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A STUDY ON ANTIBODY TITER AGAINST HEPATITIS-B IN HEALTHCARE WORKERS: A CROSS-SECTIONAL STUDY

Dr. Shweta Tripathi, Dr. Raees Ahmed, Dr. Komal Tanwar, Dr. Nashra Afaq, Dr. Pawan Arun Kulkarni, Dr. Swarnali Choudhury, Dr. Saiqa R Shah**

Associate Professor[1], Department of General Medicine, Rama Medical College Hospital and Research Centre, Kanpur, Uttar Pradesh, India.
PhD Scholar[2], Department of Microbiology, Government Medical College, Kota, Rajasthan.
Junior Resident-1[3], Department of Microbiology, Government Medical College, Jammu, India.
Research Associate[4], Department of Microbiology, Rama Medical College Hospital and Research Centre, Kanpur, Uttar Pradesh, India.
Professor and Head[5], Department of Biochemistry, Rama Medical College Hospital and Research Centre, Kanpur, Uttar Pradesh, India.
Assistant Professor[6], Department of Biochemistry, Assam Medical College & Hospital Dibrugarh, Assam, India.
Associate Professor[**], Department of Biochemistry, LNTC Indore, India.

Corresponding Author: Dr. Saiqa R Shah*
Email ID: shah.saiqa2@gmail.com

ABSTRACT

INTRODUCTION- Hepatitis is an inflammation of the liver that can cause a number of health issues and even death. Hepatitis B vaccination coverage among healthcare workers (HCWs) in underdeveloped nations is extremely low for a variety of reasons. HCWs must be immunised against HBV infection in order to prevent and control the disease. Doctors, nurses, paramedical professionals, and nursing students must be vaccinated against this high-risk disease.

AIM- To determine the antibody titer against Hepatitis B in healthcare workers at a tertiary care centre.

MATERIAL AND METHODS- This was a cross-sectional study carried out in the Department of microbiology and biochemistry for a period of six months i.e., from December 2023 to May 2024. Serum samples was 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 out of the 36 samples of HCWs, 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

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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 explicit protocols for HBV screening and immunisation in healthcare workers, particularly those who are more likely to be exposed to blood or other potentially infectious materials.

INTRODUCTION

Hepatitis B virus (HBV) is a global health issue. There is evidence that 360 million individuals are chronically infected, and almost 1 million people die each year from acute or chronic complications such as fulminant hepatitis, cirrhosis, and hepatocellular cancer [1]. The prevalence of HBV-related hepatitis varies across countries: in industrialised countries of Western Europe and North America, the prevalence of HBV surface antigen (HBsAg) positivity in the general population is <2% (low endemicity); in most Mediterranean countries, Eastern Europe, and Asia, it is in the range of 2-8% (intermediate endemicity). The total prevalence of Hepatitis B is highest in various poor nations in Far East Asia, Sub-Saharan Africa, and the Western Pacific region, where approximately 6% of the adult population is infected (high endemicity) (World Health Organization, 2018) [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]. The chances of acquiring hepatitis infection also depends on the HBeAg (Hepatitis B envelope antigen) status of the source which is a marker of infectivity as well. Fortunately enough, this disease is vaccine preventable and vaccines are available throughout the globe [4-6].

The WHO recommends that all babies receive the HBV vaccine as soon as possible after delivery, preferably within 24 hours, followed by two or three doses of the hepatitis B vaccine spaced at least four weeks apart to complete the series. Protection lasts at least 20 years and is most likely lifetime. WHO does not recommend booster immunisations for anyone who have finished their three-dose vaccination programme [2].

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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.[7-9]

HepB vaccine provides protection based on the production of anti-HBsAg antibodies [10]. Complete protection is achieved with anti-HBs titers of ≥10 mIU/mL after three vaccine doses given at 0, 1, and 6-12 months.[11]This high-risk group must be vaccinated, including doctors, nurses, paramedics, and nursing students [12,13]The study's goal was to determine the hepatitis B vaccination status of the HCWs as well as their Anti-HBs titers at a tertiary care centre.

MATERIAL AND METHODS

This was a cross-sectional study carried out in the Department of Microbiology and biochemistry for a period of six months i.e., from December 2023 to May 2024. Serum samples was 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.

The Ethical clearance was duly obtained from the Institutional Ethical Committee.

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

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

Sample collection- [Plasma]

1. Venipuncture venous whole blood into a commercial anti-coagulant tube with heparin or EDTA, then centrifuge to obtain plasma specimen.
2. Store plasma in an anti-coagulant tube in the refrigerator at 2-8ºC/36-46ºF for testing within 1 week of collection. Using the material for longer than one week can result in a non-specific reaction. For long-term storage, keep it below -20ºC/-4ºF.
3. Bring it to room temperature before usage.

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STATISTICAL ANALYSIS:

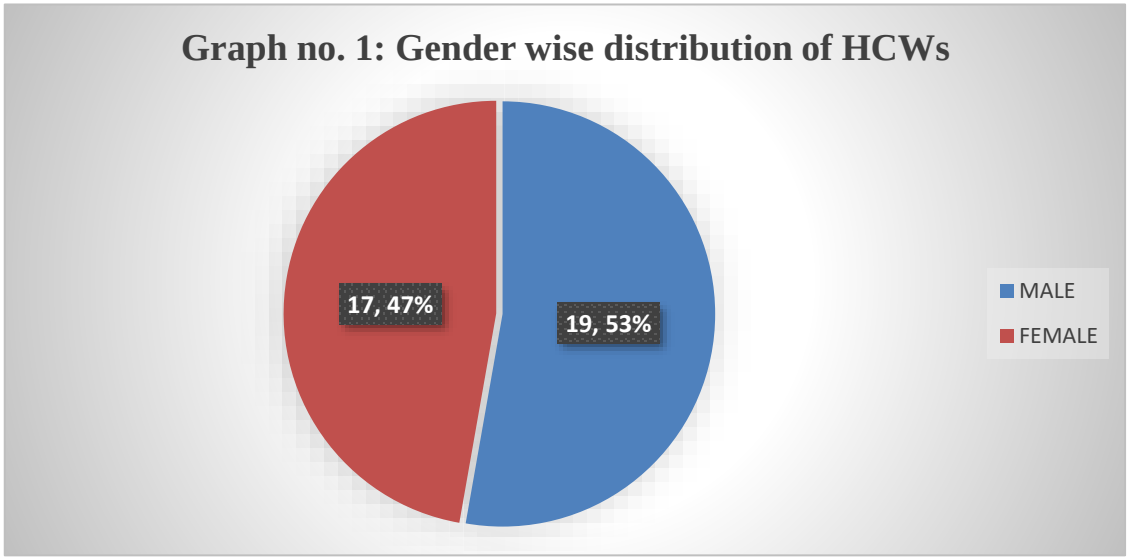
Data recorded on the case report from and structured proforma were subsequently entered and into a spreadsheet. Date management and analysis were performed using Microsoft excel.

RESULTS

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

Genderwise	No. of Cases	Percentage
Male	19	53%
Female	17	47%

Table No.1: Genderwise Distribution of the cases of HCWs



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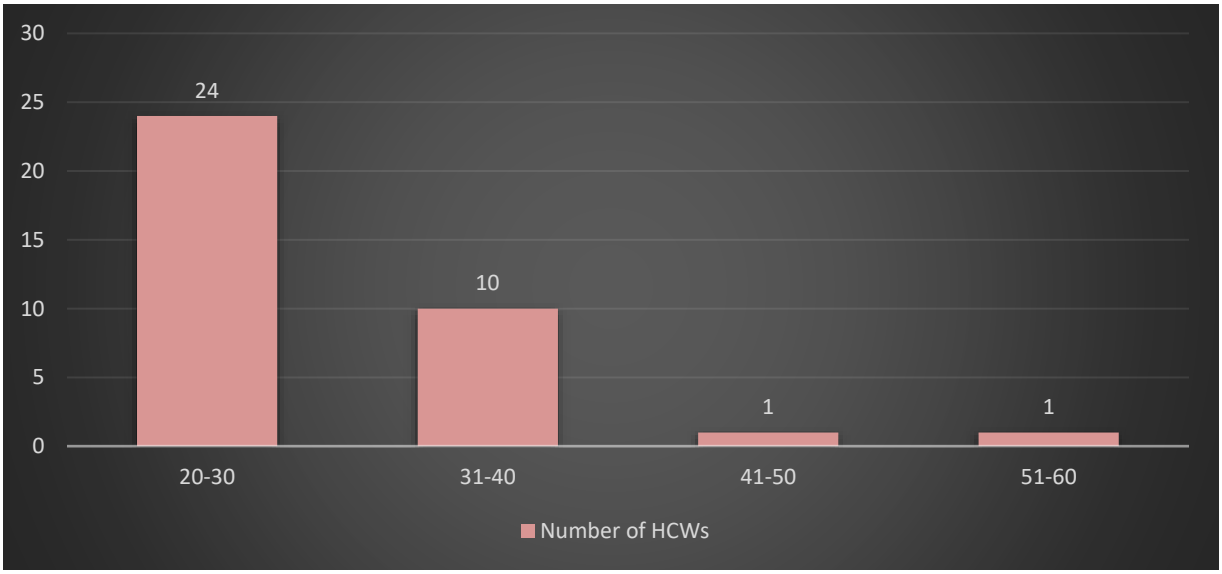
Graph No.1: Graphical Representation of Genderwise Distribution of the cases of HCWs

Among the 36 HCWs there were 19 (53%) males and 17(47%) females recorded as shown in Graph no 1 .

Agewise	Number of Isolates (n=36)	Percentage
20-30	**24**	**66.6%**
31-40	10	27.7%
41-50	1	2.7%
51-60	1	2.7%

Table No.2: Agewise Distribution of the cases



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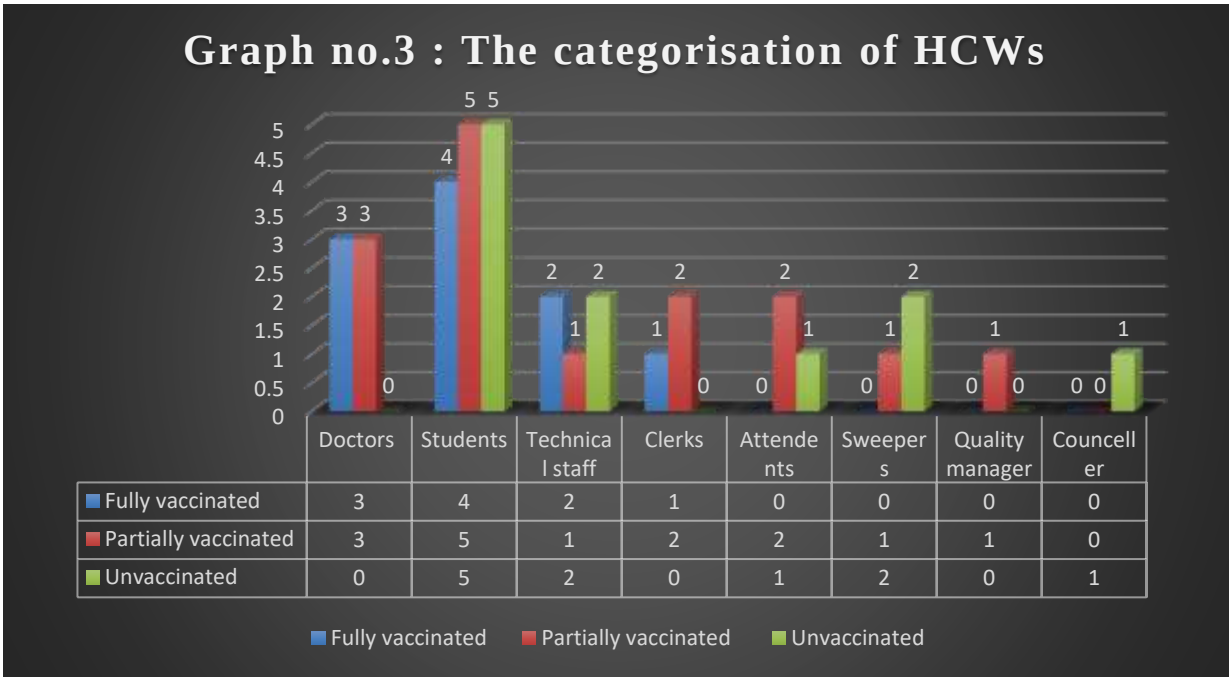
Graph No.2: Graphical Representation of Agewise Distribution

From the Table no. 2 it was observed that Age wise distribution of Healthcare workers in which maximum number was found was in the age group of 20-30 (66%) years followed by 31-40 (27.7%) years of age as shown in Graph no.2.



Graph No.3: Graphical Representation of Categorisation of HCWs

In the current study out of the 36 cases included, 10 (27.7%) were fully vaccinated that is who had completed all three doses of vaccination, 15 (41.6%) were partially vaccinated that 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.

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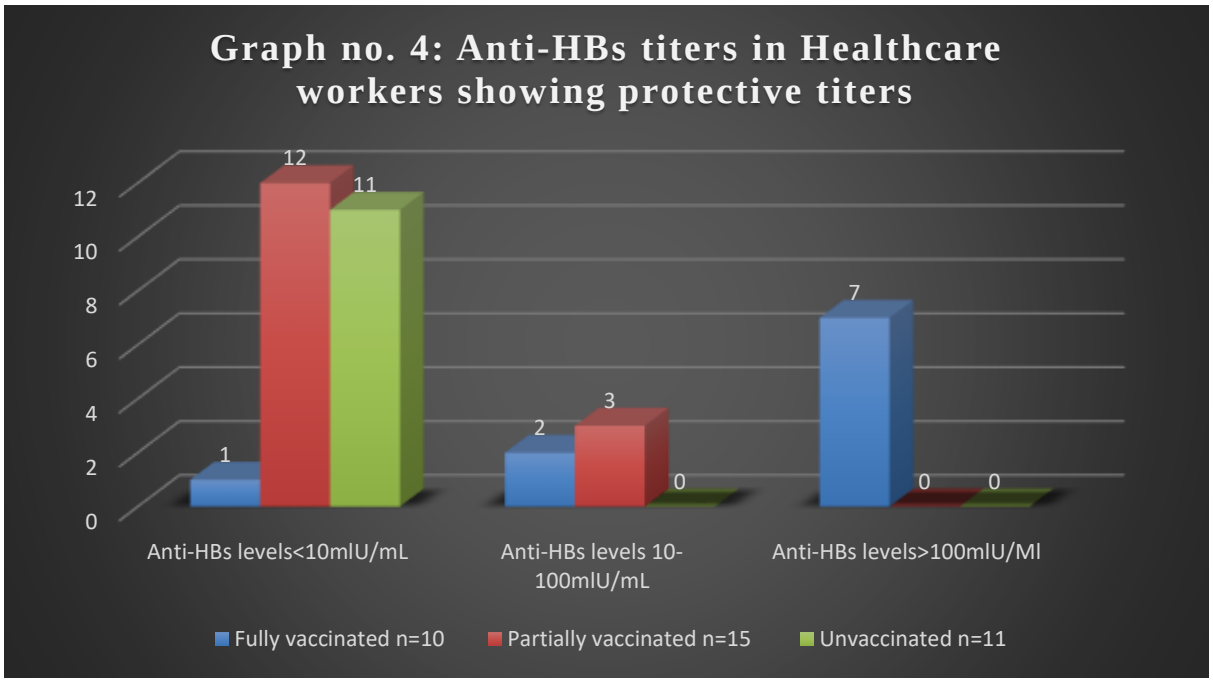

Graph No.4: Graphical Representation of Categorisation of HCWs

Out of the 10 fully vaccinated HCWs, 9 (9/10) had protective anti HBs antibody titer while 1 (1/10) didn't have protective antibody titer. The 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 and C are major concerns among healthcare professionals; all international agencies urge that workers be vaccinated against hepatitis through the cooperation of

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occupational health physicians. The discovery of a particular vaccine has served as a benchmark for workplace HBV prevention.

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 depends on the Hepatitis B Envelope Antigen (HBeAg) status of the source which is a marker of infectivity as well [7].

Since HCWs are at high-risk of acquiring HBV, it should be an institutional policy to check the hepatitis B status of its workers and periodic check-ups of their anti-HBs levels. A

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].

In the present study the ratio of Males 53% was more as compared to females 47%. Tt was observed that Age wise distribution of Healthcare workers in which maximum number was found in the age group of 20-30 (66%) years followed by 31-40 (27.7%) years of age. This study was in support to the study performed by the other research investigator where, the ratio of males was more as compared to females with the age group of 20 years and above being affected the most [14].

Study	**Year of study**	**Fully vaccinated against HBS (%)**	**Unvaccinated (%)**
Vishal Batra et. al[15]	2015	49.6%	46.1%
Dotto Aaron et. al[16]	2017	33.6%	9.3%
Irene Ann Mwangi et. al[17]	2023	82.8%	17.2%
Present study	**2023-2024**	**27.7%**	**30.5%**

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Table No. 3:Comparison between vaccination status against HBV among HCWs from various studies.

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 [18].

In the current study out of the ten completely vaccinated health-care workers, nine (9/10) exhibited protective anti-HBs antibody titers, while one (1/10) did not. The 1 HCW had received their last immunisation dosage more than ten years ago. The remaining immunised health-care workers have received their vaccinations during the last ten years. Of the nine with protective antibody titers, two (2/9) had antibody titers between 10 and 100 mIU/mL, and seven (7/9) had antibody titers greater than 100 mIU/mL. Among the partially vaccinated group, three (3/15) had protective antibody titers ranging from 10-100 mIU/mL. None of the unvaccinated HCWs had a protective antibody titer. This study was in accordance with the study by Nasir R in 2023 where in out of 46 fully vaccinated HCWs, 44 (44/46) had protective antiHBs antibody titer while 2 (2/46) didn't have protective antibody titer. These two 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 44 who had protective antibody titers, 12 (12/44) had antibody titer between 10-100 mIU/mL and 32 (32/44) had antibody titer of more than 100 mIU/mL. Among partially vaccinated group also 10 (10/84) had protective antibody titers and all of them between 10-100 mIU/mL. None of the unvaccinated HCWs had a protective antibody titer [14].

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Vaccination protects 90-95% of adults from HBV infection . The Centres for Disease Control (CDC) recommends revaccination with ≥1 dose of HBV vaccine for non-responders after the primary series to increase vaccine-induced seroprotection. Individuals with measurable but low (i.e., 1-9 mIU/mL) anti-HBs after the initial series have a better response to revaccination than those with no measurable anti-HBs [19,20]..

CONCLUSION

There is a need for well-planned and explicit protocols for HBV screening and immunisation in healthcare workers, particularly those who are more likely to be exposed to blood or other potentially infectious materials. Further research is needed to evaluate anti-HBs titers in healthcare workers, and they should be encouraged to report needle stick injuries so that essential action and tests may be taken on time.

Declarations:

Conflicts of interest: There is no any conflict of interest associated with this study

Consent to participate: We have consent to participate.

Consent for publication: We have consent for the publication of this paper.

Authors' contributions: All the authors equally contributed the work.

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