



## Original Research Article

## Evaluation of antibodies to hepatitis B (Anti HBs) titres in health care workers in a Tertiary care centre

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## ABSTRACT

**Aim :** To evaluate the anti-HBs titres among medical students and Health Care Workers (HCW) who are vaccinated against Hepatitis B virus and find the level of protection among HCWs.

**Materials and Methods :** The study was done at the Department of Microbiology, Nizam's Institute of Medical Sciences. The study group included residents from various medical and surgical departments, lab assistants and research fellows. It was a prospective cross sectional study.

**Results :** A total of 56 subjects were included in the study, all were Hbs antigen negative and vaccinated for Hepatitis B. Out of 56 subjects, 50(89%) had titres in the protective range (>10mIU/ml), 2(3.57%) had titres <10mIU/ml and titres were not detected in 4(7.14%).

**Conclusion :** All health care workers though vaccinated should regularly check the titres for optimum protection. Health care workers who are at a higher risk of exposure to Hepatitis B should be vaccinated and have their titres monitored every 5 years.

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### 1. Introduction

Hepatitis B is the most common serious liver infection worldwide, inspite of safer and affordable vaccination, affecting 2 billion people worldwide, leading to chronic liver complications like liver cirrhosis, chronic active hepatitis, and hepatocellular carcinoma to 350 million people.<sup>1</sup> Frequent exposure to blood and body fluids, medical students and health care workers are more prone to this blood-borne infection.<sup>2</sup> When compared to general population the HCWs are 3-5 times prone to hepatitis B, due to their occupation.<sup>3,4</sup> The risk of getting Hepatitis B to the non-vaccinated people was reported to be 6-30% on single exposure, whereas due to needle stick injuries the reported risk of HBV was 100 times more than HIV.<sup>5,6</sup> Practicing the safety precautions such as vaccination, safe needle disposal, and the use of gloves may minimise the risk. Vaccination against surface antigen for Hepatitis B prevents the HBV infection. Plasma derived Hepatitis b Vaccine was available

initially during 1982. The recombinant vaccine was made available since 1984, which was made mandatory to all health care workers by US CDC in 1997.<sup>7,8</sup> Development of sufficient level of antibodies against Hepatitis B antigens after the vaccination provides the evidence of protective immunity against Hepatitis B. The cut off values for HBV vaccination are shown in the table 1.1.<sup>9</sup> According to WHO due to poor awareness, only 18% of health care workers in South East Asia including India were reported to be vaccinated and complete protection was reported with > 10mIU/ml titre levels in post vaccinated individuals.<sup>10-13</sup> Hence the present study was designed to study the HBs titres among vaccinated medical students and health care workers.

**Table 1:** HBV vaccine plasma titres cut off values and response levels<sup>14</sup>

Cut-Off	Response
<10mIU/ml	Non protective
10-100 mIU/ml	Protective
>100 mIU/ml	High responders

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## 2. Aims and Objectives

1. To evaluate the anti-HBs titres among medical students and HCWs who are vaccinated against hepatitis B virus.
2. To find the level of protection among health care workers.
3. To evaluate the awareness of Hepatitis B vaccination.

## 3. Materials and methods

### 3.1. Subject Recruitment

Following Inclusion and exclusion criteria was followed for recruiting the subjects in the study.

### 3.2. Inclusion criteria

1. Hbs Ag negative subjects.
2. Medical students and healthcare workers who had received hepatitis B vaccination.
3. Subjects - completed at least six months post vaccination.

### 3.3. Exclusion criteria

1. Subjects whose immunization status not known or unimmunized subjects
2. Hbs Ag positive subjects
3. Paediatric and geriatric population.

### 3.4. Study Subjects

It is a prospective cross sectional study, carried out at Department of Microbiology, Nizam's Institute of Medical Sciences. A total of 56 subjects working in the various departments which includes Microbiology, Pathology, Biochemistry, Molecular diagnostics and immunology, Medical genetics, Neurology, neurosurgery, Anaesthesia, Pharmacology, Rheumatology, Nephrology and general medicine were recruited in the study following inclusion and exclusion criteria. Demographic details along with relevant vaccination history was collected in self-designed proforma. Informed consent was taken from all subjects. The institutional ethics committee clearance was also taken before starting the study.

### 3.5. Sample collection

2 ml blood was collected in plain vacutainers from subjects under aseptic precautions, blood allowed to clot and serum was separated by centrifugation at 2500 rpm for 15 min. The serum was separated in 2ml eppendorf tubes and stored at 4° C until further analysis.

### 3.6. HBs Titres estimation

1. Anti-HBs titres were estimated using VIDAS-PC equipment (Biomerieux)-VIDAS Anti HBs Total II(AHBS)
2. Test was performed as per the manufacturer's instructions.

### 3.7. VIDAS

The assay principle combines an enzyme immunoassay sandwich method with a final fluorescent detection (ELFA). The intensity of the fluorescence is proportional to the quantity of Anti HBs in the sample. At the end of the assay results are automatically calculated by the instrument in relation to the calibration curve stored in memory and then printed out.

## 4. Results

### Demographic Data

In the present study the antibody titres of 56 participants which includes doctors, Lab assistants and research fellows from various departments was evaluated. Antibody titres were measured by Enzyme linked fluorescent assay (ELFA). Titres of >10mIU/ ml were considered protective. As shown in table (Table 1 ), among 56 vaccinated subjects 37 (66%) were doctors, 10 (17%) were lab assistants and 9 (16%) were research fellows. The frequency of male participants was 30 (53.57%) and females were 26 (46.42%). The mean age of participants was  $30 \pm 6.5$  years, whereas the mean age of male participants was  $30.53 \pm 6.6$  years and of female participants  $28.73 \pm 6.3$  years. The mean duration of vaccination by last dose was  $6.07 \pm 4.05$  years, which was  $6.43 \pm 3.96$  in males and  $5.65 \pm 4.19$  years in females.

**Table 2:** Demographic Data

		Male	Female
Total No. of cases	56	30	26
Doctors	37(66%)	25	12
Lab assistants	10(17%)	5	5
Research fellows	9(16%)	3	6
	Mean+SD	Mean+SD	Mean+SD
Age	$30 \pm 6.5$	$30.53 \pm 6.6$	$28.73 \pm 6.3$
Duration of last dose	$6.07 \pm 4.05$	$6.43 \pm 3.96$	$5.65 \pm 4.19$

### 4.1. Serum anti HBS titres

As shown in table (Table 2 ), out of 56 participants, 52 have received primary immunisation, and 4 participants were partially immunised. Among 56 total participants, 32 (57%) were showing >100mIU/ml titres, whereas 18 (32%) were showing 10-100mIU/ml, 2 (3.57%) were showing

<10 mIU/ml and 4 (7.14%) did not show detectable titres (Figure 1). The data was further segregated into fully immunised and partially immunised groups. As shown in figure (Figure 2), out of 52 fully immunised subjects >100mIU/ml were observed in 36 (69.23%), 10-100 mIU/ml was observed in 11 (21.15%), <10mIU/ml titre levels were observed in 3 (5.76%), and in 2 (3.8%) participants titre levels were not detected. Among 4 partially immunised subjects, one subject did not show detectable titres, whereas three participants were showing 10-100mIU/ml titre levels. We also compared the titres based on the duration since last vaccination, and found 92% of subjects had good titres in <5 years group followed by 87% showing protective titres in 5-10 years group and only 83% had protective titres in >10 years group.(Figure 3). The awareness about booster doses was 81% in doctors, 66.67% in lab assistants and 55.56% in research fellow group.

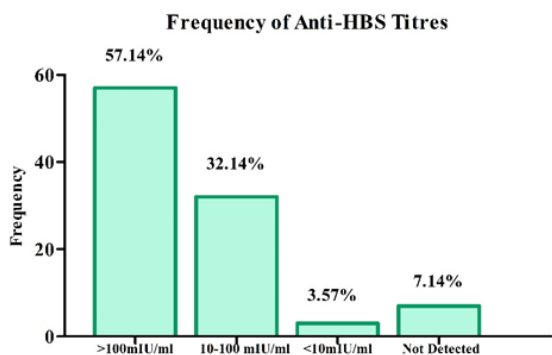


Fig. 1: Anti HBS titres in total number of subjects

Table 3: Immunisation status of subjects

Immunization status	No. of subjects
Fully immunized	52(90%)
Partially immunized	4(10%)

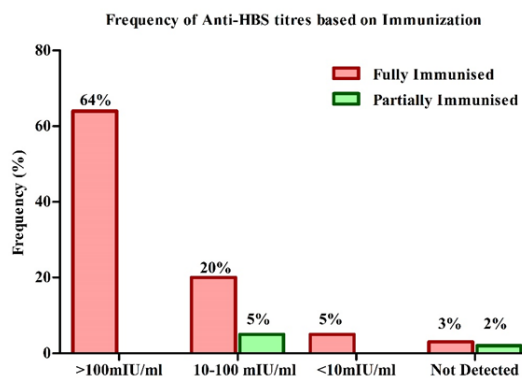


Fig. 2: Protective antibody levels in fully and partially immunized health care workers

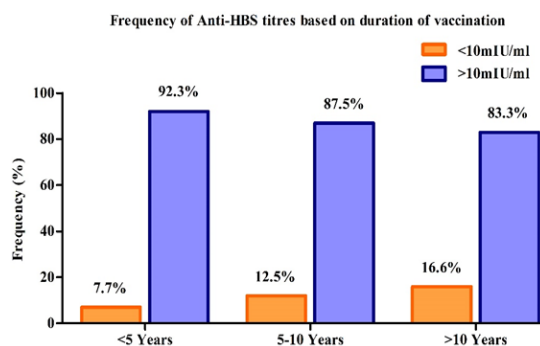


Fig. 3: – Comparison of AntiHbs titres based on the duration since last dose of vaccination

### 5. Discussion

According to WHO, Hepatitis B being a viral infection which attacks the liver and can cause both acute and chronic disease leading to 780,000 deaths each year. It is a major occupational hazard to the people involved in healthcare division.<sup>1,6</sup> There are safe and effective vaccines available to prevent Hepatitis B. As per WHO guidelines, the first dose of vaccine for infants recommended as soon as possible after birth preferably within 24 hours, which should be followed by 2 or 3 doses for the completion of series. The protection by vaccination lasts 20 years or lifelong. According to Occupational Health and Safety Administration (OSHA) for those in occupational exposure, it is recommended to take 3 doses of Hepatitis B vaccination and get the titres checked after two months of completion. In our study, 90% of the HCWs in occupational exposure were fully immunised and 10% were partially immunised, among which 9% had taken booster dose and 9% had their titres checked.

In a study conducted by Parimala Subramani et al., antibody titres were measured by ELISA. Titers of 10mIU/ml were seen in 90%of subjects which was similar to our study where 89% of subjects were showing protective titres (>10mIU/ml),. 41 out of 56 had received all the three doses of Hepatitis B vaccine.5 had received only 2 doses and 10 did not receive even a single dose of the vaccine. It was observed that 41 participants who received complete vaccination had protective levels of anti - Hbs titres (>10mIU/ml). Among the 10 participants who did not receive vaccination, 4 people had titres in the protective range.<sup>15</sup>

In our study, all the subjects recruited were immunised. In contrast with the results by Lakshmi J et al., where 41% subjects had protective titres, in our study 89% of immunised subjects were showing protective titres (>10mIU/ml), 3.5 % were showing <10mIU/ml titres and 7.14 % titres were not detected. All the participants were immunised, good antibody response found in 92.3 % in those <5 years of last vaccination, 87.5% in the group last

vaccinated 5-10 years duration and 83.34% in >10 years of last vaccination duration.<sup>16</sup>

In contrast to the above studies, another study done by Pandey Prashant et al., 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 titres 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 titres (>10 mIU/ml).<sup>17</sup>

While conducting our study, we came across non vaccinated individuals even after provision of vaccination by the institute and were educated regarding occupational exposure risk and vaccination importance to them. The awareness about booster doses was 81% in doctors, 66.67% in lab assistants and 55.56% in research fellows groups. We noticed that protective titres declined as time since vaccination elapsed and health care workers didn't monitor their titres regularly. By conducting our study, we also made healthcare workers aware of antibody titre monitoring and suggested booster doses for those with suboptimal titres.

## 6. Conclusion

Health care workers are more prone to occupational exposure to Hepatitis B. WHO guided the immunisation immediately after birth. It has also been included in the National Immunisation Schedule by the government of India. The Hepatitis B vaccine is highly efficacious and safe. According to OSHA it is mandatory to take immunisation and check titre levels to health care workers. It should be made mandatory to every institute/ organisation involving healthcare activities to provide immunisation to all the healthcare workers at no cost and at a reasonable time and place.

## 7. Recommendations

1. Mandatory vaccination at the time of recruitment for all HCW, followed by post vaccination testing(1-2months)
2. Monitoring anti Hbs titres periodically
3. Booster doses to maintain protective titres

## 8. Source of funding

None.

## 9. Conflict of interest

The authors declare that they have no conflicts of interest.

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