Original Research Article

A Study of Seroprevalence of Hepatitis Delta Virus (HDV) in Hepatitis B Virus Reactive Blood Donors at a Tertiary Care Hospital in Western Part of Rajasthan, India

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Abstract

Introduction: Blood transfusion carries the risk of transmitting major infections such as Hepatitis, HIV, syphilis and malaria. HDV is a co-infection of HBV. Studies from various parts of India since 1990 shows variable prevalence rate of HDV. The present study was undertaken to evaluate the seroprevalence of HDV among HBV reactive blood donors. **Methodology**: A blood bank based prospective study was conducted on blood donors found reactive for the HBsAg during routine screening for transfusion transmitted infections from January 2020 to December 2020. All the healthy blood donors were screened for anti-HIV 1 and 2, HBsAg and anti-HCV, Syphilis and malaria. Thus found HBsAg seropositive samples further screened for anti Hepatits D antibody. **Results**:Out of total 27450 blood donors 240 were found reactive for HBsAg. These 240 HBsAg reactive donors were further investigated for Anti Hepatitis D antibody. Out of them 2 cases were found positive for anti-Hepatitis D antibody showing prevalence of HDV among the Hepatitis B reactive blood donors as 0.83%**. Conclusion**: The results of present study show that the seroprevalence of Hepatitis D among the HBsAg reactive blood donors is very low in western part of Rajasthan.

Keywords: Seroprevalence, Hepatitis Delta Virus (HDV), Hepatitis B Virus, Blood Donors.

Introduction

Blood is a lifesaving drug. World Health Organization (WHO) recommends that all blood donations should be screened for evidence of infection prior to the release of blood and blood components for clinical or manufacturing use[1]. Transfusion-transmissible infections (TTIs) have been drastically reduced in countries where routine serologic screening of donors is implemented[2,3].

Viral Hepatitis is a serious problem in India with a high proportion of liver ailments caused by Hepatitis viruses[4-6].Hepatitis B virus can form a dangerous alliance with Delta virus and produce a new form of virulent Hepatitis which is considered to be widespread threat for much of the world[7].

Hepatitis D virus (HDV), the only member of genus Deltavirus in family Deltaviridae, is a hepatotropic virus with a circular RNA genome[9]. HDV is a co-infection of HBV. The envelope of HDV particles contains the Hepatitis B surface antigen (HBsAg). The production and transmission of HDV is entirely dependent on HBV to provide HBsAg. Hepatitis D virus (HDV) is a sub-viral agent that requires a preexisting or concurrent infection with Hepatitis B virus (HBV), which provides the coat protein for the HDV virion[8].

Approximately 5% of the global HBV carriers are co-infected with HDV. Out of approximately 350 million carriers of HBV worldwide, 18 million people are infected with HDV[9,10].It has at least eight genotypes, of which genotype 1 is the most frequent and is distributed worldwide, particularly in Europe, Middle East, North America and North Africa. In contrast, genotype 2 occurs mainly in East Asia and genotype 3 only in the northern part of South America, the remaining HDV genotypes are uncommon[11].

The present study was undertaken to evaluate the seroprevalence of HDV among HBV reactive blood donors in western part of Rajasthan. The aim was to assess any change in the epidemiology of the disease and to compare results with other ethnic groups/populations.

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Materials and Methods

Blood Bank based prospective study from January 2020 to December 2020 at Department of ImmunoHaematology & Transfusion Medicine, S.P. Medical College & Associated Group of Hospitals, Bikaner, Rajasthan. All the Blood donors attending the services at our center were screened for transfusion transmitted infections. Those who were found reactive for the HBsAg(by Merilisa HBsAg kit of Meril Diagnostics Pvt. Ltd.) during routine screening were further tested for anti HDV antibody using a commercially available ELISA kit, using the method and assay cut

off as specified by the manufacturer (Biogenix Inc Pvt Ltd). (Batch no.DK348001-1).

Sample collection: About 10 ml venous blood sample from all the healthy blood donors was collected 5 ml each in EDTA(ethylene diamine tetra acetic acid) anticoagulated and plain tube at the time of blood donation and was screened for anti-HIV 1 and 2,HBsAg, and anti-HCV,Syphilis and malaria. Syphilis was tested by card test using syphilis/TP Test Device and malaria was tested by rapid malaria antigen detection card. For each HBsAg reactive blood donor, 5 ml blood sample in plain vial, collected at time of donation, kept in slanting position(for at least one hour at room temperature) to obtain a clear, unhaemolysed serum. Immediately the serum was separated in a vial and stored at −80°C until analysis. All HBsAg seropositive sera were tested for anti-HDV antibody. The HDV ELISA kit used was an enzyme immunoassay for determination of total antibodies to Hepatitis Delta antigen (anti-HD)

Results

Out of the total 27450 donors included in the study; 27140 (98.87%) were male and 310 (1.13%) were female donors. 25504(92.91%) were voluntary and 1946 (7.09%) were replacement donors. 585 donors(2.13%) found reactive for various transfusion transmitted infections with maximum 282(1.03%) of VDRL followed by HBsAg, HCV, HIV and Malaria (n=27450)

Out of 27450 donors 240 were found HBsAg reactive with 238(99.17%) males and only two females (0.83%) with mean age [±SD]=33.16 [±7.8] years. Out of 240 HBsAg reactive donors only 02 were found reactive for anti-Hepatitis D Antibody and both were males. The seroprevalence of Hepatitis D among the HBsAg reactive blood donors was calculated as0.83%.

Out of 240 HBsAg reactive blood donors maximum were in age group of 21-30 yrs having frequency of 47.08%. Followed by age group 31-40 yrs, 41-50yrs, 51-60 yrs and 18-20 yrs with frequencies of 3.75%, 17.08%, 1.25%and 0.83% respectively showing that the infection is lowest at extremes of age groups.

Out of 240 HBsAg reactive donors maximum were of Blood group B and minimum were of blood group AB. Distribution of blood group among HBsAg reactive donors were as follows: B (101) >O(83) > A(35) > AB(21)

Table 1: Gender distribution and type of donation among the donors under study (n=27450)

SEX	No. of Donors	Percentage Out of Total Donors
Male	27140	98.87%
Female	310	1.13%
TYPE OF DONATION		
Voluntary	25504	92.91%
Replacement	1946	07.09%

Table 2: Socio De mographic Profile of HBsAg Reactive Blood Donors: (n=240)

PARAMETERS	No. Of Donors	Percentage
SEX		
Male	238	99.17%
Female	02	0.83%
LOCALITY		
Urban	50	20.84%
Rural	190	79.16%

Table 3: Distribution According To Age Group Among HBsAg Reactive Blood Donors:(n=240)

Age Group (Years)	18-20	21-30	31-40	41-50	>51	TOTAL
No of Donors	02	113	81	41	03	240
Percentage	0.83%	47.08%	33.75%	17.08%	1.25%	100%

[chi square =197.98,degree of freedom=4, p value 0.001]

Table 4: Blood Group Distribution Among HBsAg Reactive Blood Donors :(n=240)

Blood Groups	Positive	Negative	Total	Percentage
A	29	6	35	14.58%
B	91	10	101	42.08%
O	75	8	83	34.58%
AB	18	3	21	8.75%
TOTAL	213(88.75%)	27(11.25%)	240	100%

Discussion

In our study, we screened all the 27450 blood donors for HIV, HBsAg, HCV, VDRL and Malaria. 240 HBsAg reactive donors were further investigated for Anti Hepatitis D antibody. The seroprevalence of Hepatitis D among the Hepatitis B reactive blood donors from Bikaner (Western Rajasthan) were compared with studies published for Indian population. The prevalence of HDV differs widely depending on the target population and the geographical area evaluated.

HDV is a major public health problem in regions where HBV is still endemic. HDV infection adversely affects the clinical course and outcome of HBV by worsening chronic Hepatitis B and by increasing the rates of hepatocellular carcinoma[12].

Results in our study showed prevalence of HDV among the Hepatitis B reactive blood donors is 0.83%. We found only 2 cases positive for anti Hepatitis D antibody out of 240 HBsAg reactive blood donors.

Our results are in concordance with the study published by Jat et al[9] from Lucknow in 2015 where out of 318 patients with HBV infection, none was found positive for HDV infection. They also performed HDV RNA testing to study the prevalence and Champa Chakraborty et al[8] from eastern India in 2015 showing prevalence of 2% for HDV among the jaundice patients with HBV and carriers of HBV with or without jaundice andRamchandran et al[12] from new Delhi in 2020 who documented one patient positive for anti HDV IgM and IgG out of 142 enrolled patients showing overall prevalence as 0.78%.

In India, which accounts for a large proportion of the global chronic HBV infection pool, studies from various parts of country since 1990 under consideration shows variable prevalence rate of HDV those were towards higher side than the studies published in the recent past. Although all these studies were done on the known patients or carriers of Hepatitis B virus but the present study performed on blood donors assumed healthy at time of blood

donation, later found HBsAg reactive during routine screening tests done for transfusion transmitted infection.

Chakraborty et al[13] in 2005 found prevalence of Hepatitis D in HBsAg-positive individuals from New Delhi to be 10.6 %. Sravnan et al[14] in Chennai during 2008 found nine (5.9%) patients reactive to anti-Delta antibodies out of 153 individuals with HBV-related liver diseases.

In present study we screened the Hepatitis B reactive donors for both IgG and IgM anti Hepatitis D antibodies to detect both acute and chronic infection.

HDV infection occurs worldwide, though its prevalence differs substantially across geographic regions although an important trend in worldwide HDV infection is a global decline.HDV infection is still endemic in the Middle East, Central Africa, the Mediterranean, eastern part of Europe, Amazon Basin and parts of Asia however, in recent years, a declining trend is observed drastically in other parts of the world[9].

An research article Published by Elsevier B.V. by European Association for the study of the Liver in 2020 estimated 12 million people worldwide have experienced HDV infection, with higher prevalence in certain geographic areas and populations. Estimating bout 1 in 22 people with Hepatitis B also have Hepatitis D, increasing to 1 in 6 when considering people with liver disease. The estimated anti-HDV prevalence was 4.5% among all HBsAg-positive people and 16.4% among those attending hepatology clinics. Worldwide, 0.16% of the general population, totaling 12.0 million people, were estimated to be anti-HDV positive[15].

In spite of the global trend of decline, significant and persistent transmission present in some countries. This has been proposed to be related to poor hygienic conditions, high population density, poverty and poor public health infrastructure besides failure to implement universal screening of transfused blood[16].

Our study provides evidence that HDV infection rate is very low in the population under study. This may be due to increased vaccination against Hepatitis B, increasing awareness, improved prevention strategies and change in the socioeconomic condition in a fast-developing country like India.

These findings may represent either a low rate of HDV transmission in the population for some reason or a recent downward trend in the frequency of HDV infection in this population, similar to that in many other countries. As no previous study was carried out in this part of country to find out burden of Hepatitis D in the population, it is difficult to say whether the low observed HDV infection rate in our study indicates a preexisting or recent decline in HDV infection.

Therefore, every blood donor attending services of blood centre should screened carefully to avoid recruitment of Hepatitis B virus infected donors and ultimately reducing the chances of Hepatitis D virus transmission.

Table 5: Results of Indian Studies on the Prevalence of Hepatitis Delta Virus Infection Among Persons with Hepatitis B Virus Infection

S no	Author and year	Place	No of subjects	Test(s) used	No (%) that tested positive
1	**Banker et al 1992**	Bombay	331	Anti-HDV and HDAg	148(45)
2	**Singh et al 1995**	Chandigarh	204	Anti-HDV	29(4)
3	**Ghuman and kaur1995**	Ludhiana	18	Anti-HDV	6(33)
4	**Narang et al 1996**	New Delhi	31	Anti-HDV	11(35)
5	**Irshad and charya1996**	New Delhi	208	Anti-HDV	18(8)
6	**Bhattacharyya et al1998**	Kolkata	107	HD Ag	2(2)
7	**Jaiswal et al 1999**	Indore	140	Anti-HDV	9(6)
8	**Chakraborty et al 2005**	New Delhi	123	Anti-HDV	13(10)
9	**Saravanan et al 2008**	Chennai	153	Anti-HDV	9(6)
10	**Champa et al 2015**	Bihar	100	Anti HDV	2(2)
11	**Shankar laljat et al2015**	Lukhnow	318	Anti-HDV IgG and HDV RNA	0(0)
12	**Ramchandran et al 2020**	New Delhi	142	IgM anti-HDV IgG and HDV RNA	1(0.78)
13	**Present study 2020**	Bikaner	240	Total antibody against HDV	2(0.83)

Table 6: Results of Various Other Studies on the Prevalence of Hepatitis Delta Virus Infection Among Persons With Hepatitis B Virus Infection

S. No.	Author	Country	Year	Test (s)used	No. Of subjects	No. Of tested positive	%
1	**Theamboonlers et al**	Thailand	2002	Anti HDV antibody	55	12	21.81
2	**Kim HS et al**	Korea	2011	Anti HDV antibody	940	3	0.32
3	**Attaran MS et al**	Iran	2014	Anti HDV antibody	854	18	2.10
4	**Keshvari M et al**	Iran	2014	Anti HDV antibody	1038	23	2.21
5	**UzunB et al**	Western Turkey	2014	Anti HDV antibody	88	3	3.40
6	**Mese S et al**	Southeastern turkey	2014	Anti HDV antibody	186	13	6.98
7	**Sanou AM et al**	Western Burkina Faso	2018	Total Anti HDV antibody	117	4	3.41
8	**Makhlouf NA et al**	Upper Egypt	2019	Anti HDV antibody	186	80	43.01
9	**Fouad HM et al**	Egypt	2020	Anti HDV antibody	120	0	0

Conclusion

The study shows that the prevalence of Hepatitis D among the Hepatitis B reactive blood donors is very low Study support the declining trend of prevalence of Hepatitis D among Indian population, this is also true for geographical area under study.

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