

Hepatitis B Seropositivity and Vaccination Coverage among Health Care Workers in a Tertiary Care Hospital in Moradabad, UP, India

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Abstract

Introduction: Hepatitis B is one of the major public health problem globally and is the tenth leading cause of death. In India, HBsAg prevalence among the general population is 4-8%, which place India in an intermediate endemic zone and second largest global pool of chronic hepatitis B infection. Among health care workers sero prevalence is two to four times higher than that of the general population. Healthcare workers are known to be prone to infection with the hepatitis B virus. Hepatitis B virus is transmitted through percutaneous or permucosal as with exposures to blood, which occur in the healthcare setting most often as needle sticks or other sharp device injuries. To effectively curb HBV infection prevention programs must be implemented and the applicability of a complete vaccination schedule must be underline.

Aim & Objective: The following study was undertaken with the following aim and objective. To study the seropositivity of serum hepatitis in health care workers of TMMC & RC and prophylactic measures in health care workers.

Material & Method: Serum sample of 125 health care workers of Teerthanker Mahaveer Medical College and Research Center was taken during two years duration and tested for HBsAg by rapid card test and ELISA test. Vaccination history was taken from health care workers.

Result: The present study was done on 125 health care workers of Teerthanker Mahaveer Medical College and Research Center. Among 125 health care workers 4 were found HBsAg positive by rapid card test and ELISA test. Out of 125 health care workers 58(46.4%) were fully vaccinated.

Conclusion: The risk of hepatitis B infection is well documented among health care workers, although with use of hepatitis B vaccine the incidence of HBV infection in health care workers has decreased. Therefore there is need for well planned and clear policies for HBV screening and vaccination in health care workers.

Keywords: Serum Hepatitis, Health Care Workers, Seropositivity, Prophylaxis

INTRODUCTION

Hepatitis B is one of the major public health problem globally and is the tenth leading cause of death. Worldwide, more than two billion of the population have evidence of past or recent HBV infection and there are more than 350 million chronic carriers of this infection.¹ In India, HBsAg prevalence among the general population is 4-8%, which place India in an intermediate HBV endemicity zone and India with 50 million cases is also the second largest

global pool of chronic HBV infections. Among healthcare workers sero prevalence is two to four times higher than that of the general population.²

Healthcare personnel are persons whose activities involve contact with patients or with blood or other body fluids from patients in a healthcare facilities, labs, or public-safety setting. An exposure that might place Health care workers at risk of infection as a percutaneous injury (e.g., a needle-stick or cut with a sharp object) or contact with mucous

membrane (of eyes, mouth, nose, etc.) or non-intact skin (e.g., exposed skin that is chapped, abraded, or afflicted with dermatitis) with tissue blood or any other body fluids that are potentially infectious.³

The causative agent of hepatitis is hepatitis B virus, which remains asymptomatic in most individuals, but it can show features of fulminant, acute, or chronic hepatitis, considering that the last one might lead to serious complications, such as hepatocellular carcinoma & Cirrhosis. Each year, from 500,000 to 1.2 million individuals die as a consequence of hepatitis B virus infection.⁴ Hepatitis B virus (HBV) infection is highly prevalent in continents like Africa, Asia, and in the different countries, the infection rate in them ranges from 5% to 20%.⁵

Healthcare workers are known to be prone to infection with the hepatitis B virus.⁶ Hepatitis B virus is transmitted through permucosal or percutaneous exposures to blood, which occur in the most of healthcare setting through needle sticks or other sharp device injuries.⁷ To effectively curb Hepatitis B virus infection prevention programs must be implemented, and the relevance of a complete vaccination schedule must be underlined.⁴ The risk of acquiring hepatitis B virus infection through exposure to blood or its products is highest amongst health care workers. Despite potential risks, a proportion of health care workers never get their vaccinations done. India ranks second to China in the numbers of people with chronic HBV.⁸

It is very important to promote vaccination campaigns and increase knowledge and awareness about hepatitis B among health care workers.⁹

Aim of this study was to study the seropositivity of serum hepatitis in health care workers of TMMC&RC, and prophylactic measures in health care workers.

MATERIALS & METHODS

The study was done in the Department of Microbiology, Teerthanker Mahaveer Medical College and Research Center over a period of two years.

Serum sample of 125 health care workers of Teerthanker Mahaveer Medical College and Research Center was collected during two years duration. General history of age, sex, socio economic status, marital status was taken. Proper history of the health care workers was taken about needle stick injury and sharp device injury and exposure to blood and blood products during handling the patients. History of vaccination was also taken.

Samples were collected from doctors, nurses, technicians and general service workers.

Aseptically 5 ml venous blood was collected in sterilized plain vial and transported to microbiology laboratory. It was centrifuged and serum was separated. Samples were Tested for HBsAg by rapid card test and ELISA test. To detect HBsAg in samples test were done by using commercially available HEPACARD (J. Mitra. Co. Pvt. Ltd).

ELISA test was also done to detect HBsAg in 125 blood samples, commercially available HEPALISA kit (J. Mitra. Co. Pvt. Ltd) was used.

Rapid Card Test

HEPACARD is one step rapid visual test for the qualitative detection of HBsAg in human serum or plasma. Use of this assay is intended as an aid in the recognition and diagnosis of acute infections and chronic infectious carriers of hepatitis B virus. It is a one step immunoassay based on the antigen capture or sandwich principle. The particular method uses monoclonal antibodies conjugated to colloidal gold and polyclonal antibodies immobilized on a nitrocellulose strip in a thin line. This test sample is introduced to and flows laterally through an absorbent pad where it mixes with the signal reagent. If the sample contains HBsAg, the colloidal gold-antibody conjugate binds to the antigen, forming an antigen –antibody-colloidal gold complex. Then complex migrates through the nitrocellulose strip by capillary action. Then further complex meets the line of immobilized antibody (test line) T, the complex is trapped forming an antibody – antigen-antibody colloidal gold complex. The pink band formed indicates the sample is reactive for HBsAg. To serve as a procedural control, an additional line of anti-mouse antibody (control line) C, has been immobilized at a distance from the test line on the strip. When the test is performed correctly, this will result in the formation of a pink band upon contact with the conjugate.

ELISA Test

HEPALISA is a solid phase enzyme linked immunosorbent assay(ELISA) based on the Direct Sandwich principle. The microwells are coated with Monoclonal antibodies with high reactivity for HBsAg. The samples are added in the wells followed by addition of enzyme conjugate (polyclonal antibodies linked to Horseradish Peroxidase (HRPO). A sandwich complex is formed in the well wherein HBsAg (from serum sample) is trapped or sandwiched between the antibody and antibody HRPO conjugate. Unbound conjugate is then washed off with wash buffer. The amount of bound peroxidase is proportional to the concentration of HBsAg present in the sample. Upon addition of the substrate buffer and chromogen, a blue colour develops.

The intensity of developed blue colour is proportional to the concentration of HBsAg in sample. To limit the enzyme-substrate reaction, stop solution is added and a yellow colour develops which is finally read at 450 nm spectrophotometrically.

RESULTS

The present study was done on 125 health care workers of Teerthanker Mahaveer Medical College and Research Center, Moradabad

Out of 125 health care workers 80 were men and 45 were female. Among 125 health care workers 4 were found HBsAg positive by both rapid card test method and ELISA test. Out of four positive cases three were men and one was female.

Two positive cases were detected among 41 health care workers of age group 28-37 years. Out of 125 healthcare workers 4 cases were found positive. Among 36 health care workers between 18-36 years only one case was detected positive. Among 32 health care workers between 38-47 years age group one case was detected positive (Table 1).

Table 1: HBsAg positive in relation to age

Age	No. of health care workers	HBsAg positive	HBsAg positive %
18-27	36	1	2.77%
28-37	41	2	4.87%
38-47	32	1	3.12%
48-57	12	-	-
58-onward	4	-	-
Total	125	4	3.2%

Two positive two cases were detected among 32 general service workers. Among 31 nurses one case was detected HBsAg positive. Among 32 Laboratory technicians one case was detected HBsAg positive. Among 30 doctors positive case was not detected (Table 2).

Table 2: HBsAg positive in relation to occupation

Occupation	No. of health care workers	HBsAg positive	HBsAg positive %
Doctors	30	-	-
Nurses	31	1	3.22%
Lab technicians	32	1	3.12%
General service	32	2	6.25%
Total	125	4	3.2%

Out of 125 health care workers only 58 were fully vaccinated. Not vaccinated health care workers were 52. Incomplete course of vaccination was in 15 health care

workers. Among incomplete course of vaccination one case was HBsAg positive (Table 3).

Table 3: HBsAg positive in relation to vaccination status

Vaccination status	No. of health care workers	% of health care workers vaccinated	HBsAg positive	HBsAg positive (%)
Fully vaccinated	58	46.4%		
Incomplete course of vaccination	15	12%	1	6.6%
Not vaccinated	52	41.6%	3	5.77%
Total	125		4	3.2%

DISCUSSION

In the present study out of 125 healthcare workers 4 (3.2%) were HBsAg positive and 46.4% health care workers were vaccinated. In a study done by Batista SM et al⁴ reported that seropositivity for hepatitis B among dentist is 10.8% from Campo Grande and majority of the dentists (96.6%) are done with HBV vaccination, although only 73.1% completed the three-dose schedule. In dentists from the other regions of Brazil, the infection rates ranged from 10.00% to 17.9%. On the other hand, it was observed that 9% of seropositivity for HBV infection among was there among dentists from United States of America and 7% from Berlin.⁴ In a study done on healthcare workers by Shin BM et al⁵ positive rate for HBsAg was 2.4%. In 1992, Elavia et al⁶ conducted study on healthcare workers and reported that prevalence of HBsAg was 10%. In 2003 E.P. Simard et al conducted a study and reported that in the United States, a 70% decrease in the incidence of acute hepatitis B and estimated 75% of HCWs have been vaccinated against hepatitis B. In a tertiary care hospital in Delhi reported that only 1% of healthcare workers were HBsAg positive by Sukriti et al in 2008 and vaccination in health care workers was 55.4%.⁸ In a study done in 2012 by Patricia Carvalho et al⁹ seropositivity of hepatitis virus is 8.8% in health care workers. In 2008 in Japan vaccination coverage was found to be 48.2% in dental workers by Nago Y. et al.¹⁰ In a study done by Hutin Y et al. vaccination coverage varies from 18% in Africa to 77% in Australia and New Zealand.¹¹ In a study done in 2006 by Dannelun E et al in Sweden, the number of HCWs who have received at least one dose is 79%, but only 40% were reported to be fully vaccinated.¹²

The risk of acquiring hepatitis B virus infection through exposure to blood or its products is highest amongst health care workers. To effectively curb Hepatitis B virus infection prevention programs must be reinforced and the relevance of a complete vaccination schedule must be underlined.

CONCLUSION

Exposure to blood borne pathogens poses a serious risk to healthcare workers,¹³ and risk of hepatitis B infection is well documented among healthcare workers & professionals. Although with the use of hepatitis B vaccine the incidence of hepatitis B virus infection in healthcare workers & professional has sufficiently decreased, but there is still lots of scope for improvement, as many healthcare workers have not undergone any vaccination. Therefore, there is a utmost need for clear and well-planned policies for HBV screening and vaccination in healthcare workers, especially the one who are at a greater risk of exposure to blood or other potentially infectious material. To minimize the risk, all healthcares should adhere to standard precautions, including the use of appropriate use of hand washing, protective barrier and disposal of needles and sharp instruments.¹³ Energetic steps should be taken in all hospitals for the prevention of hepatitis B virus infection among healthcare workers. Hospitals need to identify methods to improve hepatitis B vaccination coverage levels and should consider developing targeted vaccination programs directed at unvaccinated, at-risk healthcare workers who have frequent or potential exposure to blood or other potentially infectious materials. To effectively curb hepatitis B virus infection prevention programs must be implemented and the relevance of a complete vaccination schedule must be underlined. It is important to promote vaccination campaigns and improve knowledge and awareness about hepatitis B among health care workers.

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