

The prevalence of ABO Blood Groups, Genotypes, Marital Status And Levels of Education of Adults HIV Positive Males In Nnewi, Nigeria

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Abstract

Background: The ABO blood group system classifies individuals into four groups namely A, B, AB, and O. Genotype classifies individuals majorly into AA, AS and SS. Infidelity is a violation of rules, relationship norms resulting in feelings of sexual jealousy and rivalry.

Aim: The aim is to determine the prevalence of ABO blood group system, genotype, marital status and levels of education of adult HIV positive males in NAUTH, Nnewi.

Methods: A total of 550 subjects were randomly recruited from voluntary, counseling and testing units in NAUTH, Nnewi. The subjects were classified based on W.H.O. HIV staging into: symptomatic HIV subjects on ART (n= 140), symptomatic HIV subjects not on ART (n= 138), asymptomatic HIV subjects (n= 136) and HIV seronegatives (control) (n=136). 3 mls of blood were collected from the participants for the determination of HIV status by Immunoassay and Immunochromatography, CD4 counts by flow cytometry, ABO blood grouping and genotyping. Questionnaire was used for subject biodata for age, marital status and levels of education. Standard routine tests were used for blood grouping, blood genotypes and flow-cytometry for CD4 counts and graphpad prism 5 for data analysis.

Results: The prevalence of blood group in controls, in symptomatic HIV with or without therapy was in this order: O>A>B>AB respectively. The prevalence of blood group O was in this order: O>B>A>AB. The genotype AA was three quarters and genotype AS was one quarter in controls and in HIV groups. The prevalence rate of married men was 72 %, unmarried men was 28 % in symptomatic HIV subjects on ART. The prevalence rate of married men was 69 %, unmarried men was 31 % in symptomatic HIV subjects not on ART. The prevalence rate of married men was 69 %, unmarried men was 31 % in asymptomatic HIV subjects. The prevalence rate of married men was 24 %, unmarried men was 76 % in symptomatic HIV control subjects. The highest prevalence rate of HIV men belong to the lowest level of education.

Conclusion: The prevalence of blood groups are in this order: O>A>B>AB in controls and symptomatic HIV groups. 2/3 of subjects had genotype AA and 1/3 had genotype AS in control and in HIV groups. 75 % of married men are HIV positives. Majorly, participants with lower levels of education had HIV positive.

Keywords: ABO, genotype, married, education.

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I. Introduction

Blood contains antigens on red blood cells used in ABO blood group system that stratifies individuals into four groups of blood namely A, B, AB and O. Individual who lacks either antigen A belongs to O, B antigen to A blood group, individual who lacks both antigen A and B belongs to O group and individual who has both antigen A and B belongs to AB group^{1, 2, 3, 4, 5, 6}. Blood groups are inherited from both parents. The ABO blood group type is controlled by a single gene (ABO gene) with three types of alleles inferred from classical genetics: I , I^A and I^B . The I designation stands for Isoagglutinin or antigen^{7, 8, 9, 10}. Type A, B and AB

blood can be converted into type O using glycosidase enzymes from specific bacteria to strip the blood group antigens from red blood cells¹¹. Occasionally, the blood types of children were not consistent with expectations for instance; type O children can be born to an AB parent due to rare situations especially in malaria Bombay Phenotypes and cis- AB¹². The cis- AB phenotype has a single enzyme that converts both A and B antigens, the resulting red blood cells do not usually express A and B antigen at the time that would be expected on common group A or B red blood cells⁹. The ABO blood tests were also used in paternity testing^{3, 13, 14}. Non-O group (A, AB, B) individuals have a 14% reduced risk of squamous cell carcinoma and 4% reduced risk of basal cell carcinoma¹⁵. Equally, type O blood is associated with reduced risk of pancreatic cancer^{8, 16, 17}. The blood group B has been linked with ovarian cancer¹⁸. Haemoglobin (Hb) molecule consists of four polypeptide chains—two identical alpha (α) chains and two identical beta (β) chains controlled by genes at separate loci. The great majority of people everywhere have one type of Hb known as normal adult HbA. The HbA is the predominant form (97%) and the α chains consist of 141 amino acids, the β , delta (δ), gamma (γ) chains consist of 146 amino acids respectively. The remaining 3% is from foetal Haemoglobin¹⁹. Haemoglobinopathies are inherited abnormalities of Hb structure known as Hb variant. The most common form of Hb variant known as sickle cell disease is HbSS. It is of clinical importance. Each gene for HbS is inherited from each parent. It is so called because their cells take on the characteristic sickle shaped when subjected to reduced oxygen tension. It is a chronic condition^{20, 21, 22, 23, 24}. Person with HbS react to anorexia and haematuria than normal persons²². The heterozygous of HbS inherited from one parent has one gene for HbS and the other for HbA, having more than HbA and 20-40% of HbS. It is a benign condition, having rare complications but in anaerobic exertion, the red blood cells turn sickle-shaped, which can cause death during sporting activity²⁵. Sick cells can be deformed in blood. Abnormal Hb can cause the body to destroy red blood cells, leading to anaemia, cramps, weakness, general body aches and fatigues^{24, 26}. The sickle cell trait was found to be 50% protective against severe malaria²⁷. Education is the acquisition of knowledge, skills, values, beliefs and habits. Education is commonly divided into preschool (kindergarten), primary school, secondary school, college, university or apprenticeship. A right to education has been recognized by some governments and the United Nations^{28, 29, 30}. Education can be formal or informal. Formal education takes place in a school. Preschool education is compulsory but secondary school is optional in some countries³¹. Tertiary education is for adults. It includes undergraduates, postgraduate as well as vocational education^{29, 30, 32}. Marriage also called wedlock (matrimony) is a socially or ritually recognized union between spouses³³. It is also called monogamy when it involves a man and a woman³⁴. Infidelity also known as cheating, adultery, unfaithful or having an affair is a violation of a couple's assumed or stated contract regarding emotional and/or sexual exclusivity³⁵. Infidelity leads to psychological damage such as feelings of rage, betrayal, lowering of sexual and personal confidence and damage to self-image³⁶.

II. Materials And Methods

The study was conducted in Nnamdi Azikiwe University (NAUTH), Nnewi in Anambra state, South East Nigeria. Based on 3.1% prevalence rate of HIV in Nigeria³⁷ and using the formula of Naing *et al*³⁸ for sample size calculation. All the participants participated voluntarily, with a written informed consent. Ethical approval was sought from the Ethics committee of NAUTH, Nnewi. A total of 550 subjects were randomly recruited from voluntary, counseling and testing units in NAUTH, Nnewi. The subjects were classified based on W.H.O. HIV staging³⁹ into: symptomatic HIV subjects on ART (n= 140), symptomatic HIV subjects not on ART (n= 138), asymptomatic HIV subjects (n= 136) and HIV seronegatives (control) (n=136). 5 mls of fasting blood samples were collected from the participants into EDTA sample for the determination of HIV status by Immunoassay and Immunochromatography, CD4 counts by flow cytometry, ABO blood grouping and genotyping. Questionnaire was used for subject biodata for age, marital status and levels of education. Standard routine tests were used for blood grouping, blood genotypes and flow cytometry for CD4 counts. Statistically, graph pad prism 5 was used for data analysis.

2.1 Quality control measures

Quality control sera were run along test in each batch of analysis these were compared with the reference values of the control sera.

2.2 Determination of Antibodies to HIV-1 and HIV-2 in Human plasma.

III. Procedure

Two different methods were used, namely, Abbott determine TM HIV -1 and HIV-2 kit, which is an in-vitro visually read immunoassay (Abbott Japan Co.Ltd.Tokyo, Japan) and HIV-1 and 2 STAT-PAK Assay kit, which is an Immunochromatographic test for the quantitative detection of antibodies to HIV-1 and HIV-2 in Human plasma (CHEMBIO Diagnostic system, Inc, New York, USA). For the Abbott determine TM HIV -1 and HIV-2 kit, the procedure described by the manufacturer was used for the analysis. Briefly, 50 μ l of

participant serum samples separated from the corresponding whole blood samples in EDTA were applied to the appropriately labeled sample pad. After 15 minutes but not more than 60 minutes of sample application, the result was read. This method has inherent quality control that validates the results. For the Immunochromatographic method for HIV -1 and HIV-2, the procedure described by the manufacturer was used for the analysis. In brief, 5 ml of participant's plasma was dispensed into the sample well in the appropriately labeled sample pad. Three drops of the buffer supplied by the manufacturer was added into the appropriately labeled sample pad. The results of the test were read at 10 minutes after the addition of the running buffer. This method has inherent quality control and validates the results.

Determination of CD4⁺T cells counts by CyFlows SL-Green Procedure

200 ml EDTA whole blood was collected into PARTEC test tubes (Rohren tube). Then 20 µl of CD4⁺ T antibody was added into the tube. The contents was mixed and incubated in the dark for 15 minutes at room temperature. 800 ml of CD4 buffer was added into the mixture and mixed gently. Then the Partec tube was plugged on the Cyflow counter and the CD4⁺ T cells were displayed as peaks and interpreted as figures.

Determination of blood group (screening for avidity)

The W.H.O recommended method⁴⁰ was used. Briefly, one drop of serum was added to one drop of saline on a clear dry Coomb's tile and was mixed. To this mixture was added 10% group A or group B cells that have been washed thrice in physiological saline. This was rapidly mixed and watched for haemagglutination within 1-2 minutes. The results were recorded as shown below:

Red blood cells Blood group	Antiserum		
	A	B	AB
A	+	-	+
B	-	+	+
AB	+	+	+
O	-	-	-

+ = indicates the presence of agglutination.

- = indicates the absence of agglutination.

Determination of blood genotypes

Cellulose acetate electrophoresis as described by Kohn *et al*,⁴¹ was carried out on whole blood from all subjects. A sample applicator was used to apply the blood sample across the width of a narrow strip on a cellulose acetate paper saturated with Tris buffer at a pH 8.9, in a Perspex tank and current allowed to flow through the strip for 30 minutes. The distance travelled by the unknown Haemoglobin was compared with that of the standard that was included in the same 'run'.

III. Results

In this result, it was observed that the prevalence rate of ABO blood groups in symptomatic HIV subjects on ART were as thus: The prevalence of blood group O was 70 %, A was 22 %, B was 8 % and AB was 2 % in symptomatic HIV subjects on ART. The prevalence of blood group O was 54 %, A was 29 %, B was 12 % and AB was 4 % in symptomatic HIV subjects not on ART. The prevalence of blood group O was 74 %, B was 13 %, A was 12 % and AB was 3 % in asymptomatic HIV subjects. The prevalence of blood group O was 76 %, A was 13 %, B was 12 % and AB was 7 % control subjects. The genotype AA prevalence rate was 75%, AS was 25% in symptomatic HIV subjects on ART. The genotype AA prevalence rate was 72 %, AS was 28 % in symptomatic HIV subjects not on ART. The genotype AA prevalence rate was 67%, AS was 33 % in asymptomatic HIV subjects. The genotype AA prevalence rate was 72 %, AS was 28 % in control subjects. The prevalence rate of married men was 72 %, unmarried men was 28 % in symptomatic HIV subjects on ART. The prevalence rate of married men was 69 %, unmarried men was 31 % in symptomatic HIV subjects not on ART. The prevalence rate of married men was 69 %, unmarried men was 31 % in asymptomatic HIV subjects. The prevalence rate of married men was 24 %, unmarried men was 76 % in symptomatic HIV control subjects. The prevalence rate of 1⁰, 2⁰, 3⁰ education was 54 %, 38 %, 8 % respectively in symptomatic HIV subjects on ART. The prevalence rate of 1⁰, 2⁰, 3⁰ education was 53 %, 44 %, 4 % respectively in symptomatic HIV subjects not on ART. The prevalence rate of 1⁰, 2⁰, 3⁰ education was 56 %, 40 %, 4 % respectively in asymptomatic HIV subjects. The prevalence rate of 1⁰, 2⁰, 3⁰ education was 40 %, 51 %, 18 % respectively in control subjects.

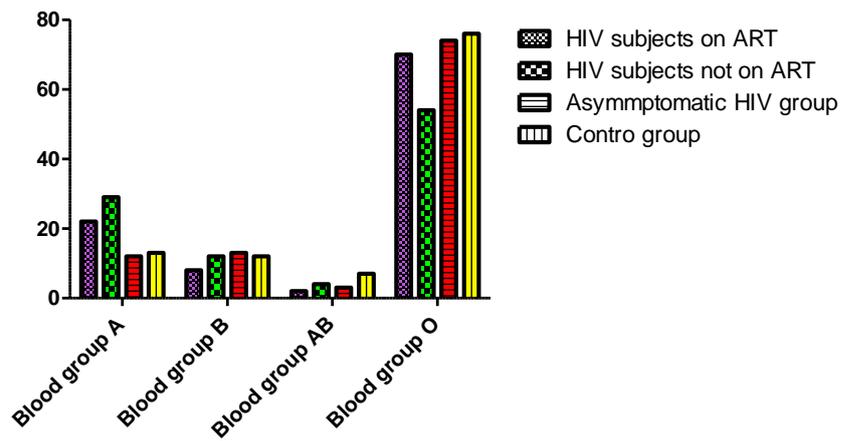


Figure 1: The prevalence of ABO blood group in subjects studied.

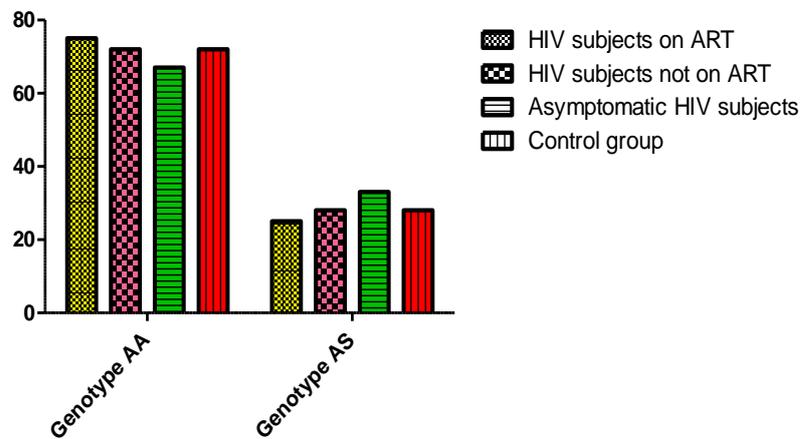


Figure 2: The prevalence of blood genotypes in subjects studied.

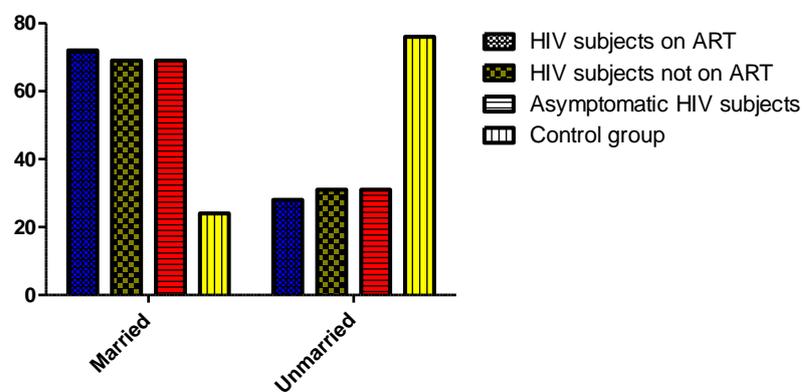


Figure 3: The prevalence of marital status in subjects studied.

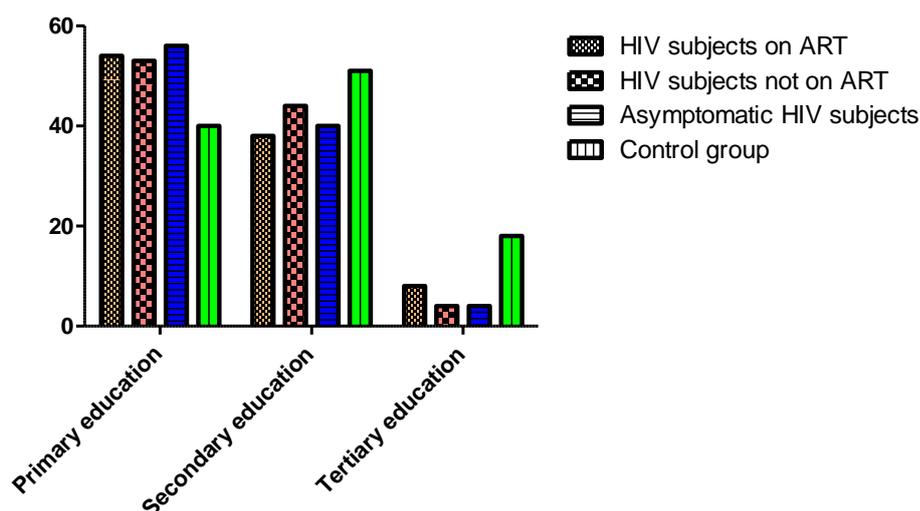


Figure 4: The prevalence of levels of education in subjects studied.

IV. Discussion

In this study, blood group O has the highest prevalence rate, followed by blood group A, then by blood group B and least in blood group AB in symptomatic HIV subjects on ART (O >A>B>AB). Similarly, the pattern was also observed in symptomatic HIV subjects not on ART. Blood group O has the highest prevalence rate, followed by blood group A, then by blood group B and least in blood group AB in this group (O >A>B>AB). Also, the pattern was the same in the control group. Blood group O has the highest prevalence rate, followed by blood group A, then by blood group B and least in blood group AB in the controls (O >A>B>AB). In USA⁴² and most Africa namely Morocco, Cameroun, Tunisia, Ethiopia, the result is in the same order⁴³. Also, in the six geological zones, the result was the in the same order⁴⁴. In contrast, blood group O has the highest prevalence rate, followed by blood group A, then by blood group B and least in blood group AB in asymptomatic HIV subjects. The results were slightly different in Madagascar and Guinea in this order (O>B>A>AB)⁴⁵. The results were also slightly different in India and Bangladesh in this order (B>O>A>AB)⁴⁶. This pattern was observed in Turkey and Colombia (A>O>B>AB)⁴⁷. The differences observed might be due to genetic and environmental factors. Reports have it that the distribution of A, B, O and AB blood groups varies across the world according to population¹². Again, blood groups are inherited from both parents^{7, 10}. The study the prevalence rate of genotype AA was thrice the value of genotype AS in symptomatic HIV subjects on ART. Similarly, the prevalence rate of genotype AA was almost thrice the value of genotype AS in symptomatic HIV subjects not on ART and in the controls. Nnaji *et al*⁴⁸ observed three quarters of the premarital couples had genotype AA, one quarter had sickle cell trait and a very low percentage (0.9 %) had HbSS. Also, Taiwo *et al*,⁴⁹ reported that 73.1 % of Yoruba subjects had genotype AA and 24.5 % had sickle cell trait. In this study, based on marital status, two-third of subjects were married in symptomatic HIV subjects on ART, in symptomatic HIV subjects not on ART and in asymptomatic HIV subjects. Reports have it that men were found to be more likely than women to engage in infidelity⁵⁰. Also it was observed that one-third of married men and one-fourth of married women have had an extramarital affair⁵¹. Also, studies have it that men are more likely to engage in extramarital sex if they are unsatisfied sexually, while women are more likely to engage in extramarital sex as they are unsatisfied emotionally⁵². In contrast, two-third of subjects were unmarried in the control group. The study showed that the highest prevalence rate of uneducated subjects were in HIV infected group on therapy, in HIV subjects not on ART and in asymptomatic HIV group than in the control group. Most of them only passed through preschool education. The HIV subjects that had secondary education had second prevalence rate of almost 40 % and least prevalence rate of less than 9 % than in the control group.

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