Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 18s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Evaluating The Antibody Titer Against Hepatitis-B In Healthcare Workers: A Cross-Sectional Study At A Tertiary Care Centre

Dr. Deepak Kumar[1], Dr. Roshni Agarwal[2], Dr. Pratima Rawat[3], Dr. Nashra Afaq[4]
Dr. Divya Srivastava*[5]

[1]Assistant Professor, Department of Microbiology, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, Uttar Pradesh, India.

[2]Associate Professor, Department of Microbiology, Autonomous State Medical College, Kanpur Dehat, Uttar Pradesh, India.

[3]Senior Resident, Department of Microbiology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Uttar Pradesh, India.

[4]Assistant Professor, Department of Microbiology and CRL, Rama Medical College Hospital and Research Centre, Uttar Pradesh, India.

[*5]Assistant Professor, Department of Microbiology, Government Medical College, Kannauj, Uttar Pradesh, India.

Corresponding Author: Dr. Divya Srivastava*

Email ID: divyakul8523@gmail.com

Cite this paper as: Dr. Deepak Kumar, Dr. Roshni Agarwal, Dr. Pratima Rawat, Dr. Nashra Afaq, Dr. Divya Srivastava*, (2025) Evaluating The Antibody Titer Against Hepatitis-B In Healthcare Workers: A Cross-Sectional Study At A Tertiary Care Centre. *Journal of Neonatal Surgery*, 14 (18s), 689-695.

ABSTRACT

INTRODUCTION: In addition to being the most contagious blood-borne virus, hepatitis B is also the only one that may be avoided with immunisation. Healthcare Workers' (HCWs') immunisation rates against Hepatitis B are extremely low in developing nations for a number of reasons. For a number of reasons, healthcare workers (HCWs) in developing countries have very low hepatitis B immunisation rates. To prevent and control the disease, healthcare workers need to be vaccinated against HBV infection. This is a high-risk disease that requires vaccination for physicians, nurses, paramedical personnel, and nursing students.
AIM: To study 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 for a period of 12 months i.e., from November 2023 to November 2024. The Serum samples were collected from 72 cases and out of which 50 HCWs and their vaccination history was collected after informed consent. 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: Among the 50 HCWs there were 33 (66%) males and 17(47%) females recorded. It was observed that age wise distribution of Healthcare workers in which maximum number was found was in the age group of 20-30 (68%) years followed by 31-40 (26%) years of age and least in the age group of 41years of age. In the current study out of the 50 cases included, 14 (28%) were fully vaccinated that is who had completed all three doses of vaccination, 21 (42%) were partially vaccinated that who had missed their 3rd dose and 15 (30%) were unvaccinated. There was no HCW in our study who had taken only one dose of vaccination. Out of the 14 fully vaccinated HCWs, 13 (13/14) had protective anti HBs antibody titer while 1 (1/14) didn't have protective antibody titer.. Of the 13 who had protective antibody titers, 3 (3/13) had antibody titer between 10-100 mIU/ mL and 10 (10/13) had antibody titer of more than 100 mIU/mL. Among partially vaccinated group also 4 (4/21) had protective antibody titers and all of them were between 10-100 mIU/mL. None of the unvaccinated HCWs had a protective antibody titer.
CONCLUSION: The only easily measurable correlate of the vaccine induced protection is the antianti-HBs concentration serological test
Healthcare professionals, especially those who are more likely to come into contact with blood or other potentially infectious materials, require clear and well-thought-out procedures for HBV screening and vaccination.

Keywords: Hepatitis B, HCW's, HBV, Antibody titer, Dose

1. INTRODUCTION

Hepatitis B is still a concern for healthcare workers (HCP) in many nations, despite the remarkable advancements in its prevention, detection, and treatment over the past few decades. An estimated 360 million people have a chronic infection, and hepatocellular carcinoma, cirrhosis, and fulminant hepatitis are among the acute or chronic consequences that claim the lives of about 1 million people annually [1]. According to the World Health Organization (WHO), approximately 296 million individuals globally were living with hepatitis B infection in 2019. Asia and sub-Saharan Africa bear most of the burden of chronic hepatitis B, with a large proportion of countries being endemic with an estimated HBV prevalence of >8% [2].

Hepatitis B is the blood-borne pathogen with the highest risk of transmission, making it extremely dangerous for those who are susceptible, such as medical personnel. According to reports, a startling 70% of healthcare workers in countries with intermediate or hyperendemic rates have needle stick injuries, with an average of two pricks year. Only 10–30% of them are reported to the authorities, which is a worrying reality [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].

Healthcare personnel (HCP) are at increased risk of hepatitis B virus (HBV) infection because of their frequent exposure to blood and other body fluids . Once infected, HCP may transmit HBV to their patients [5]; however, with appropriate precautions, transmission is rare [6]. Because of their increased occupational risk, the WHO recommends that HCP are vaccinated against HBV [7]. Specifically, the hepatitis B vaccine confers over 96% protection, making HBV infection a vaccine-preventable disease. Nevertheless, hepatitis B vaccination rates among HCP are suboptimal in several countries, with low completion rates of the recommended three-dose vaccine series, while HCP uncommonly check their hepatitis B antibody levels after vaccination

The serological test for anti-HBS (hepatitis B surface antibody) concentration is the only readily quantifiable correlate of vaccine-induced protection. Three months following the completion of the first immunisation, an anti-HBs titer of 10 mIU/mL is regarded as a protective titer [8].In order to prevent and control HBV infection, healthcare workers must be immunised against this vaccine-preventable illness.

HepB vaccine provides protection based on the production of anti-HBsAg antibodies [9,10]. Complete protection is achieved with anti-HBs titers of ≥10 mIU/mL after three vaccine doses given at 0, 1, and 6-12 month. This high-risk group must be vaccinated, including doctors, nurses, paramedics, and nursing students.

Fortunately enough, this disease is vaccine preventable and vaccines are available throughout the globe [11]. 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 atleast four weeks apart to complete the vaccination series. Protection lasts atleast 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 antianti-HBs 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 [12,13].

Therefore 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.

2. MATERIAL AND METHODS

This was a cross-sectional study carried out in the Department of Microbiology for a period of 12 months i.e., from November 2023 to November 2024. Serum samples was collected from 50 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.

Inclusion criteria:

1. HCWs who consented to submit their serum sample and gave their written consent were included.
2. Study included cases of all Gender
3. Study included cases of all Age group

Exclusion criteria:

1. HCWS who did not gave their consent were excluded.
2. Sample collection- [Plasma]

Sample Processing

Venipuncture venous whole blood into a commercial anti-coagulant tube with heparin or EDTA, then centrifuge to obtain plasma specimen.
Then 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. Finally bring it to room temperature before usage.

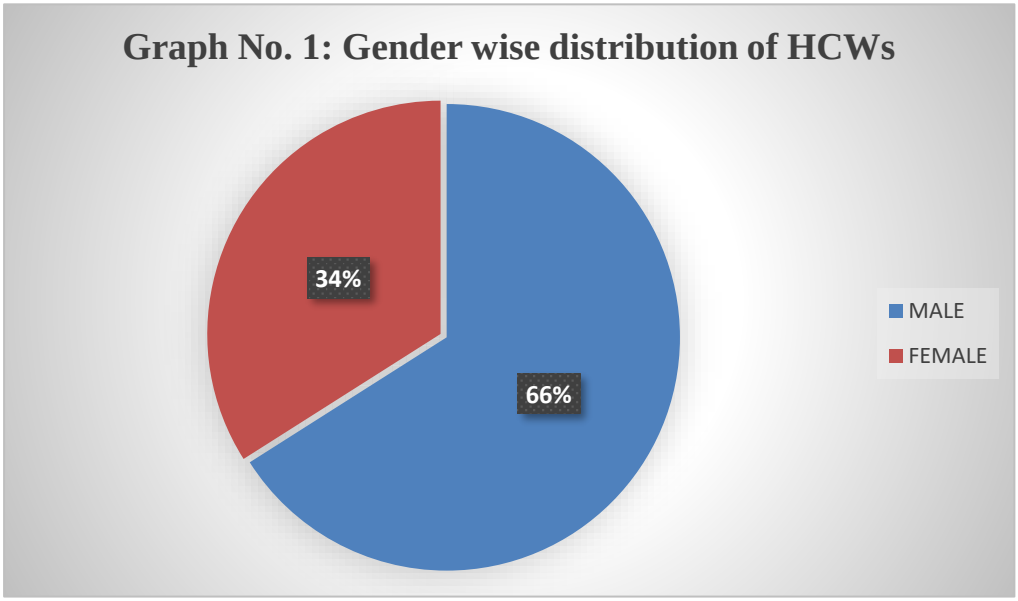
Statistical Analysis: Data recorded on the case report from and structured proforma were subsequently entered in a spreadsheet. Date management and analysis were performed using Microsoft excel.

3. RESULTS

In the present study out of 62 screened cases 50 cases were of HCWs who consented for this study, 50 HCWs were subjected to anti-HBs testing. All the participants were negative for HCV and HIV test.

Genderwise distribution	No. of Cases	Percentage (%)
Male	33	66%
Female	17	34%

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



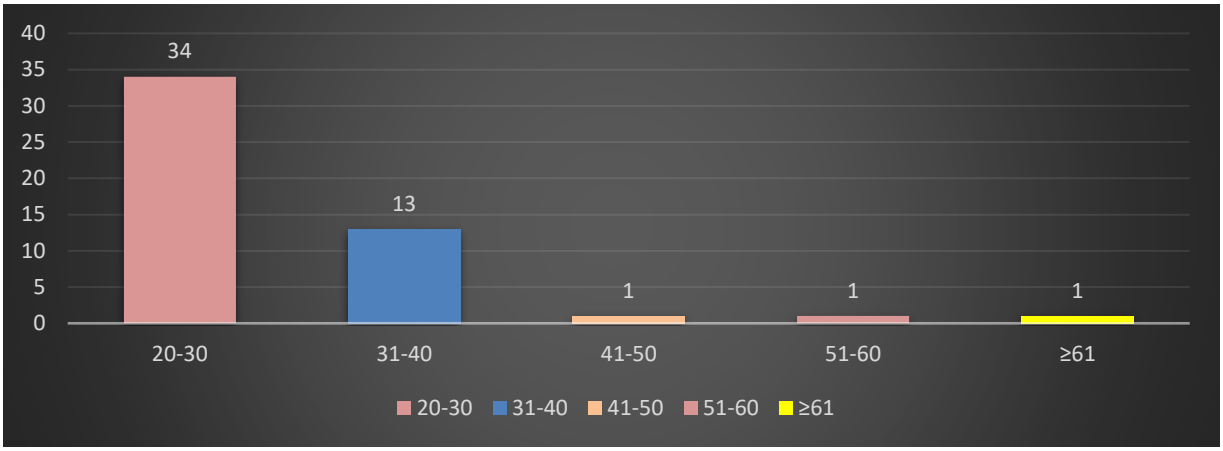
Graph No.1: Graphical Representation of Genderwise Distribution of the cases of HCWs

Among the 50 HCWs there were 33 (66%) males and 17(47%) females recorded as shown in Graph no 1 .

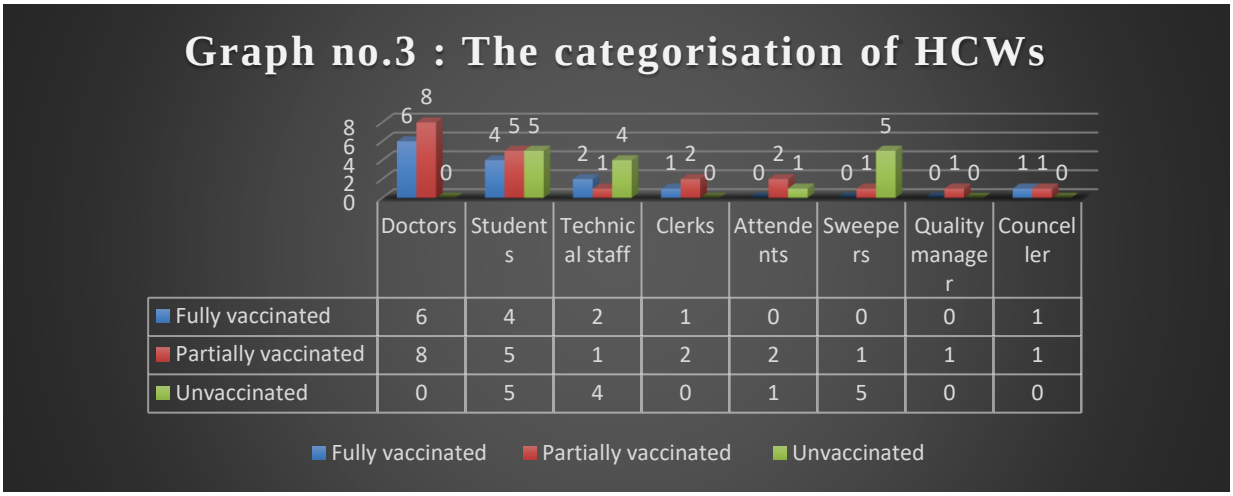
Agewise distribution	Number of Isolates (n=50)	Percentage (%)
20-30	**34**	**68%**
31-40	13	26%
41-50	1	2%
51-60	1	2%
≥61	1	2%

Table No.2: Agewise Distribution of the cases

Graph No.2: Graphical Representation of Agewise Distribution

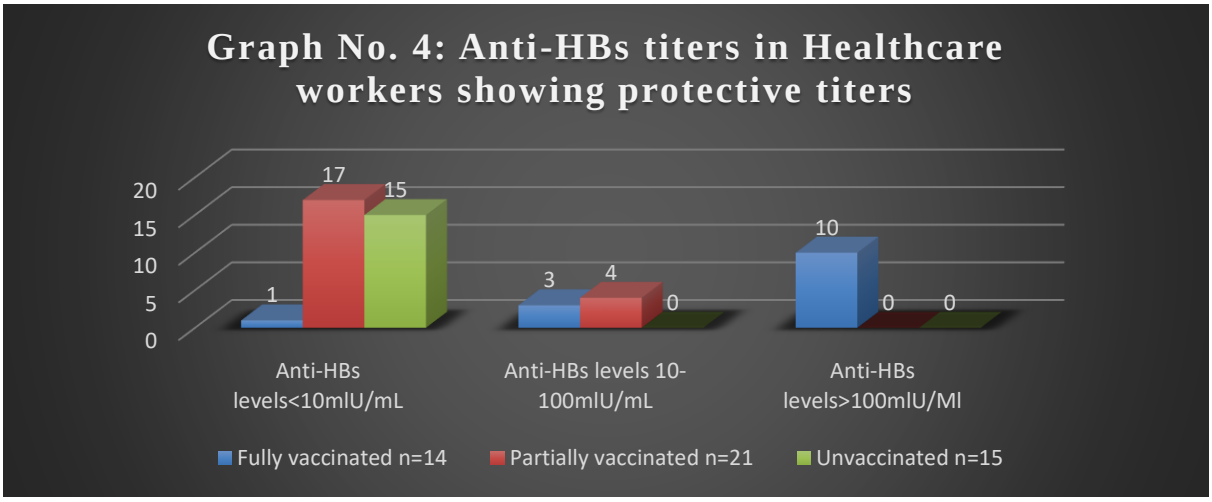


From the Table no. 2 it was observed that Age wise distribution of Healthcare workers in which maximum number was found was in the age group of 20-30 (68%) years followed by 31-40 (26%) years of age and least in the age group of 41years of age as shown in Graph no.2.



Graph No.3: Graphical Representation of Categorisation of HCWs

In the current study out of the 50 cases included, 14 (28%) were fully vaccinated that is who had completed all three doses of vaccination, 21 (42%) were partially vaccinated that who had missed their 3rd dose and 15 (30%) were unvaccinated. There was no HCW in our study who had taken only one dose of vaccination as shown in Graph no. 3.



Graph No.4: Graphical Representation of Categorisation of HCWs

Out of the 14 fully vaccinated HCWs, 13 (13/14) had protective anti HBs antibody titer while 1 (1/14) 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 13 who had protective antibody titers, 3 (3/13) had antibody titer between 10-100 mIU/ mL and 10 (10/13) had antibody titer of more than 100 mIU/mL. Among partially vaccinated group also 4 (4/21) 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.

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]. The development of a vaccine against hepatitis B virus (HBV) is one of the improvements in strategy prevention during the last decades.

Hepatitis B and C are a major concerns among healthcare professionals; all international agencies urge that workers be vaccinated against hepatitis through the cooperation of occupational health physicians. The discovery of a particular vaccine has served as a benchmark for workplace HBV prevention.

Hepatitis B is the blood-borne infection with the highest chance of transmission, making it extremely dangerous for those who are susceptible, such as medical personnel.

Healthcare workers (HCWs) are more frequently exposed to the risk of acquiring HBV infection than the general population through mucosal-cutaneous exposure to potentially infectious blood (eyes, oral mucosa or skin) or through percutaneous exposure to contaminated sharp objects (needles, blades, etc.)

According to reports, a startling 70% of healthcare workers in countries with intermediate or hyperendemic rates have needle stick injuries, with an average of two pricks year. The concerning fact is that among them only 10-30% are only reported to the authorities [5]. 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.

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

In the present study it was observed that among the 50 HCWs there were 33 (66%) males and 17(47%) females recorded. It was observed that in age wise distribution of Healthcare workers in which maximum number was found in the age group of 20-30 (68%) years followed by 31-40 (26%) years of age and least in the age group of 41years 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]. In the current study out of the 50 cases included, 14 (28%) were fully vaccinated that is who had completed all three doses of vaccination, 21 (42%) were partially vaccinated that who had missed their 3rd dose and 15 (30%) were unvaccinated.

There was no HCW in our study who had taken only one dose of vaccination. This study was in accordance to the study performed by the other research investigator by Vishal Batra et. al [15] where fully vaccinated against HBS (%) was found to be 49.6%, Unvaccinated (%) with 46.1 %. Another study by Dotto Aaron et. al [16] stated that Fully vaccinated against HBS (%) were 33.6% and Unvaccinated (%) were 9.3%. Study by Irene Ann Mwangi et. al [17] recorded that 82.8% and 17.2% were fully vaccinated against HBS and unvaccinated respectively.

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].

There was another study where results showed that nurses had higher Abs titre compared to doctors and other hospital staff members, such as technicians and assistants ($P = 0.05$). This may be due to more direct and frequent contact with patients and their body fluids compared to the other health professionals, such as the medical class that works in a clinical area or healthcare technicians less exposed to biological fluids [19].

Out of the 14 fully vaccinated HCWs, 13 (13/14) had protective anti HBs antibody titer while 1 (1/14) didn't have protective antibody titer.. Of the 13 who had protective antibody titers, 3 (3/13) had antibody titer between 10-100 mIU/ mL and 10 (10/13) had antibody titer of more than 100 mIU/mL. Among partially vaccinated group also 4 (4/21) had protective antibody titers and all of them were between 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]. There was another study which was observed to be parallel to the current study where all HBV vaccinated individuals were screened for whole marker patterns; all were HBsAg/anti-HBc negative. Of individuals, 20% had an anti-HB antibody titre < 10 IU/L [19].

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 [20].
These results suggest that HBV vaccination programs should prioritize timely booster doses, especially for older HCWs and those vaccinated long ago. Monitoring antibody levels is crucial to ensure ongoing protection, particularly in high-risk groups such as nurses. Implementing these measures can enhance the effectiveness of HBV vaccination programs, reduce HBV incidence among HCWs, and contribute to a safer healthcare environment. Post-vaccination testing is essential to ensure the safety of all HCWs against HBV [21].
The evaluation of HBV markers in HCWs is useful to identify and reduce the number of unprotected workers who have not been vaccinated or show a low antibody titre [22].

5. CONCLUSION

Introduction Hepatitis B virus (HBV) is a highly infectious disease affecting the liver, causing life-threatening acute and chronic hepatitis. Given their increased risk compared to the general population, vaccination is crucial in limiting the spread of HBV and protecting HCWs. Healthcare professionals, especially those who are more likely to come into contact with blood or other potentially infectious materials, require clear and well-thought-out procedures for HBV screening and vaccination. Healthcare professionals should be encouraged to report needle stick injuries so that necessary action and tests can be conducted on time, although further study is required to assess anti-HBs titers in these personnel.

6. 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.

REFERENCES

[1] Reyaz Nasir et al. Protective Antibody Titer against Hepatitis B in Healthcare Workers: A Cross-sectional Study from Tertiary Care Hospital of Kashmir. Journal of Clinical and Diagnostic Research. 2023; 17(4): DC15-DC17.

[2] World Health Organization . Global Progress. Report on HIV, Viral Hepatitis and Sexually Transmitted Infections, 2021: Accountability for the Global Health Sector Strategies 2016–2021: Actions for Impact. World Health Organization; Geneva, Switzerland: 2021. [(accessed on 12 December 2023)].

[3] Komatsu H, Klenerman P, Thimme R.Hepatol.Discordance of hepatitis B vaccination policies for healthcare workers between the USA, the UK, and Germany. Res. 2020; 50(3):272-282.

[4] Zafar A, Aslam N, Nasir N, Meraj R, Mehraj V. Knowledge, attitudes and practices of healthcare workers regarding needle stick injuries at a tertiary care hospital in Pakistan. J Pak Med Assoc. 2008; 58(2):57-60. PMID: 18333520.

[5] Lamberti M, De Rosa A, Garzillo EM, Corvino AR, Sannolo N, De Pascalis S, Di Fiore E, Westermann C, Arnese A, Gabriella DG, Nienhaus A, Sobrinho APR, Coppola N. Vaccination against hepatitis b virus: are Italian medical students sufficiently protected after the public vaccination programme? Journal of Occupational Medicine and Toxicology . 2015; 10: 41

[6] Evaluation of immune response to hepatitis B vaccine in healthcare workers at a tertiary care hospital. Basireddy P, Avileli S, Beldono N, Gundela SL. Indian J Med Microbiol. 2018; 36:397–400.

[7] Mabunda N., Vieira L., Chelene I., Maueia C., Zicai A.F., Duajá A., Chale F., Chambal L., Vubil A., Augusto O. Prevalence of hepatitis B virus and immunity status among healthcare workers in Beira City, Mozambique. PLoS ONE. 2022; 17:e0276283.

[8] Muvunyi CM, Harelimana JD, Sebatunzi OR, Atmaprakash AC, Seruyange E, Masaisa F, Manzi O, Nyundo M, Hategekimana T. Hepatitis B vaccination coverage among healthcare workers at a tertiary hospital in Rwanda. BMC Research Notes . 2018; 11(1): 886

[9] Van Der Scheun FC, Nagelkerke MCM, Kilaru A, Shridhar V, Prasad R, Van DerWerfTS.Stigmaamonghealthcare workers towards hepatitis B infection in Bangalore, India: a qualitative study. BMC Health Serv Res. 2019; 19(1):1e7.

[10] Gara N, Abdalla A, Rivera E, et al. Durability of antibody response against hepatitis B virus in healthcare workers vaccinated as adults. Clin Infect Dis. 2015; 60(4):505e513.

[11] Dolman G.E., Koffas A., Phipps E., Kennedy P.T. Clinical and occupational health management of healthcare workers living with chronic hepatitis B: UK policy and international comparisons. J. Viral Hepat. 2021; 28:976–981.

[12] Lewis JD, Enfield KB, Sifri CD. Hepatitis B in healthcare workers: Transmission events and guidance for management. World J Hepatol. 2015; 7(3):488e497.

[13] Hebo H.J., Gemeda D.H., Abdusemed K.A. Hepatitis B and C viral infection: Prevalence, knowledge, attitude, practice, and occupational exposure among healthcare workers of Jimma University Medical Center, southwest Ethiopia. Sci. World J. 2019; 2019:9482607.

[14] Reyaz Nasir , Anjum Farhana , Danish Zahoor, Tawhida Fazili , Sanam Rasool Wani. Protective Antibody Titer against Hepatitis B in Healthcare Workers: A Cross-sectional Study from Tertiary Care Hospital of Kashmir. Journal of Clinical and Diagnostic Research. 2023; 17 (4): DC15-DC17

[15] Batra V, Goswami A, Dadhich S, Kothari D, Bhargava N. Hepatitis B immunization in healthcare workers. Ann Gastroenterol. 2015; 28(2):276-280.

[16] Aaron, D., Nagu, T.J., Rwegasha, J. et al. Hepatitis B vaccination coverage among healthcare workers at national hospital in Tanzania: how much, who and why?. BMC Infect Dis . 2017; 17: 786.

[17] Mwangi IA, Wesongah JO, Musyoki VM, Omosa-Manyonyi GS, Farah B, Edalia LG, et al. Assessment of hepatitis B vaccination status and hepatitis B surface antibody titres among health care workers in selected public health hospitals in Kenya. PLOS Glob Public Health. 2023; 3(4): e0001741.

[18] Parimala Subramani Anitha Deva Beena Madappa Analysis of Anti HBs Titres in Health Care Workers of Clinical Laboratory at RL Jalappa Hospital. *J Pure Appl Microbiol*, 2019; **13** (2): 1223-1226.

[19] Elpidio Maria Garzillo et al. HBV vaccination status among healthcare workers: A cross-sectional study. J Infect Prev. 2019; 21(1):23–27.

[20] Mast EE, Margolis HS, Fiore AE, Brink EW, Goldstein ST, Wang SA, et al; Advisory Committee on Immunization Practices (ACIP). A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP) part 1: immunization of infants, children, and adolescents. MMWR Recomm Rep. 2005; 54(RR-16):01-31.

[21] Komatsu H, Klenerman P, Thimme R. et al. Discordance of hepatitis B vaccination policies for healthcare workers between the USA, the UK, and Germany. Hepatol Res. 2020; 50(3):272-282.

[22] Sarah Alkhaldi et al. Measuring Immunoglobulin Titers Among Healthcare Workers After Hepatitis B Vaccination: A Cross-Sectional Study in Kuwait. Cureus; 2024; 16(7):e64910.