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Seroprevalance of Hepatitis B Patients Attending a Tertiary Care Hospital Of Jharkhand, India.

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ABSTRACT

Hepatitis B is a major public health problem worldwide. Nearly 2 billion people—one-third of the world's population—alive today have been infected with HBV at some time in their life, of which about 350 million remain infected. Studying the prevalence of HBV infection in tertiary care centre / teaching hospital based study of Hepatitis B surface antigen is a strong indicator of true HBV infection rate in the community as patients of diverse backgrounds attend the hospital and aids in establishing the magnitude of problem and efficacy of vaccine coverage. The study aimed to determine the seroprevalence of hepatitis B virus infections in Jharkhand. The study was conducted at Indian Council Medical Research Grade II Viral Diagnostic Laboratory, Department Of Microbiology, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand from January 2014 to December 2014, including 19607 patients. Test methods employed was chemiluminescence. Hepatitis B surface antigen seroprevalance was 2.45% patients with high percent (3.41%) positives in males as compared to females (1.31%). HBV prevalence is of intermediate range. Males are at relatively higher risk as compared to females. Lower and higher age group is at low risk of exposure as compared to intermediate age group. .Proper preventive measures in these areas need to be scaled up likes vaccination and screening of the patients.

Keywords: Seroprevalance, Hepatitis B Endemic, Liver, Jharkhand, Tertiary care centre

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INTRODUCTION

Hepatitis is an inflammation of the liver, most commonly caused by a viral infection. Of all the hepatitis viruses, hepatitis B virus (HBV) account for a considerable proportion of liver diseases worldwide. This virus is responsible for liver damages ranging from minor ailments to liver cirrhosis and hepatocellular carcinoma (HCC). Approximately 7% of the world's population (350 million people) is infected with HBV. [1] The world can be divided in 3 regions of high, medium, and low endemicity on the basis of the HBV carrier rate. [2] About one-third of the world's population (more than 2 billion people) alive today have been infected with HBV at some time in their life, and of these, about 350 million remain infected.[3] Every year about 1 million people die because of HBV-related cirrhosis or hepatocellular carcinoma, which means that HBV kills one individual every 30 seconds.[4] HBV infection is highly prevalent in sub-Saharan Africa, Asia, and other parts of the developing world, but very less in the United States, except in natives of Alaska and immigrants from high prevalence regions. By some estimates, 1.25 million carriers live in the United States, which are defined as positive for the HBV surface antigen for more than 6 months (chronic cases) out of which about half of them, are Asian-American, taking into account the prevalence of HBV in immigrant populations. [5, 6] HBV is transmitted through exposure to semen, infective blood, and other body fluids or from infected mothers to infants at the time of birth (vertical transmission).Transmission may also occur through transfusions of HBV-contaminated blood and blood products, contaminated or infected injections used during medical practices, and through injections commonly used during taking drug by drug addicts. [7] HBV is very highly infectious, far more than HIV. Even as little as 1×10^{-5} ml of blood can be infectious. [8] According to WHO Hepatitis B vaccine for infants had been introduced nationwide in 181 countries by the end of 2012. Estimated global coverage with three doses of hepatitis B vaccine is 79%.

The present tertiary care hospital based seroprevalence study was undertaken at Rajendra institute of Medical Sciences, Ranchi with the intent that it will provide a valuable insight into assessing the true nature of problem in the community, as patients from all districts and diverse backgrounds are received here, to assess the magnitude of HBV infection and aid in devising preventive measures. There is no data available on hepatitis B infection in Jharkhand.

MATERIAL AND METHODS

Study Area

The study was carried out at Indian Council Medical Research Grade II Viral Diagnostic Laboratory, Department Of Microbiology, Rajendra Institute of Medical Sciences, Ranchi; Jharkhand from Jan 2014 to Dec 2014. Jharkhand, a state in eastern India was carved out of the southern part of Bihar on 15th November 2000. Jharkhand shares its border with the states of Bihar to the north, Uttar Pradesh and Chhattisgarh to the west, Odessa to the south, and West Bengal to the east. It has an area of 30,778 sq mi (79,710 km²). The name 'Jharkhand' means 'The Land of Forests'.

Study Population

Subjects included inpatients and outpatients for whom Bag detection was sought as diagnostic and screening purpose.

Ethical Issues

The Institute Ethics Committee had granted permission for carrying out this research work.

Data Collection

A questionnaire was framed to elicit demographic details of all patients who tested positive for hepatitis B.

Sample Collection

Blood samples were collected by venepuncture by strict aseptic method taking universal precautions. After proper positioning of the arm of the individual, under adequate illumination, the antecubital vein was made prominent by tying a tourniquet upstream of the vein and the area was disinfected using a spirit swab in a centrifugal manner. Around 5 ml whole blood was collected from each patient in a relabeled sterile plain vacutainer using a disposable sterile needle and 5 ml syringe.

Sample Processing

Blood was allowed to clot for 30 minutes followed by centrifugation at 10000 RCF for 15 minutes to separate out serum. Serum was pipette out into properly labelled micro centrifuge tubes.

Sample storage

All serum samples which tested positive for Hepatitis B were aliquot into a new labelled cry vial and stored at 4°C for a week while for long term storage at -20 °C.

Hepatitis B surface Antigen Detection

The ARCHITECT Bag assay is a fully automated two-step immunoassay, using Chemiluminiscent Micro particle Immunoassay (CMIA) technology, with flexible assay protocols referred to as Chemiflex, for the quantitative determination of Bag in human serum and plasma. In the first step, sample and anti-HBs coated paramagnetic micro particles are combined. Bag present in the sample binds to the anti-HBs coated micro particles. After washing, acridinium-labeled anti-HBs conjugate is added in the second step. Following another wash cycle, Pre-Trigger and Trigger Solutions are added to the reaction mixture. The resulting chemiluminiscent reaction is measured as relative light units (RLUs). A direct relationship exists between the amount of Bag in the sample and the RLUs detected by the ARCHITECT /^{*} optical system. The ARCHITECT Bag assay utilizes a 4 Parameter Logistic Curve Fit data reduction method (4PLC, Y-weighted) to generate a calibration curve with the calibrators’ provided by the company itself. The system has to be calibrated regularly as well the control which is also provided by the company is run in the machine before the sample is tested. If the controls value lies in the acceptable range the test is preceded for the sample testing. It takes 20 minutes for each sample to be processed .This system marks the sample given a unique ID by the user as positive or negative. The specimens with concentration values < 0.05 IU/mL are considered nonreactive and specimens with concentration values ≥ 0.05 IU/mL are considered reactive by the criteria of ARCHITECT Bag.

This test has a lower detection limit of 0.05 IU/mL and measures up to 250 IU/mL of Bag in undiluted sera. Thus if the concentration of Bag is >250 IU/ml the machine marks the sample as reactive (>250 IU/ml).

RESULTS

Table 1: Seroprevalence of hepatitis B in Jharkhand population

TOTAL	NEGATIVE		POSITIVE	
	n	%	N	%
19607	19126	97.54	481	2.45

Table 2: Prevalence in male and female

Gender	Total	Positive	Negative	Prevalence (%)
Male	10645	363	10282	3.41
Female	8962	118	8844	1.31

Table 3: Age and Gender wise distribution of patients in hepatitis B positive cases

Age groups(yrs.)	Hepatitis B positive cases in			Total Hepatitis B positive cases (%)
	No of subjects	Male (%)	Female (%)	
0-10	581	11(73.3%)	4(26.6%)	15(100%) (3.1%)
11-20	3333	32(78%)	9 (21.9%)	41(100%) (8.5%)
21-30	5191	99(63.8)	56(36.1)	155(100%) (32.2%)
31-40	4433	86(83.4%)	17 (16.5%)	103(100%) (21.4%)
41-50	2683	53(77.9%)	15(22%)	68(100%) (14.1%)
51-60	1891	51(87.93)	7(12%)	58(100%) (12.0%)
61-70	1126	26 (83.8%)	5(16.1%)	31(100%) (6.4%)
71-80	283	3(75%)	1(25%)	4(100%) (0.8%)
81-90	86	2 (33.3%)	4(66.6%)	6(100%) (1.24%)
Total	19607	363 (75.46)	118 (24.64)	481 (100%) (2.45% of 19607)

DISCUSSION

Prevalence of HBV was 2.45% in the present study correlating with an intermediate level of endemicity. A review for Hepatitis B prevalence in India was found 1-2% done by Oldham et al [9]. Balham A et al reported the same to be 3.7% after reviewing 54 studies on Bag prevalence in India [10]. Smite Stood and Shires Malvankar in a hospital based population have noted 0.87% prevalence. The relative low prevalence in their study could be due to the fact that it was conducted in a private hospital serving usually to economically privileged patients [11]. In a teaching hospital based population study Bhatt CP et al have reported 2.5% prevalence [12]. In India the Bag prevalence among different populations and geographical areas varies greatly and very high prevalence has been noted among the aborigine population of Andaman and in the state of Arunachal Pradesh [13]. Among blood donors of Bangalore prevalence of 1.86 had been reported. [14]. Prevalence of Bag among the patients attending the various clinical departments of BPS Govt. Medical College for Women, Kanpur Kaplan is 2.8%. [15].

The sex ratio is 947 females to 1000 males in Jharkhand. In the present study, HBV distribution among male and female were 3.41%. And 1.31% respectively. The high prevalence of Bag reported among male population in this study is in agreement with other studies from India. Smith Stood and Shires Malvankar have reported the prevalence to be 1.04% and 0.58% respectively for males and females [11]. Dutta et al has found it to be 35.3% in males and 19.3% in females [16]. Singh et al had reported prevalence to be 0.65% and 0.25 % respectively in males and female subjects [17]. In one more similar study depicted higher sero positivity rate in males (5.174%) as compared to females (1.662%) [15]. The reason for high infection rate among the males may be due to habits such as multiple sexual partners, unprotected sex, sharing of needles in I/V drug abusers, tattooing, acupuncture and sharing of razors at barber places. This may be also because of a high immune response in females may also help to clear the HBV more rapidly and efficiently as compared to males. [18]

The overall study of distribution of Bag positivity among the patients shows increasing trend from the lower age group 0-10 to 31-40 and then a decreasing trend from 41-50 to 81-90 age group. The Bag positivity rate in different age groups reveals that lower and higher age groups is less exposed to risk factors as compared to the intermediate age groups. Thus we conclude that positivity is directly proportional to the exposure. The highest positivity is found between age group 21-30 (32.2%) which is the most sexually active age group. These findings are similar to the study done by Easow LM et al who also reported highest sero positivity among age group 21-30 years [19]. These findings are also in concordance with the study done by Busier FI et al who reported HBV prevalence to be highest among age group 18-27 years [20]. In most of the

adults who had acquired HBV infections (94%–98%) newly with normal immune status completely eliminates virus from the blood and produces neutralizing antibody that provides immunity from future infection but in case infants, young children, and immunosuppressed individuals it result in chronic infection.[21]. Lesser positivity in earlier age group shows good sign of vaccination coverage and antenatal screening at present .But the picture will be more clear if the trend is studied in the upcoming years too.

Bag seroprevalence has marked geographic variations, and the degree of HBV endemicity often correlates with the predominant mode of transmission. The dominant route of transmission in highly endemic region are prenatal and horizontal (exposure to chronically infected household members) transmission. About 70–90 percent of the adult population has serologic evidence of prior infection. Patient develop liver cancer at higher rates than countries with lower endemicity, and hepatocellular carcinoma is a major cause of mortality in these areas .While in areas with intermediate endemicity mix of perinatal, horizontal, health-care-related, sexual, and other forms of transmission. Most new infections occur among young adults are acquired sexually or through injecting drug use. In highly endemic population subgroups may be present within low endemicity countries, however, depending upon seroprevalence rates of immigrant groups and native/indigenous populations. [22]

The vaccine has an excellent record of safety and effectiveness. The complete vaccine series induces protective antibody levels in more than 95% of infants, children and young adults and the protection lasts at least 20 years and possibly lifelong. All children and adolescents younger than 18 years old and not previously vaccinated if living in countries where there is low or intermediate endemicity should receive the vaccine .In such settings it is possible that more number of people in high risk groups may acquire the infection and thus should also be vaccinated. The hepatitis B vaccine is the mainstay of hepatitis B prevention. [23] In many countries, where 8–15% of children used to become chronically infected with the hepatitis B virus, vaccination has reduced the rate of chronic infection to less than 1% among immunized children.

A tertiary care centre / teaching hospital based study of Hepatitis B surface antigen is a strong indicator of true HBV infection rate in the community as patients of diverse backgrounds attend the hospital. The patients attending this hospital represent Jharkhand population as they belong to different districts comprising of both urban and rural inhabitants. Therefore our study highlights HBV infection rate in this part of the country and shall provide reference to future studies on the epidemiology of HBV infection.

CONCLUSION

The alarming situation of HBV infection requires that screening is necessary to avoid the transmission of blood-borne pathogens... Patients should be encouraged to participate in routine and voluntary testing for blood-borne pathogens. This early detection due to screening of asymptomatic cases can help in better management of patients and reduction in transmission HBV infection .HBV is more efficiently transmitted than HCV or HIV, because of the high volume of Hepatitis B viruses in the blood of infected people compared to the lower viral load in people infected with HIV or Hepatitis C. Strict preventive measures and an intensive precautionary environment, promoting mandatory screening of preoperative patient for HBV viruses is essential to prevent the spread. It is important to educate the patients and to encourage them for screening or other medical treatments to ensure minimal risk of transmission, spread and onset of these diseases.

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