

## DISTRIBUTION OF ABO AND RH BLOOD GROUPS IN HIV SEROPOSITIVES AT AN INTEGRATED COUNSELING AND TESTING CENTRE IN KARNATAKA, INDIA

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### ABSTRACT

**Introduction:** ABO blood group system was the first human blood group system to be discovered. Subsequent to the discovery of blood groups by Landsteiner and advancement in its study many workers tried to find out associations between blood groups and the incidence of various diseases. The objective of the study was to create a blood group database which would probably help in transfusion services and find out the distribution of blood groups in the seropositive population.

**Methodology:** Blood groups were ascertained for 1809 patients who were HIV seropositive enrolled at ICTC in a tertiary care teaching hospital in Karnataka, India from April 2004 to January 2010 using the simple tile method. The results were compiled and statistically analyzed.

**Results:** Blood grouping was done for 1809 patients, out of which 1749 (96.68%) were adults and 60(3.32%) were paediatric patients. O Rhesus positive was the most prevalent blood group in both adult (40.13%) and paediatric (43.33%) seropositives. B Rhesus positive was next commonest group in adults (26.12%) and A Rhesus positive in paediatric(30.0%). AB Rhesus negative (Adults-0.34% and Paediatric-0%) blood group was the least prevalent in the study population.

**Conclusion:** It is important to create blood group database for the Indian seropositives population, to know any probable association between blood group and HIV infection. This study is an attempt to create a blood group database in a modestly large seropositive which would play a vital role in transfusion services and future research. Larger nation-wide studies would be required to substantiate any association between blood groups and HIV infection.

**Key words:** HIV seropositive, ABO, Rhesus blood groups.

### INTRODUCTION

ABO blood group system was the first human blood group system to be discovered.<sup>1</sup> Subsequent to the discovery of blood groups by Landsteiner and advancement in its study many workers tried to

find out associations between blood groups and the incidence of various diseases. For example, strong associations have been described between O blood group and peptic ulcer.<sup>2</sup> A blood group and gastric carcinoma.<sup>3</sup> AB blood group and carcinoma cervix<sup>4</sup>, and so on. In the recent times, according to research done by Swedish scientists, the risk of being infected by Human Immunodeficiency Virus (HIV) may be determined by the presence of the carbohydrate based blood group moiety P<sup>k</sup>. Individuals with high P<sup>k</sup> levels exhibited a

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greater natural resistance to HIV infection.<sup>5</sup> World literature has few articles describing associations between HIV infection and blood groups. With this background, an attempt was made in this study to create a blood group database in HIV seropositives both adult and paediatric to ascertain the distribution of various ABO/Rh blood groups in the study population. The database so created would probably be of help in blood transfusion services particularly in this locality.

## METHODOLOGY

This is a cross sectional study in which blood groups were determined for 1809 HIV seropositives (1749 adults and 60 paediatric) at blood bank of a tertiary care hospital in Karnataka, India, during the period April 2004 to January 2010. Informed consent had been taken from the patients to perform the test. The ABO and Rhesus(Rh) blood grouping was done by a simple tile method.<sup>6</sup> A drop of blood from each subject was placed on a clean white tile in three places. A drop of each of the antisera, anti A, and anti B and anti D was added and mixed with each blood sample with the aid of glass rods. Blood groups were determined on the basis of agglutination.<sup>7</sup>

The HIV seropositive status was confirmed by standard ELISA/RAPID tests according to National AIDS Control Organization (NACO) guidelines at the Integrated Counseling and Testing Centre (ICTC). According to the earlier guidelines, HIV testing was confirmed by ELISA. Revised guidelines follow strategy 3 i. e. using 3 rapid tests for confirmation of positive status.<sup>8</sup> Baseline CD4 cell counts were done for all the participants of the study at the Department of Microbiology. The blood group of the control population was obtained from the records of 1168 consecutive personnel maintained at the blood bank of the hospital. Control group was included in this study in order to create a database and also compare the distribution of blood groups among seropositives against the general population so as to determine any significant correlation if present. Age, gender, blood group and CD4 data were compiled and subjected to relevant statistical analysis using SPSS Version 16.

## RESULTS

Blood grouping was done for 1749 adult HIV seropositives, 60 paediatric HIV seropositives between the age group of 18 months and 70 years. The adult seropositive group consisted of 1030(58.9%) males and 719 (41.1%) females. The paediatric seropositive group consisted of 25 (41.7%) males and 35 (58.3%) females. The control group comprised 1130 adult and 38 paediatric individuals. The adult controls comprised 662(58.6%) males and 468 (41.4%) females. The paediatric age group consisted of 16(42.1%) males and 22(57.9%) females

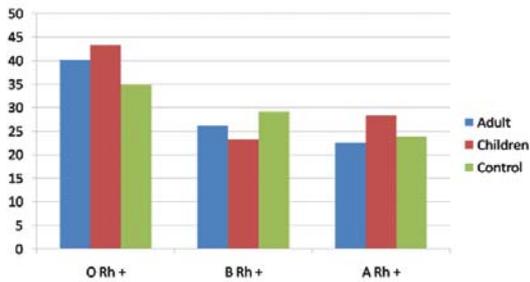
The adults seropositive group had 1649(94.28%) Rhesus positive blood group while 100(5.72%) were Rhesus negative. In the paediatric seropositive group 59(98.53%) were Rhesus positive and one (1.66%) was Rhesus negative. In the adult control group 1067(94.33%) were Rhesus positive and 64(5.67%) were Rhesus negative while in the paediatric control group 36(97.36%) were Rhesus positive while 1 (2.63%) were Rhesus negative as shown in Table1.

**Table 1.** Rhesus Positive and Rhesus Negative

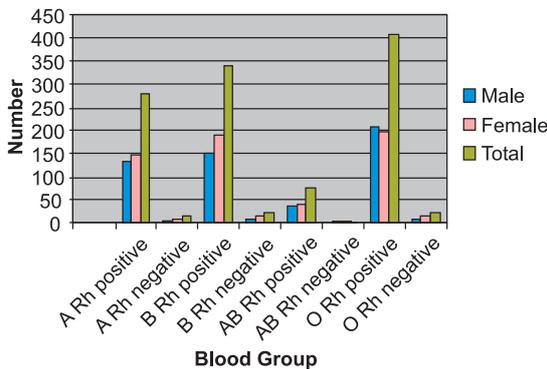
Study Population	Rhesus Positive		Rhesus Negative	
	Number	%	Number	%
Adult Seropositive	1649	94.28	100	5.72
Paediatric Seropositive	59	98.53	1	1.66
Adult Control	1066	94.33	64	5.67
Paediatric Control	37	97.36	1	2.63

Figure 1 shows that O Rh positive blood group was the commonest in 702(40.13%) adult seropositives and 26(43.33%) in paediatric seropositives as well as 407(34.84%) in the control group. In the adult seropositives population B Rh positive blood group was the next commonest in 457(26.12%) followed by A Rh positive blood group in 395(22.58%). The control group also showed a similar trend with 341(29.19%) individuals having B Rh positive blood group and 279(23.88%) having A Rh positive blood group. The paediatric seropositive population

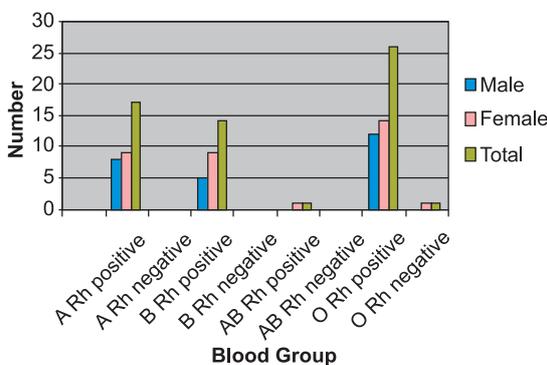
showed a variation with more number of females than males and A Rh positive blood group being the next commonest in 17(28.33%) followed by B Rh positive blood group in 14(23.33%). Figure 2, 3 and 4 show the gender-wise distribution of blood groups in adult, paediatric seropositive and the control population respectively. In all the three groups AB Rh negative was the least commonly observed blood group.



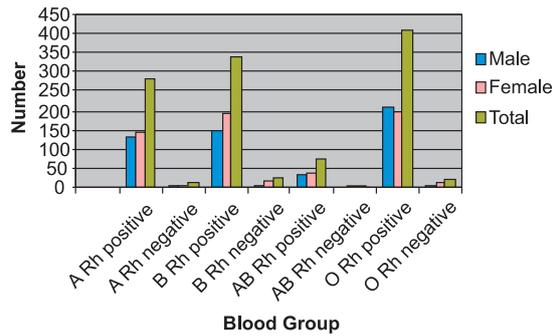
**Figure 1.** Bar graph showing the percentage (Y axis) of adult, paediatric and control subjects positive for O Rh+, B Rh+ and A Rh+ blood groups



**Figure 2.** Gender-wise Distribution of Blood Groups in Adult Seropositives



**Figure 3.** Gender-wise Distribution of Blood Groups in Paediatric Seropositives



**Figure 4.** Blood Group Distribution in Control Population

The mean baseline CD4 cell count of the study population was 121.77 cells/ $\mu$ l.

## DISCUSSION

Few studies from the world have researched probable association between blood group and HIV infection. Very few large scale studies have been conducted in India to know the distribution of blood groups of HIV seropositive population. In this study it was observed that O Rh positive was the commonest among the adult 702(40.13%) and paediatric 26(43.33%) seropositive population as well as the control 407(34.84%) population. An Indian study which determined the distribution of blood groups in 104 HIV seropositives observed O blood group in 40(38.5%) individuals which was most common, A blood group was seen in 28(26.9%), 26(25%) had B blood group and 10(9.6%) had AB blood group.<sup>9</sup> The current study showed 457(26.12%) with B Rh positive blood group in adult and 17(28.33%) with A Rh positive blood group in paediatric study population, which were the next most prevalent blood groups. In addition, there were more female seropositives than males in the paediatric study group. In a study from Nigeria, HIV status and blood groups determination (*Rhesus* and *ABO* groups) in 3691 pregnant women attending antenatal clinic and 1199 non-pregnant women visiting the same institution between 1999 to 2002 were studied. Overall, the prevalence of blood group O Rh positive was higher than in the general population with highest rate of 62.9% in HIV positive pregnant women followed by 58.4% in HIV negative pregnant women and 58.0% in

non-pregnant women. No significant difference was observed in blood groups for the three categories of subjects studied showing that no particular blood group type could be linked to the occurrence of HIV infection.<sup>10</sup> In another Nigerian study which determined ABO blood groups for 216 seropositives, 42.1% were O group, 11.1% A group, 9.4% B group and 8.7% were AB group and 5 out of 7 (71.4%) infected subjects with HIV-2 only, belonged to blood group AB.<sup>11</sup> The present study also had one HIV-2 infected individual who was found to be B Rh positive.

ABO histo-blood group antigens have been postulated to modify pathogen spread through the action of natural antibodies and complement. 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 complement. While much research has been devoted to searching for genetic factors that confer resistance to HIV-1 transmission, the most notable being the MHC and CCR5 loci, little is known about the role that some of the most well-studied blood group polymorphisms may play in viral transmission.<sup>12</sup> Swedish researchers investigated cell surface-expressed  $P^k$  in HIV infection. They concluded that  $P^k$  expression strongly influences susceptibility to HIV-1 infection, which implicates  $P^k$  as a new endogenous cell-surface factor that may provide protection against HIV-1 infection. Individuals with high  $P^k$  levels exhibited a greater natural resistance to HIV infection.<sup>5</sup>

It is important to create blood group database for the Indian seropositives population, to know about blood group distributions and any probable association between blood group and HIV infection. This study is an attempt to create a blood group database in a modestly large seropositive population which would play a vital role in blood transfusion services and future research protocols. Larger nation-wide studies would be required to substantiate any association between blood groups and HIV infection.

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