

SEROPREVALENCE OF HEPATITIS B SURFACE ANTIGEN IN A TERTIARY CARE HOSPITAL FROM CENTRAL INDIA - A FIVE-YEAR STUDY

Swati M. Bhise¹, Varsha S. Wanjare², Jaicinta³

¹Associate Professor, Department of Microbiology, Government Medical College, Nagpur.

²Assistant Professor, Department of Microbiology, Government Medical College, Nagpur.

³Postgraduate Student, Department of Microbiology, Government Medical College, Nagpur.

ABSTRACT

BACKGROUND

Infection with Hepatitis B virus (HBV) is an important global health problem. Hepatitis B virus (HBV) induced liver disease is the tenth cause of death worldwide with 500,000 to 1.2 million deaths per year due to chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma. The hepatitis B surface antigen in serum is the first seromarker to indicate active HBV infection, either acute or chronic. To assess the magnitude and dynamics of disease transmission and for its prevention and control, the study of its seroprevalence is important.

MATERIALS AND METHODS

A study was undertaken to estimate the seroprevalence of hepatitis B surface antigen (HBsAg) in both the sexes and different age groups in a hospital-based population in our Hospital. Serum samples collected over a period of 5 years from outdoor and indoor patients of government tertiary care hospital, Maharashtra. ELISA was performed on all the serum samples for the detection of HBsAg in Microbiology laboratory.

RESULTS

Among 57,073 samples tested, 1449 (2.53%) were seropositive cases. The frequency of HBV among age group 0-20, 21-40, 41-60 and above 60 was 38 (0.73%), 962 (3.35%), 316 (2.27%), 133 (1.23%) respectively. Among the positive cases, seroprevalence in male and female was 1037 (1.82%) and 412 (0.72%) respectively. Male preponderance ($p < 0.05$) was seen and majority were in the age group of 21 to 40 years.

CONCLUSION

To control Hepatitis B infection, public awareness and health education programs should be started at all levels. This study highlights the HBV infection rate in this part of country and shall provide reference to future studies on epidemiology of HBV infection.

KEYWORDS

Hepatitis B Surface Antigen, ELISA, Seroprevalence.

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BACKGROUND

The hepatitis B virus (HBV) induced liver disease is the tenth cause of death worldwide with 500,000 to 1.2 million deaths per year due to chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma.¹ The common modes of transmission are vertical transmission from Hepatitis B Virus (HBV) infected mother to the newborn child, sexually active heterosexuals and homosexuals, through contaminated blood, use of contaminated needles, infants or children in highly endemic areas and from visitors of highly endemic region.^{2,3} Prevalence of HBV infection varies greatly in different parts of the world. The World Health Organization (WHO) has classified HBV prevalence into high (>8%),

intermediate (2-7%) and low (<2%) endemicity. HBV prevalence in India is in intermediate range. Every year 100,000 Indians die due to HBV infection related illnesses.⁴ The hepatitis B surface antigen in serum is the first seromarker to indicate active HBV infection, either acute or chronic.⁵ There are two types of hepatitis B carriers based on serological markers, one is called super carrier; persons with HBeAg in blood. They are highly infectious since only 0.0001 mL of plasma can transmit the disease.⁶ Sera of super carrier may contain about ten trillion particles per mL, amounting to about 500 micrograms per mL. Super carrier mothers very commonly infect their infants and such infants in turn become carriers.⁷ Other one is called simple carrier, persons who do not have HBeAg but low titre of HBsAg in blood. The infection is transmitted only with large volume of blood.⁶

Seroprevalence of Hepatitis B can be determined by detecting the presence of hepatitis B surface antigen in a community or general population.⁸ Prevalence studies help in assessing the magnitude of HBV infection and also help in devising preventive measures. But in developing countries like India, seroprevalence studies are difficult to conduct in general population because of socioeconomic hurdles and logistic difficulties.⁹ A hospital based study is helpful in assessing the accurate prevalence, magnitude and dynamics

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Corresponding Author:

Dr. Swati M. Bhise,

C/o. D. V. Walke,

#102/B Pension Nagar,

Behind Police Line,

Takli, Nagpur-440013,

Maharashtra.

E-mail: drswatimbhise@gmail.com

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of disease in the community. Therefore, this study was undertaken to estimate the burden of HBV infection in this part of country by estimating the seroprevalence of HBV infection in both sexes and in different age groups of our hospital.

MATERIALS AND METHODS

Study design: It is a retrospective study where data of previous five years was collected.

The study was carried out in the serology section of the Department of Microbiology in our Hospital.

Data was collected retrospectively for a period of five years from January 2010 to December 2014. The study included a total of 57,073 serum samples from patients attending outpatient departments and admitted indoor patients to various wards of Govt. Medical College and Hospital.

Hepatitis B surface antigen (HBsAg) was detected using Enzyme linked Immunosorbent Assay Technique (HEPALISA which is Microwell ELISA Test for detection of Hepatitis B Surface Antigen [HBsAg] in Human Serum/Plasma), manufactured by J. Mitra & Co. Pvt. Ltd. New Delhi.

Chi square test was used to calculate p value. No statistical software was used.

RESULTS

Sera of 57,073 patients were tested for HBsAg over a period of five years from Jan. 2010 to Dec. 2014. Total 1449 patients were positive for HBsAg with the prevalence rate 2.53% as shown in Table 1. Out of 57,073 patients, 31,139 (54.55%) were male and 25,934 (45.44%) were female. Prevalence was higher in males (1.81%) compared to females (0.72%), as shown in Table 2. Analysis of age and sex wise distribution of HBsAg positivity reveals a high prevalence (3.35%) among 21-40 years followed by 2.27% in 41-60 years age, and the low prevalence was observed among 0-20 years. Male preponderance was seen in all the age groups as shown in Table 3 & 4. A five-year data was collected which shows increase in the sample size and no significant change in the prevalence of HBV during the five-year study as shown in Table 5. In this study, the prevalence rate of HBV was calculated among OPD and IPD patients, which shows prevalence rate of 1.16% and 3.31% from OPD and IPD respectively as shown in Table 6. Among various wards of IPD, maximum positive samples were from Surgery Department (30.36%) followed by Medicine Department (22.36%) and the lowest number of positive samples were seen in Paediatric Department as shown in Table 7.

Gender	Total No. of Tested Sera	HBsAg Positive Sera	Percentage (%)
Male	31139 (54.55%)	1037	1.81%
Female	25934 (45.44%)	412	0.72%

Table 2. Sex wise Distribution of Tested Sera

Chi square = 173.4449, P value = 0.001.

Age in Years	Total No. of Tested Sera	HBsAg Positive Sera	Percentage (%)
0 - 20	5180	38	0.73%
20 - 40	27207	962	3.35%
41 - 60	13898	316	2.27%
> 60	10788	133	1.23%

Table 3. Age wise Distribution of Tested Sera

Chi square = 20.0915, p value = 0.002

Age in Years	HBsAg Positive Sera	Percentage	Male	Female
0 - 20	38	0.73%	25	13
21 - 40	962	3.35%	713	249
41 - 60	316	2.27%	196	120
>60	133	1.23%	103	30

Table 4. Age & Sex wise Distribution among Positive HBsAg

Year	Total No. of Sera Tested	Total No. of HBsAg Positive	Percentage (%)
2010	10196	304	2.98%
2011	10582	259	2.44%
2012	11417	269	2.35%
2013	11638	266	2.28%
2014	13240	351	2.65%

Table 5. Year-wise Prevalence of HBsAg

Department	Total No. of Samples Received	Total No. of Positive Sera	%
OPD	20561	240	1.167%
IPD	36512	1209	3.31%

Table 6. Distribution of Tested Sera among OPD and IPD

Chi square = -145816.6416, p value = 0.001 (<0.05)

Total No. of Sera Tested	57,073
Positive sera	1449
Percentage (%)	2.53%

Table 1. Total Number of Sera Tested and Number of Positive Sera

Year	Medicine	Surgery	Ortho	IDH	Gynae	T.B Chest	ENT	ICCU	Paeds	SSH
2010	102	74	28	27	24	-	3	-	10	4
2011	77	72	17	21	11	15	4	2	3	2
2012	39	96	13	13	15	22	10	4	2	2
2013	39	91	27	17	8	13	2	4	7	1
2014	67	107	32	25	21	3	9	5	4	6
Total	324	440	117	103	79	53	28	15	26	15
Percentage	(22.36)	(30.36)	(8.07)	(7.10)	(5.45)	(3.65)	(1.93)	(1.035)	(0.017)	(1.035)

Table 7. Year wise Distribution of Positive HBsAg sera among various IPD

DISCUSSION

This study was conducted for five years and a large number of samples were tested. In India, several studies are conducted on seroprevalence of HBsAg. In this study, the seroprevalence of HBsAg was 2.53%. Lodha et al (2001), in their review article on hepatitis B epidemiology, have suggested the true prevalence rate in India as 1-2%.¹⁰ Batham A et al, in their study, reviewed 54 studies on HBsAg prevalence in India and have reported prevalence as high as 15.9% among tribal population and as low as 2.4% in non-tribal population.¹¹ High prevalence of HBsAg (between 2-7%) has been reported among pregnant women in India in the past but a recent study from Allahabad, North India has found the prevalence of 0.9%.¹² In Nepal, the prevalence rate of Hepatitis B was found to be 2.5%.¹³ Prevalence of Hepatitis B varies from country to country and depends upon a complex mix of behavioural, environmental and host factors. In general, it is lowest in countries or areas with high standards of living (e.g. Australia, North America, North Europe) and highest in countries or areas having low socioeconomic status (e.g. China, South-East Asia, South America).¹⁴ Most of the studies showed high prevalence of Hepatitis B among males compared to females. Seroprevalence of HBV among male and female in our study was 1.81% and 0.72% respectively. This study correlates with prevalence rate reported by Shirish Malvankar and Smita Soodhve's study i.e. prevalence of 1.04% in male and 0.58% in female.⁹ In a study on hospitalised patients in Manipal, Dutta et al. observed HBsAg positivity of 35.3% in males versus 19.3% in females.¹⁵ In accordance with our study, Sayed A Quadri et al, Vazhavandal G et al Rachna Behal et al also reported higher male preponderance.^{8,16,17} The possible cause of higher prevalence in males in general population may be due to higher exposure to occupational HBV risk factor and plasma disappearance rate of HBsAg in males is lower than in females.^{16,18} In this study, HBsAg was highest among the age group 21-40 years (66.39%) and it is lowest among 0-20 years (2.62%). The findings from this study were in agreement with the findings from the study by Veena et al where majority of those that tested positive to HBsAg were in the age group of 21-40 years.¹⁹ The decline in seroprevalence of HBsAg in 0-20 years is attributed to the effect of universal immunisation programme.²⁰ Higher prevalence among 21-40 years in India and other countries correlates with the peak age of highest sexual activity in the society, hence supporting the role of sexual intercourse in the transmission of hepatitis B virus.²⁰

During the five-year study, no significant change in the prevalence rate (Table 5) was observed. This may be due to

the fact that Hepatitis B vaccination among new born babies was introduced as a part of immunisation and the recommendation of both pre-exposure and post-exposure administration of hepatitis B vaccine. To add this endemicity, according to WHO, the prevalence of HBV in India is in intermediate (2-7%) range.¹⁴ This study reveals the prevalence rate of HBV among patients attending OPD (1.167%), and admitted in various wards of IPD (3.31%). Distribution of prevalence rate of HBV among IPD shows a higher number of positive sera among patients from Surgery and Medicine wards. This may be due to the maximum exposure among patients attending the hospital. Data regarding the prevalence of HBV among patients attending OPD and various wards of IPD are lacking. A study conducted by Chaudhary et al shows prevalence rate 2.28% in patients attending a surgical OPD in Rawalpindi, Pakistan.²¹ Another study conducted by Nafees et al detected a carrier state of 1.35% among patients attending Ophthalmology OPD in Lahore.²² It is important to know the prevalence rate of HBV among patients attending OPD as most of the positive sera obtained from patient attending OPD represents asymptomatic carriers. Therefore, screening of asymptomatic people is an important instrument in disease detection, prompt diagnosis and intervention particularly at an early stage of disease.²³

CONCLUSION

To assess the magnitude and dynamics of disease transmission and for its prevention and control, the study of its seroprevalence is important. The patients attending our hospital represent a mix of poor and rich as well as urban and rural population. This study shows that prevalence of hepatitis B was not uncommon in this part of the country and found to be high and most commonly observed in young males. An important preventive measure is screening of blood donors for HBsAg, which is now mandatory. Immunisation is one of the important preventive measures to manage hepatitis B infection. Poor knowledge about Hepatitis B virus infection is the main cause of its spread. Therefore, to control its further spread, public awareness and health education programmes should be started at all levels. This study highlights the HBV infection rate in this part of country and shall provide reference to future studies on epidemiology of HBV infection.

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