



## Research Article

# Status of protection against Hepatitis B infection among healthcare workers (HCW) in a tertiary healthcare center in India: results can't be ignored!

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## Abstract

**Background and Aims:** the Aim of the study was to find the level of protection among the healthcare workers (nurses, doctors, housekeeping staff and general duty assistants) by doing Anti-HBsAb titer and vaccinate those who were not properly immunized against HBV infection.

**Materials and Methods:** The study was approved by the Institutional review board of the Hospital. The study group included doctors, nurses, technical staff and lab attendants. Anti-HBs antibody titer was done on Vitros 3600 (OCD, USA). Tests were performed according to manufacturer's instruction. Vaccine provided was Engerix B (GSK Glaxo, Belgium). Vaccination was provided to all employees had titer below 10 mIU/ml.

**Results:** 489 of 794(61.5%) HCW had no history of previous vaccination and only 293 (36.9%) subjects had complete vaccination. Only 60.8 % (482/794) of the total subjects had titer above 10 mIU/ml and were protected against Hepatitis B. Around 80.6% (246/305) of those who were fully vaccinated and 40.8% (237/489) of those who were not vaccinated previously had protective anti-HBs titers(>10 mIU/ml). Majority (86.8%, 271/312) who had titer below 10 mIU/ml were unvaccinated. Two of eight employees who had history of needle stick injury in past were found non-immune to Hepatitis-B infection.

**Conclusion:** Despite being involved in the procedures with high chances of infections through needle stick or other exposures, only one third of health care workers were vaccinated against hepatitis B. We recommend that all the HCWs should be vaccinated for Hepatitis B and their anti-HBs levels determined at regular intervals.

## Introduction

In spite of an availability of the safe, effective and affordable vaccine, hepatitis B infection is still the most common serious liver infection. Around two billion people in the world are infected with hepatitis B virus (HBV), of whom over 350 million are chronic carriers. India is considered to have an intermediate level of HBV endemicity with a prevalence rate of 2-8% [1]. Due to the frequent occupational exposure to blood and body fluids, healthcare workers (HCW) are at a higher risk of acquiring a blood-borne infection [2]. The risk of occupational hepatitis B virus (HBV) infection



is 3-5 times greater than for the general population and increases with age and length of employment [3,4]. According to WHO, 5.9% of HCWs are each year exposed to blood-borne HBV infections corresponding to about 66,000 HBV infections in HCWs worldwide [5].

Paramedics have a higher risk of HBV/HCV transmission and receive HBV vaccination less often than doctors [6,7]. The practice of universal precautions, such as safe needle disposal, wearing gloves during phlebotomy and using goggles is suboptimal among HCWs in developing countries [8,9]. As a part of occupational safety measures, all HCWs are recommended to a compulsory vaccination against HBV [10]. However, as per the estimates by WHO, only 18% of HCW of South East Asia including India are vaccinated [11,12] due to poor awareness in this group. The HBV vaccines has been demonstrated to be very effective in clinical trials involving several groups which showed complete protection in persons with anti-HBs concentration of more than 10 miu/ml following vaccination [13,14]. Aim of the study was to find the level of protection among the healthcare workers (nurses, doctors, housekeeping staff and general duty assistants) by doing Anti-HBsAb titer and vaccinate those who were not properly immunized against HBV infection.

## Materials and Methods

This prospective study was conducted for the duration of 12 months from November 2015 to October 2016 in 844 healthcare providers at our hospital. The study group included doctors, nurses, technical staff and lab attendants. The study was approved by the Institutional review board of the Hospital. Employees were informed about the study and its implementation at the time of joining and 3 ml whole blood sample in red top vacutainer was collected with all aseptic precautions and allowed to clot. The serum was separated and stored at -40°C until use. All the employees were asked to fill a format which had information about history of any previous exposure, needle stick injury and history of vaccination. The data was compiled and analyzed using SPSS 12.0 software. Anti-HBs antibody titer was done using antiHBs reagent on Vitros 3600 (orthoclinical diagnostics, Jn], USA). Tests were performed according to manufacturer's instruction. Vaccine provided was Engerix B (GSK Glaxo, Belgium). Those participants with significant anti-HBs titers (>10 miu/ml) were reassured of their Hepatitis B immunity. Vaccination was provided to all employees had titer below 10 miu/ml. The vaccine was given in three doses over a 6 month period (0, 1, and 6 months). Testing of anti-HBs antibody titer and vaccination in low titer individuals were offered free of cost. In a situation where further serological evaluation of Hepatitis B infection required, we did antiHBcore total (IgG+IgM), HBeAg (OCD, USA) and HBV-DNA quantitative PCR using Qiagen real time PCR (Germany).

## Results

Among the 844 health care workers (HCWs) recruited during the study period we received duly filled registration format in 794 individuals only (Table1). Out of 794 subjects, there were 372(46.8%) females and 422(53.2) males.

We observed that 489 out of 794(61.5%) health care workers had no history of previous vaccination, 12(1.5%) had partial vaccination and only 293 (36.9%) subjects had completed their full schedule of Hepatitis B vaccination(0, 1 and 6 months). Out of these 293 fully vaccinated staff, 30 (10.3 %) had their last vaccination within last 1 year of this study, while 43(14.6%) had been vaccinated more than 5 years ago.

**Table 1:** Anti HBs titers according to last vaccination(N=794).

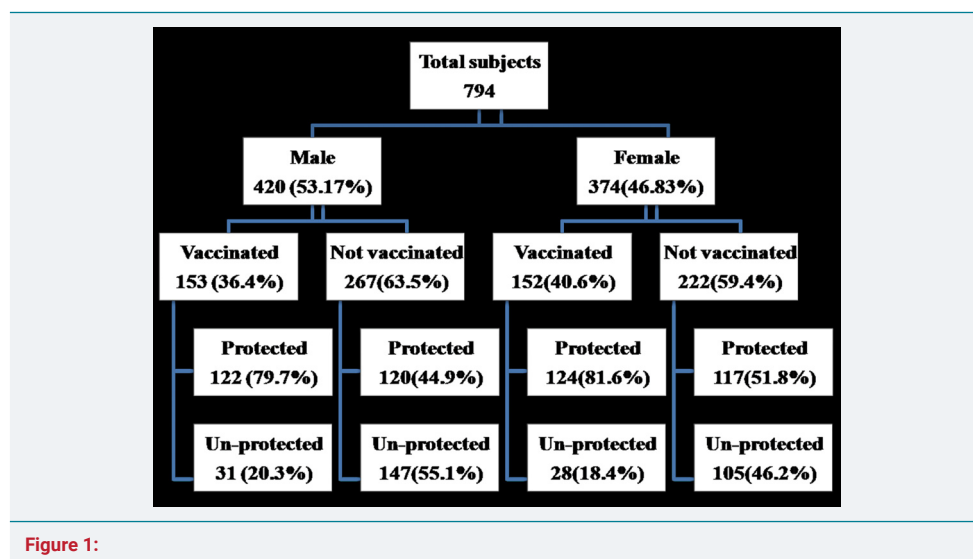
Last Vaccination	Number Vaccinated	Protective titers (%) (>10miu/ml)
<1 Year	35 (2 partial)	31(88.5)
1-5Year	220 (10 partial)	186 (84.5)
>5 Year	50	29(58)

When we compare the results between the genders, 40.6% of females were vaccinated previously while only 36.4% of the males were vaccinated (Figure 1). Out of 12 partially vaccinated HCWs, 8 were males and 4 were females. All of them had missed their third dose of vaccine.

Only 60.8 % (482/794) of the total subjects had titer above 10 miu/ml and were protected against Hepatitis B. Around 80.6% (246/305) of those who were fully vaccinated and only 40.8% (237/489) of those who were not vaccinated previously had protective anti-HBs titers(>10 miu/ml). Out of those 483 subjects who had protective anti-HBs titers, 121 (15.27%) had titers between 10-100 miu/ml while 203(25.5%) had titers above 1000 miu/ml. Majority (86.8%, 271/312) of those who had titer below 10 miu/ml were unvaccinated (Figure 1). One fourth of (2/8) employees who had history of needle stick injury in past were found non-immune to Hep-B infection and one individual was found to antiHBcore total positive. On further serological and molecular evaluation of this case we found him we found him chronic infective carrier (Table 2). Irrespective of history of vaccination, females were found to be more protected than the males (241/374, 64% vs.242/420, 57%) (Figure 1).

### Discussion

Healthcare workers are exposed to various body fluids and therefore at a greater risk of various blood-borne infections like Hepatitis B and HIV. The risk of occupational hepatitis B virus (HBV) infection is 3-5 times greater than for the general population and increases with age and length of employment [2]. Hepatitis B vaccination is effective in protecting 90-95% adults [15]. According to WHO estimates, HBV vaccination coverage among HCWs varies from 18% (Africa) to 77% (Australia and New Zealand) [6]. In the present study of 794 HCWs, only 293 (36.9 %) were fully and 12 (1.5%) were partially



**Table 2:** Immune status of healthcare workers showed history of previous exposure (N=8).

Sr no.	Titer*	Previous vaccination	HBsAg	HBcT**	HBeAg	HBV-DNA	Interpretation
1	>1000	Yes	NR	NEG	NR	ND	Immune to Hep.B
2	>1000	No	NR	NEG	NR	ND	Immune to Hep.B
3	>1000	Yes	NR	POS	NR	TND	Noninfective chronic carrier/ Immune by natural Hep.B infection
4	0	No	NR	NEG	NR	ND	Non-immune to Hep-B
5	>1000	Yes	NR	NEG	NR	ND	Immune to Hep.B
6	283	Yes	NR	NEG	NR	ND	Immune to Hep.B
7	316	Yes	NR	NEG	NR	ND	Immune to Hep.B
8	7.2	No	NR	NEG	NR	ND	Non-immune to Hep-B



vaccinated. A similar study done at New Delhi showed that 55.4% of HCWs were fully vaccinated against HBV [6]. In a study performed at a large tertiary healthcare center In India, 224 out of 446 (50%) health care workers were completely vaccinated and 28 (6%) had received incomplete vaccination. [16] We found in our study that 80 percent of HCWs who were previously vaccinated had protective titers while only 41 % of the unvaccinated subjects had anti HBs titers above 10 miu/ml. similar results were seen in some other studies from India [11,17]. This finding reiterates the fact that most of the healthcare workers are still unaware or ignorant about hepatitis B vaccination and are prone for the infection through blood and other body fluid exposure. It is notable though that around 20% of the subjects who were vaccinated were found to have titers below protective levels. This was also demonstrated by, who stated that this unresponsiveness to recombinant hepatitis B vaccine may be due to non-response or waning of vaccine-induced immunity caused by inadequate Th1- and Th2-like cytokine production [18].

One more finding of this study was that only 58 percent of subjects who had vaccination more than 5 years before this study, had protective anti-HBs titers while out of 35 HCWs who were vaccinated within 1 year of this study, around 88% had anti HBs above 10 miu/ml. Though it has been seen that the level of protective antibodies decline with time in various studies [19], but it is still debatable whether this fall in anti-HBs level with the time require booster every 5 years or not as various studies show difference in their views. Long-term studies in some hyper-endemic areas have indicated that immunological memory remains intact beyond 10 years after vaccination; thus initial vaccination offers protection against HBV infection even after anti-HBs declines below detectable levels [20,21].

## Conclusion

We found in our study that more number of health care workers with complete hepatitis B immunization have protective level of anti HBs and there were lower anti-HBs levels in unvaccinated subjects. Despite being involved in the procedures with high chances of infections through needle stick or other exposures, only one third of health care workers were vaccinated against hepatitis B. We recommend that all the HCWs should be vaccinated for Hepatitis B and their anti-HBs levels determined at regular intervals.

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