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RESEARCH ARTICLE

Relationship between ABO Blood Groups/Rhesus factor and Risk of Human Immuno Deficiency Virus (HIV) Infection

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ABSTRACT

ABO blood groups/ Rhesus factor were randomly investigated in relation with Human Immune Deficiency Virus (HIV) infection from August to December, 2011. A total of 651 blood samples were collected, HIV infested donors were 287 male, donors 121, (18.6%), female 166 (25-5%) and health control donors (HIV-negative) were 364, male 193 (29.6%), female donors 171 (26.3%), with ages ranging between 15-50 years of HIV-infected and HIV healthy control donors. ABO blood group donors were determined by white tile method and confirmed by a direct coombs test method to rule out any weakly positive antigens. All HIV-blood samples were screened using Enzyme linked Immuno absorbent Assay (ELISA) and the positive samples were confirmed by western blood. Statistical analysis was by Binary logistic regression SPSS 15.0 version, blood groups A^+B^+, B^-, AB^-, O^+ odd values were shown < 1.0, no risk group to HIV infection and non-significant, while A^- blood group (odd 2.00, 95% Cl, 0-490-8.68 p value = 0.33) was more likely to be HIV infection risk.

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INTRODUCTION

The ABO-blood grouping was discovered in 1901 by Karl Landsteiner at the University of Vienna, in the process of trying to learn why blood transfusions sometimes cause death (Dennis, 2009).

Many workers have tried to find out a possible relationship between the incidence of blood groups and the incidence of various diseases. Sagal, (1996), peptic ulcer and blood group O, gastric carcinoma and blood group A, toxemia of pregnancy and blood group O, carcinomia cervix and blood group AB, and in Lichen planus and blood group A, pemphigus and Seborrhoec dermatitis and blood group B, vitiligo and blood group AB, (Tyapi, 1971). People who are of the O group are at high risk for contracting cholera, plague as well as developing duodenal and peptic ulcers and are tastier to mosquitoes. This could be a significant factor in contracting malaria (Dennis, 2009).

Recent study, Stuart, (2005), have shown that the presence of natural antibodies can have a profound effect on the generation of cytotoxic-cell responses against pathogens. Such inmate immune response may also defer the speed at which adoptive immune response against HIV is generated, thus, limit primary viral replication.

The difference in people of blood Groups is the enzyme responsible for adding N acetygalactosamine versus galatose, respectively, people of AB blood group have inherited both forms of glycosyltransferase, one from parent, and therefore, synthesize both the A and B antigens (Medline, 2004).

People of O group also have a gene encoding the glycosyltransferase, however, the O group enzyme have a mutant which creates a truncated, hence dysfunctional enzyme. Thus the O blood group does not have extra terminal sugar mol like either A or B group with terminal sugars (Saitou and Yamamoto F, 1997).

Lachar, (1998) have examined the association between the ABO alleles and a variety of diseases, mainly focused on infections agents that can use the A and B antigens of diseases as receptors or in the case of O allele, the absences of the A and B antigens, the O allele can provide a selective advantage since it also produces both Anti-A and Anti-B antibodies. Antigens have been postulated to modify pathogens spread through the action of natural antibodies and complement. Serum sensitivity requires active complement and specific ABO antibodies. The incorporation of ABO-antigens by HIV-1 may affect transmission of virus between individuals of discordant blood groups by interaction with host natural antibody and compliment (Stuart, 2009). For this reasons, HIV constantly changing the structure of its predominant surface protein, the virus can avoid recognition changing the structure of its predominant surface protein, the virus can avoid recognition by antibodies produced by the immune system (Lachgar 1998).

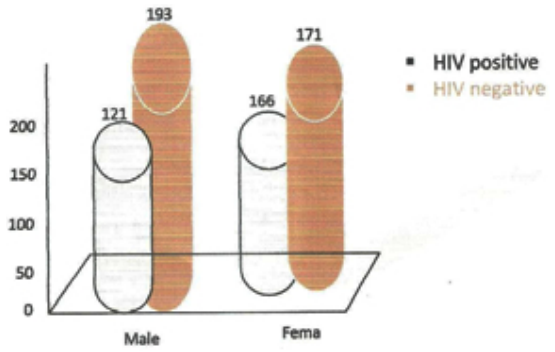

Fig. 1: Sex distribution of HIV positive and healthy controls donors

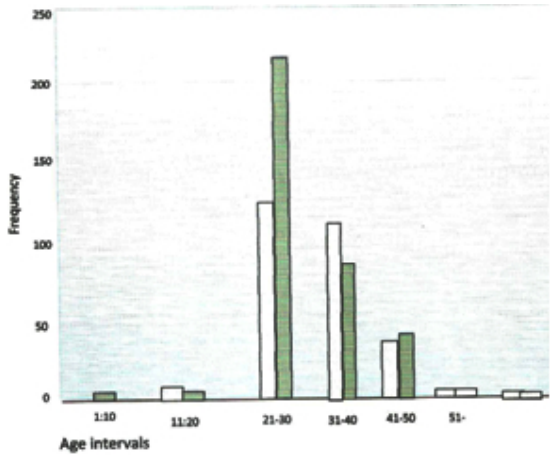

Fig. 2: HIV interval and HIV status of patients

The main objective of the study was to examine possible association between ABO blood groups-Rhesus factors (Rh) and HIV infection.

MATERIALS AND METHODS

The research study was conducted at the national AIDS Research Institute, NARI Pune, from August to December, 2010.

Sample collection

All blood samples were collected at NARI clinics (Model Colony, Gadikhana, Talera) from patients attending the clinics. A total of six hundred and fifty one (651)blood samples, HIV-1 infected donors were 287, male 121 (18.6%), female 166 (25.5%) and healthy control donors (HIV negative) were 364, male 193 (29.6%) and female 171 (26.3%) with ages between 15-50 years of HIV positive and healthy controls.

Samples analysis

All blood samples were screened for HIV infection using enzyme-linked immune sorbent assay (ELISA).The positive samples were confirmed by western blot (WB) test (Gene LAB diagnostic (Singapore).

ABO rhesus-blood grouping test

The white tile method was used.The blood which was collected after obtaining an informed consent from the patients before collecting blood. The blood was collected into EDTA vacutainers, one drop of 20% red cell suspension each was mixed with a drop of anti sera, A, B and D mixed/ all agglutinations were interpreted positive and all Rhesus negative groups were confirmed with a direct coombs test to rule out any weakly positive antigens.

Statistical analysis

Association between ABO blood groups Rhesus factors and HIV infection were examined by estimated ODDS ratio (ORS) with a corresponding 95% confidence intervals conditional Binary logistics regression SPSS 15.0 version and ChiSq (X^2) test for independence contingency table.

RESULTS

During the period of this research study from the month of August to December, 2010, the infected donors were 287, male 121 (18.6%), female 166 (25.5%) and healthy control (HIV negative) were 364, male 193(29.6%) and female 171, (26.3%) with ages between 15-50 years of HIV positive and healthy controls

Table 1: Represents blood groups and HIV both negative and HIV-positive association. There was high incidence of HIV among blood group B^+ patients.

Table 2: Represents Sex distribution of HIV infected individuals and healthy controls. Female sex had the highest HIV incidence.

Table 3: Represents a distribution of blood groups/rhesus factors among HIV positive and HIV negative patients. High incidence of HIV was recorded among the patience with rhesus positive.

Table 4: Represents a distribution of HIV infection in relation to age group. Patients of age group interval 21-30 recorded higher incidence of HIV (HIV positive) and age interval 51-60 recorded less HIV incidence.

DISCUSSION

ABO blood group /rhesus factors were studies in relation to HIV infection. Table 1 represents results obtained for ABO blood groups distribution of the population studies and HIV infection. The blood group B^+, B^- was observed to have a significant association with P value 0.410, 0.337 and lower 0.141 and 0.079, 95.0%CI. It is observed that ABO gene polymorphisms are associated with specific-types of disease and ABO antigens are associated with infection and other diseases such as cancer

There was no significance differences observed in the mean age between the HIV positive and HIV healthy control cases (the above paragraph replaced and putted as a comment for the table 1 in the results).

There was no risk group among blood groups A^+, AB, O^+ and were non significance with HIV infection while blood group A^- was likely to be risk of HIV infection. In agreement with (Agotollah, 2008), in his study of Association between ABO blood system A- bloods was linked with HIV infection, reason was not given. It was observed in table1: that blood group B+ recorded high incidence of HIV infection with 36.6% there was no clear

Table 1: Blood groups and HIV association

Blood groups and Rh factors	HIV positive	HIV Negative	P Value	Odd	95.0% C.I	
					Lower	Upper
A+	49 (17.1%)	70 (19.2%)	0.283	0.549	0.184	1.641
A-	5 (1.7%)	26 (7.1%)	0.334	2.000	0.490	8.168
B+	105 (36.6%)	112 (30.8%)	0.101	0.410	0.141	1.190
B-	8 (2.8%)	7 (1.9%)	0.140	0.337	0.079	1.430
AB+	32 (11.1%)	36 (9.9%)	0.148	0.433	0.139	1.348
AB-	6 (2.1%)	16 (4.4%)	0.972	1.026	0.254	4.136
O+	77 (26.8%)	84 (23.1%)	0.114	1.420	0.143	1.232
O- Reference	5 (1.7%)	13 (3.6%)	-	1.000	-	-
Total	287 (100.0%)	364 (100.0%)	-	-	-	-

Table 2: Sex distribution in HIV infected individuals and healthy controls

HIV Status	Gender		Total
	Male	Female	
HIV positive	121 (18.6%)	166 (25.5%)	287 (44.1%)
HIV negative	193 (26.9%)	171 (26.3%)	364 (55.9%)
Total	314 (48.2%)	337 (51.8%)	651 (100.0%)

Table 3: Distribution of blood groups/Rhesus factors among HIV positive and HIV negative patients

Blood groups	HIV		P value
	HIV positive	HIV negative	
Blood types			0.097
A	54 (18.8%)	96 (26.4%)	
B	113 (39.4%)	119 (32.7%)	
AB	38 (13.2%)	52 (14.3%)	
O	82 (28.6%)	97 (26.6%)	
Total	287 (100.0%)	364 (100.0%)	
Rh factor			<0.001
Rh positive	263 (83.0%)	302 (83.0%)	
Rh negative	24 (8.4%)	62 (17.0%)	
Total	287 (100.0%)	364 (100.0%)	

Table 4: Age distribution of HIV infection and HIV negative people

Age Interval	HIV (+)	HIV (-)
11-20	6	5
21-30	134	209
31-40	121	98
41-50	49	52
51-60	5	6

reason to this. However samples were randomly collected from patience before their blood groups were determined. (Typapi (1971), observed that blood group B is at risk of contracting various diseases.

Table 2 shows sex distribution in HIV infected and in healthy controls as observed females sex have recorded high prevalence of HIV infection in this study. High rates of HIV in females was not surprising given that most of this women have had Sexually Transmitted Infections (STI) cases which could facilitate the acquisition of HIV infection.

Table 4: shows age distribution of HIV infection, with the prevalence rate between ages of 21-51 years, this is a dynamic age/age of exposure to all various sexual activities and other negative pressures. Within the age too, there is much HIV infection awareness in knowledge among the youths.

Recommendation

More Research work can be carried out with more HIV Positive and Negative blood samples. Control of HIV infection could be established through ABO blood groups distributions with HIV infection.

Conclusion

At this level of this research study, it been established that major ABO Blood groups Rhesus factors are not associated with HIV infection by increasing or decreasing HIV in Normal population.

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