

Original Research Article

Association of chronic viral hepatitis with ABO blood groups and rhesus (Rh) factor

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ABSTRACT

Background: Chronic viral hepatitis includes hepatitis B and hepatitis C and is responsible for causing the deaths of millions of people all across the world each year. Although there are small studies in literature about association between ABO blood groups and chronic viral hepatitis, only few studies found relation between them. The objective of this case control study is to establish a relation between the host factors and these viral infections.

Methods: This is a case control study on patients diagnosed with CVHB and CVHC. The study was conducted on 508 patients reported to Nishtar Hospital, Multan and Sheikh Zayd Hospital, Rahim Yar Khan, Pakistan. 709 healthy blood donors were selected as a control group from Nishtar Hospital blood bank during December 2016 and December 2017. The results were subjected to SPSS v.20 for analysis using the chi square test. The patients and blood donors were also asked about certain demographic factors like age, sex and blood transfusions.

Results: Among CVHB patients, 173 (100%), the distribution of blood groups was following: Group A, 38 (21.96%), B, 57 (32.94%), AB, 11 (6.35%), O, 67 (38.72%). 158 (91.32%) were Rh positive and 15 (8.67%) Rh negative. In CVHC patients, 335 (100%), the distribution was following: Group A, 69 (20.59%), B, 123 (36.71%), AB, 24 (7.16%), O, 119 (35.52%). 303 (90.44%) were Rh positive while 32 (9.55%) were Rh negative. In healthy blood donors, 167 (23.55%) were group A, 225 (31.73%) group B, 41 (5.78%) group AB, 276 (38.92%) group O. 632 (89.13%) were Rh positive and 77 (10.86%) Rh negative.

Conclusions: There was no significant difference between blood groups ($p > 0.5$) and Rh ($p > 0.5$) with chronic viral hepatitis. However, it was also observed that the infections of HCV increase among (26-45) years old patients while the HBV infections increase with progression of age. Association of chronic viral hepatitis infection with blood group types needs more studies to get more knowledge about this aspect.

Keywords: Blood donors, Hepatitis B, Hepatitis C, Rh factor

INTRODUCTION

Two major forms of hepatitis, B and C, are among the most serious and prevalent diseases. These two viral infectious diseases are among the major health problems, especially in developing countries.¹ It is estimated that worldwide 2 billion people have been infected with HBV and more than 350 million have chronic lifelong infection.² Transmission of hepatitis B virus results from

exposure to infectious blood or body fluids containing blood. It is 50 to 100 times more infectious than HIV. Possible forms of transmission include sexual contact, blood transfusions and transfusion with other human blood products, re-use of contaminated needles and syringes, and vertical transmission from mother to child (MTCT) during childbirth.³ Chronic infection with hepatitis B virus either may be asymptomatic or may be associated with a chronic inflammation of the liver

(chronic hepatitis), leading to cirrhosis over a period of several years. This type of infection dramatically increases the incidence of hepatocellular carcinoma (HCC; liver cancer).³ It is estimated that 170 million people are chronically infected with HCV and 3-4 million are newly infected each year.⁴ Overall frequency of HCV infection in general population of Pakistan ranges from 4-25% as shown by different studies.⁵ In the developing world, the main methods for the transmission of HCV are blood transfusions and unsafe medical procedures.⁶ In CVHC infection, most experience minimal or no symptoms during the initial few decades of the infection. It can be associated with fatigue and mild cognitive problems. Chronic infection after several years may cause cirrhosis or liver cancer.⁷

There is a well-known relationship between ABO blood group and various infectious diseases like plague, malaria, cholera, smallpox, Norwalk virus and influenza virus (certain strains) infection. In most people A and B antigens are secreted by the cells and are present in blood circulation. It is observed that non-secretors are susceptible to a variety of infections.⁸ Many studies have been performed to determine relationship between infectious diseases and blood groups. Interaction of microorganisms and RBC membrane is probably because of antigenic similarity, adherence through specific receptors or modulation of antibody response.⁹ In this study, we are going to try to establish an association of various blood groups with chronic viral hepatitis in our patients in comparison with healthy blood donors.

METHODS

Study design and setting

A case control study that included 508 patients diagnosed with chronic viral hepatitis and 709 healthy blood donors as a control group was conducted from December 2016 to December 2017 at Nishtar Hospital, Multan and Sheikh Zayd Hospital, Rahim Yar Khan. The patients and blood donors were also asked about certain demographic factors like age, sex and blood transfusions.

Method and material

Blood group type of these donors and patients was determined by using ABO blood grouping antisera and confirmed by standard technique where required. For

screening against HBsAg and anti-HCV, three to five ml of blood was obtained by standard aseptic technique with the help of 5 ml disposable syringe and added to a sterile test tube. The blood was allowed to clot, and serum was separated by centrifugation at 6000 RPM. These sera were immediately screened for HBsAg and anti-HCV using one step rapid immuno-chromatographic technique. The membrane of chromatographic immunoassay strips is pre-coated with anti-HBsAg antibody or recombinant HCV antigen on the test line region of the strips. During testing, the serum or plasma specimen reacts with the particle coated with anti-HBsAg antibodies or with protein A coated particles in case of HCVAb on the membrane, the mixture migrates upward on the membrane chromatographically by capillary action to react with anti-HBsAg or recombinant HCV antigen in the membrane and generate a colored line. Presence of this colored line in the test region indicates a positive result, while its absence indicates a negative result. The sera reactive for HBsAg and Anti-HCV on screening were subjected to ELISA for confirmation.

Statistical analysis

The data obtained was entered and analysed on SPSS v.20. Comparison between the different groups was assessed for significance by application of chi square test. In the present study, p value of <0.05 was considered as significant difference between the different groups.

RESULTS

In this study, out of 508 patients, 335 (66%) were diagnosed with CVHC while 173 (34%) had CVHB (Figure 1). 281 (55.31%) patients were male and 227 (44.68%) were females. Among 281 male patients, 207 (73.66%) were suffering from CVHC while 74 (26.34%) were having CVHB. Among 227 female patients, 154 (67.84%) were suffering from CVHC while 73 (32.51%) were having CVHB (Figure 2). The majority of hepatitis B infected patients have age between (46-70) years with (43.93%) followed by (26-45) years (35.83%) and (15-25) years (20.23%) respectively. While the majority of hepatitis C infected patients have age between (26-45) years with (52.23%) followed by (46-70) years (36.41%) and (15-25) years (11.34%) respectively. The prevalence of hepatitis B infections and of hepatitis C infections in age groups were highly significantly different from that in the age groups of control (Table 1) (Figure 3).

Table 1: Prevalence of chronic viral hepatitis in different age groups.

Years	Numbers	Percentage	Numbers	Percentage	Numbers	Percentage
15-25	120	16.92%	38	11.34%	35	20.23%
26-45	349	49.22%	175	52.23%	62	35.83%
46-70	240	33.85%	122	36.41%	76	43.93%
Total	709	100%	335	100%	173	100%

Among CVHB patients, 173 (100%), the distribution of blood groups was following: Group A, 38 (21.96%), B, 57 (32.94%), AB, 11 (6.35%), O, 67 (38.72%). 158 (91.32%) were Rh positive and 15 (8.67%) Rh negative (Table 2). In CVHC patients, 335 (100%), the distribution was following: Group A, 69 (20.59%), B,

123 (36.71%), AB, 24 (7.16%), O, 119 (35.52%). 303 (90.44%) were Rh positive while 32 (9.55%) were Rh negative (Table 3). In healthy blood donors, 167 (23.55%) were group A, 225 (31.73%) group B, 41 (5.78%) group AB, 276 (38.92%) group O. 632 (89.13%) were Rh positive and 77 (10.86%) Rh negative.

Table 2: Distribution of blood groups and Rh in CVHB and healthy blood donors.

Blood group and Rh	CVHB numbers	CVHB percentage (%)	Blood donors numbers	Blood donors percentage (%)
A	38	21.96	167	23.55
B	57	32.94	225	31.73
Ab	11	6.35	41	5.78
O	67	38.72	276	38.92
Rh positive	158	91.32	632	89.13
Rh negative	15	8.67	77	10.86
Total	173	100	709	100

Table 3: Distribution of blood groups and Rh in CVHC and healthy blood donors.

Blood group and RH	CVHC numbers	CVHC percentage (%)	Blood donors numbers	Blood donors percentage (%)
A	69	20.59	167	23.55
B	123	36.71	225	31.73
AB	24	7.16	41	5.78
O	119	35.52	276	38.92
Rh positive	303	90.44	632	89.13
Rh negative	32	9.55	77	10.86
Total	335	100	709	100

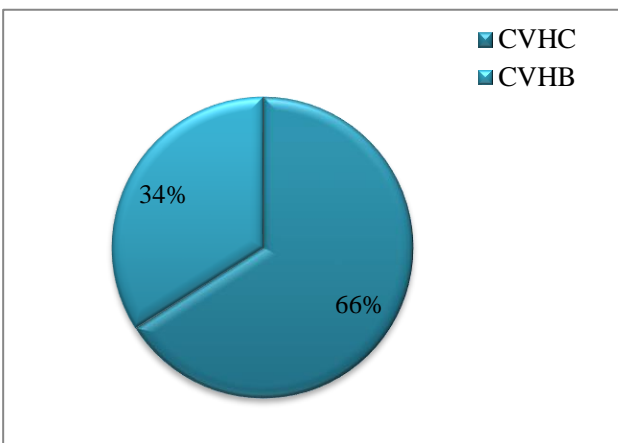


Figure 1: Prevalence of chronic viral hepatitis.

After comparing the data of patients with that of control group it was observed that there was no significant difference between blood groups ($p > 0.5$) and Rh ($p > 0.5$) with chronic viral hepatitis. However, it was also observed that the infections of HCV increase among (26-45) years old patients while the HBV infections increase with progression of age.

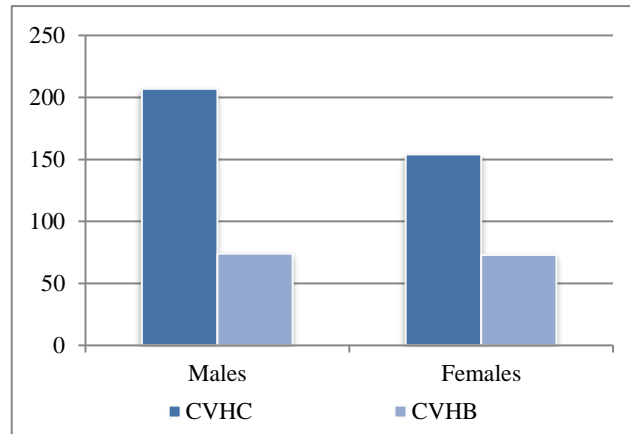


Figure 2: Prevalence of chronic viral hepatitis based on sex.

DISCUSSION

Transmission of hepatitis B and C virus results from exposure to infectious blood or body fluids containing blood and unsafe medical procedures. As little as 0.01ml of such secretions can transmit these infections.¹⁰ ABO blood groups are one set of agglutinogens (antigens),

which are genetically determined carbohydrate molecules carried on the surface of membranes of red blood corpuscles.^{11,12}

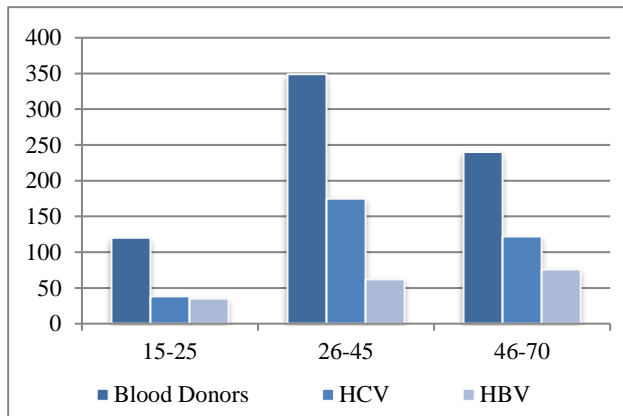


Figure 3: Prevalence of chronic viral hepatitis in different age groups.

It has long been observed that blood group antigens do have a biological role in the human beings.¹³ For example, type O “non-secretors” have about twice the incidence of duodenal ulcer than secretors of types A and B. On the other hand, type A carries a higher incidence of tumours of salivary glands, stomach and pancreas than do type O blood groups.¹⁴ In 1973, Nature published a paper by Gibsen et al, which showed that group A was found to have the highest IQ.¹⁵ There are reports showing that thrombosis, elevated serum cholesterol and myocardial infarction are more common in persons with blood group A than in O.¹⁶

Anti-A and Anti-B are not RBC antibodies but bacterial antibodies, cross-reacting with RBCs. Individuals lacking A or B antigens make either Anti-A or Anti-B at about 3-6 months of age when they make their own bacterial antibodies in utero. There are many reports associating different infections with particular ABO blood group.^{17,18} Individuals who have Anti-A (group B and O) are more resistant to small pox.¹³ Similarly individuals who lack Duffy system antigen are protected against infection by *Plasmodium vivax*.¹⁹

This case control study shows the comparison of relative frequency of ABO blood groups and Rh between cases of chronic viral hepatitis and control healthy blood donors. It was found that there was no significant difference between blood groups ($p > 0.5$) or Rh ($p > 0.5$) and chronic forms of viral hepatitis. The study also showed that frequency of HBsAg and Anti-HCV positivity is different in different ABO blood groups. The variation was seen more in case of HCV infection. As far as CVHB is concerned our study is in line with the findings of other studies regarding the association of ABO blood groups and Rh factor with chronic viral hepatitis.^{20,21}

However, with comparing the control and HC groups, the rate of blood group O was significantly higher in HC group and concomitantly, the rate of AB blood group was significantly higher in the control group.¹

Regarding age group, HCV infections show a high percentage at age group (26-45) years old. The high positivity recorded in these groups may be as a result of their exposure to contaminated blood through blood transfusion. The similar findings were reported by OO Alao et al, and FI Buseri et al. The percentage of HBV infections increase with progress of age. The prevalence of HBV infections and HCV infections in age groups show highly significantly different from that in the similar age groups of control. This finding agrees with data from I Jbara, et al, and R Behal et al.^{22,23} Exposure to the unsafe injections also increased with age as the total number of injections increase per person in year.²⁴ The reduction of the donor age group to 20 years and a stringent practice of voluntary donation would help to reduce the prevalence of hepatitis infections in our country. This recommendation is in line with the international objective of “reaching young blood donors”, a new strategy adopted by the international community to recruit blood donors from 16-25 years old for the purpose of providing safe blood.²⁵

Blood screening should be done routinely and properly to help early detection of cases along with vaccination services for high risk groups and awareness program are the key to bring these diseases under control. The blood bank data could provide reliable information to monitor trends prevalence of these infections.

CONCLUSION

There was no significant difference between blood groups ($p > 0.5$) and Rh ($p > 0.5$) with chronic viral hepatitis. However, it was also observed that the infections of HCV increase among (26-45) years old patients while the HBV infections increase with progression of age. More studies with larger sample size should be done to find out if there is a real association of ABO blood groups and Rh factor with chronic viral hepatitis.

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