Seroprevalence of Anti-HBs Titers in Health-care Workers in a Tertiary Care Hospital in Mumbai

Surg Cdr Kavita Bala Anand, Surg Cdr Supreet Mohanty, Surg Capt V Manu
Associate Professor, 1Assistant Professor, 2Professor, Department of Pathology, INHS Asvini, Mumbai, Maharashtra, India

Abstract

Introduction: Hepatitis B is a vaccine preventable disease caused by Hepatitis B virus which is a partially double stranded virus. Sharp injuries are the most common occupational injuries among healthcare workers (HCW). HCW are prone to sharp injuries during work, and infection after exposure. Materials and Methods: Anti-HBs titres were measured in 231 HCW in a tertiary care hospital in Mumbai. Result: Eighty six males and 145 females participated in the study. Out of these 41 were vaccine non compliant; 37 were partially immunized and 4 were not immunized. 32 out of 231 individuals tested had titres below 10 mIU/ml (10 mIU/ml considered to be the minimal protective titre). Among the individuals who had titres <10 mIU/ml, 17 were medical assistants, 10 were nursing officers and 5 were doctors. Out of these there were 04 who had not received any HepB vaccination in the past. The rest had received either complete or partial immunization. All those who had completed primary vaccination series and had titres <10 mIU/ml (n = 14) had completed primary vaccination more than 5 years ago. Conclusions: In our study 82.2% were vaccine compliant and 27.8% were vaccine non compliant. Out of 231 individuals 32 (13.85%) had titres <10 mIU/ml. This study highlights the need for HCW to undergo anti-HBs titres post primary vaccination and after 5 years of primary vaccination to identify susceptible individuals. The HCW with non protective titres should be give Hep B booster and antibody levels should be tested to confirm protective titres.

Keywords: Anti-hepatitis B antibodies, hepatitis B vaccine (HepB vaccine), primary immunisation

INTRODUCTION

Hepatitis B (HepB) is one of the vaccine-preventable diseases caused by hepatitis B virus (HBV) which is a partially double stranded virus and belongs to the Hepadnaviridae family. Hepatitis B is a global health problem, and the World Health Organization has stated that approximately a third of the world population is infected. Among the modes of transmission, contact with body fluids in health-care setting in the form of occupational exposure is known. The virus is relatively hardy and can survive for a long duration outside the body. Hence, the consequences of acute and chronic hepatitis B are considered a vaccine-preventable health problem. In India, the prevalence of hepatitis B infection is 2%–7% (intermediate endemicity zone), with an average of 4%. Health-care workers (HCWs) can contract HBV through infected blood and body fluids, and infected HCWs can transfer HBV to uninfected patients. In addition to standard precautions which should be followed religiously, susceptible personnel must be identified. These personnel must be immunized to reduce the morbidity of HCWs. Injuries by sharp objects are responsible for the most number of occupational injuries. HCWs are prone to sharp injuries during work and infection after exposure. In 2000, around 66,000 HBV, 16,000 hepatitis C virus, and 1000 HIV infections occurred in HCWs due to sharp injuries. Healthy HepB vaccination recipients respond to hepatitis B (Hep B) vaccination; however, these numbers may be lower in the overall population, particularly in people suffering from chronic health conditions. HCWs who show a response to Hep B vaccination rarely develop acute or chronic hepatitis B infection. However, the minority of HCWs not responding to the vaccination should be identified and re-vaccinated to prevent transmission of the virus to others.
vaccination remain susceptible. Serologic testing for antibody to hepatitis B surface antigen (anti-HBs) after vaccination aids to recognize vaccine nonresponders. These nonresponders should undergo revaccination to attain protective blood titers.

We undertook a cross-sectional study to establish the seroprevalence of anti-HBs in the HCWs in a tertiary care setup to assess the level of protection that workers in these high-risk zones have. The subjects for the study were HCWs ranging from physicians, surgeons, residents, operating room technicians, laboratory technicians, nurses, and nursing students.

**Materials and Methods**

A cross-sectional study was carried out in a tertiary care hospital in February 2019. Taking 81.5% to be the prevalence of HepB vaccine compliant health workers from a study and 95% to be the confidence interval and 80% to be the power of the study, with a deviation of 5% on either side, the sample size was calculated to be 232.

Two hundred and thirty-one HCWs were finally enrolled in the study, and written consent was obtained. The HCWs comprised medical professionals, nursing staff, and nursing students.

The samples were collected during a period of 6 days. History of immunization in terms of when the immunization had been instituted, whether it was completed within 5 years or more than 5 years from the date of testing was collected. Also how many doses of vaccine were taken, in terms of complete immunization or incomplete immunization, were collected. The primary HepB vaccination in adults generally comprises three doses of 20 μg of recombinant hepatitis B surface antigen protein given intramuscularly into the deltoid muscle at 0, 1, and 6 months.

Those who had not completed the primary vaccination series or those who had not been administered even a single dose of HepB vaccine were considered vaccine noncompliant. This group consisted of two subgroups: partially vaccinated HCWs — those who had started vaccination but did not complete three doses of primary vaccination and nonvaccinated HCWs — who were not exposed to Hepatitis B vaccine.

The serum samples were processed for anti-HBs titers by enzyme-linked fluorescent assay method using VIDAS (by bioMérieux, France).

**Results**

Of 231 HCWs who participated in the study, 32 (13.85%) had titers below 10 mIU/ml (10 mIU/ml considered to be the minimal protective titer), as shown in Table 1. Among these 32 individuals, 17 (53.12%) were medical assistants, 10 (31.25%) were nursing officers, and 5 (15.6%) were medical professionals. Of the 32 participants with nonprotective titers, 18 were vaccine noncompliant, whereas the rest had completed primary vaccination, as presented in Table 1.

Among the vaccine noncompliants, there were 4 who had not received any immunization in the past. The rest 14 had received partial vaccination. All individuals in the range of nonprotective titers were either vaccine noncompliant or had been fully immunized more than 5 years ago. None in the fully immunized group with low titers had completed immunization with the past 5 years.

Among the total 231 participants, 190 (82.25%) were vaccine compliant. Forty-one (17.7%) were noncompliant, 37 (16%) were partially immunized, and 4 (0.17%) were not immunized. Among the vaccine noncompliants, 21 nurses, 15 paramedics, and 1 doctor were partially immunized. Of the 231 participants, 134 had titers >500 mIU/ml, 33 had value 101–499 mIU/ml, 32 had titers between 10 and 100 mIU/ml, and 32 had value <10 mIU/ml. Of 86 males enrolled in the study, 20 (23%) had values <10 mIU/ml. Of 145 females enrolled in the study, 11 (7%) females had values <10 mIU/ml. Of the partially immunized individuals, 23 had protective titers and 16 among them had titers above 500 mIU/ml.

**Discussion**

Hepatitis B is a vaccine preventable infection with long-term complications in up to 5% individuals. HCWs are at the greatest risk of contracting infectious diseases because of the high-risk environment they work in. The effectiveness of vaccination can be ascertained by measuring the anti-HBs titers that develop in response to the vaccination and hence is a serological marker for effective vaccination. Immunocompetent individuals who have vaccine-induced anti-HBs levels of ≥10 mIU/mL 1–2 months after receiving a complete ≥3-dose HepB vaccine series are considered having protective titers and being vaccine responders. In our study, 82.2% of the health-care personnel had completed the primary vaccination series, which is below the Healthy People 2020 target of 90% HepB vaccination coverage among HCWs (objective no. IID-15.3). Among immunocompetent HepB vaccine responders, studies suggest that protection against acute symptomatic and chronic hepatitis B infection...
persists for ≥22 years.\textsuperscript{[13-15]} Another study suggests that 493 individuals in an intermediate HBV endemicity area who had received HepB vaccination at >6 months of age, no acute or chronic hepatitis was detected among vaccine responders, though 1% of individuals experienced subclinical HBV infection without chronic infection during ≥20 years of follow-up.\textsuperscript{[13,16]} In our study, 13.85% of the HCWs at given point in time had titers <10 mIU/ml. In our study, 37 individuals were partially immunized and 4 were not immunized. Furthermore, 23 individuals, despite being partially immunized, had titers more than 10 mIU/ml, which also indicates that the vaccine has good immunogenic potential for certain individuals. Of the 23 individuals, 16 had titers >500 mIU/ml. Furthermore, the individuals with titers <10 mIU/mL when completely immunized were mainly those who had taken their vaccination more than 5 years back as shown in Table 1. Among the individuals with titers <10 mIU/mL with partial doses, was seen maximum in paramedics (n = 11) followed by nurses (n = 3). Among doctors, only one was partially immunized and one was not immunized. On inquiry, lack of awareness was the most common cause for not completing the primary vaccination series. The titers show a decrease after 5 years of primary immunization in certain individuals, as evident from Table 1. The same has been brought out in various studies by Chaudhari et al.\textsuperscript{[11]}

\section*{Conclusion}

Our study highlights the prevalence of nonvaccine compliance among HCWs as well as falling titers over a course of time. Vaccine response assessment should be carried out in the form of anti-HBs titers for all HCWs after completing primary vaccination series to identify nonresponders and 5 years after immunization to detect individuals whose titers have fallen below the protective levels.

\section*{Financial support and sponsorship}

Nil.

\section*{Conflicts of interest}

There are no conflicts of interest.