

ABO & Rh Blood Groups' Distribution among Blood Donors from Southern Nepal and Its Relation with Hepatitis B Viral Infection

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ABSTRACT

Background: Now a days Hepatitis B viral infection is one of the most chronic viral infection which spread mainly through Blood and other tissue fluids. Before blood transfusion we need to screen the blood very carefully. So determination of prevalence of HBV among different blood group is helpful to transfuse safe blood. The purpose of our present study was to find out the distribution of Hepatitis B virus among ABO and Rh group and to develop a statistical association between Blood group and HBV infection.

Materials and Methods: Data were used for this study, collected from Blood Bank of the National medical College, Birgunj, Nepal, during the session of 2014 to September 2017. The method of study was descriptive and comparative in retrospective aspect. All samples were tested to determine the blood group and then screened by routine laboratory analysis. All the HBsAg positive samples were retested by using ELISA for conformation. Finally all data were analyzed statistically by Chi-square test.

Results: Among 5653 blood donors, 35.9% were Group B, 31.1% were group O, 23.67% group A and remaining 9.64% were group AB. We have found overall 29HBsAg positive individual. With highest percentage in group O (0.57%) followed by group AB (0.55%), group A (0.53%) and group B(0.44%). In Rh system 0.51% Rh antigen having individual infected by HBV but only 0.28% Rh negative donors were infected by HBV.

Conclusions: Blood Group O and Rh positive donor were mostly infected by HBV though we did not found any close statistical association between ABO group and Rh group with HBV infection.

Key Words: ABO-group, Rh-System, HBV infection, HBsAg, transfusion, Southern Nepal.

INTRODUCTION

Hepatitis is one of the chronic infectious diseases caused by different strain of hepatitis viruses like HBV, HCV etc. According to WHO (www.who.int/mediacentre/factsheets/fs204/fr/) an estimated 600 000 persons die each year due to the acute or chronic consequences of hepatitis B. The hepatitis B virus is 50 to 100 times more infectious than HIV. Infection of HBV can cause an acute illness with symptoms that last several weeks, including yellowing of the skin and

eyes (jaundice), dark urine, extreme fatigue, nausea, vomiting and abdominal pain and even chronic liver infection that can later develop into cirrhosis of the liver or liver cancer and this Hepatitis B virus is transmitted through contact with the blood or other body fluids of an infected persons. ⁽¹⁾

In human more than 26 Blood group system is identified and out of them the main important major blood group system are ABO, Rh/Hh, MNS, and P system. ⁽²⁾ Whereas ABO and Rh-systems are

clinically significant in human. ABO and Rh group distribution are different depending on geographical location, ethnic group and socio-economic status. ⁽³⁾

In Nepal the ABO and Rh/Hh blood group distribution is not constant. One group of researcher found that frequency of A blood group shows highest value (34%) followed by O group (32.5%), B (29%) group and AB (4%) blood group along with 96.66% Rh -D positive and 3.33% Rh negative. ⁽⁴⁾ Unlike this research other group of researcher found that the commonest blood group is group O followed by group A, group B and group AB. ⁽⁵⁾ other study conclude that the distribution of blood group A is highest followed by blood group O, group B and group AB. ⁽⁶⁾ Though JP Saha et al. concluded that Nepali population have highest frequency of O blood group so it indicate that Nepal have large pool of universal donor. ⁽⁷⁾

Human body is always susceptible for certain infectious diseases and some of diseases are directly related with human blood group antigens. For example peptic ulcer and gastric cancer show strong association with the ABO/Rh blood groups ⁽⁸⁾ and Gastric cancer is more common in blood group A individuals whereas gastric and duodenal ulcers ⁽⁹⁾ and even type 2 diabetes occur more frequently among individual having blood group O. ⁽¹⁰⁾ Periodontal disease also associated with ABO blood grouping system. ⁽¹¹⁾ The prevalence rate of infection with hepatitis B viral (HBV) varies widely among different parts of the world. ⁽¹²⁾ And their distribution somehow depends on Blood grouping system, the blood group O and Rh D positive are more susceptible towards HIV and HBV infection ⁽¹³⁾ Blood group O may probably be involve in significant fibrosis and progression to liver cirrhosis as a host genetic factor in chronic hepatitis B. ⁽¹⁴⁾ Throughout different study relationship between Blood group antigen and susceptibility of HBV infection is till now controversial, some researcher said that there is a positive relation between blood

group antigen and HBV infection ⁽¹³⁻¹⁵⁾ and other researcher denied that. ^(16,17) In the present study we were trying to find out the relationship between ABO and Rh blood group with HBV infection among the blood donor of Southern Nepal.

MATERIALS AND METHODS

Study population:

For our study we have selected the blood donor who donated their blood within the duration of August 2014 to September 2017 at the Blood Bank of the National Medical College, Birgunj, Nepal. The selected donors were healthy according to their clinical histories, and physical examinations, and they fulfilled the optimum criteria for donation having the age ranged from 18 to 60 years.

The study includes total 5653 donors in different category by gender basis, willingness basis and area of living basis. From each and every donor, donor consent was collected and stored it confidentially. Permission was also taken from our institutional research committee to use the data for research purposes only.

Collection of Sample:

Blood sample were collected separately from donor blood bag and placed it into a pilot tube for further examination and screening purposes.

Analysis of Sample:

Blood samples were tested anonymously and confidentiality was maintained as described by Nepal Red Cross Society, Blood Transfusion Service. All samples were examined by "Hepacard" manufactured by J. Mitra & Co. Pvt. Ltd. (India) with sensitivity 0.5ng/ml. and reactive sera were reconfirmed by testing repeatedly then positive samples were tested by using standard ELISA test. And Blood grouping was performed by using Anti-A+B+D(Rh₀) Monoclonal diagnostic reagent (1×10ml each). Manufactured by ARKRAY Healthcare Pvt. Ltd.

Statistical Analysis:

For the analysis of data we have used Chi-square test with the help of SPSS

computer software (SPSS 16, 2008; SPSS Inc., Chicago, IL, USA)

RESULTS:

This study includes total 5653 blood donors who were referred to donate their blood, coming from southern part of Nepal. They were coming from both Rural and urban area and this group contain both Male and Female having the age 18-60 years. Among the total blood donor most of them (2029 individuals) were belongs to B group (35.89%) followed by group O (1758 individuals, 31.1%), Group A (1321 individuals, 23.37%) and Group AB (545 individuals, 9.64%). The rate of infection by HBV is more or less same among different group of ABO system though the percentage of infected individuals is more in group O

(0.57%) followed by group AB (0.55%), group A (0.53%) and group B(0.45%) [Table-1]. Unlike other group, only group A showed the decreasing order of HBV infection. From the below table during 2014-2015 the blood group A infected most (0.81%) followed by group AB(0.65%), O(0.38%) and B(0.16%). but during 2015-2016 it is different where group O infected by HBV were most and group A with least infection than other groups. And during the period of 2016-2017 most of the HBV infected donor belongs to group B (0.46%). We have also observed that out of total 29 infected individuals 28 donor(0.51%) having Rh antigen and remaining 1 (0.28%) infected donor did not have Rh antigen [Table-2].

Table: 1. Percentage distribution of HBV infected individuals within ABO blood group system among the Blood donor of South-central part of Nepal.

Year	Total Donor	Blood group A N=1321		Blood group B N=2029		Blood group AB N=545		Blood group O N=1758	
		HBsAg Positive	HBsAg Negative	HBsAg Positive	HBsAg Negative	HBsAg Positive	HBsAg Negative	HBsAg Positive	HBsAg Negative
2014-2015	1675	3(0.81%)	367	1(0.16%)	622	1(0.65%)	152	2(0.38%)	527
2015-2016	2096	3(0.60%)	494	5(0.67%)	743	2(0.93%)	212	6(0.94%)	631
2016-2017	1882	1(0.18%)	453	3(0.46%)	655	0(0.00%)	178	2(0.39%)	590
Total	5653	7(0.53%)	1314	9(0.44%)	2020	3(0.55%)	542	10(0.57%)	1748

Chi-square value 0.955957 which is significant at p<0.5

Table: 2. Percentage of HBV infected individuals within Rh system among the blood donors of South-central Nepal.

	Rh- Positive	Rh-Negative	Total
HBsAg Positive	28(0.51%)	01(0.28%)	29
HBsAg Negative	5316	308	5624
Total	5344	309	5653

Chi-square value=0.631754 which is significant at p<0.5

DISCUSSION

Each and every blood group system of our body reflects how many type of antigen present on the surface of RBC. Knowing the association between cell surface antigen and different chronic diseases helps to get better treatments. To determine therapeutic strategies we need to know the association between blood group antigen and viral infection because there is no medication available to treat acute as well as chronic hepatitis though some patients are treated with antiviral drugs. Our study was targeting to find out the association between ABO & Rh system with HBV infection. The blood groups have some biological role in case of hepatitis B (18) and having a complicated correlation between blood group and viral infection. (19)

In current study we have found that Blood group O(0.57%)having the highest percentage of HBV infected donor followed

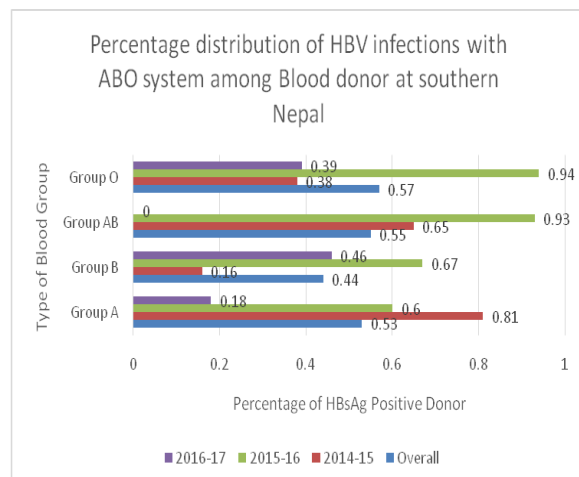


Figure:1. Blood group wise Percentage distribution of Hepatitis B virus among Blood donors.

by group AB(0.55%), group A(0.53%) and group B(0.45%). This highest occurrence rate in group O, is supported by P. Sharma et al⁽²⁰⁾ and L K Siransy et al⁽²⁰⁾ but they did not find any association between TTI like HBV with ABO group and Rh group^(20,21) like Bharadva S et al.⁽²²⁾ After doing chi-square test in between ABO group and Rh group with HBV infection then we found chi-square value=0.9559 and 0.6317 respectively Which were not statistically significant at $p < 0.05$ level though both of these value significant at $p < 0.5$. On the other side Sinha RTK et.al. conduct another study and according to them there is a correlation between blood group antigen and TTI like Hepatitis B. though it is strongly denied by O Genc⁽²³⁾ and Babu KVS et al.⁽²⁴⁾ like us. Many other research groups conducts their research to find out is there any relation between ABO/Rh groups with HBV infections? And they did not found any statistical association between them.⁽²⁵⁻³⁰⁾ Most interestingly Lenka et al found that HBSAg was prevalent in blood group A and they found statistically significant value at $p > 0.005$ level.⁽³¹⁾ The current study also showed same type of result if we focus on only one year (2014-2015) data but overall we observed that the blood group O having highest percentage of HBV infection

CONCLUSION

In conclusion we did not found any statistical correlation between ABO blood group and Rh blood group with HBV infection. Though we have got Blood group O was mostly affected by Hepatitis B virus followed by AB, A and group B.

Limitations of the Study:

This study was constrained by small amount of blood donor or sample size. There is need to boost up the population to get subsequent amount of blood donors. The documentation and screening processes, data analysis, and demography of prospective blood donors must be improved in future similar studies.

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List of Abbreviations:

HBV=hepatitis B virus, HCV=Hepatitis C virus, HBsAg=hepatitis B surface antigen, ELISA=Enzyme linked immunosorbent assay, HIV=Human Immunodeficiency Virus.

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