Control).

Blood Group	HIV Positive	HIV Negative (Control) (%)	Total (%)	Chi-Square	p-value
A+	46 (25.6%)	11 (18.3%)	57 (23.8%)	11.909	0.104
B+	40 (22.2%)	13(21.7%)	53(22.1%)		
AB+	8 (4.4%)	2 (3.3%)	10(4.2%)		
O+	79 (43.9%)	26 (43.3%)	105 (43.8%)		
A-	1 (0.6%)	2 (3.3%)	3(1.2%)		
B-	3(1.7%)	1 (1.7%)	4(1.7%)		
AB-	0 (0.0%)	2 (3.3%)	2 (0.8%)		
O-	3(1.7%)	3 (5.0%)	6 (2.5%)		
<b>Total</b>	180	60	240		

(Table 2) shows a comparison of blood group antigens associated with HIV positive individuals and HIV negative individuals. In the HIV positive population, the most prevalent blood group antigen was O+ occurring with a prevalence of 43.9% while blood group AB- occurred with the least prevalence of 0.0%. In the control population, blood group O+ was also the most prevalent blood group occurring with a prevalence of 43.3%, while the least detected blood group was B- occurring with a prevalence of 1.7%. There was no statistically

significant association ( $X^2=11.909$ ,  $P$ -value = 0.104) between the distribution of blood group antigens and the studied population.

**Table 3:** Comparison of Study and Control Population According to Age.

Age (years)	HIV Positive (Test) (%)	HIV Negative (Control) (%)	Total (%)	Chi-Square (x2)	p-value
Oct-20	12(6.7%)	5 (8.3%)	17(7.1%)	18.521	0.001
21 -30	64 (35.6%)	39 (65.0%)	103 (42.9%)		
31-40	52 (28.9%)	10(16.7%)	62 (25.8%)		
41 -50	36 (20.0%)	4 (6.7%)	40(16.7%)		
51 -60	16 (8.9%)	2 (3.3%)	18(7.5%)		

Some of the demographic factors of the individuals were analyzed. Table 3 shows the comparison of study and control population according to age. In the HIV positive patients, the highest numbers of participants were in the age group 21-30 years with a prevalence of 35.6% while the lowest number of participants was in the age group 10-20 years with a prevalence of 6.7%. In the control subjects, the greatest subjects fall into the age group 21-30 years (65.0%), while the age group 51-60 years had the lowest number of participants (3.3%). There was a significant relationship between HIV infection and age group ( $X^2=18.521$ ,  $P=0.001$ ).

**Table 4:** Cross Tabulation Analysis of Population Gender versus HIV Status.

Age (years)	HIV Positive (Test) (%)	HIV Negative (Control) (%)	Total (%)	Chi-Square (x2)	p-value
Female	118(65.6%)	11 (18.3%)	129 (53.8%)	40.366	0.0001
Male	62 (34.4%)	49 (81.7%)	111 (46.2%)		
Total	180	60	240		

Table 4 indicates the cross-tabulation analysis of the population gender versus HIV status. 65.6% of the Test group (HIV Positive) was females and 34.4% were males; while in the control population, the highest number of participants was males (81.7%) and the lowest were females (18.3%). There was a statistically significant association ( $X^2=40.366$ ,  $P=0.0001$ ) between gender and HIV infection.

## Discussion

In this research carried out to evaluate the relationship of ABO and Rhesus blood group with HIV infection, blood group O (42.6%) was the most commonly recognized blood group and its preponderance over other blood groups is in accord with several previous accounts from diverse parts of Nigeria [5]. It was also shown that blood group antigens were not linked to HIV infection. This proposes that there is nothing intrinsic in blood group antigens that

expose an individual to HIV infection. Blood group antigens of an individual cannot alter because of any infection. The result gotten in this work is in agreement with the results of [10] in which there was no link to the distributions of blood group antigens in HIV patients. Though, the outcome varies from that accounted in Yola, Adamawa [2] where blood group AB was the main blood group linked to HIV-2 infection; while seropositive of HIV serotype was noteworthy higher among rhesus D negative persons. In this work, there was no relationship between the acquisitions of HIV with the different blood group antigens, but there are accounts that related specific blood group types with certain disease conditions. Ukaejiofo and Togbo [11] reported the relationship of blood group A with carcinomas. A wealth of controversial accounts has shown the existence of a relationship between blood groups and illness merely on the foundation of statistical contrast of the spread of blood groups and hemoglobin kinds of patients with different illnesses and among healthy persons [10]. Though, there was no proof advanced for some of the relationships because it could be due to variations in the approach of compiling the outcomes or sampling that might have brought in a bias in the work or mistakes in methods of blood grouping. Before making inferences on the relationship of blood groups with illness, this proof should be verified via different definitive researches. Some demographic features of the HIV positive population were compared with healthy individuals. Age was reported to be linked to HIV infection ( $p=0.001$ ), with infection climaxing within the age group 21-30 years old in both Tests and healthy individuals. The motive this age group has the greatest HIV infection rate in the test population could be because they are in the period of high sexual activity and are in the age range where they tend to be ambitious thereby endangering themselves to the infection. The Federal Ministry of Health opined in 2009 that in all epidemiological works, younger age has usually shown to be the major relevant feature. The age of acquiring the infection is the major determinant of the incidence and prevalence rates. The outcome though contradicts Enqueselassie and Girma [12] who opined that age group 35-44 had a higher prevalence of HIV infection. In this work, there were a greater number of female patients in the test population contrasted to the healthy persons and gender was linked to HIV ( $p<0.05$ ). This revelation may be because the anatomy of female sex organs exposes them more susceptible to HIV infection than their male groups. In healthy persons, on the other hand, more males were seen than females probably because more males go for blood donation than females. Besides, the periodic loss of blood by females through menstruation makes them have apathy for blood donation and may be responsible for the low number of females in the control population.

## Conclusion

This study was conducted to determine the relationship between ABO and Rhesus blood group antigen with HIV infection. The study revealed that there was no relationship between blood group antigens with HIV infection. Hence, blood group antigens cannot be said to have either protective or predisposing characteristics to HIV infection. Further studies with larger sample sizes are recommended to confirm these findings.



## References

1. Funnye AS, Akhtar AJ. Syphilis and human immunodeficiency virus co-infection. *J Natl Med Assoc.* 2003;95(5):363.
2. Abdulazeez AA, Alo EB. Prevalence of trichomonas vaginaglis and HIV infection among women in Yola Metropolis, Nigeria. *J Med Libr Sci.* 2008;4(2):12-4.
3. Abdulazeez AA, Alo EB, Nassar AS. Harmonization of HIV testing in Nigeria. A missing step in HIV/AIDS control. *Nig J Biomed Sci.* 2006;2:23-6.
4. Conteras M, Lubenko A. *Immunohaematology: introduction. Postgraduate haematology.* London, UK. Arnold Publishers. 2001:165-81.
5. Enosolease ME, Bazuaye GN. Distribution of ABO and Rh-D blood groups in the Benin area of Niger-Delta. Implication for regional blood transfusion. *Asian J Transfus Sci.* 2008;2(1):3.
6. Akhigbe RE, Ige SF, Afolabi AO, Azeez OM, Adegunlola GJ, Bamidele JO. Prevalence of haemoglobin variants, ABO and rhesus blood groups in Ladoke Akintola University of Technology, Ogbomoso, Nigeria. *Trends Med Res.* 2009;4(2):24-9.
7. Reid ME, Lomas-Francis C, Olsson ML. *The blood group antigen factsbook.* Academic press. 2012.
8. Abdulazeez AA, Alo EB, Rebecca SN. Carriage rate of human immunodeficiency virus (HIV) infection among different ABO and Rhesus blood groups in Adamawa State, Nigeria. *Biomed Res.* 2008;19(1):41-44.
9. Pramanik T, Pramanik S. Distribution of ABO and Rh blood groups in Nepalese medical students. a report. *East Mediterr Health J.* 2000;6(1):156-58.
10. Ukaejiofo EO, Nubila T. Association between ABO, Rheus blood group systems and haemoglobin genotype among confirmed HIV/AIDS-TB co-infected patients in Enugu urban, Nigeria. *West Afr J Med.* 2006;25(1):61-4.
11. Ukaejiofo EO, Togbo RN. Association between ABO blood groups and some carcinomas among Nigerians. *Niger Postgrad Med J.* 1995;3:1-4.
12. Enquselassie F, Girma S. HIV prevalence among clients with possible clinical signs of HIV infection using the provider initiated testing and counseling approach. *Ethiop Med J.* 2009;47(3):187-94.