

Association between ABO, Rhesus blood group systems and haemoglobin genotype among confirmed HIV/AIDS-TB co-infected patients in Enugu Urban, Nigeria

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Summary

Background: The distribution of ABO, Rhesus blood group and haemoglobin (Hb) genotypes was investigated among 320 confirmed human immunodeficiency virus I & II (HIV)/acquired immunodeficiency syndrome (AIDS) with tuberculosis (TB) co-infected patients. One Hundred and Sixty (160) healthy HIV I & II negative age and sex – matched population were used as controls for this study.

Study design: Patients and controls were from the same environment and their blood groups and Hb genotypes were determined by the standard tube and electrophoresis methods respectively.

Results: The statistical analysis of the results revealed statistically significant association ($P < 0.01$) between Hb – genotype among female patients and female controls $\chi^2 = 6.099$, $P < 0.01$, and also between patient and control groups of both sexes $\chi^2 = 7.4561$, $p < 0.01$ only.

Conclusion: We conclude that HIV I & II/AIDs with TB co-infection among Nigerians so far studied appear to show no association in the distribution of ABO, Rhesus blood group and Hb–genotype prevalence. Hence they cannot be said to have either protective nor predisposing characteristics.

Key-words: Association, ABO, Rhesus, Blood groups, Haemoglobin genotypes, HIV, AIDS, TB, Co-infection.

Résumé

Introduction: La distribution d'ABO groupe Rhésus et hémoglobine (Hb) génotype ont été étudiés parmi 320 patients co-infectés par virus de l'immuno déficience humaine I et II VIH/syndrome immunodéficientaire acquis (SIDA) avec la tuberculose (TB) confirmés. Cent soixante (160) VIH et II négatif en bonne santé âge et sexe population bien assortie ont été utilisé comme groupe témoin pour cette étude.

Plan d'étude: Les patients et les contrôles étaient du même milieu et leur groupe sanguin et Hb génotype étaient décidés à travers le tube normal et méthodes électrophorese respectivement.

Résultats: L'analyse statistique des résultats avait indiqué une association importance statistiquement ($P < 0,01$) entre Hb - génotype parmi les patients du sexe féminin et groupe témoin du sexe féminin $X^2 = 6,099$, $P < 0,01$ et aussi entre le patient et groupe témoin des deux sexes $X^2 = 7,4561$, $P < 0,01$ seulement.

Conclusion: Nous concluons que le VIH I et II/SIDA avec TB co-infection parmi les Nigeriens étudiés jusqu'ici semble qu'il n'ya a aucune association dans la distribution et la fréquence d'ABO, groupe sanguin Rhésus et Hb-génotype.

Donc, on ne peut pas dire qu'ils ont soit les traits caractéristiques protecteurs soit prédisposés.

Introduction

For the past 50 years, numerous attempts have been made by a number of investigators to find some correlation between blood groups, and heightened susceptibility to certain diseases¹. Although the reasons for these associations are not clear, it may be related to either (a) the cross-reactions between iso-haemagglutinins or iso-antibodies and cell wall antigens of various microorganisms² or (b) individual secretor status¹. Such natural antibodies may act by blocking attachment of the bacterium to its target cell. Another recent finding indicates that human immunodeficiency virus (HIV) envelope may be glycosylated by the blood group A glycosyl transferase and that this interferes with the ability of the virus to infect individuals of other blood groups, possibly due to the presence of Anti – A antibodies².

In developing countries, the average time from seroconversion to acquired immunodeficiency syndrome (AIDS) is approximately 10 years^{4,5}, but there is significant variation between individuals. Some patients progress to AIDS within a few months⁶, whereas others fail to manifest signs or Symptoms of progression for many years⁷.

However, relatively little has been studied or is known about the association between human ABO, Rhesus blood group systems, haemoglobin genotype and HIV/ AIDs and TB co-infection hence the goal of this study.

Patients, materials and method

Study population consisted of the three hundred and twenty (320) HIV – I & II with tuberculosis (TB) co-infected patients who were recruited over a period of 8 months (April - November, 2003) from a larger cohort of confirmed HIV I & II positive patients with TB. Among the 320 patients, 175 (54.69%) were males, and, 145 (45.31%) females. They were all adults, aged 25 – 60 years. Risk factors for HIV-I and II infection were mainly hetero sexual relationships, and blood transfusion.

The ABO, Rhesus blood groups and haemoglobin (Hb) genotypes were determined by the standard techniques⁸, and the results were compared with those of one hundred and sixty (160) healthy (age and sex – matched) controls, who were made up of blood donors mainly, staff and students from the same race and community as the patients.

Data analysis

The data obtained were analyzed using the statistical package for social sciences (SPSS) software. The Student's t

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Table 1 Comparison of ABO and Rhesus blood group distribution among patients with control of both and different sexes

Blood group and Rhesus factors	Both Sexes						Different Sexes						χ^2	p	
	Patients			Control			Patients			Control					
	No studied	%	Prevalence	No studied	%	Prevalence	Males No. studied	%	Prevalence	Females No. studied	%	Prevalence			Males No. studied
A+	65	20.44	23.75	62	23.75	43	24.57	22	15.17	39	24.38	23	22.77		
B+	37	11.56	16.48	43	16.48	21	12	16	11.03	23	14.37	20	19.80		
AB+	6	1.88	0.77	2	0.77	3	1.72	3	2.07	0	0	2	1.98		
O+	197	61.56	53.64	140	53.64	101	57.71	96	66.21	90	56.25	50	49.50		
A-	5	0.56	0.77	2	0.77	2	1.14	3	2.07	0	0	2	1.98		
B-	1	0.31	0.38	1	0.38	0	0.00	1	0.96	0	0	1	0.99		
AB-	0	0.00	0	0	0	0	0.00	0	0.00	0	0	0	0.00		
O-	9	2.81	4.21	11	4.21	5	2.86	4	2.76	8	5.00	3	2.98		
Total	320	100	7.736	261	100	175	100	145	100	160	100	101	100	3.977	0.67697

Table 2 A comparison of haemoglobin types distribution among patients and control groups of both and different sexes.

Hb-Geno type	Both Sexes						Different Sexes						χ^2	p	
	Patients			Control			Patients			Control					
	No studied	%	Prevalence	No studied	%	Prevalence	Males No. studied	%	Prevalence	Females No. studied	%	Prevalence			Males No. studied
AA	249	77.81	68.2	178	68.2	138	79.31	111	76.03	116	72.5	62	61.38		
AS	71	22.19	31.42	82	31.42	36	20.69	35	23.97	43	26.88	39	38.62		
SS	0	0	0.38	1	0.38	0	0.00	0	0.00	1	0.62	0	0		
Total	320	320	7.4561	261	100	174	100	146	100	160	100	101	100	4.468	0.1071

- test and chi-square (χ^2) were used wherever appropriate. Two – tailed p- values less than 0.05 were considered significant.

Results

The results obtained during this study are shown in tables 1 and 2. Tables 1 shows a comparison of the prevalence rate of ABO and Rhesus blood group distribution in patients, with healthy (control) population and patient with control group in both and different sexes. Distribution in the prevalence rate of Hb genotypes amongst patients and control group: in both and different sexes are shown in table 2.

There were statistically significant differences ($P < 0.01$) in the distribution of Hb genotype among female patients and female control groups and also between patients and control groups of both sexes only, in all the associations and population studied.

However, these results could not be compared with any other previous findings in the Nigerian community, since none had been done to the best of our knowledge.

Discussion

During the past 25 years, hundreds of reports have been published on the distribution of blood groups among patients with such conditions as carcinomas³, TB⁹, schizophrenic, general paresis, rheumatic fever, epilepsy, longevity, arterio-sclerosis, poliomyelitis, hypertension, gastric and duodenal ulcers, stomach cancer, pernicious anemia, and many others. In many cases the investigations have disclosed no evidence of any association; in other cases in which an association was reported, this could not be confirmed in subsequent studies. Often, as pointed out by Wiener¹⁰, the fallacious conclusions and claims of association between blood groups and disease are due to fundamental errors. For instance, in some cases the technique of blood typing is suspected.

In addition, a very large number of controversial reports have claimed the existence of an association between blood groups and disease merely on the basis of statistical comparison of the distribution of blood groups and Hb genotypes of patients with various diseases and that among healthy controls.

Furthermore, a serious pit-fall is the danger of the bias when selecting cases, for inclusion in a series, especially when criteria for diagnosis of a disease are not sharply defined. Also, "stratification" is another pit-fall when one compares the distribution of the blood groups in a series of patients with that of a control group. Few population in large cities are homogenous; most consist of individuals of more than one ethnic origin. Very often the control groups have consisted of thousands of blood donors typed within a short period of time in blood donation centers, whereas the experimental group was pulled from the records of many hospitals over a period of several years. This difference in the method of compiling the data in the two groups may introduce a serious bias into the results¹¹.

However, it is obvious that reliability of conclusions based on statistical analyses, as in the case of studies of blood groups and Hb- genotypes in various diseases,

depends largely on careful elimination of all possible sources of errors and biases. When such conditions are met, the evidence indicating possible relationship of blood groups and Hb-genotype to disease cannot all be ruled out.

The results from this study revealed statistically significant association ($P < 0.01$) in the distribution of the prevalence rate of Hb genotype among female patients and control group, patients and control groups of both sexes. Hence, this indicates that the blood group and Hb genotype of an individual have little to do with the occurrence of disease as do finger prints, the colour of hair or colour of the eyes. The only exception is, of course, immunologic disease notably haemolytic disease of the newborn. Also, the results of this study agrees with that of Wiener's which revealed that the fallacious conclusions and claims of association especially between ABO bloods and disease are due to two principal errors: (1) failure to take the a priori probabilities into account and (2) biased data and errors in blood grouping.

Conclusion

We conclude that the association between blood groups, Hb genotypes and HIV/AIDS – TB co – infection may actually not exist and neither protect nor predispose an individual to HIV and TB infection.

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