Merowe University Of Technology

Faculty Of Medicine And Health Sciences

Medical Laboratory Program

Microbiology Department

Awareness and practice of Healthcare Workers Regarding the importance of Post-Vaccination antibody Testing of Hepatites (B) in Merowe locality Hospital Sudan (2026)

A proposal submitted for the partial fulfillment for the requirements of the Bsc in medical laboratory science (Microbiology)

Prepared by :

Bahar aldeen Abdallh Mohammed

Rahaf Hassan Mohammed Farah

Mariam Mohyeldin Abdallah Ali

Mona Zaki Abd Alwahab Osman

Miada Mohammad Idris Abdelati

Nadir Abdallh Mohmmed Ali

Supervisor:

Dr : Al Sara Bashir Ibrahim Omer

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1. Introduction:

1.1. Background :

Hepatitis is considered a silent epidemic of the modern world. It is a highly infectious disease which is 50 to 100 times more contagious than the Human Immunodeficiency Virus (HIV). Hepatitis B is a potentially life-threatening liver infection caused by the Hepatitis B Virus (HBV). HBV is a DNA virus belonging to the Hepadnaviridae family, and human beings serve as its sole reservoir. It can cause chronic infection and puts people at high risk of death from cirrhosis and liver cancer (1) .

Acute infection manifests as acute viral hepatitis—an illness that begins with general malaise, loss of appetite, nausea/vomiting, body aches, low-grade fever, darkened urine, and then progresses to the development of jaundice. The incubation period ranges from 30 to 180 days. Chronic infection with HBV may be either asymptomatic or associated with chronic inflammation of the liver (chronic hepatitis), leading to cirrhosis over a period of several years (1) .

Every healthcare specialty involving contact with mucosa, blood, or body fluids contaminated with blood must ensure compliance with standard precautions and other methods to minimize infection risks (2) . It has been documented that HBV infection is the most important infectious occupational hazard among healthcare professionals. Dental surgeons and medical staff are at a great risk of exposure due to their numerous encounters involving the use and disposal of sharp instruments (1).

Hepatitis B virus (HBV) is a double-stranded, enveloped DNA virus belonging to the Hepadnaviridae family that replicates in the liver and causes hepatic dysfunction (3).

To minimize occupational exposure and ensure safety, guidelines from the Centers for Disease Control and Prevention (CDC) advise that HCWs receive the complete three-dose vaccine series, evaluate their immune response by measuring post-vaccination anti-HBs antibody levels, and receive revaccination or booster doses if titers fall below protective thresholds (4).

In Sudan, although Hepatitis B vaccination programs have been operational for several years, post-vaccination serological testing is not routinely practiced (3). This shortfall is attributed to

the high cost of immunological assays and the lack of clear institutional policies enforcing post-vaccination antibody verification (3).

The incidence of HBV infection can be significantly reduced by providing proper education and awareness regarding its transmission and vaccination to healthcare workers. In Sudan, limited data are available regarding post-vaccination immunity and adherence among healthcare workers, particularly in Merowe City. Therefore, this study aims to evaluate the , vaccination adherence, and protective Anti-HBs antibody levels among healthcare workers.

Healthcare workers (HCWs) are at increased risk of acquiring hepatitis B virus (HBV) infection because of their frequent exposure to blood and body fluids during clinical practice. Hepatitis B vaccination is the most effective preventive measure against occupational HBV infection. However, vaccination alone does not guarantee protective immunity for all individuals, as a small proportion of vaccinated persons fail to develop adequate antibody levels. Therefore, international recommendations advise post-vaccination antibody testing (anti-HBs) 1–2 months after completion of the three-dose vaccination schedule to confirm seroprotection and identify non-responders.

1.2. Problem Statement:

Healthcare workers (HCWs) are at high occupational risk of (HBV) infection due to continues clinical exposure. Despite the availability of vaccination programs, the immune response after vaccination is rarely evaluated in Sudan, and post-vaccination screening is not strictly enforced. The lack of clear information regarding actual protective Anti-HBs antibody levels among healthcare workers in Merowe locality may leave many susceptible individuals exposed to infection without their knowledge, creating a critical gap in occupational safety.

1.3. Justification of the Study:

Healthcare workers are at an increased risk of occupational exposure to HBV due to continues contact with blood and potentially infectious body fluids. Although the Hepatitis B vaccine is highly effective, incomplete vaccination and the lack of post-immunization serological testing may leave some HCWs inadequately protected. Adequate knowledge about HBV transmission plays a crucial role in promoting vaccination compliance and encouraging post-vaccination antibody testing. However, studies in low- and middle-income countries report significant gaps

in knowledge, incomplete adherence to schedules, and low rates of post-immunization serological testing.

In Sudan, and specifically in Merowe City, there is limited local evidence regarding these practices. This lack of data makes it difficult for healthcare institutions and policymakers to evaluate the effectiveness of existing occupational health programs. Therefore, this study will provide crucial baseline data to identify knowledge of peple for post vaccination anti body testing gaps and barriers to vaccine compliance. The findings will support the development of targeted educational interventions, strengthen local occupational health policies, improve vaccination monitoring programs, and ultimately reduce the risk of occupational HBV transmission.

2. Rsea rch Questions:

• Whet is the knowledge people regarding of post vaccination anti body testing ?

•What is the prevalence of post-immunization serological testing practices among healthcare workers in Merowe City?

• What are the main barriers and challenges preventing healthcare workers from undergoing post-vaccination antibody testing (Anti-HBs)?"

3.Objectives:

3.1. General Objective:

To assess the level of awareness and practices of healthcare workers regarding the importance of post-vaccination antibody testing at Merowe locality Hospitals, Sudan, in 2026

3.2. Specific Objectives:

1. To determine the percentage of healthcare workers who completed the Hepatitis B vaccine series .

2. To verify underwent subsequent antibody testing (Anti-HBs).

3.To identify the main barriers and factors (e.g., cost, lack of guidelines, availability) influencing the adherence of healthcare workers to post-vaccination testing.

4.Literature Review:

Previous Studies :

1. Study by Leila et al. (2024) regarding post-vaccination immunity status among healthcare workers in Sudan. The authors investigated the immunity status of vaccinated healthcare workers (HCWs) across hospitals in Khartoum State, Sudan. The study revealed that 70\% of vaccinated HCWs maintained protective anti-HBs antibody levels (\ge 10\text{ mIU/mL}), whereas 30\% lacked adequate protection despite completed vaccination. The authors concluded that receiving the full 3-dose schedule is crucial and emphasized the urgent need for mandatory post-vaccination serological monitoring and institutional digital record-keeping to ensure protection against occupational exposure (5)

2. Study by Jain et al. (2026) regarding seroprotection disparities and awareness among hospital personnel. In a cross-sectional study evaluating hepatitis B vaccination and awareness in a tertiary care center in India, the authors reported an overall seroprotection rate of 53.1\% among hospital staff. Crucially, 12.2\% of fully vaccinated participants were non-responders with non-protective antibody levels (<10\text{ mIU/mL}). The study identified marked knowledge and protection gaps between clinical staff and non-clinical support personnel (67.8\% vs. 21.5\% seroprotection), highlighting that self-reported vaccination status is unreliable and demonstrating the necessity of post-vaccination serological testing for all exposed cadres(6)

3. Study by Kumar et al. (2023) regarding awareness and practice of post-vaccination testing. The study evaluated hepatitis B vaccination status and post-vaccination testing practices among HCWs in a tertiary teaching hospital in South India. The authors found significant deficits in testing practice, as only 8.4\% of vaccinated HCWs were aware of the necessity of post-vaccination titer testing, and only 30\% knew the specific protective threshold (>10\text{ mIU/mL}). The authors concluded that targeted educational interventions and workplace policies

are vital to bridge the gap between vaccine coverage and post-vaccination immunity verification(7)

4. Study by Vivian Efua et al. (2023) regarding antibody levels and testing adherence Assessing post-vaccination serological testing adherence and anti-HBs levels among HCWs in Ghana, the authors reported that although 91.3\% of vaccinated participants achieved seroprotection, only 21.3\% underwent post-vaccination serological testing. Higher geometric mean titers (GMTs) were significantly associated with receiving booster doses, younger age, and lower body mass index (<25\text{ kg/m}^2). The authors emphasized integrating post-vaccination antibody testing into routine occupational health screening to identify non-responders early (8)

5. Methodology:

5.1. Study Design:

A descriptive, hospital-based cross-sectional study.

5.2. Study Area and duration

The study will be conducted across major healthcare facilities in Merowe hospitals City, Sudan.from July 2026 to September 2026.

5.3. Study Population:

Medical healthcare workers (including doctors, dental surgeons, nurses, and laboratory technicians) operating in the selected facilities.

5.4.1. Inclusion Criteria:

- Healthcare workers Received at least one dose of the Hepatitis B vaccine.
- Consenting and willing to participate in the questionnaire

5.4.2. Exclusion Criteria:

- Helthcare workers with a known history of chronic HBV infection.
- Healthcare workers who decline to participate.

5.5. Sample Size Calculation:

The sample size (n) will be calculated using the standard Cochrane formula for cross-sectional studies:

Cochran formula ($n = Z^2pq / e^2$)

n- The sample size

Z- The abscissa corresponding to the horizontal axis in the normal distribution curve (1.96).

P- prevalence from previous studies (take to be 0.5).

q- probability of Non-Occurrence (q = p-1)

e- desired margin of error (0.05)

Determined based on similar studies and statistical consedration

5.6. Data Collection Tools and Procedures:

Data will be collected through a structured, self-administered questionnaire divided into tow main parts:

1. Demographic Data: Age, gender, profession, department, and years of experience.
2. Knowledge and Adherence Assessment: Questions regarding HBV transmission, prevention, vaccination history (number of doses, dates), and previous serological tests.

5.7. Data Analysis:

The collected data will be cleaned, coded, and entered into the Statistical Package for the Social Sciences (SPSS) software.

5.8. Study Variable:

- **Dependent variable:**
  - Healthcare Workers vaccination adherence post vaccination anti body testing.
  - Vaccination compilation status (complete vaccination 3 does) or partial vaccination (<3 does)

Independent variable:

Age, sex, profession ,vaccination history .

5.9 Ethical Considerations:

- Ethical approval will be obtained from the Research Ethics Committee of Abdulatif Alhamad University of Technology and Merowe locality Hospital's, . Participation was entirely voluntary without any coercion, with informed consent obtained and the right to withdraw at any time guaranteed.and Participant privacy was protected using anonymous codes instead of names, and all data were stored under strict confidentiality.

6.Time line

Task	Week 1	Week 2	Week 3	Week 4	Week 5
Proposal writing					
Data collection					
Research practical					
Data analysis					
Thesis writing					
Discussion and final report					
Printing					

7. Budget :

Item	Quantity	Price
ppaper	One box	50,000
Box of Ballpoint pen	One box	40,000
printing cost		50,000
	Total	140,000

8.References:

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3.Leila MA, Aisha ME, Ghanem MM, Tibyan AA, Mosab NH. Determination of Immunity Status of Vaccinated Health Care Workers against Hepatitis B Virus in Khartoum State, Sudan. Middle East Res J Med Sci. 2024 Jan-Feb;4(1):6-11. Available from: DOI: 10.36348/merjms.2024.v04i01.002. (Accessed data 1/8/ 2026).

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6.Jain RK, Chaurasia D, Shrivastava R, Ahirwar KK, Jain SK, Agarwal A, Perumal N. Assessment of Hepatitis B Vaccination, Awareness, and Seroprotection Among Healthcare and Support Staff in a Tertiary Care Center in Central India. Cureus. 2026 Feb 10;18(2):e103395. Available from: DOI: 10.7759/cureus.103395 . (Accessed data 1/8/ 2026)

7.Kumar R, Rizvana S, Anandhan PR, Sindhujaa RR, Ragendu S, Rahul K, Rakshana AR. Hepatitis B vaccination and post-vaccination test among health care workers in a tertiary care teaching hospital in South India: a cross-sectional study. Global Journal of Public Health Medicine. 2023;5(2):843-852. (Accessed data 1/8/ 2026)

8.Vivian Efua SD, Armah D, Delali Adwoa W. Hepatitis B virus vaccination post serological testing and antibody levels of vaccinated health care workers in Accra, Ghana. Vaccine: X. 2023 Apr 3;14:100294. Available from: DOI: 10.1016/j.jvacx.2023.100294. (Accessed data 1/8/ 2026)

9.Appendix

Part 1: Socio-demographic & Professional Data

1 Age:

20–29 ( )

30–39 ( )

40–49 ( )

50+ ( )

2. Gender:

Male ( )

Female ( )

3.occupation:

Doctor ( )

Nurse ( )

Lab Technician ( )

cleaning staff ( )

Other ( ) write: ( )

3.Number of Years of Experience:

Less than 5 years ( )

5–10 years ( )

More than 10 years ( )

Part 2:(A) Knowledge & Awareness regarding HBV (B) Post-Vaccination Testing

4.- **Is Hepatitis B a major occupational hazard for healthcare workers?**

Yes ( ) No ( )

Not shure ( )

5.How many doses of the Hepatitis B vaccine are required for full primary immunization?

(1) dose ( )

(2) dose ( )

(3) dose ( )

Not shure ( )

6.Are you aware of the recommendation to test for Hepatitis B surface antibody titers after completing the vaccine series?

Yes ( )

No ( )

7. Do you know that the ideal time to perform the post vaccination antibody test is (1-2 months) after the last dose ?

Yes ☐ No ☐

8.What Anti-HBs antibody level indicates adequate protection against HBV?

< 10 mIU/mL ( )

≥10 mIU/mL ( )

I don't no ( )

Part 3: practice regarding Hepatitis B Vaccination & testing :

9.Numbers of does take ?

Yes, fully (3 doses) ( )

Yes, partially (1 or 2 doses) ( )

Not shure ( )

10.Have you ever checked your antibody level (Anti-HBs) after vaccination?

Yes ( )

No ( )

11.If you suffered from a needle-stick injury, do you know the protocol for post-exposure prophylaxis (PEP)?

Yes ( )

No ( )

Never thought about it ( )

Part 4: Barriers to Post-Vaccination Testing

12.If you DID NOT perform the post-vaccination antibody test, what was the main reason? (Select all that apply):

Lack of awareness about its importance ( )

Unavailability of the test in the hospital ( )

High cost of the test ( )

No clear hospital policy/guidelines enforcing it ( )

I forgot / Lack of time ( )