

# Study to Assess the Status of Hepatitis B Vaccination and Factors Affecting Antibody Titers Level for Hepatitis B to Various Health Care Workers and Medical Students in Tertiary Healthcare Setup in Himachal Pradesh

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## ABSTRACT

**Background:** Hepatitis B (HBV) is one of the most important occupational hazards among the medical student and healthcare workers (HCW's) due to risk of exposure to infected bodily fluids and blood. This study aimed to assess status of HBV vaccination and factors affecting anti-HBs titres levels for HBV in HCW and medical students.

**Material and Method:** It was a prospective, descriptive and cross sectional study done at the Department of Microbiology, DRPGMC Kangra at Tanda (H.P). Randomly 215 HCW's and medical students were taken in the study who fulfilled the inclusion criteria.

**Results:** Total of 215 subjects were included in the study. Males were 89 and females were 126. 182 subjects were vaccinated and 33 were unvaccinated for hepatitis B. Out of 182 vaccinated 137 were completely vaccinated. Significant correlation was seen with decrease in antibody titers with gender, duration of vaccination and smoking.

**Conclusion:** Vaccination should be mandatory for every HCW and medical student entering the health institutions. The factors affecting the antibody titers must be evaluated and antibody titers must be reviewed from time to time. The need for a booster dose can be made mandatory at least for healthcare professionals.

**Key words:** Hepatitis B virus, Vaccination, Antibody titers, HCW

## INTRODUCTION

The human Hepatitis B Virus (HBV) is the prototype member of the family Hepadnaviridae[1] WHO estimates that in 2015, 257 million people were living with chronic hepatitis B infection (defined as hepatitis B surface antigen positive). In 2015, hepatitis B resulted in an estimated 887 000 deaths, mostly from cirrhosis and hepatocellular carcinoma.[2]

India has intermediate endemicity of hepatitis B with hepatitis B surface antigen HBsAg prevalence between 2% and 7%. India accounts for 10-15 % of the entire pool of Hepatitis B carriers in the world. hepatitis B carriers in India account for 50 million.[3]

Hepatitis B infection is one of the most important occupational hazard among the medical students and healthcare workers(HCW's) due to their risk of exposure to infected bodily fluids and blood. According to WHO, annually 5.9% of HCW are exposed to blood borne

HBV infection which corresponds to about 66,000 globally.[4]

Vaccination for HBV is the foremost in protection of many lives globally. In this study we aim for assessing the status of Hepatitis B vaccination and factors affecting the antibody titers in the long run.

## MATERIAL AND METHODS

A prospective, descriptive and cross sectional hospital based study was conducted in Department of Microbiology, DRPGMC Kangra at Tanda, Himachal Pradesh. 215 blood samples were collected from various HCW and medical students who fulfill the inclusion criteria with consent and aged more than 18 years.

Three to five ml of blood was collected under aseptic precautions. Serum separation was performed by centrifugation of the blood sample at 3000rpm for 5 minutes at room temperature. Anti-HBs

antibody levels were detected by Enzyme Linked Immunosorbent Assay using (Dia.Pro, Italy) kit strictly adhering to the manufacturer's protocol.

## RESULTS

There were 215 subjects of which 182(85%) were vaccinated and 33(15%) were unvaccinated. (Fig. 1) Out of 33 unvaccinated 24(57.1%) were class IV workers and 9(14%) were medical students. (Fig. 2)

89(41.4%) were males and 126(58.6%) were females. (Fig. 3) Out of 182 subjects 137(75.2%) were fully vaccinated and the rest were partially vaccinated. Age groups taken were between 18 to 60 years. Majority 122(56.7%) were between 18-30 years, followed by 58(26.9%) were between 41 to 60 and least 35(16.2%) were between 31 to 40 years. (Fig. 4)

Status of vaccination

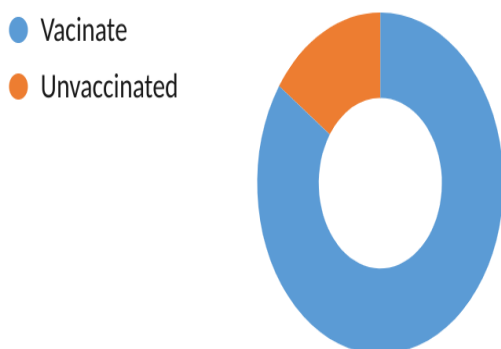


Figure 1: Status of vaccination

Unvaccinated individuals

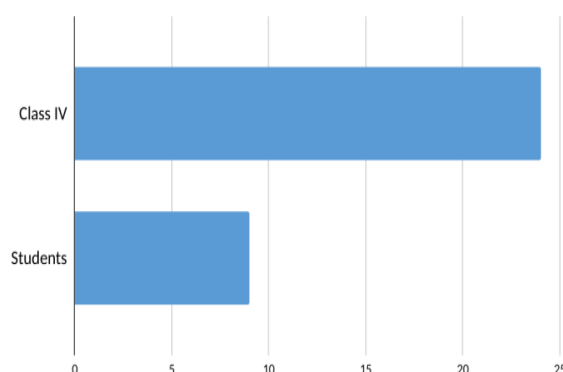


Figure 2: Unvaccinated individuals

Distribution on the basis of sex

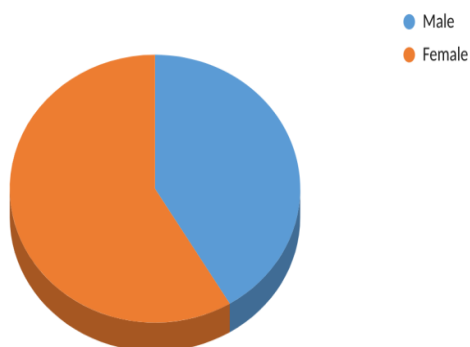


Figure 3: Distribution on the basis of sex

Distribution of subjects on the basis of age

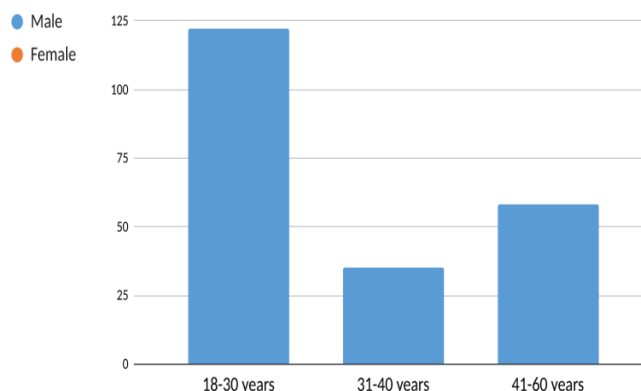


Figure 4: Distribution on the basis of age

Majority of the subjects were in range of normal BMI 145(22.3%) followed by overweight 48(22.3%), obese 17(7.9%) and least were underweight 5(2.3%). Doctors were in preponderance 73(34%) followed by medical students 62(19.5%) and least were lab technicians 15(7%). Work experience with less than 5 years was predominant in our study with 71(33%). (Table 1)

**Table 1: Distribution of various parameters**

BMI(Kg/m <sup>2</sup> )	Number(n)	Percentage (%)
Underweight (<18.5)	5	2.3%
Normal (18.5-22.9)	145	67.4%
Overweight (23.0-24.9)	48	22.3%
Obese (>24.9)	17	7.9%
Occupation	Number(n)	Percentage (%)
Doctors	73	34%
Students	62	19.5%
Class IV workers	42	10.7%
Nurses	23	28.8%
Lab Technicians	15	7.0%
Work experience	Number (n)	Percentage (%)
Nil	62	28.8%
≤ 5 years	71	33%
6-10 years	29	13.5%
> 10 years	53	24.7%

Out of 182 vaccinated individuals 128(70.3%) had a history of vaccination of ≤5 years followed by 28(15.3%) with more than 10 years and 26(14.2%) with 6 -10 years of vaccination history.(Table 1)

Risk factors associated with altered immunity, majority of subjects 37(20.3%)

were alcoholic followed by smokers 25(13.7%), Hypertensive 10(5.4%) and none of the subjects were suffering from cancer. (Table 2)

**Table 2: Risk factors for altered immunity**

Risk Factors for altered immunity	Number (n)	Percentage (%)
Alcohol	37	20.3%
Smoking	25	13.7%
Hypertension	10	5.4%
Jaundice	7	3.8%
Diabete Mellitus	5	2.7%
Chronic illness	5	2.7%
Immunomodulating drugs	1	0.5%
Cancer	0	0%

Mean antibody titers 223.3(mIU/ml) were maximum in the age group 18-30 years and least 127.6(mIU/ml) in age more than 40 years. Females have significantly higher antibody titers in comparison to males (p=0.002) (Table 3)

No significance correlation in antibody titers and BMI was seen in the study. Significant decrease was seen in antibody titers with duration of vaccination. In our study smokers and alcoholics had significant decrease in antibody titers to non smokers and non alcoholics (p=0.0037, 0.085). (Table 3) Negative correlation was seen in decreasing antibody titers with increasing age.(Fig. 5)

**Table 3: Factors affecting Antibody Titers**

Age	Mean Ab Titer (mIU/ml)
18-30	223.3
31-40	139.1
41-60	127.6
Gender	Antibody titers (P value 0.002)
Male	142.8±142.4
Female	211.9±164.6
Duration of Vaccination	Ab titers (Median) (P value <0.0001)
≤ 5 years	319.0 [200.0, 378.0]
6-10 years	87.0 [70.7, 115.0]
> 10 years	1.0 [1.0, 3.0]

Risk Factors		Mean antibody titers(mIU/ml)	P value
Alcoholic	Alcoholic	142.7±153.6	0.085
	Non Alcoholic	194.7±169.0	
Smoking	Smoker	120.4±145.1	0.037
	Non smoker	194.4±168.5	
Hypertension	Hypertensive	201.7±174.6	0.759
	Non hypertensive	185±167.3	
Chronic illness	Chronic illness	147±189.3	0.601
	Healthy	186.7±167.1	
Diabetes	Diabetic	184.9±166.8	0.628
	Non diabetic	221.7±206.8	

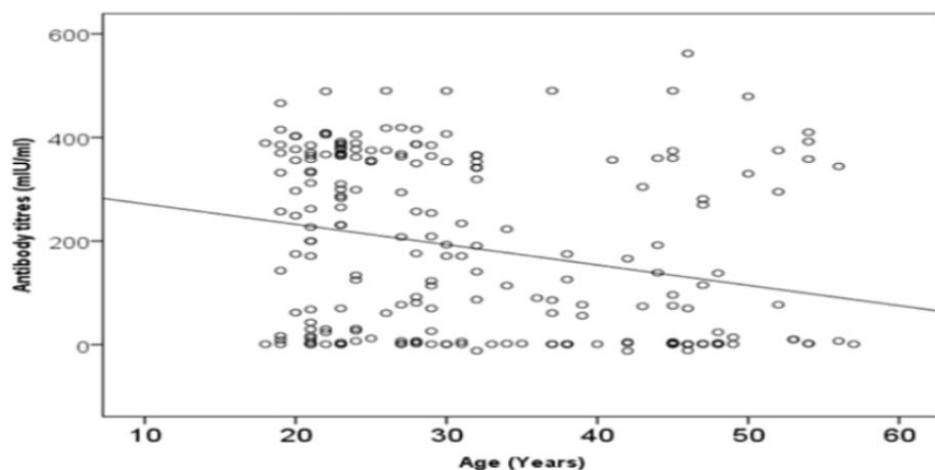


Figure: 5 Showing negative correlation between increasing age and decreasing antibody titers

## DISCUSSION

Hepatitis B is vaccine preventable disease. In our study 33(15%) subjects were unvaccinated and 182 (75%) were vaccinated. Kumar et al in their study also showed 43.9% of unvaccinated healthcare workers for HBV.[4] Majority of the unvaccinated individuals were class IV workers 24(57.1%) and 9(14.5%) were medical students. In our study by Batra et al showed least vaccination in Class IV workers. This could be due to lack of awareness of the disease in this group of HCW's.[6]

Majority 223.3 (mIU/ml) mean antibody titers for HBV vaccination were seen in the 18-30 year age group. This could be justifiable by the history of recent vaccination in this age group. Significant correlation was seen in antibody titers in females to males. Antibody titers were higher in females in comparison to males. Study by Stephaine et al in their study showed females generate higher immune response due to genetic, hormonal and miRNA factors.[7]

In contrast to our study results no correlation was seen in antibody titers to BMI. Scott D et al in their study showed obesity leads to decrease in immune response to HBV vaccination.[8]

Significant decreases in antibody titers were observed in smokers and alcoholics. Similarly in study by Yang et al and Tagliabue et al showed a deteriorating

effect of immune response in smokers to non smokers.[9,10] Averhoff et al showed significant decrease in antibody titers of HBV in smokers.[11]

Remarkable reductions in antibody titers were seen with increasing age in our study. In similarity to our result study by Basireddy P et al, Farahnaz et al and Sahana et al showed decrease in antibody titers with increasing age.[12-14]

## CONCLUSION

We recommend that all HCW's and medical students should be vaccinated for Hepatitis B. There is a need for strict implementation of the policy of Hepatitis B immunizations; periodic follow up for the level of antibody titers is required in every health care setting. It's not only to ensure safety of health care workers but also to reduce rate of transmission hence reducing nosocomial transmission which is very much desired in source limited countries.

HBV campaigns should be organized to sensitize HCW's on this disease. Campaign should include improved mass media programs, broadcasting health talks and programs.

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**Ethical Approval:** Approved

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