

Low prevalence of hepatitis B and C infections among the healthcare workers despite low vaccination coverage for hepatitis B in Mumbai

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ABSTRACT

Background: The risk of acquiring hepatitis B virus (HBV) and hepatitis C virus (HCV) infections through exposure to blood or its products and contact with other body fluids is high amongst health care workers (HCWs). Despite potential risks, a proportion of HCWs never get vaccinated. This study aimed to investigate the vaccination practices and the prevalence of HBV infection in HCWs. **Aims:** To determine the prevalence of HBV and HCV, their possible association with occupational and non-occupational risk factors. We also studied the prevalence of vaccination for hepatitis B in different subgroups of study population. **Materials and Methods:** In this cross-sectional study, total 1347 hospital staffs were screened for hepatitis B and hepatitis C. HBV is detected by HBsAg testing, and HCV is detected by anti-HCV testing by ELISA method. Positive results were confirmed by HBV DNA testing (Qualitative) and HCV RNA testing (Qualitative). A questionnaire used to collect data from study participants was pre-designed by the authors. **Results:** Out of total 1347 hospital staffs screened, 6 (0.4%) were HBsAg-positive and 2 (0.1%) were anti-HCV-positive. Only 54% had a history of complete vaccination, and 0.3% had incomplete vaccination. Vaccination coverage was highest in residents (76.7%), medical students (68.9%), nursing (66.1%), and teachers (61.4%) and lowest in servants (5.4%), office staff (6.6%), and lab technicians (24.3%). Awareness about the risk factor for transmission of HBV and HCV and complication related to them was 77.7%. It was highest in teachers (93.9%) and residents (97.8%), lowest in servants (16.3%). No statistically significant difference in the exposure to various risk factors among those who are HBsAg or anti-HCV-positive and HBsAg or anti-HCV-negative. **Conclusions:** The prevalence of HBV and HCV infection is not high in hospital staff than general population. Hepatitis B vaccination coverage was below expectation in all the subgroups even in resident doctors and teachers.

Key words: Health care workers, hepatitis B, hepatitis B vaccination

INTRODUCTION

Hepatitis B and C are most common causative agents of chronic hepatitis, which are asymptomatic in most individuals. Chronic infection is often life-long, and can lead to liver cell failure and hepatocellular carcinoma.

Transmission of HBV is through the parenteral route, blood transfusion products, sexual intercourse, and vertically from infected mothers to neonates. The virus is found in body fluids such as urine, saliva, nasopharyngeal fluids, semen, and menstrual fluids and can be transmitted through contact with these fluids.

Hepatitis B virus (HBV) is the most commonly transmitted blood-borne virus in the health-care setting. Transmission generally occurs from patient to patient or from patients to health-care personnel via contaminated instruments or accidental needle-stick or sharps injuries. Frequency of exposure of HCW to HBV is influenced by HBV endemicity. Thus, 90% of such HBV infections occur in Asia and Africa.^[1] Hospitals in these countries are overburdened, and HCW provide service to large populations with HBV carrier rates of 5-10%.

More than 70% of HCW in hyper- or intermediate endemic countries have been reported to have needle-stick injuries, with an average of two needle pricks a year and four needle pricks

during their active professional life. However, less than 30% of needle-stick injuries were reported to appropriate authorities.^[2-5]

Due to high risk of HBV and hepatitis C virus (HCV) infection among healthcare workers (HCW), routine pre-exposure vaccination against hepatitis B and the use of standard precautions to prevent exposure to potentially infectious body fluids have been recommended by the Center for Disease Control and Prevention (CDC). However, despite the long-standing existence of recommendations for risk-groups vaccination, hepatitis B vaccination coverage remains low in high-risk groups. This may be attributed to the lack of perceived risk of hepatitis B infection and to the absence of appropriate health care programs targeting vaccination against HBV infection.

The aim of the study was to study the prevalence of hepatitis B and hepatitis C infection among the various class of hospital staffs and their association with various occupational and non-occupational risk factors. We also studied the awareness of various risk factors and complication of hepatitis B and C infection. We also studied the hepatitis B vaccination coverage in hospital staff.

MATERIALS AND METHODS

This was a cross-sectional study conducted at B.Y.L. Nair hospital, Mumbai in March 2012 by Department of Gastroenterology. Hospital staffs (teaching staff, resident doctors, medical students, nurses, servant staff (Class IV workers), lab technicians, and office staff) were screened for hepatitis B and hepatitis C infection.

The questionnaire used to collect data from study participants was pre-designed by the authors. It comprised 2 parts: The first covered basic information such as age, sex, occupation;

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the second part covered risk factors for HBV infections and vaccination for hepatitis B.

Informed consent was obtained from each participant after explaining the objective of the study. Participants were assured that any identifying information would not be disclosed. Institutional ethics committee approval was obtained before starting the study.

Laboratory work

We collected 5 mL of venous blood in a Vacutainer tube from each of the participants. Serum was separated and kept at -20°C until screening.

HEPALISA Microwell Enzyme-linked immunosorbent assay (ELISA) commercial kit was used to detect HBsAg in serum. SD HCV ELISA 3.0 (3rd generation anti-HCV ELISA test) kit was used to detect anti-HCV in serum. Positive results were confirmed by more specific assay like HBV DNA (reverse transcription polymerase chain reaction [RT-PCR] qualitative) and HCV RNA (cobas method, qualitative).

Data were recorded and analyzed using the SPSS software. We categorized the study population into groups according to the occupation into seven groups (teachers, resident doctors, nursing staff, lab technicians, medical students, servants [class IV workers], and office staff). Association of various occupational and non-occupational risk factors with hepatitis B and C in study population was studied using Fisher's Exact Test.

RESULTS

In a screening program held in B.Y.L. Nair hospital, total 1347 hospital staffs were screened for hepatitis B and hepatitis C infection.

Of the total population screened, 886 (65.8%) were females and 461 (34.2) were males. We sub-categorized the study population in seven subgroups according to their occupation [Figure 1]. Five hundred and sixty (41.6%) were nursing staff and nursing students, 227 (16.9%) were resident doctors and intern doctors, 114 (8.5%) were teaching faculty, 119 (8.8%) were medical students, 116 (12.3%) were servants, (6.8%) were office staff, and 70 (5.2%) were lab technicians.

Out of total 1347 hospital staffs screened, 6 (0.4%) were found to be HBsAg-positive and 2 (0.1%) were found to be anti-HCV-positive. Sero-positivity for the hepatitis B was highest among the servants (2.4%). None of the resident doctors, lab technicians, and office staffs was seropositive for hepatitis B. All the HBsAg participants undergo HBV DNA (RT-PCR qualitative) assay for confirmation. All of them were found to be HBV DNA-positive. One (0.6%) servant and 1 (1.1%) office staff were found sero-positive for hepatitis C. Their results were confirmed by HCV RNA (cobas method, qualitative) assay. Both were positive for HCV RNA.

History of complete vaccination for hepatitis B was there in only 54% of hospital staff. Only 76.7% of resident doctors, 66.1% nursing staffs, and 61.4% of teaching faculty had history of complete vaccination [Figure 2]. Vaccination coverage was very poor among the servants (5.4%), office staff (6.6%), and lab technicians (24.3%).

Only 77.7% of the hospital staffs were aware of various mode of transmission of hepatitis B and C and its complications [Figure 3]. Awareness was highest among the resident doctors (97.8%), medical students (94.1%), teaching faculty (93.9%), and nursing staff (88.2%). It was very low among the servant staff (16.3%), lab technicians (57.1%) in spite of being at higher risk of acquiring these infections. Awareness regarding the hepatitis B and C infection had no statistically significant impact on the infection rate of hepatitis B and C (0.4% vs. 1.4%, $P = 0.08$).

Exposure to the various risk factors for the transmission of hepatitis B and C were studied from the questionnaire filled by participants. Sixty-four (4.8%) had history of blood transfusion in past, 423 (31.4%) had past history of surgery, 65 (44.9%) had undergone some form of dental treatment, 356 (26.4%) had history of needle prick, and 614 (45.6%) had history of hospitalization in past for various reasons and 111 (8.2%) had tattooing done on their body. Associations of various risk factors for hepatitis B and C sero-positivity were studied with Fisher's exact test.

Fifty percent (3 out of 6) of the participants who were hepatitis B-positive and 100% (2 out of 2) participant who were HCV-positive had history of dental treatment. No statistically significant difference for the exposure to dental treatment was found among those who are seropositive for hepatitis B and C and those who are not (0.8% vs. 0.4%, $P = 0.479$).

Only one (1 out of 6) participant who was HBsAg-positive had history of needle stick injury. None of the HCV-positive participant had history of needle stick injury.

None of the seropositive hospital staff had past history of blood transfusion. Only one had history of surgery in past.

None of the hospital staff gave the history of I.V. drug abuse and high-risk sexual behavior.

DISCUSSION

India has been categorized as having intermediate endemicity of HBV with 2-4% HBsAg prevalence in general population. Health

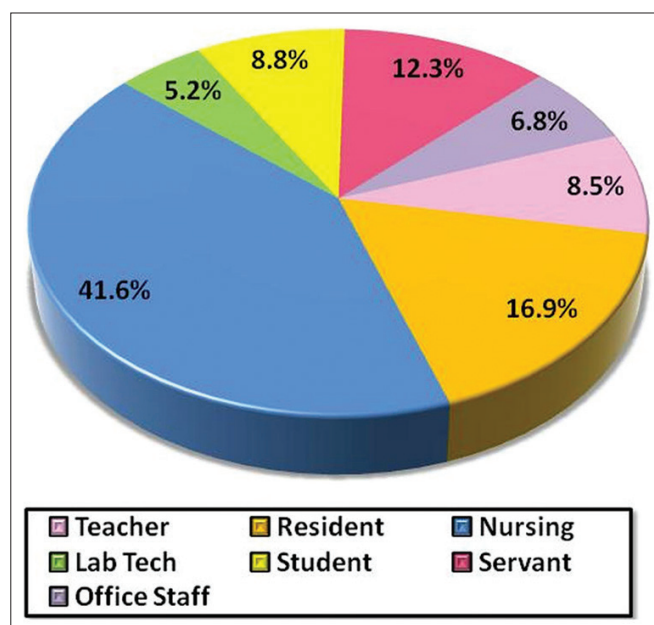


Figure 1: Designation among the participants

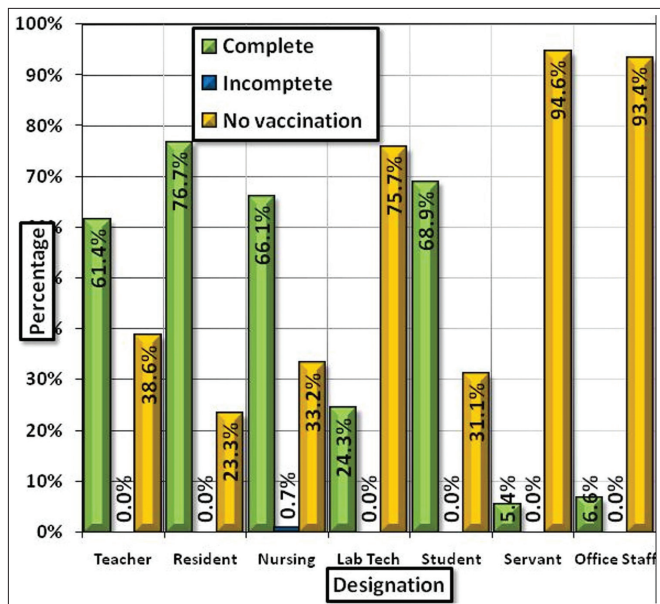


Figure 2: Vaccination among various groups of participants

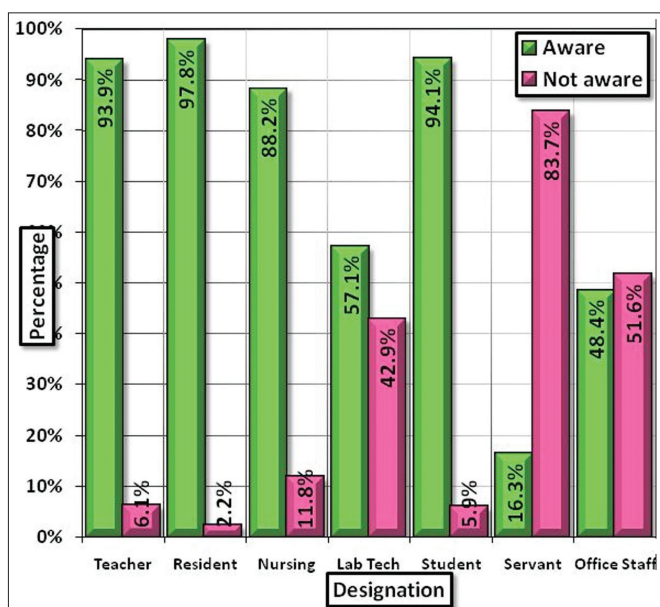


Figure 3: Awareness regarding hepatitis B and C infections among the participants

care workers fall into high-risk group, but the prevalence of the disease in our study population is much low in spite of the fact that this group was inadequately vaccinated lower than expected level of awareness.

HBV infection rates among HCW were reported to be 10% in 1992 in one study,^[6] and 2.21% in another study done in 1998.^[7] More recently, a tertiary care hospital in Delhi reported that only 1% of healthcare workers were HBsAg-positive.^[8] Other studies done in the various parts of India shows HBsAg prevalence of 1-1.7% in various studies, which is lower than the HBV carrier frequency of 2-4% in the general population.^[9] This decreasing trend is most probably due to increasing awareness regarding these infections and hepatitis B vaccination.

In our study, only 6 (0.4%) were HBsAg-positive and 2 (0.1%) were anti-HCV-positive. Infection rate for hepatitis B and C was higher in males (1.3%) compared to the females (0.2%) ($P = 0.022$). Higher prevalence of hepatitis B infection in servant staff may be due to low vaccination coverage, lack of awareness.

Prevalence of hepatitis B and C infections lower than expected in our study is may be due to decreasing prevalence of hepatitis B in general population because of increasing awareness and vaccination. Prevalence of hepatitis B and C infections in healthy blood donors in Mumbai was reported 1.98% and 0.9%, respectively.^[10] Due to perceived problem of confidentiality, hospital staff with high-risk behavior might have avoided participation. These factors might have led to the underestimation of the true prevalence of the infection rate.

In spite of all this, the exact reason for low positivity cannot be explained fully. Studies on prevalence rates of hepatitis B and C in India, on health care workers, have shown higher prevalence than our study.

HBV vaccination rates among HCW in South Asia and other countries with low socio-economic status have been reported to be unsatisfactory. Reports from India,^[8,11] Pakistan,^[3] Nepal,^[2,12] Egypt,^[13] Brazil,^[14] and Nigeria^[5] indicate that only 16-60% of HCW have received complete HBV immunization. In these countries, paramedics were more often unaware of HBV/HCV transmission and less often received HBV vaccination than doctors.

HBV vaccine coverage rates were 50-55% among HCW in India.^[9] The collected data indicated very poor vaccination coverage for hepatitis B in our study population. Only 54% of hospital staff had history of complete vaccination. Significantly lower level of vaccination was found in servants (5.4%) and lab technicians (24.3%) who are at high risk of acquiring hepatitis B infection. Vaccination coverage was lower than expected even in resident doctors (76.7%), nursing staffs (66.1%), and teaching faculty (61.4%).

Lower vaccination may be due to indifferent attitude, lack of motivation, or lack of awareness. Another reason may be the lack of vaccination policy for health care workers by hospital management.

Awareness regarding the hepatitis B and C infection had no statistically significant impact on the infection rate of hepatitis B and C (0.4% vs. 1.4%, $P = 0.08$). This statistical no difference may be due to low prevalence of hepatitis B and C infection in study population.

We also studied exposure to various occupational and non-occupational risk factors in study population from the questionnaire filled by participants. Significant proportion of study population had history of exposure to the various risk factors. Sixty-four (4.8%) had history of blood transfusion in past, 423 (31.4%) had past history of surgery, 65 (44.9%) had undergone some form of dental treatment, 356 (26.4%) had history of needle prick, 614 (45.6%) had history of hospitalization in past for various reasons, and 111 (8.2%) had tattooing done on their body. None of the hospital staff gave the history of I.V. drug abuse and high-risk sexual behavior.

No significant difference was found in exposure to various risk factors; blood transfusion ($P = 1.00$), past surgery ($P = 0.448$), dental procedure ($P = 0.479$), history of needle prick ($P = 0.698$), tattooing ($P = 1.00$), and hospitalization ($P = 1.00$) among those who are seropositive for hepatitis B and C and those who are seronegative. Again, this statistical non-difference may be due to very few numbers of hepatitis B and C-positive participants in our study.

According to a report by WHO, between 1980-1985, 6-8% of all infected personnel were HCW. This figure has steadily declined over years after wide-scale efforts to vaccinate HCW and to introduce universal precautions.^[15,16] So, the vaccination strategy is very effective in prevention of hepatitis B infection in health care workers. Therefore, all HCW globally, and particularly in countries of high and intermediate endemicity for HBV, should be vaccinated at their initial entry to the respective training program or at initiation of their professional activities. In spite of this recommendation, uniform policy for vaccination of health care workers is lacking.

In conclusion, the findings of the study suggest that even now, a large population of HCWs in India is unvaccinated and ignorant about their safety against a major health problem. So, compulsory vaccination for hepatitis B at entry level for every healthcare worker should be included in hospital policy.

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