

## Awareness, Attitude, and Practice of Medical Students Towards Hepatitis B Virus Vaccine at University of Mosul, Iraq

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(Received : 11 March 2024; Accepted : 1 June 2024; First published online: 23 July 2024)

### ABSTRACT

**Background:** Hepatitis B virus (HBV) infection is a common health problem; all over the world, around 300 million people have had chronic HBV infection in 2019. Healthcare staff and medical students are at four times greater risk of acquiring HBV infection than the general population.

**Objectives:** To assess medical students' awareness, attitude, and practice towards the HBV vaccine.

**Materials and methods:** We selected a convenient sample of 300 students from Mosul Medical College, from different academic stages, and a cross-sectional study was conducted from May 1<sup>st</sup>, 2023, to September 30<sup>th</sup>, 2023. Data were collected through a direct interview using a special questionnaire form, then tabulated, and analyzed using Excel 2010 and SPSS software Version 24.

**Results:** The participants were mainly from the 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> stages (82%), and a good percent of student's awareness (96%) of HBV transmission via contaminated blood, with 73% knowing vertical transmission of the virus from pregnant mother to their fetus. For vaccination awareness, 89% of students agreed that vaccination should be given to health care workers and 75% knew that full immunization consists of 3 doses, 53% of students have received the HBV vaccine, 50% of them received full 3 doses and half of vaccinated students received it at 4<sup>th</sup> and 5<sup>th</sup> stage. Around 90% of the non-vaccinated students don't know when and where to get the vaccine.

**Conclusion:** Despite good knowledge of HBV transmission, control, and vaccination schedule; only half of the participants have received the vaccine. One of the most important causes for the non-receiving vaccine was a lack of knowledge about the time and place for receiving the vaccine.

**Keywords:** Hepatitis B; Vaccine; Health care worker; Medical students; Awareness.

DOI: [10.33091/amj.2024.147647.1625](https://doi.org/10.33091/amj.2024.147647.1625)

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### INTRODUCTION

**H**epatitis B virus (HBV) infection is a global health problem, during 2019 300 million people have chronic HBV infection worldwide, that represents nearly 3.5% of the world's population and about 800,000 deaths occur annually from HBV-related causes and complications [1, 2].

The incidence of HBV infection in Iraq was 8.3/100000 of the population in 2015, while during the period from 2016-2018, the incidence fell to 5.2/100000 of the population. A Further fall in its incidence occurred during the period from

2019-2022 and it becomes 4.2 to 3.5/100000 of the population. This means that Iraq is now in the "low-intermediate" class according to the classification of the World Health Organization (WHO) [3]. This decline means good progress in control of HBV spread and an effective Iraqi national program that goes with the WHO eradication program of HBV by the year 2030.

Among people with an increased risk for HBV infection are healthcare workers and medical students. Since HBV is a highly contagious virus and can be transmitted via many body fluids, it is 40-100 times more contagious than human immunodeficiency virus (HIV) [4, 5]. Healthcare staff and medical students are at a 4 times higher risk of acquiring HBV infection than other general adult populations [2, 5], and they usually get infections during their medical interventions, like needle injuries [1, 4, 5].

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The clinical presentation of HBV infection may vary from asymptomatic to severe fulminant liver failure. About one-third of patients have a mild form of disease as fever and jaundice, and about 10% of HBV infections progress to chronic liver disease. This chronic hepatitis can lead to liver failure, liver cirrhosis, or even hepatocellular carcinoma in about a quarter of patients [6, 7].

According to the WHO estimation, around the world, almost 90% of people chronically infected with HBV are unaware of the infection [4]. The WHO targeted a 65% lowering in viral hepatitis mortality with a 90% decline in cases by 2030 compared to 2015 and aims to eradicate the virus by 2030 [8]. Accordingly, a national program in Iraq was initiated in 2002, with its goal is controlling HBV infection, reducing the disease prevalence, and decreasing associated complications via different interventions, like screening and vaccination [3].

Effective safe strategy against the high prevalence of viral hepatitis can be achieved by prevention, and the HBV infection chain of transmission should be interrupted through vaccination, following a safety precaution when dealing with infected material, perfect sterilization of medical equipment and instruments, and proper handling of medical waste [9, 10].

Good knowledge and proper attitudes toward HBV infection are the cornerstone for the prevention of transmission. Awareness of medical students regarding HBV and HBV vaccine play a very important role in disease prevention in themselves and the patients they treated [11, 12]. A recombinant HBV vaccine is advised for all healthcare workers staffs and medical students, and for optimum protection 3 doses of vaccine over 6 month period (at 0,1, and 6 months) is recommended [12–15].

A good knowledge of HBV mode of transmission and safety precautions is needed to decrease health care worker-acquired infections [16–18]. As well as health care workers and medical students should have efficient knowledge for the HBV vaccine importance and practice a simple hygienic measure [19–21]. Assessing knowledge, attitude, and practice towards the HBV vaccine among medical students as well as studying obstacles preventing them from receiving the vaccine are of great importance in interrupting the chain of HBV transmission. As far as this is the first study conducted in Mosul Medical College aiming to assess HBV vaccination state among medical students.

The goal of the present study was to assess the awareness, attitude, and practice of medical students towards the HBV vaccine.

## MATERIALS AND METHODS

An analytic cross-sectional study has been conducted at the College of Medicine, Mosul University, Mosul, Iraq. The study covered the period from the first of May 2023 to thirty of September 2023. A convenience sample was used with a total of 300 students selected from different academic college stages of the Mosul Medical College.

The study participants have been informed about the objectives of the research, and a written informed consent has been signed by students who agree to participate. We collected data through direct interviews with study participants using a special questionnaire form. Those students who signed consent were included in the sample, while students refusing participation in the current study were excluded.

The questionnaire was prepared by authors depending on available references from WHO regarding the HBV

infection and vaccine (<https://www.who.int/news/item/29-03-2024-who-publishes-updated-guidelines-on-hepatitis-b>), in addition to certain published research questionnaires [5, 6, 22]. This includes demographic data of the students, including age, sex, residency, and college stage. The second part contains information regarding awareness questions about HBV infection, its mode of transmission, and control measures. The third part involves HBV vaccine knowledge questions regarding the full dose and immunity of the vaccine. The last part of the questionnaire was about students' attitudes and practice toward the vaccine, whether they have received it or not, their college stage of receiving it, and why they don't receive it. The Family and Community Medicine Department Scientific Committee checked and accepted the questionnaire's validity, resulting in an overall validity rate of 93.3% (Table 1), without any translation made for the questionnaire form.

The following formula has been used to calculate the required adequate sample size  $n = Z^2 \times P(1-P)/d^2$  where  $n$  represents the sample size,  $Z$  is the statistic corresponding to the level of confidence,  $P$  is the expected prevalence, and  $d$  is precision (corresponding to effect size). Since no previous study was conducted in Iraq to assess the prevalence of the HBV vaccine among medical students, we used the nearby Saudi Arabia HBV vaccine prevalence which was estimated to be 50% [20], and accordingly, the calculated required sample size was (288.12); we approximated it to 300 students.

Ethical approval has been obtained from the Medical Research Ethical Committee (MREC) of Mosul Medical College (Reference number: UOM/MREC/23-24/APL8, Date:21/4/2023).

Data was tabulated and analyzed using Excel 2010 and Statistical Package of the Social Sciences (SPSS) Version 24.0. The frequency and percentage of categorical variables have been calculated. The mean  $\pm$  SD were measured for continuous variables. In addition to calculating the total knowledge score and using the Chi-Square test to compare awareness levels across different academic college stages, A statistically significant difference was considered when the P-value of  $< 0.05$ .

## RESULTS

A total of 300 students participated in the study, about 40% of them were in the age group 23-24 years, 56% of the study sample were males, and 66% of them were from the 5<sup>th</sup> and 6<sup>th</sup> stages (Table 2).

Table 3 shows good awareness of medical students on HBV transmission as 96% of participants know contact with contaminated blood can transmit HBV, also 73% of participants know transmission of the virus from pregnant mothers to their fetus; in addition, sharing of contaminated tools can transmit the virus-like sharing same blade at barbers, and 67%

Table 1. Questionnaire validity.

Validity rate	Percent
Clarity rate	95%
Coverage rate	95%
Reliability rate	90%
Overall validity rate	93.3%

**Table 2.** Demographic characteristics of the 300 students.

Variables	Number	Percent
Age per years		
19-20	26	8.6
21-22	82	27.3
23-24	118	39.3
≥ 25	74	24.6
Sex		
Male	168	56
Female	132	44
Residence		
Inside Mosul	264	88
Outside Mosul	36	12
Marital status		
Married	21	7
Unmarried	279	93
Academic stage		
1 <sup>st</sup> stage	6	2
2 <sup>nd</sup> stage	27	9
3 <sup>rd</sup> stage	21	7
4 <sup>th</sup> stage	48	16
5 <sup>th</sup> stage	69	23
6 <sup>th</sup> stage	129	43

of participants know that HBV can be transmitted from the asymptomatic patient.

Regarding students' awareness of HBV control, it is clear that 95% of them reported that vaccination is the control measure in addition to wearing gloves while handling blood reported by 71% of the participants (Table 4).

Regarding students' knowledge of the HBV vaccine, the study revealed that 70% of them agree that the vaccine is effective post-exposure prophylaxis, 91% agree that healthcare workers should receive the vaccine, with 87% know that full immunization consists of 3 doses, and the overall total knowledge score is 75% (Table 5).

Table 6 shows the comparison of HBV transmission knowledge scores in those students from the 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> college stages with those of the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> stages, with a highly significant association between the higher college stage and HBV transmission knowledge ( $P$ -value = 0.0001).

Table 7 shows that 53% of students have received the hepatitis B vaccine, and 50% of those received 3 doses of the vaccine, 73% of vaccinated students received it at stages 4, 5, and 6. Among students receiving vaccines 100% of them see that medical students are at risk of getting infections and that the vaccine is safe and effective. Of those who don't receive vaccines, 91% of them don't know when and where to get the vaccine.

## DISCUSSION

The participant students were selected from all Mosul medical college stages, this makes the sample more representative. However, around eighty percent of the participants from stages 4, 5, and 6 where started clinical science and clinical sessions at different teaching hospitals, which in turn increased their knowledge about HBV infection and HBV vaccine importance.

A generally good student's total knowledge score about

HBV mode of transmission has been obtained by the current study (70.5%); this is in accordance with other studies conducted in 2021 in Bosaso, Somalia by Ali et al. [23] and in India during the year 2019 by Wadekar et al. [5].

Most of the participant students (96%) knew that HBV transmitted via contaminated blood and blood products. This goes with a result obtained by other studies conducted in India by Rathi et al. in 2018 to assess knowledge and practice towards HBV prevention in medical students [22], and Turkey [8]. The student's awareness of the blood route for HBV transmission increases their practice of blood testing before any blood transfusion.

At the same time, the current study revealed that 67% of students agree that infection can be acquired from asymptomatic persons. This will in turn increase students' awareness of the importance of the HBV vaccine for medical students who are in continuous contact with asymptomatic patients to protect themselves from infection.

For other modes of HBV transmission like sharing blades by barber, vertical transmission of the virus from the infected mother to her fetus, and breast milk of the infected mother; the study results showed that 60-70% of participants students agreed that these could transmit infection. This goes with the result of the study by Ibrahim and Idris from Syria in 2014 [24]. Such knowledge will encourage students to practice safe hygienic daily life as well as good management for babies of infected mothers.

Around three-quarters of students in the current study agreed that HBV infection can cause liver disease as one of its complications. A similar result was obtained by a Ghomraoui et al. study done at King Khalid University Hospital, Saudi Arabia to assess awareness and compliance with the vaccine in medical students in 2015 [21], where another study revealed that 35% of participants knew that chronic HBV infection is considered as a high risk of liver cirrhosis and hepatocellular carcinoma [24]. Student's awareness of HBV complications is of great importance in managing hepatitis patients.

For HBV control measures, most students (95%) agreed that the hepatitis B vaccine is the effective control measure with 71% of them agreeing that personal protection like wearing gloves during contact with patients is an effective measure. This means that the students had good hygienic practice in clinical sessions while dealing with patients. Another study in Oman found that around (72%), and (53%) of students knew that hepatitis B vaccination and wearing gloves are effective control measures respectively [25].

Regarding hepatitis B vaccine awareness, the majority of students (91%) agreed that healthcare workers and medical students should receive the HBV vaccine as a part of workplace safety, and around 87% of them knew that full immunization consists of 3 doses. While a study in Turkey found that 83% agree that the HBV vaccine is mandatory for healthcare workers and only 59% of students know the full immunization schedule [8]. This may be due to differences in participant student college stage where the current study participants were mainly from the 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> stages when they start clinical science and have more clinical knowledge.

About half of the students have received the HBV vaccine, and of those 50% have received a full 3 doses. This was similar to the result obtained by a study in Nigeria in 2021 to assess HBV vaccination status in medical students [26]. Another study done at Makerere University-Uganda in 2019 revealed that 44% of students had received the full 3 doses of the HBV vaccine and the remainder were either received incomplete

**Table 3.** Awareness of the medical students on hepatitis B virus (HBV) transmission.\*

Mode of transmission	Yes Number (%)	No Number (%)
*Contaminated blood and blood product	288 (96)	12 (4)
*Using blades by barbers	219 (73)	81 (27)
*Ear and nose piercing	150 (50)	150 (50)
*From pregnant mother to fetus	219 (73)	81 (27)
**Feces/urine of patient	39 (13)	261 (87)
*Breast milk of the infected mother	180 (60)	120 (40)
**HBV can be transmitted via casual contact like holding hands	30 (10)	270 (90)
*HBV can cause liver disease	222 (74)	78 (26)
*Infected person will remain infected for life	105 (35)	195 (65)
*HBV can be transmitted from an asymptomatic person	201 (67)	99 (33)
Overall total transmission knowledge score (true answer)	2115 (70.5)	885 (29.5)

\* Correct answer: Yes, \*\* Correct answer: No.

**Table 4.** Awareness of medical students on control of hepatitis B virus infection.

Mode of transmission	Yes Number (%)	No Number (%)
By using sterilized instruments	192 (64)	108 (36)
Getting hepatitis B virus	285 (95)	15 (5)
Using gloves while handling infectious material	213 (71)	87 (29)

**Table 5.** Medical students' knowledge on hepatitis B virus (HBV) vaccine.\*

Mode of transmission	Yes Number (%)	No Number (%)
*HBV vaccine is effective post-exposure prophylaxis	211 (70.3)	89(29.6)
**HBV vaccine can't be used for immune-compromised patient	108 (36)	192(64)
*Health care worker should receive HBV vaccine for their safety	274(91.3)	26(8.6)
*Full immunization in an adult consists of 3 doses of HBV vaccine	261(87)	39(13)
*Full dose of HBV vaccine may give lifelong immunity, but a booster dose is recommended after 5 years for healthcare worker	267(89)	33(11)
*Once a full dose of the HBV vaccine has been given, a blood test is not needed to confirm immunity. (except for immune compromise or health workers)	202 (67.3)	98(32.6)
*HBV vaccine is safe during pregnancy	183 (61)	117(39)
Overall total HBV vaccine knowledge score (true answer)	1590(75.7)	510(24.2)

\* Correct answer: Yes, \*\* Correct answer: No, HBV: Hepatitis B virus.

**Table 6.** Comparison of total hepatitis B virus (HBV) knowledge score among study participants in different academic college stages.

HBV Transmission knowledge score	Total true answer in 4 <sup>th</sup> , 5 <sup>th</sup> , and 6 <sup>th</sup> stages. Number (%)	Total true answer in 1 <sup>st</sup> , 2 <sup>nd</sup> , and 3 <sup>rd</sup> stages. Number (%)	$\chi^2$	P-value
2115	1888 (89.2)	227 (10.7)	256.5	0.0001

doses or non-vaccinated [27]. While another study conducted in 2018 found that around 60% of students have not received a vaccine and 15% of them have incomplete vaccination [22]. Having such a percentage of vaccinated medical students will help in cutting the chain of transmission as healthcare workers and medical students are an important part of the HBV

transmission chain.

All vaccinated students agreed that the HBV vaccine is effective and safe, and they are at risk of getting the infection, so they receive the vaccine. Seventy-three percent of those vaccinated students received the vaccine at the 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> stages where they started the clinical sessions in the

**Table 7.** Attitude and practice for hepatitis B virus (HBV) vaccination among medical students.\*

Variable	Number	Percent
Have you received the HBV vaccine?		
Yes	159	53
No	141	47
How many shots did you receive?		
1	15	9.4
2	63	39.6
3	81	50.9
Reason for receiving HBV vaccine:		
• Fear of illness.	117	73.5
• I am at risk.	159	100
• It is safe and effective.	159	100
When did you receive the HBV vaccine?		
Stage 1	0	0
Stage 2	12	7.5
Stage 3	30	18.8
Stage 4	39	24.5
Stage 5	42	26.4
Stage 6	36	22.6
If you don't receive the vaccine, do you intend to receive it in future?		
Yes	129	91.4
No	12	8.5
Why haven't you received the vaccine yet?*		
• I will protect myself.	21	14.8
• Not needed.	18	12.7
• Not at risk.	54	38.2
• Not interested.	15	10.6
• Not available.	27	19.1
• Costly.	0	0
• Don't know when and where to get it.	129	91.4

\* Since more than one option was chosen, the % distribution was calculated according to the general total.

teaching hospital and came in contact with the patient. For non-vaccinated students, 91% of them intended to receive a vaccine in future. Students' awareness of vaccination safety will help them practice public health education about the importance of the HBV vaccine.

Ninety-one percent of non-vaccinated students, Don't know when and where to get the vaccine was the reason for non-receiving vaccine. Other studies found that about half of non-vaccinated people lack access to vaccines [25, 26, 28, 29]. Another explanation for non-vaccination was thinking of not being at risk (38%) ; others said they would protect themselves and were not interested in vaccines (24%).

The present study has certain limitations. First, the sample size was mainly collected from the 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> stages. This might affect the accuracy of the results. Second, the current study enrolled medical students from one college, not from all Iraqi medical colleges. Third, there might be a bias in collecting the self-reported answers, as in any survey. Fourth, even though we calculated the sample size, we cannot generalize the study's results.

## CONCLUSION

A good general knowledge among participant students for HBV modes of transmission and complications has been found, this reflects their high awareness of control measures like vaccination and personal protection, together with their

high awareness of the full vaccination schedule and their positive attitude towards vaccines as a mandatory for health care workers. Despite this good knowledge, only half of participants have received the HBV vaccine. One of the most important causes for the non-receiving vaccine was a lack of knowledge of the time and place for receiving the vaccination. Therefore, we suggest conducting a lecture on the vaccination schedule for students, outlining the appropriate vaccination time and place for 3<sup>rd</sup> stage students to receive it during their clinical sessions at teaching hospitals.

## ETHICAL DECLARATIONS

### Acknowledgments

The authors would like to thank all Mosul Medical College students who participated in the study and answered the questionnaire form.

### Ethics Approval and Consent to Participate

The study has been approved by the Medical Research College Ethical Committee of Mosul Medical College (Reference number UOM/COM/MREC/23-24/APL8). Informed consent from every student was obtained.

### Consent for Publication

Not applicable (no individual personal data included).

**Availability of Data and Material**

None.

**Funding**

No funding.

**Competing Interests**

The authors declare that there is no conflict of interest.

**Authors' Contributions**

All authors have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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