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Short Communication

Evaluation of immune response to hepatitis B vaccine among health care workers at a tertiary care hospital in south India: a retrospective record based study

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ABSTRACT

Seroprevalence of hepatitis B virus (HBV) among healthcare workers (HCWs) is two to four times higher than that of the general population due to repeated exposure. To determine the hepatitis B (hep B) vaccination status, non-response rate to (hep B) and its determinants among HCWs at a tertiary care teaching hospital in south India. A secondary analysis of the medical records of a group of HCWs who joined the hospital from 1st January 2015 to 31st December 2016 was done. A total of 451 HCWs received the vaccine at the study hospital. Mean age of the HCWs was 25.3±6.1 years, majority 374 (82.1%) of them were females and joined as staff nurses 213 (47.2%). Only 164 (36.3%) had received all 3 doses of hep B vaccination. Complete vaccination with (hep B) among HCWs was poor. Health education and suitable administrative controls must be instituted to ensure protection.

Keywords: Hepatitis B vaccine, Health care workers, Occupational health, Workplace safety

INTRODUCTION

Hepatitis B is an infection caused by the hepatitis B virus (HBV), which is transmitted through percutaneous or mucosal exposure to infectious blood or body fluids.[1] Its sequelae include chronic liver disease, cirrhosis, and hepatocellular carcinoma. The World Health Organization (WHO) reports that annually about 6% of HCWs are exposed to blood-borne HBV infections corresponding to about 66,000 HBV infections in HCWs worldwide.[2] HCWs can be a potential source of infection to patients. Vaccination is a highly reliable strategy for preventing HBV infection. Hepatitis B (hep B) vaccine is usually given as 0, 1, 6 month schedule. The immune response is measured after 2 months of last dose and an anti-HBS antibody titre of ≥10 mIU/ml is considered to be protective.[3] India with 50 million cases is the second largest global pool of chronic HBV infections.[4] The Ministry of Health and Family Welfare, Government of India has passed a resolution on 01 June 2018 to immunize all HCWs against HBV infection.[5]

In spite of the policies, the implementation is poor in low and middle-income countries.[6]

Objectives

Objectives of the study were to determine the hep B vaccination compliance, immune response to hep B vaccine and its determinants among HCWs at a private tertiary care teaching hospital in south India.

METHODS

The present study involved the analysis of retrospective medical records of hep B vaccination and reports of immunological tests of HCWs who were recruited from 01 January 2015 to 31 December 2016 at the study hospital.

Institutional ethics committee approval was obtained before starting the study. Permissions have been taken from administrative heads of the institution for accessing various records. The need to obtain informed consent was waived because we retrospectively collected data without using any identifiable information of individuals neither was there any intervention.

Inclusion criteria

All HCWs who had taken hep B at tertiary care teaching hospital during the study period.

Protocol for hepatitis B vaccine at the hospital is given in Figure 1.

Table 1: Operational definitions.

Parameter	Definition
Health care worker	A healthcare worker is one who delivers care and services to the sick and ailing either directly as doctors and nurses or indirectly as aides, helpers, laboratory technicians, or even medical waste handlers[7]
Compliant to hepatitis B vaccination	Recipient of all 3 doses of hep B vaccine
Responders (anti-HBs positive)	Anti-HBs titre value ≥10 IU/mL
Non responders (anti-HBs negative)	Anti-HBs titre value <10 IU/mL

Table 2: Data sources and variables captured.

Human resource department	**Name, age, gender, date of joining, designation, hospital number**
Information technology department	Date of receiving hep B vaccination
Pharmacy data base	Hep B vaccine trade name
Laboratory data base	Date of testing and anti-Hbs titre values

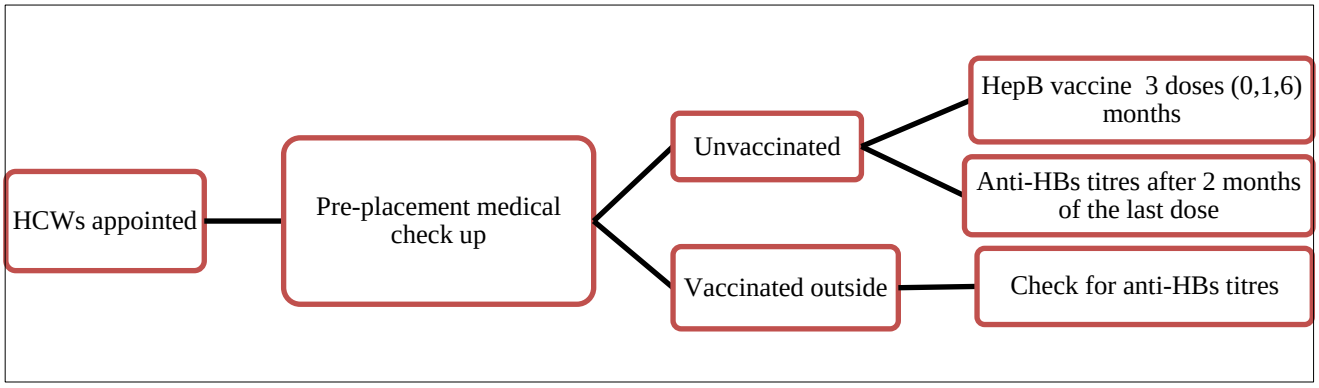

Figure 1: Protocol for hepatitis B vaccine at the hospital.

Data analysis

Data was analysed using statistical package for the social sciences (SPSS) V 21. The data is described using frequencies, proportions, mean and standard deviation. Vaccination status was tested with socio-demographic factors using tests of significance such as Chi square test and Fischer exact test as applicable. A p value of <0.05 was considered significant

RESULTS

A total of 451 HCWs recruited from January 2015 to December 2016 at the study hospital received hep B vaccine. Majority 183 (40.6%) of the HCWs were in the age group of 23-27 years. Mean age of the HCWs was 25.3±6.1 years, majority of them were females 374 (82.1%) who had joined as staff nurse 213 (47.2%). Out of 451 HCWs, 119 (26.4%) had taken only 1 dose of HBV vaccine and 164 (36.3%) had taken all 3 doses of vaccine (Figure 2). Out of those who took 1 dose, 2 doses, 3 doses and more than 3 doses, the conversion was 71.4%, 72.2%, 83.5% and 85.7% respectively (Table 4). More than two-thirds 134 (65.1%) of the HCWs tested their titres after 6 months of receiving the last dose (Figure 4). On univariate analysis socio-demographic variables were tested with outcome variables. No statistically significant associations were found between the same (Table 5). There was no statistically significant association between number of doses and immune response achieved (Table 6).

Table 3: Participant distribution according to age, gender and designation (n=451).

Variable	Number	Perce-ntage
Age group (years)		
18-22	157	34.8
23-27	183	40.6
≥28	111	24.6
Gender		
Female	374	82.1
Male	77	17.9
Designation		
Staff nurse	213	47.2
Administrative staff	71	15.7
Helpers	65	14.4
Hospital aides	51	11.3
Lab technicians	36	7.9
Doctors	15	3.3

Table 4: Sero-prevalence of anti-Hbs antibody (n=451).

Anti-Hbs antibody	Number of vaccine doses			
	1	**2**	**3**	**>3**
Responders (anti-HBs positive)	85	91	137	36
Non responders (anti-HBs negative)	34	35	27	6
Percent	71.4	72.2	83.5	85.7

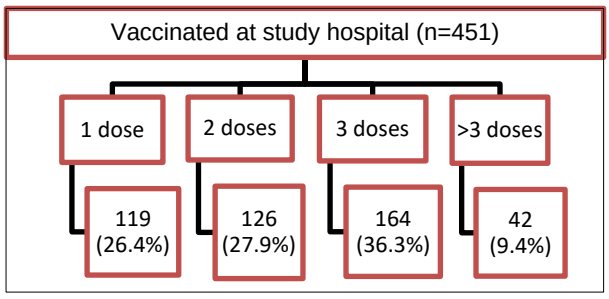

Figure 2: Vaccination coverage among HCWs.

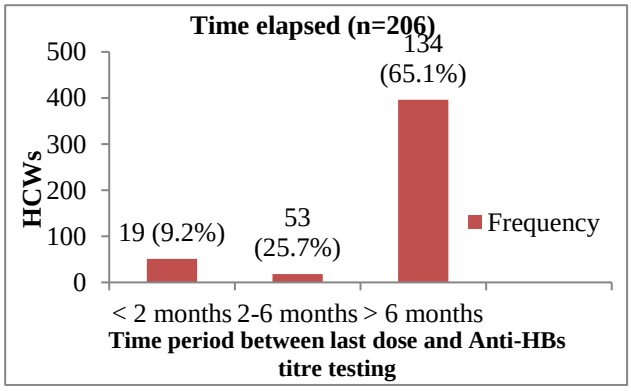

Figure 3: Time elapsed between last dose and testing of titres.

Table 5: Association between socio-demographic variables and vaccination status (n=451).

Factors and categories	Vaccination status		P value
Age (years)	Yes (%)	No (%)	
18-22	125 (79.1)	33 (20.9)	0.654*
23-27	138 (75.8)	44 (24.2)	
≥28	86 (77.4)	25 (22.6)	
Gender			
Female	291 (77.8)	83 (22.2)	0.781*
Male	58 (75.3)	19 (24.7)	
Designation			
Staff nurses	165 (77.4)	48 (22.6)	0.897*
Administrative staff	53 (81.5)	18 (19.5)	
Helpers	52 (80.0)	13 (20.0)	
Hospital aides	38 (74.5)	13 (24.5)	
Lab technicians	30 (83.3)	6 (16.7)	
Doctors	11 (73.3)	4 (26.7)	

*Chi square test

DISCUSSION

Among the 451 HCWs who have taken hep B vaccine, only 164 (36.3%) had received the recommended three doses of vaccine. This finding is in consistent with vaccination coverage in earlier studies done in Ethopia (28.7%), Tanzania (33.6%) and India (49.6%).[8-10] The reasons for incomplete vaccination in previous studies were forgetfulness and not finding time during busy hours. The underlying factors could also be lack of awareness or inclination on the part of HCWs not realising its importance. Surprisingly in our study 42 (9.3%) had received more than 3 doses. Among people who received more than 3 doses, referral came from emergency medicine mostly. This might be due to needle stick injuries where they were advised vaccination. Also 19 (9.2%) have tested the titres within 2 months. It is essential to look at the cost implication and wastage of human resources in this context. Among those who received all three doses of the primary vaccination, 137 were responders (83.5%) and 37 were non-responders (16.5%). This finding was consistent with a study done in Delhi.[11] The positive response to Hepatitis B vaccine varied from 72 to 85% among people who have taken one dose to people who have taken more than 3 doses respectively – as number of doses increased, there was an increase in the immune response rate. Only 19 (9.2%) have done the titre values after 2 months of the last dose again reinforcing the need for creating awareness among HCWs regarding hep B vaccination.

Limitations

As this is a retrospective record based study, background of HCWs were not considered. Individuals with chronic diseases, immune defects, on immune modulatory medications, or even smokers, alcoholics, obese persons, and males have a diminished immune response following

vaccination.[3] The influences of these possible confounding factors were not adjusted for in the present study.

CONCLUSION

This study identified that vaccination coverage of hepatitis B among HCWs was poor. The adherence to stipulated doses and time interval between doses was not followed by majority of the HCWs.

Recommendations

Results of the study indicate that all HCWs should be screened for anti-HBs. Hospital infection control committee (HICC) can play an active role by conducting health education sessions regarding the importance of hep B vaccination. Reminders can be sent to the mobile so that they do not miss the dose and get immunised themselves in stipulated time period. HCW having initial anti-HBs titres of less than 10 mIU/ml should be investigated for HBV infection and if negative, they should be offered HBV vaccine.

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