Section: Pathology

Research

PREVALENCE OF HEPATITIS- B AMONG BLOOD DONORS AT A MEDICAL COLLEGE HOSPITAL BLOOD BANK IN HAPUR

Kansal Ritika[1], Kotian Shravya[2], Kashyap Sagar[3], Joon Amit[4], Kumar S[5]

[1]Associate Professor, Department of Pathology, GS Medical College and Hospital, Pilkhuwa, Uttar Pradesh, India
[2]Senior Resident, Department of Pathology, GS Medical College and Hospital, Pilkhuwa, Uttar Pradesh, India
[3]Assistant Professor, Department of Microbiology, GS Medical College and Hospital, Pilkhuwa, Uttar Pradesh, India
[4]Associate Professor, Department of Community Medicine, GS Medical College and Hospital, Pilkhuwa, Uttar Pradesh, India
[5]Professor, Department of Anesthesia, GS Medical College and Hospital, Pilkhuwa, Uttar Pradesh, India

Received : 17/11/2022
Received in revised form : 25/12/2022
Accepted : 07/01/2023

Keywords:
ABO- group, Rh – system, HBV infection, HBsAg, TTI.

Corresponding Author:
Dr. Kashyap Sagar,
Email: drsagarkashyap88@gmail.com
ORCID: 0000-0003-1983-2221

DOI: 10.47009/jamp.2023.5.1.98

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (1); 473-476

Abstract

Background: Hepatitis B is a major health problem worldwide, that is commonly transmitted via blood transfusion. India falls in the intermediate endemicity zone of 2-4%. On spot diagnosis of Hepatitis B is difficult in blood banks at the time of voluntary blood transfusion. **Materials and Methods:** This retrospective study was conducted at the GS Medical college and Hospital blood bank between January 2019 – December 2022.Blood samples from voluntary blood donors was tested for the five important transfusion transmitted infections namely Hepatitis B and C, HIV, Malaria and Syphilis. **Result:** A total of 2581 blood samples were tested for transfusion transmitted infections for 3 years which showed 2% positive cases of hepatitis B and a predominance of B positive cases of hepatitis. Diagnostic accuracy was 100% via the ELISA method of testing. The HbsAg out of which 53 cases (2%) tested positive for the Virus. **Conclusion:** Blood group B and Rh positive donor were mostly infected by HBV. We concluded that the prevalence of HBV was highest among all other TTI. The ELISA method showed more accuracy than the card method.

INTRODUCTION

Hepatitis is a global health burden. Amongst the different serotypes of the hepatitis virus, hepatitis B virus is associated with significant mortality and morbidity.[1] Although the prevalence of hepatitis B infection is highest in the Western Pacific Region and Africa, India carries a substantial burden. According to the WHO, 40 million people are chronically infected with hepatitis B in India.[2]

The hepatitis B virus belongs to the Hepadna viridae family of DNA viruses and is made up of several proteins, which are used as markers of active and latent infection. These include Hepatitis B surface antigen (HbsAg), Hepatitis core antigen (HBcAg), Heptatits Be antigen (HBeAg), HBV Polymerase (Pol) and Hepatitis B X Protein (HBx). Active replication in the hepatocytes induces a CD 8+ led cytotoxic attack on the infected cells. Subsequently virus specific CD4+ and Interferon – gamma produced by CD8+ cells help in resolution of infection.

Clinically Hepatitis B causes a subclinical or a mild infection in majority of patients. Symptoms maybe nonspecifc and range from mild fever to anorexia and jaundice. 10% of individuals progress to chronic infection and this is commonly encountered in babies who acquire infection via vertical transmission.[3] The first marker to appear in blood after infection is HbsAg whose titres begin to rise before the elevation of other liver enzymes like transaminases and before the onset of clinical symptoms.[4]

India's drugs and cosmetic act, 1943 states that donor blood should be tested for the following five infections: HIV, Hepatitis B (HbsAg), Hepatitis C, VDRL and Malaria. HBsAg can be routinely screened with the use ELISA and other card tests. Out of these ELISA is widely employed.[5]

The ABO and Rh system are the among the most common blood group systems used in routine practise.[6] It has been observed that the distribution of the ABO Rh system varies with geographical location and ethnic groups.[7] Several studies and observations state that co-morbid conditions like

ISSN (O): 2687-5365; ISSN (P): 2753-6556

coronary artery diseases, vascular diseases and tumorigenesis are seen frequently in certain ABO blood group system. A good example of this is the effect the ABO system has on the half like of vWF. Subjects with O blood group have a significantly shorter half-life of vWF which makes them susceptible to thromboembolism.[1,8,9] Conversely the incidence of hepatocellular carcinoma is low in populations with O blood group.[10] A similar association is also seen with infectious diseases like H. Pylori, HIV etc.[11] ABO antibodies are a component of the innate immune system and play a role in defence against certain bacteria, viruses and parasites. This explains the association between these blood systems and infectious diseases.[11-13]

Many studies have attempted to establish an association between increased prevalence of HBV and its complications among certain blood groups. Siransy et al state that subjects with an "O" Positive blood group are more susceptible to HIV and HBV.[14] On the other hand a study conducted by Satya Prakash et al found that B Rh positive blood group had the highest incidence of HBsAg positivity of 1.09% and accounted for the highest seropositivity among various transfusion transmission infections (2.19%).[15] However, Mohammadali et al state that a lower frequency of HbsAg was seen among blood group O donors.[16] Smuzness et al and Behal et al failed to establish a definite association between blood group subtype and HBV infection.

MATERIALS AND METHODS

This retrospective study was conducted at the GS Medical college and Hospital blood bank between January 2019 – December 2022.Blood samples from voluntary blood donors was tested for the five important transfusion transmitted infections namely Hepatitis B and C, HIV, Malaria and Syphilis.

RESULTS

A total of 2606 healthy donors registered during the study period were included. Out of them, 53 donors (2%) were HBV positive. Among the total positive cases most of them 24 cases(45%) were belongs to B group followed by 13cases (24%) of group A, 11 cases (20%) of group O and 5 cases (9%) of group AB. We have also observed that out of 53 HBV positive cases 47 cases (88%) are Rh positive and remaining 6 cases (11%) are Rh negative.

Graph 1: Percentage of Positive Cases From 2019-2022

Table 1: Total Percentage Of Donor Positivity For HbsAg From 2019 - 2022

Year	Total	Positive Cases	Percentage
2019	484	8 / 484	1.6%
2020	201	2/201	0.9%
2021	720	14/720	1.9%
2022	1176	29/1176	2.4%
		53/2581	2%

Table 2: Positive cases in each blood group (abo and rh system)

HbsAg Status	A GROUP (t = 13)		B GROUP (t = 24)		AB GROUP (t = 5)		O GROUP (t=11)	
	A +ve	A -ve	B +ve	B -ve	AB +ve	AB -ve	O +ve	O -ve
HbsAg Positive	11	2	23	1	3	1	9	2

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 batter treatments. To determine therapeutic strategies, we need to know the association between blood groups antigen and viral infection because there is no medication available to treat acute as well as chronic hepatitis though some patients are targeted with antiviral drugs. Our study was targeting to find out the association between ABO & Rh system with HBV infections. The blood groups have some biological role in case of hepatitis B[16] and having a complicated correlation between blood group and viral infections.[17] In our study, out of a total 2606 donors, 53 (2%) cases were positive for HBs Ag which is similar to Bagiyalakshmi, et al. (2016) and Gupta,et al. (2004)

In our study blood group B Rh (D) positive blood donors had highest percentage (45%) of HBsAg seropositivity. In India blood group distribution has a lot of diversity. Therefore, it is essential to have

ISSN (O): 2687-5365; ISSN (P): 2753-6556

knowledge on frequency of ABO blood groups in particular region in determining the course prevalence of TTIs. Many studies have been done to explore association of ABO and Rh blood group and risk of TTIs; but the results obtained from such studies are contradictory. This is because such studies have adopted different sample size, different screening methods and different social and geographical factors. Few studies observed higher seroprevalence of HBV, HCV and HIV, among O positive blood group.[14,25] However, studies with large sample size did not find any statistically significant association between ABO blood groups and hepatitis B, and between ABO blood group and HIV infection.[27-29]

CONCLUSION

To conclude, the prevalence of Hepatitis-B is high among all Transfusion-transmitted infections. Predominantly B+ve donors were infected. ELISA method shows more reliable results than the Card method and it should be mandatory for voluntary blood donors screening to avoid false negative which is more common in the Card method. Considering the complications, mode of spreading and chronicity of spreading and to carrier and chronicity of disease, increased awareness and prophylactic measures need to be taken at the public level. The risk of spreading Hepatitis B is high but it can be checked by vaccination, education of high-risk group like sex workers, health care providers and voluntary blood donors. The present study was carried out to determine the prevalence of TTI and its association with the ABO and Rh blood group. However, the highest frequency of infected donors was observed in blood group 'B' High number of HBV infection in blood donor in general population such as donor awareness programmes on blood safety and risk of TTI, improved standards for donor selection criteria, improved serological screening protocols, use of advanced techniques like NAT, universal pathogen reduction system and last but not the least, recommendation of active immunization programme for HBV to all recipients who are on repeated blood transfusion therapy

REFERENCES

1. Trépo C , Chan HLY ,Lok A. Hepatitis B virus infection. Lancet 2014;384:2053–63
2. WHO
3. Robbins
4. Government of India. Drugs and Cosmetics rules, 1945 (amended till 30TH June 2005)
5. Yengkhom Daniel Singh, Govindarajan R, Bagavad Geetha M, Deeptisachan, Krishnakumar J. Prevalence of Hepatitis-B among voluntary blood donors at a Medical College Hospital blood bank in Chennai. IAIM, 2020; 7(2): 29-34.
6. Geoff Daniels.Human Blood Group.Blackwell science Ltd.2nd Edition 2002.Chp 1:p2
7. Jana D, Jana N, Patel AK, Yadav N. ABO & Rh blood groups' distribution among blood donors from southern Nepal and its relation with hepatitis B viral infection. Int J Health Sci Res. 2018;8(5):45-50.
8. Jenkins PV ,O'Donnell JS.ABO blood group determines plasma von Willebrand factor levels: a biologic function after all? Transfusion 2006;46:1836–44
9. Gallinaro L , Cattini MG ,Sztukowska M , et al . A shorter von Willebrand factor survival in O blood group subjects explains how ABO determinants influence plasma von Willebrand factor. Blood 2008;111:3540–5.
10. Liu F , Li C ,Zhu J , et al.ABO blood type and risk of hepatocellular carcinoma: a meta-analysis. Expert Rev Gastroenterol Hepatol 2018;12:927–33.
11. Blood groups in infection and host susceptibility. Clin Microbiol Rev 2015;28:801–70.
12. Paré G Chasman DI , Kellogg M , et al .Novel association of ABO histo-blood group antigen with soluble ICAM-1: results of a genome-wide association study of 6,578 women. PLoS Genet 2008;4:e1000118.
13. Zhou Y , Zhou Q Lin Q , et al .Evaluation of risk factors for extrahepatic cholangiocarcinoma: ABO blood group, hepatitis B virus and their synergism. Int J Cancer 2013;133:1867–75.
14. 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, Côte D'ivoire. European Journal of Microbiology and Immunology. 2015 Sep;5(3):205-9.
15. Prakash S, Sahoo D, Mishra D, Routray S, Ray GK, Das PK, Mukherjee S. Association of transfusion transmitted infections with ABO and Rh D blood group system in healthy blood donors: A retrospective analysis. Int. J. Community Med. Public Heal. 2020 Nov;7:4444-8.
16. Mohammadali F , Pourfathollah A. Association of ABO and Rh blood groups to blood-borne infections among blood donors in Tehran-Iran. Iran J Public Health 2014;43:981–9
17. Naseri Z, Ghannad MS, Hosseini SM, Roshannaei G, Nejad ASM, Mohammadi A. Evaluation of Accompaniment of ABO Blood Groups System and Rhesus blood group type with Infection to Hepatitis B Virus and Hepatitis C Virus in Hamadan, Iran. Int J Med Res Health Sci. 2016;(4): 1-5.
18. Kumar MR , Rao MS , Pulicherla 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) : 1930-1931 .
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) : 191-195 .
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) : 560-562 .
22. Dirisu JO , Alli TO , Adegoke AO , Osazuwa F. A survey of prevalence of antibodies human serum to immunodeficiency virus (HIV) , hepatitis B virus (HBV) and hepatitis C virus (HCV) among blood donors . N Am J Med Sci . 2011 ; 3 (1) : 35-38 .
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) : 343-352 .
24. Lenka MR , Ghosh E , Bhattacharyya PK.ABO blood groups in relation to hepatitis - B surface antigen (Australia antigen) . Transactions of the Royal Society of Tropical Medicine and Hygiene . 1981 ; 75 (5) : 688-690 .
25. Sharma P , Chaurasia RK , Singh P. Distribution of Transfusion Transmitted Infections in ABO and Rh Blood Groups : A 5 Year Study . Ann Int Med Den Res . 2017 ; 3 (5) ; 16-18 .
26. 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 .

ISSN (O): 2687-5365; ISSN (P): 2753-6556

27. Emeribe AO , Ejezie GC . ABO blood groups distribution in relation to hepatitis B surface antigen and the presence of lipoidophil antibodies . East Afr Med J. 1992 ; 69 (3) : 146-8
28. Szmuness W , Prince AM , Cherubin CE . Serum hepatitis antigen (SH) carrier state : relation to ABO blood groups . Br Med J. 1971 ; 2 (5755) : 198-9 .
29. Makroo RN , Chowdhry M , Bhatia A , Arora B , Rosamma NL . Prevalence of HIV among blood donors in a tertiary care centre of north India . Indian Med Res . 2011 950-3.

ISSN (O): 2687-5365; ISSN (P): 2753-6556