Original Research

A Study of Seroprevalence and Associated Risk Factors of Hepatitis B at A Tertiary Care Hospital

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Abstract

Background: Hepatitis B is a vaccine preventable hepatotropic virus. India shows wide range of seroprevalence in different regions. Hepatitis B being a hepatotropic virus, long termeffects on liver should be studied specially in cases of metabolic diseases.

Aims & objectives: The study was conducted at a tertiary care hospital to estimate seroprevalence of hepatitis B in both sexes & different age groups, association of hepatitis B with signs and symptoms, possible risk factors for the transmission and co morbidities.

Method: A prospective, cross-sectional study was conducted for a period of one year (2018-2019) at a tertiary care hospital and included 600 subjects at a tertiary care hospital. Adetailed history of patient was recorded. Five milliliter of blood was collected for testing Hepatitis B by ELISA test. Results were analyzed statistically.

Result: Seroprevalence of 2.8% was observed in present study. It was predominantly seen in age group 31-40yr (5.9%). History of past surgeries was observed to be a significant risk factors for hepatitis B. Diabetes was a statistically significant comorbidity associated with hepatitis B.

Conclusion: Association of Hepatitis B with diabetes needs to be evaluated as both the diseases primarily affect liver which may accelerate the course of either of the diseases. There is a need to do molecular studies to identify escape mutants and genotypes of hepatitis B to decrease it's incidence.

Keywords: Seroprevalence, Hepatitis B, Risk factors, Diabetes, Past surgery

Introduction:

Hepatitis B is a vaccine preventable hepatotropic virus. It is widely distributed in world. An estimated 257 million people are living worldwide with hepatitis B virus infection [1]. Hepatitis B virus is known to be highly infectious. Chronic sequelae

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of hepatitis B like Liver cirrhosis, hepatocellular carcinoma accounts for many deaths worldwide. India lies in intermediate zone of prevalence (2 -7 %)[2]. Most of the Seroprevalence studies are done in targeted population and it varies in different regions. There are very less studies done in general population to assess the prevalence & risk factors for hepatitis B. National viral hepatitis program 2018 aims at achieving significant reduction in infected population, morbidity and mortality associated with Hepatitis B. The present study aimed to find the seroprevalence in general population of hepatitis B & identify risk factors associated with it.

Aims and Objectives:

The study was conducted at a tertiary care hospital to estimate Seroprevalence of hepatitis B in both sexes & different age groups, to study signs and symptoms, identify possible risk factors and co relation of hepatitis B with co morbidities.

Materials and Methods

The present study was a prospective, cross-sectional study. It was conducted at the Department of Microbiology of a tertiary care hospital for a period of one year period and included 600 clinically suspected cases. Patients with high clinical suspicion of hepatitis were advised screening for hepatitis & blood samples were sent to Microbiology department. Resident of Microbiology department then took relevant history of the patients coming from OPD. For ward a brief history is written on requisition form. Detailed history was taken by going on rounds in wards.Simple sampling i.e., every n^{th} sample was included in the study. Patient not willing to test & known positives were excluded from the study. The study was carried out after permission from the Institutional ethics committee.

Methodology

A detailed clinical history was taken & patients were explained about the test procedure. Written consent from patient was taken. Five milliliters of fasting blood sample from each patient was collected aseptically in a plain vacutainer. The serum was separated in sterile vials and then tested by ELISA test as per kit literature[2]. The ELISA kit used was HBsAg MERILISA kit of Meriline (Gujarat, India). Known serum specimens which had tested positive & negative were included as external positive & negative controls for quality control. Results were statistically evaluated. Fischer's exact test was used for calculating statistical significance.

Results

In the present study, seventeen out of 600 patients tested positive for hepatitis B. Thus, the Seroprevalence was found to be 2.8%.

Hepatitis B cases were seen in above 18 years age group, pediatric age group was not affected.

Of the 600 samples, 384 were male and 216 were female. Six (2.8%) females out of 216 and 11 (2.9%) males out of 384 are positive for hepatitis B. No significant association of sex & hepatitis B was seen.

Highest positivity was found in 31-40yr (5.9%) followed by 51yr and above (4.8%) and 21-30yr (3.2%).

Mean age was found to be 38.12yr in hepatitis B positive cases.

In the present study, association of signs & symptoms in hepatitis B positive cases was assessed & it was observed that:

- 16 (61.5%) out of 26 patients having Jaundice were positive for Hepatitis B. (p value <0.001)
- 17 (60.7%) out of 28 patients having loss of appetite were positive for Hepatitis B. (p value <0.001)
- 13 (13.8%) out of 94 patients having fever were positive for Hepatitis B. (p value <0.001)
- 2 (15.4%) out of 13 patients having weight loss were positive for Hepatitis B. All of these symptoms were seen to be statistically significant. (p value <0.006)

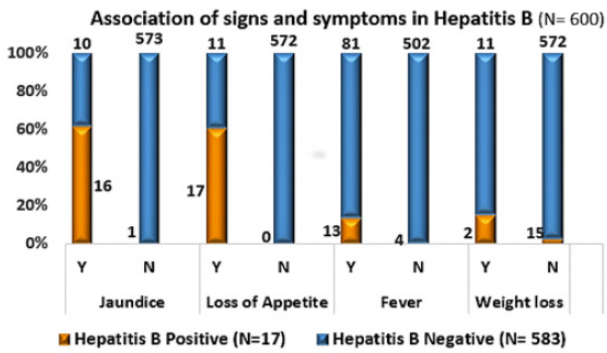

Fig 1: Hepatitis B association with signs and symptoms

In the present study association of risk factors with hepatitis B infection was studied & it was observed that out of 36 patients having history of past surgery, four (11.1%) tested positive for hepatitis B which is statistically significant.

Thirty patients had history of tattooing of which three (10%) tested positive for hepatitis B.

Forty-three patients had history of alcohol consumption of which four (9.3%) tested positive, two patients had history of IV drug abuse and both (100%) tested positive. A statistical significance was found between these risk factors & Hepatitis B.

Patients with history of blood transfusion and renal dialysis tested negative for hepatitis B.

HBsAg positivity by ELISA test was assessed in patients with different co-morbid conditions. Two patients positive for hepatitis B were having diabetes. This association was found to be statistically significant.

Liver function test panel done in all cases included SGOT, SGPT, Serum bilirubin, Serum albumin, Serum protein and Alkaline phosphatase.

Mean of all Liver function test values were significantly higher in hepatitis B positive cases compared to hepatitis B negative cases.

In the present study, association between Hepatitis B infection and vaccination was also assessed.

Of the 600 cases, 272 patients had received the complete vaccination as per National Immunization schedule, 121 patients were incompletely vaccinated and 207 patients were not vaccinated at all.

- Of 272 patients who were vaccinated with all 3 doses of hepatitis B vaccine, two (0.74%)

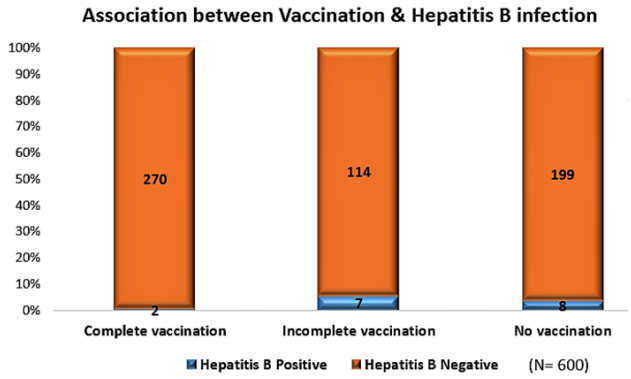

Fig 2: Hepatitis B association with vaccination

Discussion

Seroprevalence of hepatitis B in world has been classified as high (>8%), intermediate (2-8%) and low (<2%) [3]. India is placed in intermediate range of prevalence for hepatitis B [3]. Different states/regions in India have varying Seroprevalence for hepatitis B (Table – 1).

Table 1: Different studies showing varied seroprevalence of Hepatitis B

Sr no.	Study by	Conducted at	Year	Prevalence
1	Bhatta CP et al [4]	Nepal	2001	2.5%
2	Qureshi H. et al. [5]	Pakistan	2004	2.5%
3	Alrowaily MA et al. [6]	Saudi Arabia	2006	1.6%
4	Sood S et al. [7]	Rajasthan	2008	0.87%
5	Enahoro et al. [8]	Nigeria	2013	0.7%
6	Ansumana R. et al. [9]	Sierra Leone	2013	13.7%
7	Prasad A et al. [10]	Shillong	2016	1.4%
8	Srivastava N et al. [11]	Agra	2017	5.04%

In the present study, a Seroprevalence of 2.8% of hepatitis B was detected. This varying prevalence probably can be because of poor hygiene practices, low socioeconomic standards, close person to person contact and different cultural practices in different regions.

In the present study it was found that prevalence of hepatitis B among males and females was similar. There was no sex predilection in the present study for hepatitis B.

A predominance of hepatitis B positive cases was seen in 31- 40 years age group in the present study

which is in concordance to a study by Kateera F. et al. [12] at Rwanda in 2013. Another study by Prasad A et al. [10] found higher prevalence of hepatitis B in 21 to 40 years age group. The higher prevalence of hepatitis B in 21- 40year age group is probably due to this age group being the physically & sexually active age group & hence more prone to contract hepatitis B infection.

In the present study it was found that mean age for hepatitis B positivity was 38.12 years which is in concordance to study by Khatoon R et al. [13] at Lucknow in 2016. In their study, the mean age of hepatitis B positivity was found to be 37.5 years.

In the present study, it was observed that Hepatitis B was significantly associated with signs & symptoms like jaundice, fever, weight loss, loss of appetite (Fig- 1).

A study conducted by Owusu M. et al. [14] at Ghana in 2016 found that hepatitis viruses are an important etiology for jaundice. Similar study was conducted by Ochwoto M et al. [15] at Canada in 2013 to find hepatitis B infection in people presenting with jaundice. They also find significant association between hepatitis B & jaundice. Liver is a principal organ for all the metabolic activities in body. Any insult or infection to liver disrupts its normal function & can be assessed by liver function test. Hepatitis B virus causes injury & inflammation to hepatocytes & disrupts its normal functioning which can be seen by raised bilirubin levels causing jaundice. In the present study it was observed that liver function test values were significantly increased in hepatitis B patients which is similar to study by Singh K et al. [16] conducted at Uttar Pradesh in 2016 who found that hepatitis B virus is the major causative agent of liver dysfunction which is seen as increased LFT values. As explained above, hepatitis B virus interferes with the functions of liver & replicates in the hepatocytes. During infection, the host immune response causes hepatocellular damage particularly virus- specific cytotoxic T lymphocytes. The resulting damage causes alteration in liver functions which is signified by abnormal liver function test values.

In the present study, it was observed that there is significant association of hepatitis B with risk factors like past surgery, tattooing, alcoholic history & IV drug abuse. This is in concordance to a study by Khatoon R et al. [13] who found a significant association of hepatitis B with dental procedure, IV drug abuse, tattooing & multiple sexual partners. In the present study, it was also observed that patients with history of previous surgery were having significant association with hepatitis B. This may probably be because of lack of safety precautions like improper sterilization observed during surgeries. In the present study, three cases with history of past surgeries were dental procedures while the remaining one was a vasectomy operation done in a peripheral hospital. On further eliciting the history it was observed that these patients had visited unauthorized practitioners/quacks. A study conducted by Sali S MD. et al. [17] at Iran in 2003 also found past surgery is an independent risk factor for hepatitis B. The present study is in concordance with the study by Khatoon R. et al. [13] who did not find blood transfusion as a significant risk factor for transmission of hepatitis B. The reason as to why no association between blood transfusion and hepatitis B in the latter studies may probably be because of routine & effective screening of blood bags in blood banks for Hepatitis B & C in these institutions. Effective screening of blood bags against these blood borne infective agents will negate or minimize the risk of transmission of these infections.

On studying the association between diabetes and hepatitis B in the present study, it was observed that there is statistically significant co relation of hepatitis B & diabetes. Very few studies have been done to study the association between hepatitis B & diabetes. A study by LiNg. M et al. [18] was conducted to find association between chronic hepatitis B virus infection & diabetes among Asian Americans & Pacific Islanders at New York in 2005 & they found that there is significant association between diabetes & hepatitis B in Asian group of people. They concluded that hepatitis B infection may be a potential risk factor for development of diabetes among Asians. On contrary, Huang ZS et al. [19] conducted a study to understand the impact of HBV infection on the incidence of diabetes. In their study, which was conducted at Taiwan in 2008, they found that there is no association between diabetes and hepatitis B. It is known that diabetes & HBV infection are independent risk factors for cirrhosis &

hepatocellular carcinoma. Liver plays a key role in glucose metabolism in body. It balances the storage & output of glucose. If hepatitis B infection occurs, it may cause glycometabolism disorder. Secondly, persistent inflammatory activities in liver may cause defective glucose homeostasis because of Hepatitis B infection. Inflammatory mediators like tumor necrosis factor alpha & nitric oxide can impair the metabolic action of insulin resulting in insulin resistance leading to diabetes [18]. Besides, development of diabetes may depend upon certain factors like ethnicity, age, metabolic requirements, genetic make -up, lifestyle and several other factors contribute to the causation of diabetes.

Certain population groups including healthcare workers like veterinary doctors, sexual workers are at increased risk of contracting hepatitis B infection. Vaccination is recommended in such cases so as to minimize the risk of transmission. Efficacy of hepatitis B vaccine is 95%. Protection against Hepatitis B infection lasts for 30 years or longer. A literature search showed that there is a lack of sufficient data on vaccination status in general population. Most of the studies regarding vaccination status are done in health care workers.

In the present study, it was observed that out of 272 cases which received 3 doses of hepatitis B vaccine, two (0.74%) were tested positive for Hepatitis B. Out of the 121 cases which received 1 or 2 doses of vaccine, seven (5.79%) were tested positive for Hepatitis B. Of the 207 cases which were not vaccinated at all, eight (3.86%) were tested positive for Hepatitis B (Fig 2). There are cases where in spite of vaccination, hepatitis B infection has occurred. This can be due to improper vaccination technique, failure to maintain specified temperature range for vaccine leading to inactivation of vaccines. Alternatively, escape mutants of Hepatitis B virus which alter the surface antigen may also cause infection in spite of vaccination [20].

Conclusion

In the present study, Seroprevalence of Hepatitis B was found to be 2.8% with past history of surgery as a risk factor. Further, association of Hepatitis B with diabetes needs to be evaluated as both the diseases primarily affect liver which may accelerate the course of either of the diseases. There is a need to do molecular studies to identify genotypes of HBV and identify escape mutants so as to decrease the chances of HBV infection.

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Conflicts of Interest: None

Ethics approval: Institutional ethics committee approval taken. (Ref. ID: D020160137 dt: 23/12/2016)

References

1. Hepatitis B Fact Sheets. www.who.int/topics/hepatitis/factsheets/en/
2. Summary of Safety and PerformanceCE-SSP/IM/CLD/018 Revision No.: 02
3. Puri P. Tackling the Hepatitis B Disease burden in India. *Journal of Clinical and Experimental Hepatology* 2014; 4(4): 312-319.
4. Bhatta CP, Thapa B, Rana BB. Seroprevalence of hepatitis "B" in Kathmandu Medical College Teaching Hospital (KMCTH). *Kathmandu Univ Med J (KUMJ)* 2003 Apr-Jun; 1(2): 113-6
5. Qureshi H., Bile K., Jooma R., Alam S., Afridi H. Prevalence of hepatitis B and C viral infections in Pakistan: findings of a national survey appealing for effective prevention and control measures. *Eastern Mediterranean Health Journal*, 2010; 16: S15-S23.
6. Alrowaily MA, Abolfotouh MA, Ferwanah MS. Hepatitis B Virus Sero-Prevalence Among Pregnant Females in Saudi Arabia. *Saudi Journal of Gastroenterology: Official Journal of the Saudi Gastroenterology Association*. 2008;14(2):70-72.
7. Sood S, Malvankar S. Seroprevalence of Hepatitis B Surface Antigen, Antibodies to the Hepatitis C Virus, and Human Immunodeficiency Virus in a Hospital-Based Population in Jaipur, Rajasthan. *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine*. 2010;35(1):165-169.
8. Enahoro, F.O., Daudu, J.I., Nwaopara, A.O. Orjiakor, I.C. The incidence of hepatitis b virus infection among patients at the specialist teaching hospital, irrua, edo state, Nigeria. *International Journal of Basic, Applied and Innovative Research* 2015; 4(2): 44- 53.
9. Ansumana R., Dariano D., Jacobsen K., Leski T., Lamin J. Seroprevalence of hepatitis B surface antigen (HBsAg) in Bo, Sierra Leone, 2012–2013. *Bio Med Central Research Notes* 2018; 11: 113- 116

10. Prasad A., Elantamilan D., Lyngdoh C., Ramudamu M., Phukan A. Seroprevalence Of Hepatitis B and Hepatitis C Infection in A Tertiary Care Hospital in North-East India And Co-Infection With HIV. *International Journal of Scientific Research* 2017; 6(7): 370- 72.
11. Srivastava N., Agarwal A., Kumar V., Goyal A. Seroprevalence of Hepatitis B Surface Antigen in a Tertiary Care Centre. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 2017; 16(8): 65- 66
12. Kateera F, Walker TD, Mutesa L, et al. Hepatitis B and C seroprevalence among health care workers in a tertiary hospital in Rwanda. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 2015;109(3):203-208.
13. Khatoon R, Jahan N. Evaluation of Seroprevalence of Hepatitis B Virus Infection among Patients Attending a Hospital of Semi-urban North India Using Rapid Immunoassay Test. *Nigerian Postgraduate Medical Journal* 2016; 23 (4): 209- 214.
14. Owusu M, Bonney K, Annan A, Mawuli G, Okyere K, Mutocheluh M, et al. Aetiology of viral hepatitis among jaundiced patients presenting to a tertiary hospital in Ghana. *PLoS ONE* 2018 13(9): e0203699
15. Ochwoto M., Kimotho J., Oyugi J., Okoth F., Kioko H. Hepatitis B infection is highly prevalent among patients presenting with jaundice in Kenya. *BMC Infectious Diseases* 2016; 16: 101-16.
16. Singh K., Farooq U, Singh S, Bharti A. Kaur N., Shariq MD. Hepatitis B- and Hepatitis C-infected Cases and Their Correlation with Liver Function Test in TeerthankerMahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh India. *International Journal of Scientific Study* 2016; 4(1): 16-20
17. Sali S MD., Bashtar R MD. Bashtar S MD. Risk Factors in Chronic Hepatitis B Infection: A Case-control Study. *Hepatitis Monthly* 2005; 5(4): 109- 115.
18. Li- Ng. M, Tropp S., Danoff A., Bini E.J. Association between chronic hepatitis B virus infection & diabetes among Asian Americans and Pacific Islanders. *Digestive and liver Disease* 2007; 39: 549-556.
19. Huang ZS, Huang TS, Wu TH, Chen MF, Hsu CS, Kao JH. Asymptomatic chronic hepatitis B virus infection does not increase the risk of diabetes mellitus: a ten-year observation. *Journal of Gastroenterology and Hepatology* 2010; 25(2010): 1420- 1425.
20. Coleman P. Detecting Hepatitis B Surface Antigen Mutants. *Emerging Infectious Diseases www.cdc.gov/eid* 2006; 12(2): 198-203.