

PREVALENCE OF TRANSFUSION TRANSMITTED INFECTION AND ITS DISTRIBUTION AMONG ABO AND RHESUS BLOOD GROUPS

Immunohaematology

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ABSTRACT

BACKGROUND : To reduce the risk of transfusion transmitted infections (TTIs) screening of HBV, HCV, HIV, Syphilis and Malaria should be necessary for all the blood donors.

AIM: To ascertain the seroprevalence of TTIs among the blood donors and to detect its distribution among ABO and Rh blood groups .

MATERIAL AND METHODS : It is a retrospective study conducted at RIMS Blood Bank, Ranchi, India from January 2019 to April 2020, with 40,447 blood donors. ABO and Rh typing of these donors was done by tube agglutination method.

RESULT : Out of 40,447 screened donors, 686 (1.70%) were found seroreactive.. Out of this, the highest number of seroreactive donors were of HBsAg (49.71%), followed by HCV (40.52%) , HIV (9.33%) , Malaria (0.3%) and Syphilis (0.15%).

Highest seroreactivity was found among blood group O+ve followed by B+ve.

CONCLUSION: Seroprevalance of these infections signify that routine screening should be done for safe transfusion of blood and blood products.

KEYWORDS

TTIs; ABO; Rh blood groups.

INTRODUCTION :

Transfusion transmitted infections (TTI) are transmitted from one person to another via parenteral administration of infected blood or blood products. The prevalence of TTI is high in most regions of Asia even after following transfusion safety measures provided by World Health Organistaion (WHO) and other organisations to reduce the risk of TTI.[1] There is a evidence that genetically determined ABO blood group antigen may block the binding of possible causative organism to polysaccharide present on the cell surface. So, non secretors , are at risk of variety of TTI as they lack their antigen.[2]

NACO 2016- 17 report state that 12.8 million units of blood is required yearly for blood transfusion . India bears the 3rd highest number of HIV infected individuals in the world.[3]

ABO antibodies are a part of the innate immune system against some bacteria , parasites and enveloped viruses ,[4] and blood antigens are important as receptors for immune and inflammatory responses.[5,6] This signifies that there should probably be a biological association between ABO blood groups and HBV infection. But an exact relationship between the two have not been explored , as most of the results are contradictory.[7]

Transmission of malaria by blood transfusion leads to significant public health problem , specially in the malaria endemic regions of the country. RBCs infected with malarial parasite binds to uninfected RBCs leading to formation of clumps called rosettes , which further obstruct the flow in small sized blood vessels. This leads to tissue damage and severe malaria disease.[8]

MATERIALS AND METHOD :

This was a retrospective study conducted at Blood Bank ,RIMS , Ranchi during the period from January 2019 and April 2020. History of all 40,447 apparently healthy donors, coming from different localities was taken following the norms of SOP of blood bank. Before donation it was carefully checked if all the criteria for donor fitness was fulfilled . Important criteria for blood donation fitness included the age group 18 to 60 years, haemoglobin ≥ 12.5 g/dl ,weight ≥ 45 kg ,normal pulse and blood pressure. Menstrual history in case of females. Special attention was taken to eliminate any professional donors. Individuals fulfilling the above mentioned inclusion criteria and with good mental and physical health were allowed to donate after signing the donor questionnaire and written informed consent form. ABO and Rh typing

of all the donors was done by tube agglutination method. In case there was a doubt regarding the blood group , it was confirmed by gel technology method (Biorad company).

Blood sample of each donor was collected in a Ethylene diamine tetra acetic (EDTA) vials and plain vials for screening of HBsAg, HCV , HIV , Syphilis and Malaria. Tests for HBsAg, HCV and HIV was performed by using chemiluminescent microparticle immunoassay (CMIA) technique. Cutoff values of the samples for the above mentioned diseases were documented <1.00 as non reactive, and with results <1.00 RLU but between 0.80 to 0.99 were included as grey zone results and concerned bags were discarded for further safety of blood transfusion.

Chemiluminescence technique works on the principle that when excited electrons return to their natural relaxed state, they release energy in the form of light. This emitted light is detected by a photomultiplier tube for analysis. Chemiluminescence technique being more stable, relatively non toxic , and very sensitive are preferred over ELISA. Moreover, compared to ELISA ,less reagent are required. As the reactions are quick , turnaround time is faster in Chemiluminescence technique.

Rapid Plasma Reagin (RPR) card test (Pathozyne diagnostics company) was used for detection of Syphilis and Rapid Malarial Antigen test (Med source ozone company) for Malaria was used.

The serological report of the blood donors if positive or negative for any TTIs was recorded.

RESULT:

During the study period from January 2019 to April 2020 , 40,447 donors were screened out of which 686 donors were found seropositive. This implies that the percentage of TTIs was 1.70%. The highest number of seroreactive were of HBsAg - 341 donors (49.71%), followed by HCV – 278 donors (40.52%) , HIV - 64 donors (9.33%) , malaria – 2 donors (0.3%) and syphilis only 1 donor (0.15%). Highest seroreactivity was found among blood group O+ve (38.48%) followed by B+ve (29.15%) , A+ve (23.91%) and AB+ve (7.43%).

When we individually studied the TTIs , it was found that for HbsAg and HCV the predominant blood groups are O+ve >B+ve >A+ve

>AB+ve. But when we compare this with HIV infections ,the order was O+ve > B+ve > A+ve > AB+ve. Finally, we can conclude that O+ve blood group was most common blood group associated with TTIs in our study.

TABLE 1 : Spectrum of Transfusion Transmitted Infections among blood donors with ABO and Rh blood group distribution.

Blood groups	No. of donors of respective blood groups	TTIs positivity among respective blood groups	HbsAg +ve donors (49.71 %)	HCV +ve donors (40.52 %)	HIV +ve donors (9.33%)	MP +ve donors (0.3%)	Syphilis +ve donors (0.15%)
O ⁺	14,436	264	137	103	23	0	1
A ⁺	7,062	164	79	69	15	1	0
B ⁺	14,723	200	102	74	23	1	0
AB ⁺	2,993	51	19	30	2	0	0
O ⁻	386	2	1	0	1	0	0
A ⁻	291	0	0	0	0	0	0
B ⁻	471	4	3	1	0	0	0
AB ⁻	85	1	0	1	0	0	0
Total	40,447	686	341	278	64	2	1

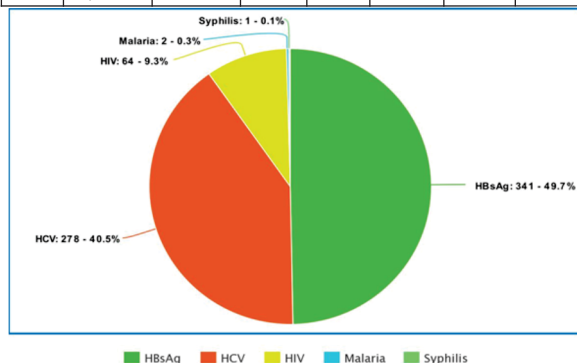


Fig: pie chart depicting percentage of transfusion transmitted infections among seroreactive donors

DISCUSSION :

Blood and its products are used as a source of transfusion therapy in various medical conditions. Cellular components comprise of red cells, platelets, granulocytes ,whereas the plasma components are fresh frozen plasma and cryoprecipitate .

B+ve blood group was the most predominant blood group in our region, which is similar to the observation made by Anumanthan et al., Nigam et al., Tyagi et al [9,10,11]. ABO may vary in different areas depending upon the geographical distribution , race, tribes and ethnic groups in local population.

In toto, seroreactivity of TTIs was 1.70% , which was quite low as compared to the study by Sharma et al. and Arif SH et al. which was 4.20% and 5.59% respectively.[12,13]

India has been placed in the intermediate zone (2-7%) of prevalence of hepatitis for HBsAg by the World Health Organisation.[14] From our study maximum cases (49.71%) were reactive for HBsAg. The same prevalence was observed in other studies. [10,11 15,16]

It was observed that, the maximum number of HBsAg reactive cases were Rh positive. There is a significant association between Rh positive and HBsAg seropositivity as evident by Sharma et al., Sinha et al. and Sreedhar et al.[12,15,17]

Next to HBsAg, the prevalence of HCV predominates. 278 blood donors out of 686 TTIs positive donors were HCV positive, that accounts for 40.52% of total TTIs. According to Saeed and Mujtaba (2011) report , there is high seropositivity of HCV and HbsAg among O+ve blood group donors. [18] There is similar trend of association between HCV and HbsAg with O+ve blood group donors in our study too.

This study highlights that O+ve and B+ve blood group donors were the commonest among the seropositive population for HIV. The

prevalence of HIV serotypes is 98.96% among Rhesus D positive blood donors than 1.04% observed in Rhesus D negative blood donors. This is in accordance with the results of Omoriege et al study which states that Rh D positive donor were more susceptible to HIV infection.[19]

In present study of one years and four months , there was only 1 case of syphilis, which was O+ve. So, we could not make a healthy association between seropositivity of syphilis and ABO blood group in our study. Even the study of Behal et al. could not find any evidence of association.[20]

Henceforth, various study observed that , there is higher seroprevalence of HbsAg , antiHCV ,HIV, and syphilis among O+ve blood donors. [21,22]

CONCLUSION:

Seroprevalance of these infections signify that routine screening should be done for safe transfusion of blood and blood products. Study design with a large scale in general population ,and selection of donors from multiple center could help us to conclude a better correlation between TTIs and ABO and Rhesus blood group. There might be a disparity between the results of different studies which can be correlated to geographical variations.

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