International Journal of Research in Medical Sciences
Genc O. Int J Res Med Sci. 2017 Sep;5(9):3782-3785
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20173949

Original Research Article

Hepatitis B virus infection and ABO/Rh blood groups

Ozlem Genc*

Department of Medical Microbiology, Dumlupinar University, Kutahya, Turkey

Received: 06 January 2017
Revised: 04 July 2017
Accepted: 05 July 2017

***Correspondence:**
Dr. Ozlem Genc,
E-mail: drozlemg@hotmail.com

ABSTRACT

Background: Chronic HBV infection is a significant public health problem all around the world. It is not clear if ABO/Rh blood groups have a role in the development of chronic forms of hepatitis B virus (HBV) infection. The aim of the study was to investigate the relationship between chronic HBV infection and ABO/Rh blood groups.
Methods: The study was designed as a retrospective study that included totaled 937 individuals: 453 patients diagnosed with chronic hepatitis and 484 healthy individuals as the control group. HBsAg (hepatitis B surface antigen) and blood groups results of patients between the years 2013-2015 were collected by reviewing the laboratory results. During these three years HBsAg was performed on the architect i2000sr (Abbott diagnostic, Illinois, USA) with ELISA and ABO/Rh blood groups were analyzed with gel centrifugation method (Grifols, Barcelona, Spain).
Results: Blood group A Rh positive was higher than other blood types in the chronic hepatitis B group (44.3%) and in control group (41.9%), whereas blood types O, AB, and B were similar between cases with chronic hepatitis and controls ($p>0.05$). HBV infection was moderately less frequent in subjects with AB positive blood group ($p=0.07$). The prevalence of Rh positive was 89.1% in patients and 88.2% in the control group ($p>0.05$).
Conclusions: This study showed that there was not an association between ABO/Rh blood groups and chronic HBV infection, but there is a need for different and more numerous case-control studies about this subject.

Keywords: ABO blood group, Hepatitis B virus, Rh blood group

INTRODUCTION

The surface of erythrocytes contains different carbohydrate and proteins named blood group antigens.[1,2] Approximately 300 red cell antigens are defined; ABO and Rh groups' system is the most important one among these antigens.[3] ABO antigens are also expressed on the surface of the epithelium, sensory neurons, platelets and vascular endothelium in secretor status and found to be dissolved in urine, stool, plasma, saliva and mother's milk.[2,4] It is known relationship between ABO blood groups and some infectious diseases such as malaria, Helicobacter pylori infections, cholera and Norwalk virus infections.

The responsible pathogenesis for this susceptibility is that as many organisms that may bind to polysaccharide on cells and soluble blood group antigens may block this binding.[5] Additionally, some microbes share (molecular mimicry) blood group antigens with their hosts.[6] Chronic HBV infection is significant public health problem all around the world. An estimated 240 million people are chronically infected with hepatitis B.[7] It is not clear if ABO/Rh blood groups have a role in the development of chronic forms of HBV infection.

The aim of this study was to investigate the relationship between chronic hepatitis B virus (HBV) infection and ABO/Rh blood groups.

METHODS

The study was designed as a retrospective case control study that included 453 patients (208 female) diagnosed with chronic hepatitis and 484 healthy individual (206 female) as the control group. HBsAg (hepatitis B surface antigen) and blood groups results of patients between the years 2013-2015 were collected by reviewing the laboratory results of Dumlupinar university Evliya Celebi training and research hospital in Kutahya/Turkey. During these three years HBsAg was performed on the architect i2000sr (Abbott diagnostic, Illinois, USA) with ELISA and ABO/Rh blood groups were analyzed with gel centrifugation method (Grifols, Barcelona, Spain).

Statistical analyses were performed using Med Calc 8.0.0.0. The comparisons of proportional data were made using the Chi-square test and the comparisons of the numerical data between the study groups were made using the t test. An AP value of less than 0.05 was considered statistically significant.

RESULTS

The study population consisted of 937 individuals. The study population was divided into two groups as chronic hepatitis B (453 patients, mean age 51.99±18.3 years, 208 females) and the control (484 healthy peoples, mean age 45.1±20.3 years, 206 females) group. There was a difference between two groups for age ($p<0.001$) and the individuals in healthy control group were younger than chronic hepatitis group. The demographic characteristic and ABO/Rh blood group types of two groups are summarized in Table 1.

Table 1: The demographic characteristic and ABO/Rh blood group types in patients and control cases.

	Chronic hepatitis B group (n=453)	Control group (n=484)	% 95 CI	χ^2	P
Age	51.99±18.3 (mean±SD)	45.1±20.3 (mean±SD)	4.6 - 9.4		< 0.001*
Sex	208 females (45.9%)	206 females (42.5%)	-3.50-9.47	0.86	0.355
A Rh (+)	201 (44.3%)	203 (41.9%)	-4.09-8.87	0.55	0.459
O Rh (+)	107 (23.6%)	117 (24.1%)	-5.12-6.09	0.03	0.858
B Rh (+)	70 (15.4%)	64 (13.2%)	-2.43-6.86	0.93	0.336
AB Rh (+)	26 (5.7%)	43 (8.8%)	-0.38-6.58	3.32	0.07
A Rh (-)	26 (5.7%)	28 (5.7%)	-3.18-3.13	0.0	1.000
O Rh (-)	13 (2.8%)	16 (3.3%)	-1.92-2.90	0.20	0.657
B Rh (-)	6 (1.3%)	9 (1.8%)	-1.32-2.32	0.38	0.537
AB Rh (-)	4 (0.8%)	4 (0.8%)	-1.45-1.40	0.0	1.000
Rh (+)	404 (89.1%)	427 (88.2%)	-3.34-5.11	0.18	0.665
Rh (-)	49 (10.9%)	57 (11.8%)	-3.34-5.11	0.18	0.665

Blood group A Rh positive was higher than other blood types in chronic hepatitis B group (n=201 out of 453 patients, 44.3%) and in control group (n=203 out of 484 individuals, 41.9%), whereas blood types O, AB, and B was similar between cases with chronic hepatitis and controls ($p>0.05$). Although there was no statistical difference regard to blood types between cases and controls, HBV infection was moderately less frequent in subjects with AB positive blood group ($p=0.07$, Table 1). The prevalence's of Rh positive was 89.1% in patients and 88.2% in control group ($p>0.05$).

DISCUSSION

Prevalence of chronic HBV infection varies from country to country and depends upon a complex interplay of behavioral, environmental and host factors. The overall population prevalence of chronic HBV infection in our country is 4.5 % and the estimated total number of chronic HBV cases is about 3.3 million8. In current study, we compared the distribution of ABO/Rh blood types in patients with chronic HBV infection (n=453) and in healthy individuals (n=484).

ABO and Rh blood group distribution rates in current study are similar to the general rates in Turkey.[9] The frequency of A, O, B, and AB blood group types was 50%, 26.4%, 16.7% and 6.5% respectively in chronic HBV cases versus 47.6%, 27.4%, 15% and 9.6 respectively in control group. Rh positivity rate was 89.1% in HBV positive patients and 88.2% in healthy peoples. Blood group distribution was found similar between these two groups and there was no significant difference between two groups for ABO and Rh type distribution ($p>0.05$). Only HBV infection was moderately less frequent in patients with AB Rh positive blood group ($p=0.07$). AB Rh positive blood type was

detected 5.7% in chronic HBV cases and 8.8% in healthy control group.

There are quite a few studies using a similar methodology with current study. For example, the studies of Pourhassan et al and Naeini et al can be considered as case-control studies like current study. In these two studies, a control group and a patient group with chronic HBV infection were compared for ABO/Rh type distribution and a significant association was not detected between HBV infection and ABO/Rh types like our findings.[10,11]

Unlike our work, in many studies often various numbers of donors or healthy people were screened and HBV frequency was investigated in every ABO/Rh blood types. While data was compared statistically in some studies, in other studies only the rates of the ABO/Rh blood types and HBV infection were listed. In the study of Mohammadali et al, about 2 million donors were scanned and HBV infection rate was determined lesser in donors with O blood type and more in Rh positive blood group ($p < 0.05$).[12] There are many similar studies with the study of Mohammadali et al, that cannot find a significant correlation between HBV infection and blood groups.[13-17] In these studies, usually HBV infection was more commonly detected in patients in blood group O.[13,14,16] Only in the study of Siransy et al, HBV infection were more frequently observed in blood group A and in blood group B in the study of Behal et al.[15,17] In these five studies, the results of Rh blood group were different (Table 2).

Table 2: Studies that investigating the relationship between blood groups and HBV infection.

Author	Reference No[a]	Number of screened donors/peoples	Number of HBV positive	Results[b]
Mohammadali F[c]	12	2.031.451 donors	7.851	Rh positive *
Joshi SK	13	627 males	17	O Rh positive **
Anwar MS	14	16.695 donors	467	O Rh negative and Rh negative**
Behal R	15	20.000 peoples	450	B blood type **
Sreedhar B	16	41.652 donors	983	O Rh positive **
Siransy LK	17	45.538 donors	7.707	O blood type and Rh positive **
Kumar MR	18	488 peoples	145	O blood type and Rh positive ***
Tyagi S	19	6000 donors	95	A Rh negative and Rh negative ***
Das S	20	26.847 donors	237	O Rh positive and Rh negative***
Nigam JS	21	4128 donors	40	A Rh negative and Rh negative***
Dirisu JO	22	427 donors	200	O Rh positive ***
Ahmad J	23	4000 donors	76	B Rh positive ***

[a] See the reference section, [b] Shows that in which blood type HBV infection is higher, [c] HBV infection is lesser in O blood type ($p<0.05$). * $p<0.05$, ** $p>0.05$, ***no statistical data.

Many studies are also available that do not have statistical data about the relationship between ABO/Rh blood groups and HBV infection (Table 2).[18-23] In all these studies only the HBV infection rates in every blood group types were reported. The results in these six studies are quite different. While in a study of Kumar et al. HBV infection was more prevalent in people with O and Rh-positive blood types than people with other blood types, in the study of Tyagi et al.[18] HBV infection was more in people with A Rh-negative blood type and Rh negative.[19] Of course for the evolution of these studies it is necessary to take into consideration regional differences about distribution of blood group types.

When we compare the studies on this field (Table 2) we have observed that chronic HBV infection was higher usually in the blood group O. But there was not statistically meaningful relationship between O blood group and HBV infection in most studies and this relationship is not clear. In this situation two questions cannot be answered: 1) which blood group is at high risk for chronic HBV infection, 2) can people with blood type O still be considered as universal donors and should they be given extra attention while screening.

Limitation of current study is that the study was conducted with a relatively small number of individuals and was designed as a retrospective study. However, this study is the first study in our country as a case-control study of the relationship between ABO/Rh blood groups and chronic HBV infection.

CONCLUSION

In conclusion, this study showed that there was not an association between ABO/Rh blood groups and chronic HBV infection, but there is a need for different and more numerous case-control studies about this subject.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Anstee DJ. The relationship between blood groups and disease. Blood. 2010;115(23):4635-43.
2. Liumbruno GM, Franchini M. Beyond immunohematology: the role of ABO blood group in human disease. Blood Transfus. 2013;11:491-9.
3. Storry JR, Castilho L, Daniels G, Flegel WA, Garratty G, de Haas M, et al. International society of blood transfusion working party on red cell immunogenetic and blood group terminology: Cancun report (2012). Vox Sang. 2014;107:90-6.
4. Ravn V, Dabelsteen E. Tissue distribution of histo-blood group antigens. APMIS. 2000;108:1-28.
5. Anstee DJ. The functional importance of blood group-active molecules in human red blood cells. Vox Sang. 2011;100:140-9.
6. Yamamoto F, Cid E, Yamamoto M, Blancher A. ABO research in the modern era of genomics. Transfus Med Rev. 2012;26:103-18.
7. World Health Organization. Hepatitis B factsheet number 204 (updated March 2015). Available at http://www.who.int/mediacentre/factsheets/fs204/en/.
8. Toy M, Onder FO, Wormann T, Bozdayi AM, Schalm SW, Borsboom GJ, et al. Age and region-specific hepatitis B prevalence in Turkey estimated using generalized linear mixed models: a systematic review. BMC Infect Dis. 2011;11:337.
9. Salduz ZI, Cetin G, Karatoprak C, Ozder A, Bilginc M, Gultepe I, et al. ABO and Rh blood group distribution in Istanbul Province (Turkey). Istanbul Med J. 2015;16:98-100.
10. Pourhassan, A. Association between ABO Blood/Rhesus Grouping and hepatitis B and C: a case-control study. Pak J Biol Sci. 2014;17(6):868-71.
11. Naeini AE, Rostami M, Naeini SE. Chronic viral hepatitis and their relation to ABO blood groups and rhesus (Rh) factor. Med Case Stud. 2010;1(1):5-7.
12. Mohammadali F, Pourfathollah A. Association of ABO and Rh blood groups to blood-borne infections among blood donors in Tehran-Iran. Iran J of Public Health. 2014;43(7):981-9.
13. Joshi SK, Ghimire GR. Serological prevalence of antibodies to human immunodeficiency virus (HIV) and hepatitis B virus (HBV) among healthy Nepalese males- a retrospective study. Kathmandu Univ Med J. 2003;1(4):251-5.
14. Anwar MS, Sıddıqı GM, Haq S, Khokhar NG. Association of blood group types to hepatitis B and hepatitis C virus infection. Biomedica. 2011;27:57-61.
15. Behal R, Jain R, Behal KK, Bhagoliwal A, Aggarwal N, Dhole TN. Seroprevalence and risk factors for hepatitis B virus infection among general population in Northern India. Arq Gastroenterol. 2008;45(2):137-40.
16. Sreedhar Babu KV, Bandi S, Kondareddy S, Madithadu A. Association of ABO and Rh blood groups to HBV, HCV infections among blood donors in a blood bank of tertiary care teaching hospital in Southern India: A retrospective study. Int J Res Med Sci. 2015;3(7):1672-6.
17. Siransy LK, Nanga ZY, Zaba FS, Tufa NY, Dasse SR. ABO/Rh blood groups and risk of HIV infection and hepatitis B among blood donors of Abidjan, Cote D'Ivoire. Eur J Microbiol Immunol. 2015;5(3):205-9.
18. Kumar MR, Rao MS, Pulıcherla K, Ghosh M. Studies on the distribution of hepatitis B (HBV) and human immunodeficiency virus (HIV)- their relation to blood groups and rhesus (Rh) factor in Guntur district of Andhra Pradesh, India. Asian J Pharm Clin Res. 2013;6(1):109-11.
19. Tyagi S, Tyagi A. Possible correlation of transfusion transmitted diseases with Rh type and ABO blood group system. JCDR. 2013;7(9):1930-1.
20. Das S, Kumar MH. Association of blood group types to hepatitis B and hepatitis C viruses among blood donors. A five years institutional based study. Int J Appl Basic Med Sci. 2012;2(1):191-5.
21. Nigam JS, Singh S, Kaur V, Giri S, Kaushal RP. The prevalence of transfusion transmitted infections in ABO blood groups and Rh type system. Hematol Rep. 2014;6(4):560-2.
22. Dirisu JO, Alli TO, Adegoke AO, Osazuwa F. A survey of prevalence of serum antibodies to human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) among blood donors. N Am J Med Sci. 2011;3(1):35-8.
23. Ahmad J, Taj AS, Rahim A, Shah A, Rehman M. Frequency of hepatitis B and hepatitis C in healthy blood donors of NWFP: a single center experience. JPMI. 2011;18(3):343-52.

Cite this article as: Genc O. Hepatitis B virus infection and ABO/Rh blood groups. Int J Res Med Sci 2017;5:3782-5.