

# Antibody Titer against Hepatitis-B in Healthcare Workers: A Cross-Sectional Study in Microbiology Department at Rama Medical Collage Hospital and Research Centre, Kanpur

Aman Singh<sup>1</sup>, R. Sujatha<sup>2\*</sup> NashraAfaq<sup>3</sup>,

## Abstract:

**Introduction:** Hepatitis is an inflammation of the liver that can reason a variety of health problems and can be fatal. In developing countries, Hepatitis B vaccination coverage among Healthcare Workers (HCWs) is very low for various reasons. Immunization protection for HCWs for prevention and controlling HBV infection is mandatory for this vaccine preventable disease. Vaccination for doctors, nurses, paramedical staff, and nursing students is mandated for this high-risk prevention of the disease.

**Aim:** To determine the antibody titer against Hepatitis B in healthcare workers in microbiology department at Rama Medical Collage Hospital and Research Centre, Kanpur.

**Material and Methods:** This was a cross-sectional study conducted in the department of microbiology, RMCH&RH Kanpur, India for a period of 3 months i.e., from April 2023-June 2023. Serum samples were collected from 36 HCWs and their vaccination history was collected. Those who had taken all three doses of hepatitis B were considered to be fully vaccinated those that had taken two doses as partially vaccinated. Anti HBs antibody Titers were assessed by enzyme linked immunosorbent assay method.

**Results:** In the present study among 36 samples 10(27.7%) were fully vaccinated, 15(41.6%) were partially vaccinated and 11(30.5%) were not vaccinated, out of which male were 19(52.7%) and females were 17(47.2%). Anti-HBs titers were protective in 12 (33.3%) which belonged 75% (9/12) to vaccinated category and 25% (3/12) to partially vaccinated category.

**Conclusion:** There is a need for well-planned and clear policies for HBV screening and vaccination in HCWs, especially those who are at a greater risk of exposure to blood or other potentially infectious material.

## Introduction

The HBV is the leading cause of acute and chronic liver disease throughout the world [1]. The recent figures from the World Health Organization (WHO) shows that 296 million people were living with chronic hepatitis B infection in 2019, with 1.5 million new infections each year. In 2019, an estimated 820, 000 people died mostly from cirrhosis and hepatocellular carcinoma that was attributed to HBV infection [2]. With the highest risk of transmission among blood borne pathogens, hepatitis B poses a great risk to the people at risk like the healthcare professionals. Reports have indicated that a disturbing figure of 70% HCWs in intermediate or hyper endemic countries encounter needle stick injury with an average of two needle pricks per year. The concerning fact is that among them only 10-30% are only reported to the authorities [3-6]. The chances of acquiring hepatitis infection also depend on the HBeAg (Hepatitis B envelope antigen) status of the source which is a marker of infectivity as well [7]. Fortunately enough, this disease is vaccine preventable and vaccines are available throughout the globe.

WHO recommends that all infants receive the HBV vaccine as soon as possible after birth, preferably within 24 hours, followed by 2 or 3 doses of hepatitis B vaccine at least four weeks apart to complete the vaccination series. Protection lasts at least 20 years and is probably lifelong. WHO does not recommend booster vaccinations for persons who have completed the three-dose vaccination schedule [2]. The only easily measurable correlate of the vaccine induced protection is the anti HBS (Hepatitis B surface antibody) concentration serological test. An anti-HBs titer of 10 mIU/mL achieved three months after completing the primary vaccination is considered as a protective titer [8]. Immunization protection for HCWs for prevention and controlling HBV infection is mandatory for this vaccine preventable disease.[9]The protection accorded by HepB vaccination depends on development of antibodies to HBsAg (anti-HBs).[10]Complete protection occurs when anti HBs titers  $\geq 10$  milli-international units per milliliter (mIU/mL) are attained after three doses of vaccine given at 0, 1, and 6-12 months.[11]Vaccination for doctors, nurses, paramedical staff, and nursing students is mandated for this high-risk cohort.[12]Hence, the purpose of the study was to find the hepatitis B vaccination status of the HCWs and to find the Anti-HBs titers in these HCWs.

PG Student<sup>1</sup> Department of Microbiology, Rama Medical College Hospital & Research Centre.

Professor and HOD<sup>2</sup> Department of Microbiology, Rama Medical College Hospital & Research Centre.

Research Associate<sup>3</sup> ,Dept of Microbiology, Rama Medical College Hospital and Research Centre..

### Material and Methods

This was a cross-sectional study conducted in the Department of Microbiology in Rama Medical College Hospital & Research Centre Kanpur (RMCH&RC) from April 2023 to June 2023 after getting approval from the Institute Research and Ethical Committee. Total 36 samples of HCWs were collected.

**Inclusion criteria:** HCWs who consented to submit their serum sample and gave their written consent were included.

**Exclusion criteria:** HCWS who did not give their consent were excluded.

#### Sample collection- [Plasma]

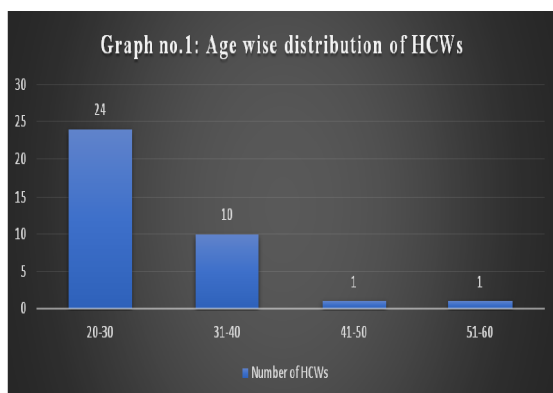
1. Collect the venous whole blood into the commercially available anti-coagulant tube such as heparin or EDTA by venipuncture and centrifuge blood to get plasma specimen.
2. If plasma in an anti-coagulant tube is stored in a refrigerator at 2-8°C/36-46°F, the specimen can be used for testing within 1 week after collection. Using the specimen in the long-term keeping more than 1 week can be cause non-specific reaction. For prolonged storage, it should be at below -20°C/-4°F.
3. It should be brought to room temperature prior to use.

### Statistical analysis:

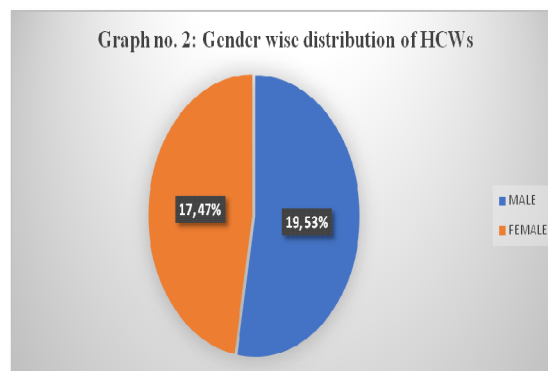
Data recorded on the case report from and structured proforma were subsequently entered and into a spreadsheet. Date management and analysis were performed using Microsoft excel.

### Results

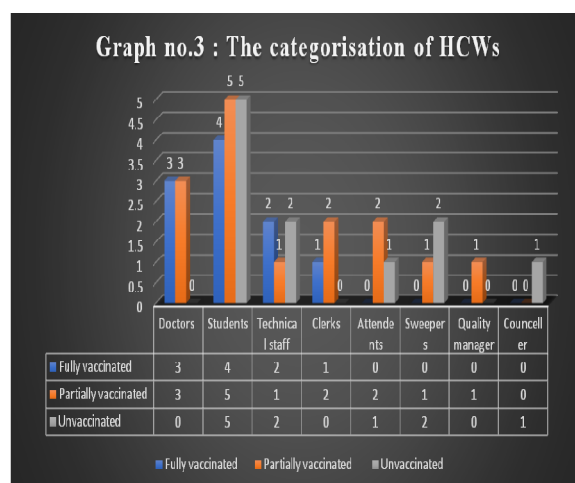
Out of 36 HCWs who consented for this study, 36 were subjected to anti-HBs testing since one HCW turned out to be HBsAg Ag positive. All participants were negative for HCV and HIV.



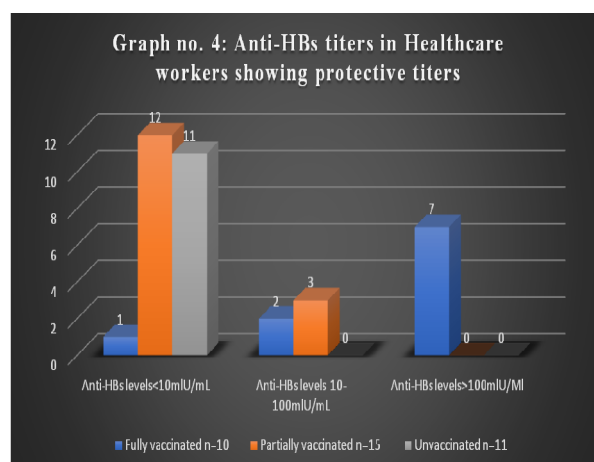
Age wise distribution of Healthcare workers in which maximum number was found in the age group of 20-30 years followed by 31-40 years of age as shown in Graph no.1



Among 36 HCWs there were 19 (53%) males and 17(47%) females as shown in Graph no 2



Out of 36 included, 10 (27.7%) were fully vaccinated that is who had completed all three doses of vaccination, 15 (41.6%) were partially vaccinated that is who had missed their 3rd dose and 11 (30.5%) were unvaccinated. There was no HCW in our study who had taken only one dose of vaccination as shown in Graph no. 3



Out of 10 fully vaccinated HCWs, 9 (9/10) had protective anti HBs antibody titer while 1 (1/10) didn't have protective antibody titer. These 1 HCWs had

received their last vaccination dose more than 10 years back. Rest all the vaccinated HCWs had taken vaccination within last 10 years. Of the 9 who had protective antibody titers, 2 (2/9) had antibody titer between 10-100 mIU/ mL and 7 (7/9) had antibody titer of more than 100 mIU/mL. Among partially vaccinated group also 3 (3/15) had protective antibody titers and all of them were between 10-100 mIU/mL. None of the unvaccinated HCWs had a protective antibody titer as shown in Graph no.4.

## Discussion

Hepatitis B virus (HBV) infection is a major global health problem, with an estimated 290 million infections worldwide; international targets set the challenge for this public health threat to be eliminated by 2030 [2].

**Table no1: Comparison between vaccination statuses against HBV among HCWs from various studies.**

Study	Year of study	Fully vaccinated against HBS (%)	Unvaccinated (%)
Vishal Batra et. Al [13]	2015	49.6%	46.1%
Dotto Aaron et. Al [14]	2017	33.6%	9.3%
Irene Ann Mwangi et. Al [15]	2023	82.8%	17.2%
Present study	2023	27.7%	30.5%

In our study, there is less number of fully vaccinated against Hepatitis-B and more number of unvaccinated healthcare workers which is not in accordance to the study conducted by Vishal Batra et. Al, Dotto Aaron et. Al, Irene Ann Mwangi et. al.

There was another study conducted by by Parimala Subramani et al., which was in accordance to our study where antibody titres were measured by ELISA. Titers of 10mIU/ ml were seen in 90% of subjects, 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 [16]

## Conclusion

There is a need for well-planned and clear policies for HBV screening and vaccination in HCWs, especially those who are at a greater risk of exposure to blood or other potentially infectious material. Further studies are needed to test anti-HBs titers in HCWs and they are to be encouraged to report needle stick injuries so that necessary action and tests can be conducted in time.

## Ethical Clearance

The ethical committee clearance certificate was taken before starting of study by institutional medical ethical committee.

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