

Hepatitis B Virus Vaccine Status among students of Al-Kindy College of Medicine - University of Baghdad

Mousa Qasim Hussein ^{1,*}, Ali Abbas Hussein ², Muqtada Yahya rishaq ², Yehia Kassem Hossein ³ and Suhad Jassim Mohammed ⁴

¹ Department of Medicine, Al Kindy College of Medicine -University of Baghdad, Baghdad, Iraq.

² Al-kindy College of Medicine- University of Baghdad, Baghdad, Iraq.

³ Medical and Health Technical College- Imam Jaafar AL-Sadiq University, Baghdad-Iraq

⁴ Specialist doctor- Community Medicine, Al-Kindy Teaching Hospital, Baghdad-Iraq.

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Abstract

Background: Hepatitis B virus (HBV) infection remains a global public health concern, with over 296 million individuals chronically infected and at risk of serious complications such as liver cirrhosis and hepatocellular carcinoma. In regions like Iraq, where healthcare infrastructure faces numerous challenges, HBV continues to present a moderate to high burden, particularly among high-risk groups such as healthcare workers and medical students. Despite the availability of effective vaccines, many students may enter clinical environments without full immunization or adequate awareness of HBV transmission risks, placing both themselves and patients at increased risk.

Aims of the study : Assessing the status of HBV vaccination among students of Al-Kindy College of Medicine-University of Baghdad. Methods:

A cross-sectional study was conducted from October 19, 2024, to April 1, 2025, including 120 medical students from all six academic years. Data were collected through a structured questionnaire, which included sections on sociodemographic characteristics, vaccination status, and reasons for non-vaccination. The data were analyzed using IBM SPSS Version 26.

Results: Among the 120 participants, 67 (55.8%) were female and 53 (44.2%) were male. Vaccination coverage was 37.5% (n=45), while 62.5% (n=75) were unvaccinated. Of the vaccinated students, 15.6% received only one dose, 75.6% received two doses, and 8.9% completed all three doses. Most vaccinations occurred in the fourth stage of medical school (75.6%). Among the unvaccinated students, the most common reason was "other reasons" (80.0%), followed by vaccine unavailability (10.7%), distance to vaccination centers (5.3%), and fear of side effects (4.0%).

Conclusion: The findings highlight a suboptimal HBV vaccination rate among medical students, with a significant percentage remaining unprotected. Late-stage vaccination suggests gaps in early immunization strategies. These results emphasize the need for institutional policies that mandate early vaccination and increase awareness about HBV risks among medical students.

Keywords: HBV; Vaccination; Non-Vaccination; Iraq

* Corresponding author: Mousa Qasim Hussein

1. Introduction

Hepatitis B virus (HBV) is a serious global health issue, responsible for a wide range of liver diseases including cirrhosis, liver failure, and hepatocellular carcinoma. According to the World Health Organization (WHO), an estimated 296 million people worldwide were living with chronic HBV infection in 2022, and more than 820,000 people died as a result of HBV-related complications [1]. The virus is transmitted primarily through contact with infected blood and body fluids, which places healthcare workers—including medical students—at heightened occupational risk, especially in countries where safety practices may be inconsistent or under-resourced [2].

Medical students are particularly vulnerable due to their early exposure to clinical environments, often involving invasive procedures and the handling of blood samples. Accidental needle stick injuries and insufficient knowledge about infection control contribute further to their susceptibility [3]. Vaccination is considered the most effective way to prevent HBV infection, with a three-dose schedule shown to confer long-lasting immunity in over 90% of healthy individuals [4]. The WHO has long recommended that all healthcare workers and students be fully vaccinated before clinical exposure begins [1].

Blood testing to verify that the vaccine has worked is recommended in those at high risk. Additional doses may be needed in people with poor immune function but are not necessary for most people. In those who have been exposed to the hepatitis B virus (HBV) but not immunized, hepatitis B immune globulin should be given in addition to the vaccine [5].

Serious side effects from the hepatitis B vaccine are very uncommon. Pain may occur at the site of injection; it is safe for use during pregnancy or while breastfeeding [5].

It has not been linked to Guillain-Barré syndrome. Hepatitis B vaccines are produced with recombinant DNA techniques and contain immunologic adjuvant. They are available both by themselves and in combination with other vaccines [5].

Poor responses are mostly associated with being over the age of 40 years, obesity, celiac disease, and tobacco smoking [6][7] and also in alcoholics, especially if with advanced liver disease [8]. People who are immunosuppressed or on dialysis may not respond as well and require larger or more frequent doses of vaccine [9]. At least one study suggests that hepatitis B vaccination is less effective in patients with HIV [10]. The immune response to the hepatitis B vaccine can be impaired by the presence of parasitic infections such as helminthiasis [11].

The Hepatitis B vaccine is now believed to provide indefinite protection. Older literature assumed that immunity would wane with antibody titers and only effectively last five to seven years [12][13] but immune-challenge studies show that even after 30 years, the immune system maintains the ability to produce an anamnestic response, i.e. to rapidly bump up antibody levels when the previously seen antigen is detected [14][15]. This shows that the immunological memory is not affected by the loss of antibody levels. As a result, subsequent antibody testing and administration of booster doses is not required in successfully vaccinated immunocompetent individuals [16, 17]. UK guidelines suggest that people who respond to the vaccine and are at risk of occupational exposure, such as for healthcare workers, a single booster is recommended five years after initial immunization [9].

It is generally considered safe for use hepatitis B vaccine during pregnancy or while breastfeeding [5][18].

Despite the availability and proven efficacy of the HBV vaccine, coverage among medical students in many low- and middle-income countries remains suboptimal. Various factors contribute to this issue, including poor awareness, vaccine unavailability, absence of institutional policies, and lack of follow-up systems [19]. In Iraq, where the healthcare system faces logistical and resource challenges, comprehensive data on HBV vaccination rates among medical students is scarce. Previous studies suggest that

A significant proportion of students either remain unvaccinated or fail to complete the full vaccination schedule [20].

1.1. Data Collection

Data were collected via a structured questionnaire, which included:

Sociodemographic information and vaccination status (Yes/No)

For vaccinated students: Number of doses received and stage at which vaccination occurred

For unvaccinated students: Reasons for non-vaccination (e.g., unavailability, fear, distance, other reasons)

1.2. Data Analysis

Data were analyzed using IBM SPSS Version 26. Descriptive statistics were used to calculate percentages and distributions.

2. Results

The study involved 120 medical students from the University of Baghdad, Al-Kindy College of Medicine, who participated in the survey from October 19, 2024, to April 1, 2025. The sample consisted of 67 females (55.8%) and 53 males (44.2%) across various academic stages, from the first to the sixth stage. The distribution of students by stage was as follows:

First Stage: 9 students (7.5%), Second Stage: 14 students (11.7%), Third Stage: 52 students (43.3%), Fourth Stage: 45 students (37.5%), Fifth & Sixth Stages: 0 students (0%) (Table 1).

Table 1 Sociodemographic Characteristics of Participants (N = 120)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	53	44.2%
	Female	67	55.8%
Academic Stage	First Stage	9	7.5%
	Second Stage	14	11.7%
	Third Stage	52	43.3%
	Fourth Stage	45	37.5%
	Fifth & Sixth Stage	0	0.0%

The vaccination status of the participants was as follows:

45 students (37.5%) reported having received the hepatitis B vaccine, while 75 students (62.5%) had not been vaccinated (Figure 1). For the 45 vaccinated students, the distribution of doses received was:

7 students (15.6%) received only one dose. 34 students (75.6%) received two doses. 4 students (8.9%) completed all three doses (Table 2). The timing of vaccination among the 45 vaccinated students was distributed as:

5 students (11.1%) received the vaccine in the first stage. 1 student (2.2%) received the vaccine in the second stage. 5 students (11.1%) received the vaccine in the third stage. 34 students (75.6%) received the vaccine in the fourth stage (Table 3). The vaccination status difference between males and females were as follows: there was total of 53 males (44.2%) and 67 females (55.8%). 36 of males haven't received the vaccination (68% of males) and 17 have received the vaccination (32% of males). 39 of females haven't received the vaccination (58% of females) And 28 have received the vaccination (42% of females) (Figure 2).

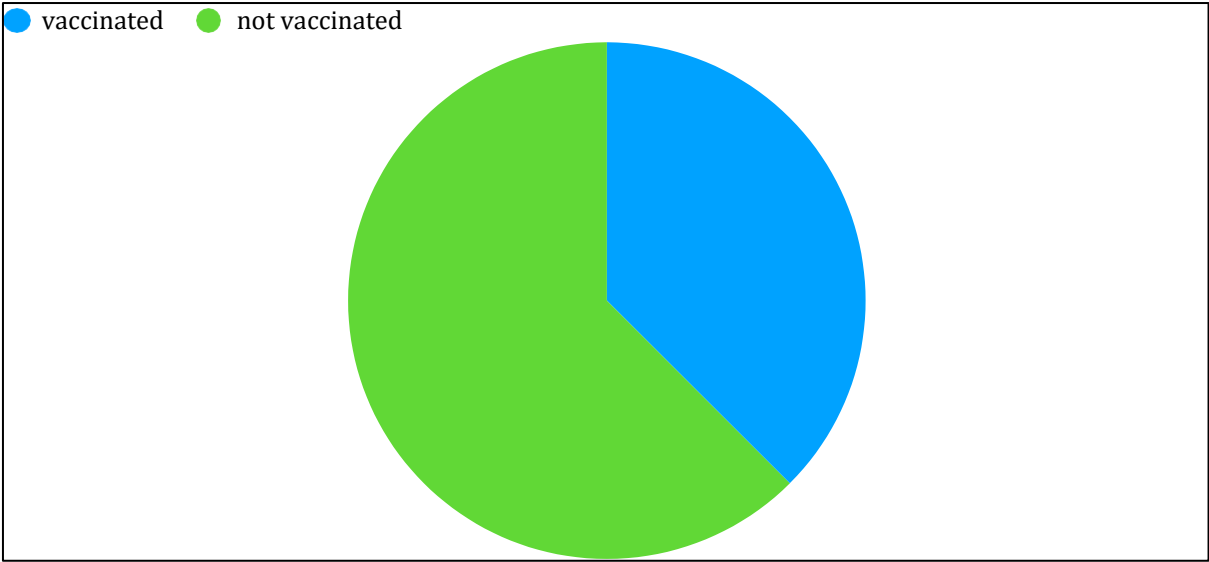


Figure 1 Vaccination Status of Participants (N = 120)

Table 2 Number of Doses Received by Vaccinated Participants (n = 45)

Number of Doses	Frequency (n)	Percentage (%)
1 Dose	7	15.6%
2 Doses	34	75.6%
3 Doses	4	8.9%

Table 3 Timing of Vaccination by Academic Stage (Vaccinated Students Only, n = 45)

Stage of Vaccination	Frequency (n)	Percentage (%)	P value
First Stage	5	11.1%	
Second Stage	1	2.2%	
Third Stage	5	11.1%	
Fourth Stage	34	75.6%	<0.001

Among the 45 vaccinated participants, a majority (75.6%) reported receiving the hepatitis B vaccine during their fourth academic stage, while fewer were vaccinated during the first (11.1%), third (11.1%), or second stage (2.2%). A Chi-square test indicated a statistically significant difference in vaccination timing across academic stages ($p < 0.001$), suggesting a strong association between stage and likelihood of vaccination.

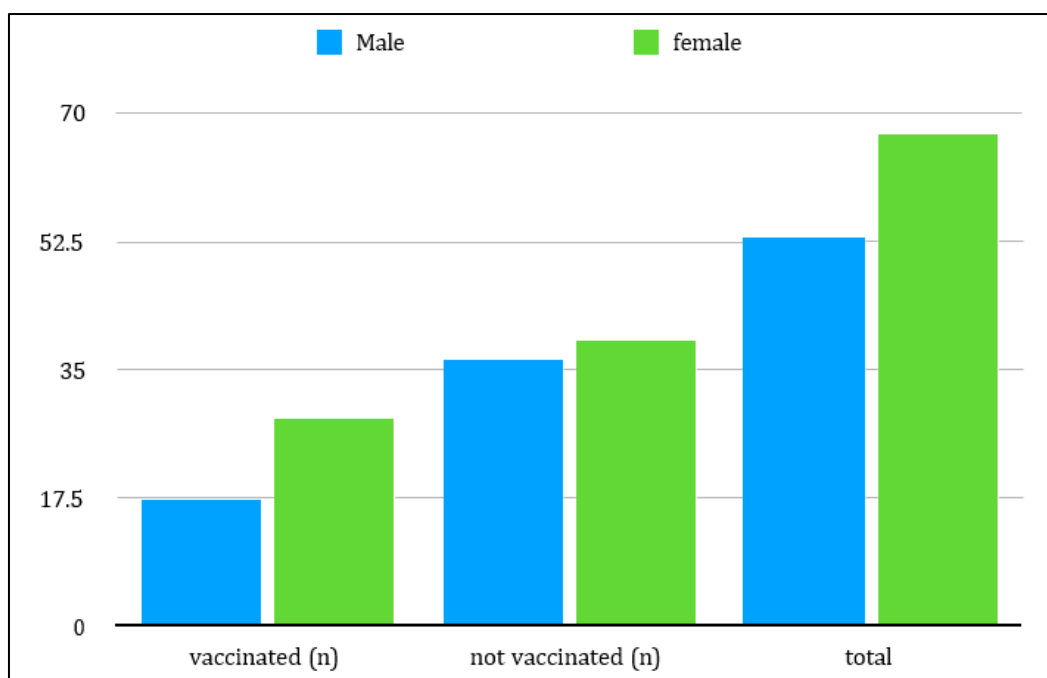


Figure 2 Vaccination Status by Gender

A Chi-square test was performed to examine the association between gender and hepatitis B vaccination status. Although a higher proportion of females (41.8%) were vaccinated compared to males (32.1%), the difference was not statistically significant ($p = 0.21$).

Among the 75 unvaccinated students, the reasons for non- vaccination were as follows:

8 students (10.7%) reported the vaccine was not available to them. 3 students (4.0%) cited fear as the reason. 4 students (5.3%) stated the vaccination site was too far away. 60 students (80.0%) indicated “other reasons,” which were not specified but suggest that personal motivation or institutional factors may be contributing to the low vaccination rate (Table 4).

Table 4 Reasons for Non-Vaccination (n = 75)

Reason for Not Taking Vaccine	Number of Students	Percentage (%)
Vaccine Not Available	8	10.7%
Fear	3	4.0%
Location Too Far	4	5.3%
Other Reasons	60	80.0%

Among the 75 unvaccinated participants, the most common reason cited was “other reasons” (80.0%), followed by unavailability of the vaccine (10.7%), distance from the vaccination site (5.3%), and fear (4.0%). A Chi-square test for goodness of fit demonstrated a statistically significant difference in the distribution of reasons for non-vaccination ($p < 0.001$), indicating that unmeasured or non-specific factors are the predominant barriers to hepatitis B vaccination.

3. Discussion

This study aimed to assess the hepatitis B vaccination status among medical students at Al-Kindy College of Medicine, revealing significant gaps in both coverage and timing of immunization. Despite the well-documented risk of HBV transmission in healthcare settings, especially via percutaneous injuries, only **37.5%** of the students reported being vaccinated. This rate is concerningly low, especially considering the World Health Organization’s (WHO)

recommendation for mandatory hepatitis B vaccination among all healthcare workers and students prior to clinical exposure [1].

One of the most striking findings of this study is that the majority of vaccinated students received their doses in the fourth stage of medical school, long after they are likely to have been exposed to clinical environments. In fact, only 11.1% were vaccinated in the first stage, and a similar percentage in the third stage, while earlier vaccination during the pre-clinical years would have provided better protection. This delay reflects a systemic issue—either a lack of institutional requirement for early vaccination or insufficient awareness among students.

Another point of concern is the incomplete dose coverage. Among the 45 students who were vaccinated, only 8.9% completed all three doses, while 75.6% received only two, and 15.6% received just one dose. This incomplete schedule potentially leaves students vulnerable, as full immunity against HBV requires the completion of the three-dose series [4]. These findings are consistent with studies conducted in other developing countries, where medical students often initiate vaccination but fail to complete it due to lack of follow-up systems, awareness, or access [19][20]

When examining the reasons for non-vaccination, 80% of students cited “other reasons”, suggesting a mix of factors that were not captured by the predefined options in the questionnaire. This may include underestimation of personal risk, misperceptions about the safety or necessity of the vaccine, or broader systemic barriers such as poor health infrastructure or administrative hurdles. Only a small percentage cited unavailability (10.7%), fear of the vaccine (4.0%), or distance to the vaccination site (5.3%). These findings suggest that personal motivation and institutional culture may play a larger role in vaccine uptake than physical access.

Compared to similar studies in other countries, the vaccination rate in our study is lower. For instance, a study conducted in Ethiopia reported a 60% vaccination rate among medical students, with 35% completing all three doses [21]. In Saudi Arabia, vaccination coverage among medical students is above 80%, largely due to strong institutional requirements and systematic follow-up [22]. These comparisons emphasize the importance of national and institutional policy enforcement in improving vaccination compliance.

The fact that no students were recorded from the fifth and sixth stages in this sample may be due to limited data collection access or timing of the survey. Including them in future studies would be beneficial to assess long-term trends and changes in vaccination behavior throughout medical training.

Another implication is the need for structured vaccination tracking systems within medical colleges. The current findings indicate that many students remain unaware of the importance of timely and complete vaccination. Medical colleges could establish digital records, vaccination campaigns during orientation weeks, and follow-up reminders to improve compliance.

Recommendations

- Enforce mandatory HBV vaccination for all students before clinical exposure.
- Offer the vaccine on campus, especially during the first year, to improve accessibility.
- Conduct awareness workshops to educate students on HBV transmission, risks, and the critical need for full vaccination.
- Implement a monitoring system that tracks the vaccination status of each student and provides reminders for follow-up doses.

Limitations

This study is limited by its reliance on self-reported data, which may be subject to recall or social desirability bias. Also, serological testing was not used to confirm immunity or past exposure to HBV. Additionally, the absence of fifth and sixth stage students may have skewed the representation of the upper clinical years.

4. Conclusion

This study found that only 37.5% of medical students at Al-Kindy College of Medicine were vaccinated against hepatitis B, with most vaccinations occurring in the fourth stage. The majority of unvaccinated students cited unclear or personal reasons. These findings highlight the need for better awareness and easier access to vaccination, especially in the early years of medical training.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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Appendix

- Gender :
 - Male
 - Female
- Address:
 - Baghdad Other
- Stage:
 - First Second Third Fourth Fifth Sixth
- Have you been vaccinated against Hepatitis B virus : Yes
- No
- IF the participant said yes :
 - How many doses of the vaccine have you received : 1
 - 2
 - 3
 - When did you received the first does of the vaccine :
 - First stage Second stage Third stage Fourth stage Fifth stage Sixth stage
 - IF the participant said No :
 - Why haven't you received the vaccine
 - Notavailable Afraid
 - Other
 - The vaccination place is far from me.