

ORIGINAL ARTICLE**Awareness and Practice of Complete Hepatitis B Vaccination and Anti-HBs Testing in Vaccinated Health Care Workers***Annapurna G. Sajjan^{1*},Smita S. Mangalgi¹**¹Department of Microbiology, BLDEU's Shri B. M. Patil Medical College, Hospital & Research Centre, Vijayapur-586101(Karnataka) India***Abstract:**

Background: Hepatitis B is a serious and common infectious disease affecting millions of people worldwide. Health Care Workers (HCW) are at an increased risk of occupational exposure to HBV and the incidence is 2-4 times higher than in the general population. Despite potential risks, awareness and vaccine compliance is poor among the HCWs.

Aim: To assess the awareness of complete Hepatitis B vaccination, anti-HBs testing & protective titres and determine the anti HBs titres amongst vaccinated HCWs. **Material & Methods:** A total of 500 Health care workers of both sexes in the age group from 20-60 years vaccinated against Hepatitis B were tested for anti-HBs titres by quantitative ELISA. **Results:** The rate of complete immunization was 81.4% in doctors, 63.3% in nursing staff and 90% in the technical staff. Amongst the 500 participants, 70.8% had received all the doses and 29.2% incomplete doses of the vaccine. Titres of ≥ 10 mIU/ml were demonstrated in 84.4% of HCWs who received all the doses and in 65.7% those who defaulted. **Conclusions:** The results of the study indicate lack of awareness about complete HB vaccination and the importance of post vaccination testing in HCWs.

Keywords: Health Care Workers, Complete Vaccination, Anti-HBs Testing, Protective Titres

Introduction:

Hepatitis B infection is a major health problem affecting millions of people throughout the world. According to the World Health Organization, approximately 240 million people are chronically infected with Hepatitis B Virus (HBV) and more than 7, 80,000 die every year due to its consequences [1]. India is considered to have an intermediate level of HBV endemicity with a prevalence rate of 2-8% [2, 3]. HCWs are at an increased risk of acquiring infection through occupational exposure to blood and body fluids and the incidence is 2-4 times higher than that of the general population [4, 5].

As a part of occupational safety measures, all HCWs are required to be vaccinated against HBV [6]. However, vaccination awareness is found to be poor among them and as per the estimates by WHO, only 18% of HCW of South East Asia including India are vaccinated [7, 8].

Hepatitis B vaccination without post-vaccination anti-HBs testing is common among HCWs. A complete course of vaccine usually gives protection in majority of them but it may cause a false sense of security which in case of vaccine failure makes infection inevitable. Despite the high efficacy of the vaccine, there is a non response

rate of 5-32% and the duration of protection is not completely known [9, 10]. Knowledge of anti-HBs status is important for appropriate post-exposure management. Although serological testing for immunity is not necessary after routine vaccination of adults, post-vaccination testing after 1-2 months after the last dose is recommended for health care personnel [11, 12]. As there is waning of protective antibodies and the HCWs are at an increased risk, evaluation of anti-HBs titre at 5-10 years and consideration for a booster dose / revaccination is recommended, if anti-HBs level is low (<100 IU/L) [13,14].

With these perspectives, this study was undertaken with the objectives to assess the knowledge, attitude and practice (KAP) regarding complete Hepatitis B vaccination, anti-HBs testing and sero-protective titres in vaccinated HCWs and to evaluate anti-HBs titres in individuals who received complete course of vaccine and those who defaulted.

Material and Methods:

A cross-sectional study was conducted among the faculty of B.L.D.E.U's Shri. B. M. Patil Medical College, Vijayapur, Karnataka, India. Five hundred HCWs in the age group of 20-60 years, who had been vaccinated against Hepatitis B (complete/incomplete doses), 1 to 15 years before the commencement of the study, were included in the study. Unvaccinated HCW, those with history of HBV infection or those who did not agree to get their immune status checked

were excluded. The study group included 270 doctors, 120 nursing staff, 50 technical staff and 60 attendant staff.

Written consent from each study subject, eligible and willing to participate in the study, was obtained.

All the participants were interviewed with a pre-designed questionnaire which covered general information like age, gender, profession, knowledge and practice regarding Hepatitis B vaccination, post vaccination testing and protective titres. Questions were explained to the participants. They were requested to give correct answers and filled questionnaires were collected in the consecutive day. Second visit was made to include those who were not available on first visit and again the same procedure was followed. The study was approved by the Institutional Ethics Committee.

Three ml of blood was collected from each participant with all aseptic precautions and allowed to clot. The serum was separated and stored at -20°C until use. The samples were tested for anti-HBs titres along with standard reference sera by quantitative ELISA using MONOLISA HBs Ab kit (BIORAD, USA). The test was performed according to manufacturer's guidelines.

Statistical analysis:

Statistical analysis of the data was done using GrapPad InStat software devised by GrapPad Software Inc., USA. Chi Square test was used for comparison.

Results:

Of the 500 participants, 332 were males and 168 females. The mean age of male participants was $33.8 \pm SD$ of 9.7 and the mean age of female participants was $32.5 \pm SD$ of 9.1.

Knowledge about complete Hepatitis B vaccination was 100% in doctors but only 5 (1.8%) knew about post vaccination anti-HBs testing and 8 (2.9%) regarding protective titres. Despite good knowledge and attitude, the rate of complete immunization was 81.4% and the practice of post vaccination anti-HBs testing was too poor as only 2 (0.7%) doctors had got it done. The commonest reason given for incomplete vaccination was they couldn't recall the dose date due to busy schedule.

Amongst the nursing and technical staff, knowledge about complete Hepatitis B vaccination was 100% but none of them knew about the protective titres and anti-HBs testing. The attitude towards complete immunization was fairly good (90%) and the practice of complete vaccination was 63.3% and 90% in the nursing and technical staff respectively. Disregard, high cost and failure to remember were the common reasons for incomplete vaccination. The attendant staff had no knowledge about Hepatitis B vaccination, anti-HBs testing and the protective titres. They had taken the vaccine just because the institute had provided it free of cost (Table 1).

Table 1: KAP regarding Complete Hepatitis B Vaccination, Anti-HBs Testing & Protective Titres

Category	No	Knowledge			Attitude	Practice		
		Complete Hepatitis B vaccination	Anti-HBs testing	Protective titres		Complete Hepatitis B vaccination	Anti-HBs testing	Protective titres
Doctors	270	270 (100)	05 (1.8)	08 (2.9)	246 (91.1)	220 (81.4)	02 (0.7)	02 (0.7)
Nursing staff	120	120 (100)	00	00	90 (75)	76 (63.3)	00	00
Technical staff	50	50 (100)	00	00	45 (90)	45 (90)	00	00
Attendant staff	60	00	00	00	00	13 (21.6)	00	00
Test applied - χ^2 Test		$\chi^2 = 66.6$ $P < 0.0001$			$\chi^2 = 50.5$ $P < 0.0001$	$\chi^2 = 24.2$ $P = 0.004$		

* Figures in the parentheses indicate percentages

395 participants (79%) had anti-HBs titres of ≥ 10 mIU/ml with mean titre \pm SD of 673 ± 426.5 mIU/ml (Table 2). The mean of protective titres in males was $474.8 \pm$ SD of 412.8 and $576 \pm$ SD of 410 in females. Protective titres were noted in 183 (83.1%), 65 (85.5%), 40 (88.8%) and 11 (84.6%)

completely vaccinated doctors, nursing staff, technical staff and attendant staff respectively. No significant association was seen between the protective titres and working categories with $\chi^2 = 0.084$ and $p=0.9937$ (Fig 1).

Table 2: Anti-HBs titres in 500 Health Care Workers

Total	<10mIU/ml			>10mIU/ml			
	Nil	<10	Total	10-100	>100-1000	>1000	Total
500	71 (14.2)	34 (6.8)	105 (21)	117 (23.4)	212 (42.4)	66 (13.2)	395 (79)

* Figures in the parentheses indicate percentages

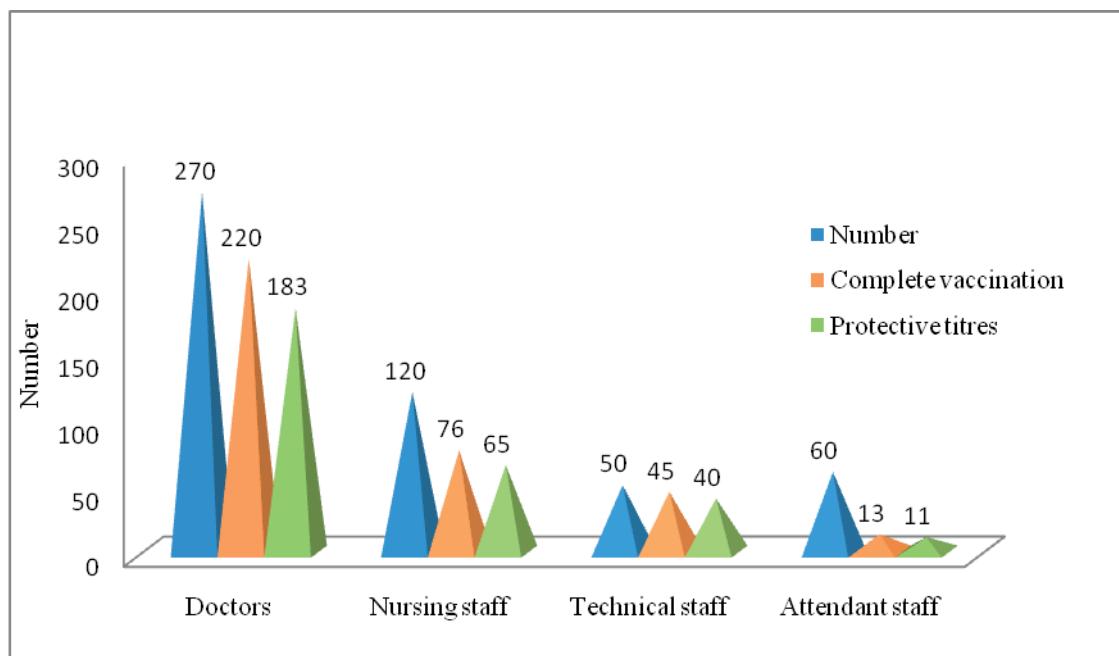


Fig. 1 : Complete Vaccination and Protective Titres in Working Categories

Amongst the 500 participants, 70.8% had received all the doses and 29.2% incomplete doses of the vaccine. Titres of ≥ 10 mIU/ml were demonstrated in 84.4% of HCW who received all the doses and in 65.7% those who defaulted. Significant statistical association was noted between the number of doses and protective

titres by Chi Square test ($\chi^2 = 21.8$, $p < 0.0001$). Significant difference was also noted in the anti-HBs titre levels and the number of doses; majority of individuals who completed the course (184) had titres ranging between 100-1000 mIU while in majority who defaulted (61) titres ranged between 10-100 mIU, as shown in Table 3.

Table 3: Protective Anti-HBs Titres in Relation to Number of Vaccine Doses

Vaccination	Total	Protective titre	Titres mIU/ml		
			10-100	100-1000	>1000
Complete 3 / 4 doses (0,1,6 / 0,1,2,12)	354	299 (84.4)	56 (18.7)	184 (61.5)	59 (19.7)
Incomplete doses (0,1)	146	96 (65.7)	61(63.5)	28 (29.1)	07 (7.2)
Total	500	395 (79)	117 (29.6)	212 (53.6)	66 (16.7)
Test applied χ^2 test	$\chi^2 = 21.8$, $p < 0.0001$				

* Figures in the parentheses indicate percentages

Three doctors and two nurses had taken a booster dose with the notion that a booster has to be taken after 5 years of primary vaccination.

Discussion:

Two complete standard vaccination schedules exist – 3 or 4 doses administered as 0, 1, 6 or 0, 1, 2 and 12 months schedule [15]. Amongst the 500 individuals, 70.8% had received all the doses of the vaccine which is lower than that observed in a study by Rao TV (88%) [13]. Comparatively higher rate of awareness and immunization (85.4%) has been found in oral health care

personnel as revealed in study by Reddy V *et. al.* [16]. Out of the total number of participants in each category, the rate of complete immunization was 81.4% in doctors, 63.3% in nursing staff and 90% in technical staff. Comparable results have been observed by Pathak R *et al.*, Mighlani A and S. Poongodi SL and Palaniappan N [17-19]. The common reasons given for incomplete vaccination were busy schedule, failure to remember the next dose, high cost, which are in accordance with findings by other authors [20-21].

In our study 79 % of HCW had protective anti-HBs titres of ≥ 10 mIU/ml with mean titre \pm

SD of 673 ± 426.5 mIU/ml. We noted that seroprotective status was not influenced by age, gender or profession as also noted by another author [22]. However, Daboer *et al* have noted that age at vaccination is an important factor in the immunogenicity of the Hepatitis B vaccine and higher age at vaccination in adults has been identified as a factor for non response [23].

We could demonstrate protective titres in 84.4% of HCW who received all the doses and in 65.7 % those who defaulted. Analogous findings have been reported by Jha *et al.* [24]. However no significant difference was noted in the protective levels in fully vaccinated and incompletely vaccinated individuals in study by Poongodi and Palaniappan [19].

In our study 105 (21%) of HCWs had titres <10 mIU/ml. It was unclear whether it was due to non-response or waning of vaccine-induced immunity or preserved anamnestic potential. Similar findings have been reported by Zamani *et al.*, Sukriti *et al.* and Barash *et al* [25-27]. HCWs usually remain unaware of the importance of

post vaccination testing. In our study only two doctors had got done their anti-HBs testing after vaccination. The findings of Rana *et al* also are not at variance with ours [10].

A lot of conflicting ideas exist regarding booster dose. The National Advisory Committee on Immunization (NACI) recommends a booster to be given 5 years after completion of the primary series based on the need [14]. Three doctors and two nurses in this study had taken booster dose with the notion that a booster has to be taken after 5 years of primary vaccination.

Conclusions:

In our study compliance of complete immunization was low. Lower anti-HBs levels were noted in defaulters. Hepatitis B vaccination without post-vaccination testing is common among HCWs as they are unaware of the significance of anti-HBs testing. It is recommended that all the HCWs should be vaccinated for Hepatitis B and their anti-HBs levels determined. Reassessment for revaccination/booster dose should be considered according to their anti-HBs levels.

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