

Hepatitis B Immunisation in Health Care Workers

Surg Cdr CN Chaudhari*, Col MR Bhagat⁺, A Ashturkar[#], Surg Capt RN Misra**

Abstract

Background: Hepatitis B virus (HBV) infection is an important occupational risk in health care workers (HCW). In spite of HBV vaccine availability in Armed Forces, the high prevalence of HBV infection in HCW continues to be a problem. The study was undertaken to study the HBV vaccine-compliance among HCW.

Methods: A cross-sectional study was conducted at a tertiary care hospital. HCW were requested to fill up the pre set questionnaire to assess the HBV vaccination coverage.

Result: Amongst 254 HCW, only 57.7% were vaccinated against HBV. The vaccine compliance was lowest among housekeeping professionals. The mean age at vaccination was high (30.5 years). Amongst the vaccine non-compliant subjects, 34.3% were above 30 years of age. 32.2% HCW completed primary vaccination after spending more than 10 years in the profession. Accessibility of HBV vaccine, knowledge and perception of HBV risk were important factors in vaccine non-compliance.

Conclusion: Due to low and delayed HBV vaccine-compliance, HCW continue to be at the risk of occupational HBV. Health education highlighting occupational risk of HBV, accessibility of vaccine and mandatory vaccination of HCW is recommended to increase HBV vaccine compliance among HCW.

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Key Words : Health care workers; Hepatitis B virus; Occupational risk; Hepatitis B vaccine

Introduction

Health care workers (HCW) are defined as persons whose activities involve contact with patients or with blood or other body fluids from patients in health care or laboratory settings [1]. They are at occupational risk of exposure to blood borne pathogens. Hepatitis B virus (HBV) infection is a well recognized occupational risk in HCW. One of the most efficient modes of HBV transmission in the health care setting is percutaneous exposure to HBV due to an unintentional injury from a sharp objects contaminated with HBsAg-positive blood from an infected patient [2]. The global burden of HBV due to contaminated sharp injuries alone in HCW is estimated to be 66000 cases and 261 deaths annually [2]. In developing countries only 40-60% HBV infections in HCW are attributed to percutaneous occupational exposure due to sharp injuries [2]. Hepatitis B is a vaccine preventable disease for which a safe, immunogenic and effective vaccine is available since 1981[3]. All HCWs are required to be vaccinated against HBV [1,3,4]. However World Health Organisation (WHO) has estimated that mean HBV vaccination rate amongst HCWs ranges from 18-39% in developing countries to 67-79% in developed countries [2]. As per estimates, only 18% of HCW of South East

Asia including India are vaccinated against HBV [2]. Occupational Health and Safety Administration (OHSA) of United States mandates all health care facilities to offer HBV vaccine to their employees [4]. Various studies have highlighted the importance of knowledge of occupational risk of HBV and accessibility of vaccine as important factors in vaccine compliance [5,6].

HBV vaccine is accessible to all HCW of Indian Armed Forces, however a study published in 2004 reported HBsAg prevalence of 8.3% among serving Army Medical Corps personnel with more than 10 years of service [7]. The present study was undertaken to assess HBV vaccination status among HCW and to study factors responsible for vaccine non-compliance.

Material and Methods

A cross-sectional study was carried out at a tertiary care hospital in January 2005. A total of 254 at risk HCWs were enrolled for the study. They included medical professionals, nursing officers, paramedics i.e. medical assistants (sailors) working in different wards, intensive care units and housekeepers i.e. sailors of domestic branch and ward sahayikas (defence civilian) working in laboratories and acute care wards. All subjects were requested to fill up a pre-set questionnaire to determine their health status, vaccination history and relevant information related to HBV vaccination.

*Classified Specialist (Microbiology), INHS Jeevanti, Vasco-Da-Gama-403802. *Senior Advisor (Medicine & Gastroenterology), Command Hospital Central Command, Lucknow. #Ex-Post Graduate Student (Pathology), INHS Asvini, Colaba Mumbai.-400005. **Commanding Officer, INHS Kalyani Visakhapatnam.

Table 1
HBV vaccination status among different professionals

Vaccine status	Medical	Nursing	Paramedics	Housekeeping	Total
Compliance	37 (77.1%)	64 (68.8%)	45 (43.3%)	0	146 (57.5%)
Non-compliance	11 (22.9%)	29 (31.2%)	59 (56.7%)	9 (100%)	108 (42.5%)
(a) Partially vaccinated	9 (18.7%)	23 (24.7%)	16 (15.4%)	0	48 (18.9%)
(b) Non-vaccinated	2 (4.2%)	6 (6.5%)	43 (41.3%)	9 (100%)	60 (23.6%)
Total	48 (100%)	93 (100%)	104 (100%)	9 (100%)	254 (100%)

$\chi^2=26.83$, $df=2$, $p < 0.001$ significant

In the study vaccine compliant subjects were those who had been administered minimum three doses of Hepatitis B vaccine, at schedule of 0, 1 and 6 months, intramuscularly, with dose of 20 microgram of HBsAg (hepatitis B surface antigen) at each setting, thus completing the minimum primary vaccination series. Vaccine non compliant were those who had not completed primary vaccination or had not been administered any dose of HBV vaccine. It consisted of two subgroups : Partially Vaccinated subjects who have started vaccination but did not complete three doses of primary vaccination i.e. left after one or two dose (s) of primary vaccination series and Non vaccinated subjects who were not exposed to HBV vaccine.

Chi square test was used to test the significance of difference in various groups. 'Z' test and 'Student's t test' were applied in finding out standard difference in the mean of two groups in groups with sample size above 30 and less than 30 respectively.

Results

Out of 254 HCWs enrolled for the study, 48 (18.9%), 93 (36.6%), 104 (40.9%) and nine (3.5%) subjects were medical, nursing, paramedics and housekeeping professionals respectively. Of these, 146 (57.5%) HCW were vaccinated against HBV (Table 1). Analysis revealed that 77% of medical professionals were vaccine-compliant as against 43% paramedics, but none of the housekeeping personnel was vaccine-compliant. The profession-wise difference of vaccination-coverage was statistically highly significant. Study subjects included 151 (59.4%) male and 103 (40.6%) female. Amongst them 77 (51%) males were vaccine-compliant against 69 (67%) females. The difference in vaccination compliance in male and female was statistically significant ($\chi^2=6.41$, $df=1$, $p < 0.02$).

The age of study subjects ranged from 19 to 54 years. Amongst them, 53.9% were in age group of 21 to 29 years (mean 30.1 ± 8.6 years), however, it was 36.9 ± 7.7 years among medical professionals and the difference was statistically significant by Z test ($p < 0.01$). Table 2 shows age at which primary vaccination was completed by study subjects. The mean age at vaccination was 30.5 ± 7.3 years in medical professionals as against 24.7 ± 6.1 years in nursing professionals and the difference was significant by Z test ($p < 0.01$). Age distribution of vaccine non-compliant study subjects is presented in Table 3. The results highlight that 34% of HCW of the vaccine non-compliant group were over 30 years of age. Again the mean age of vaccine non-compliant

Table 2
Age at primary vaccination in vaccine compliant HCW

Age group	Medical	Nursing	Paramedics	Total
<19 year	1 (2.7%)	10 (15.6%)	3 (6.7%)	14 (9.6%)
20-29 year	18 (48.7%)	39 (60.9%)	26 (57.8%)	83 (56.8%)
30-39 year	12 (32.4%)	14 (21.9%)	12 (26.7%)	38 (26.0%)
40-49 year	6 (16.2%)	1 (1.6%)	4 (8.9%)	11 (7.5%)
Total	37 (100%)	64 (100%)	45 (100%)	146 (100%)

Age group ≤ 29 & ≥ 30 yrs, $\chi^2=6.7488$, $df=2$, $p < 0.05$ significant

medical professionals was highest at 35.0 ± 7.2 years as against lowest of 26.11 ± 7.4 years in paramedics and the difference was statistically significant ($t_{68}=3.73$, $p < 0.001$).

The data of completion of primary vaccination in relation to date of joining the health profession is presented in Table 4. Vaccine-compliant study subjects completed primary immunisation at mean professional seniority of 6.5 ± 6.2 years. Amongst professional categories, nursing professional had an early primary immunisation at 4.8 ± 5.2 years as against 7.2 ± 6.4 years and 8.5 ± 6.6 years among medical and paramedics respectively; the difference in mean age of professional seniority in primary vaccination was statistically significant when compared with nursing professionals by 'Z' test ($p < 0.01$). Data analysis revealed that 32.2% of HCW of vaccine-compliant group took the vaccine after spending more than decade in the health profession. Based on professional seniority, vaccine compliance and age at primary vaccination, we calculated cumulative risk of HBV in years. These study subjects have spent 2397 years in the health profession of which 1747 (72.9%) years were with occupational risk of HBV.

The HBV vaccine became freely available to all HCWs of Armed Forces around year 2000 (before that it was on case to case basis for select HCW), based on which we analysed the financing of vaccine by 'self' (vaccine cost paid by individual) or 'services' (vaccine provided by services, free of charge), the result of which is presented in Fig 1. The trend of financing of vaccine by self in study subjects decreased from 50% before year 1999 to 29.6% after year 2000, which is statistically significant ($\chi^2=5.80$, $df=1$, $p < 0.02$). Analysis of data also revealed, HBV vaccine uptake till 1999 in study subjects (those study subjects joined health profession and vaccinated on or before 1999) was 33.1% (48 / 145) as against current vaccine uptake of 57.4% (146 / 254), which was statistically significant ($\chi^2=21.96$, $df=1$, $p < 0.001$). The findings reaffirmed a direct relationship between vaccine uptake and accessibility of vaccine. Interestingly majority of subjects who were

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