

Knowledge, Attitude, and Practices Towards Prevention and Transmission of Hepatitis B Infection Among Medical Interns in a Tertiary Care Teaching Hospital of Western Uttar Pradesh: A Cross-Sectional Study

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Background: Hepatitis B virus (HBV) infection constitutes a major global public health challenge. The World Health Organization estimates that 254 million individuals were living with chronic hepatitis B infection in 2022, with approximately 1.2 million new infections annually. Healthcare workers, including medical interns, are among the highest-risk occupational groups for HBV acquisition. Knowledge, attitude, and practice (KAP) studies are essential tools for identifying gaps in health behaviour and designing targeted public health interventions. Data regarding KAP of medical interns towards HBV in western Uttar Pradesh remains scarce. This study aimed to assess the KAP of medical interns towards prevention and transmission of Hepatitis B infection at a tertiary care teaching hospital.

Methods: A cross-sectional study was conducted from June 1 to October 1, 2024, among medical interns at Uttar Pradesh University of Medical Sciences (UPUMS), Saifai, Etawah, Uttar Pradesh. Simple random sampling was employed using a computer-generated random number list from a sampling frame of 200 eligible interns. Data were collected using a pre-tested, self-administered structured questionnaire distributed electronically via Google Forms. The questionnaire assessed socio-demographic characteristics and KAP domains relevant to HBV transmission and prevention. Data analysis was performed using IBM SPSS Statistics, version 24.

Results: Of 200 eligible interns, 177 (88.5%) participated. The majority were male (57.6%) and aged 25 to 30 years (62.1%). Nearly all participants demonstrated correct knowledge of the Hepatitis B vaccine (94.9%) and HBV transmission routes (93.7%); however, knowledge gaps were evident for vaccination schedules (68.4%) and antiviral therapy (66.1%). While 95.5% agreed the HBV vaccine is safe and 96.0% endorsed infection control guidelines, only 73.4% were fully vaccinated. Approximately 14.7% considered glove use before procedures unnecessary, and only 64.4% endorsed nursing barrier precautions. Association analysis revealed a statistically significant relationship between full vaccination status and higher knowledge scores ($p = 0.015$).

Conclusion: Medical interns demonstrated satisfactory knowledge of HBV infection and its routes of transmission. However, significant gaps in vaccination coverage and attitudinal inconsistencies regarding standard precautions underscore the urgent need for mandatory infection prevention training and strict institutional policies ensuring complete HBV immunisation prior to clinical practice commencement.

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Introduction

Hepatitis B virus (HBV) infection remains one of the most significant preventable public health challenges worldwide. According to the World Health Organization (WHO), an estimated 254 million individuals were living with chronic hepatitis B infection in 2022, with approximately 1.2 million new infections recorded annually.¹ The infection poses a disproportionate burden

in low and middle-income countries, where access to preventive interventions and treatment remains limited.²

India bears a substantial share of this global burden, classified as a region of 'intermediate to high endemicity' for Hepatitis B surface antigen (HBsAg). An estimated 40 million chronic HBV carriers reside in India, representing approximately 11% of the total global carrier pool.³ In recognition of this burden, the Government of India incorporated the Hepatitis B vaccine into the Universal

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Immunisation Programme across ten states during 2007–2008, with subsequent nationwide scale-up.⁴

Knowledge, attitude, and practice (KAP) studies occupy a central role in public health research, providing a systematic framework for identifying gaps between awareness and health behaviour. The relationship between knowledge and practice is well-established: adequate knowledge is a necessary, albeit insufficient, prerequisite for positive health behaviour change.⁵ KAP studies in occupational health settings have consistently demonstrated that even when healthcare workers possess correct knowledge, attitudinal barriers and suboptimal practices frequently persist.⁶ Understanding these gaps is critical for designing effective, evidence-based public health interventions.

Healthcare workers, including medical interns, constitute a particularly high-risk occupational group for HBV acquisition due to repeated exposure to blood and body fluids during clinical practice. Medical interns, as frontline trainees entering clinical environments, are especially vulnerable given their relative inexperience with standard precautions and the high frequency of invasive procedural exposure.^{7,8} Despite this elevated risk, data regarding KAP of medical interns towards occupational exposure to HBV in western Uttar Pradesh remain scarce.

Adequate knowledge of HBV transmission routes, vaccination schedules, post-exposure prophylaxis (PEP), and antiviral therapy is fundamental to safeguarding healthcare workers and ensuring patient safety.^{9,10} The present study was therefore designed to assess the knowledge, attitude, and practice of medical interns towards prevention and transmission of Hepatitis B infection at a tertiary care teaching hospital in western Uttar Pradesh.

Methods

Study Design and Setting

A descriptive, cross-sectional study was conducted among medical interns enrolled at UPUMS, Saifai, Etawah, Uttar Pradesh, India. UPUMS is a prominent government-run tertiary care teaching hospital and medical university located in Saifai, Etawah district, situated approximately 210 km from Lucknow in western Uttar Pradesh. The hospital offers a wide range of secondary and tertiary care specialties and hosts a large number of medical interns completing their mandatory one-year internship following the MBBS degree. The institutional setting is representative of government medical education in the Uttar Pradesh region.

Study Period

Data collection was carried out from June 1, 2024 to October 1, 2024.

Study Population and Eligibility Criteria

The target population comprised all medical interns completing their compulsory rotating internship at UPUMS during the study period. Interns who provided informed consent and were available during the study period were included. Those who declined participation or were absent during data collection were excluded.

Sample Size and Sampling Method

The total eligible population comprised 200 interns. A complete sampling frame consisting of the official register of all 200 interns was obtained from the Academic Section of UPUMS prior to data collection. Simple random sampling was employed, using a computer-generated random number sequence to select participants from the sampling frame. All 200 eligible interns were approached; 177 (88.5%) provided consent and completed the questionnaire, yielding the final analytical sample.

Data Collection Tool

A self-administered, structured questionnaire was developed and validated for this study. The questionnaire comprised two sections: (i) socio-demographic profile, including age, gender, and place of residence; and (ii) a KAP module assessing knowledge of HBV transmission and prevention (five items), attitudes towards HBV infection and vaccination (five items), and reported practices regarding infection control and vaccination. The questionnaire was pre-tested on a convenience sample of ten interns not included in the main study; minor revisions were made for clarity based on pre-test feedback. The validated questionnaire was distributed electronically *via* Google Forms.

Ethical Considerations

Participation was entirely voluntary. All interns were briefed about the purpose, nature, and voluntary character of the study prior to questionnaire completion. Written informed consent was obtained electronically. The confidentiality and anonymity of all participant data were maintained throughout the study. No personally identifiable information was collected.

Statistical Analysis

Completed responses were exported from Google Forms and analyzed using IBM SPSS Statistics, version 24. Descriptive statistics, including frequencies and

proportions, were used to summarise socio-demographic characteristics and KAP responses. For the purposes of association analysis, knowledge was categorised as ‘good’ (correct response to ≥ 4 of 5 knowledge items) or ‘poor’ (correct response to < 4 items). Chi-square tests were employed to assess associations between socio-demographic variables, vaccination status, and knowledge category. A *p-value* of < 0.05 was considered statistically significant.

Results

Participation and Socio-demographic Profile

Of the 200 medical interns invited, 177 (88.5%) completed the questionnaire and were included in the analysis. Most respondents were male ($n = 102$; 57.6%), with female interns constituting 42.4% ($n = 75$). The predominant age group was 25 to 30 years, accounting for 62.1% ($n = 110$) of participants, followed by the 18 to 24 year age group (35.6%; $n = 63$), with only four participants (2.3%) aged above 30 years. Regarding residence, 65.0% ($n = 115$) were from urban areas and 35.0% ($n = 62$) from rural areas. Socio-demographic data are summarised in Table 1.

Knowledge Regarding Hepatitis B Prevention

Knowledge items were assessed across five domains (Table 2). A large majority of participants ($n = 168$; 94.9%) demonstrated correct knowledge regarding Hepatitis B vaccination. Awareness of HBV as a causative agent of hepatocellular carcinoma was noted in 84.7% ($n = 150$) of respondents. Knowledge of the HBV vaccination schedule was correct in 68.4% ($n = 121$), while 89.3% ($n = 158$) correctly identified post-exposure prophylaxis measures. Fewer participants (66.1%; $n = 117$) accurately identified first-line antiviral therapy for chronic HBV

Table 1: Socio-demographic profile of study participants ($n = 177$)

Variable	Category	Frequency ($n = 177$) / %
Gender	Male	102 (57.6%)
	Female	75 (42.4%)
Age group (years)	18–24	63 (35.6%)
	25–30	110 (62.1%)
	Above 30	4 (2.3%)
Residence	Rural	62 (35.0%)
	Urban	115 (65.0%)
HBV vaccination status	Fully vaccinated	130 (73.4%)
	Partially vaccinated	47 (26.6%)

Table 2: Knowledge of participants regarding Hepatitis B prevention ($n = 177$)

Knowledge Item	Correct n (%)	Incorrect n (%)
Hepatitis B vaccination	168 (94.9%)	9 (5.1%)
HBV causes liver cancer	150 (84.7%)	27 (15.3%)
Schedule of HBV vaccination	121 (68.4%)	56 (31.6%)
Post-exposure prophylaxis (PEP)	158 (89.3%)	19 (10.7%)
First-line antiviral therapy for chronic HBV	117 (66.1%)	60 (33.9%)

infection. Overall, 93.7% of interns exhibited satisfactory knowledge of HBV transmission routes.

Attitude Towards Hepatitis B Prevention

A substantial majority (95.5%; $n = 169$) agreed that the HBV vaccine is safe, and 96.0% ($n = 170$) agreed that adherence to infection control guidelines would protect them from HBV infection. Most participants (95.5%; $n = 169$) expressed concern about the risk of acquiring HBV infection. A noticeable proportion (85.3%; $n = 151$) agreed on the importance of using gloves before clinical procedures; conversely, 14.7% ($n = 26$) held the erroneous view that wearing gloves was unnecessary. Notably, only 64.4% ($n = 114$) expressed agreement with the importance of following nursing barrier precautions, with 35.6% ($n = 63$) disagreeing. Detailed attitude data are presented in Table 3.

Vaccination Status and Practice

Regarding vaccination practice, 130 interns (73.4%) reported being fully vaccinated against HBV (completion of all three doses of the recombinant HBV vaccine), while the remaining 26.6% ($n = 47$) were only partially vaccinated (one or two doses received). Approximately one-fourth of participants indicated a lack of confidence in clinically managing HBV-positive patients. Furthermore, most interns had not completed any dedicated HBV-related training or infection prevention courses during their internship.

Association Analysis

Association between key socio-demographic variables and vaccination status with knowledge category (good vs. poor) was examined using Chi-square tests (Table 4). Full vaccination status was significantly associated with good knowledge (87.7 vs. 74.5%; $\chi^2 = 5.87$; $p = 0.015$). No statistically significant association was observed between gender and knowledge category ($p = 0.265$), nor between urban/rural residence and knowledge ($p = 0.140$). These findings suggest that vaccination

Table 3: Attitude of participants towards Hepatitis B prevention (n = 177)

Attitude statement	Agree n (%)	Disagree n (%)
No concern about being infected with HBV	8 (4.5%)	169 (95.5%)
HBV vaccine is considered safe	169 (95.5%)	8 (4.5%)
Wearing gloves before procedures is not required	26 (14.7%)	151 (85.3%)
Infection control guidelines will protect from HBV	170 (96.0%)	7 (4.0%)
Following nursing barrier precautions is important	114 (64.4%)	63 (35.6%)

completion may both reflect and reinforce a better understanding of HBV-related knowledge, though causality cannot be established from a cross-sectional design.

DISCUSSION

This cross-sectional study assessed the knowledge, attitude, and practice of medical interns at UPUMS, Saifai, Etawah, towards HBV infection prevention and transmission. The findings indicate that while the majority of participants possessed satisfactory knowledge regarding Hepatitis B vaccination and transmission routes, substantial gaps persist in vaccination coverage, and attitudes toward standard precautionary measures remain inconsistent.

The finding that 94.9% of participants correctly recognised the Hepatitis B vaccine and 93.7% demonstrated sound knowledge of HBV transmission is encouraging and aligns with results from comparable studies conducted in South Asia.^{11,12} Dahal *et al.*¹¹ similarly reported high levels of vaccine awareness among medical undergraduates in Nepal, though knowledge of specific vaccination schedules and antiviral therapy remained suboptimal, consistent with the current study's findings

of 68.4 and 66.1% correct responses for these domains, respectively.

The incomplete vaccination rate of 26.6% is a particularly concerning finding. Since medical interns routinely perform invasive procedures and are frequently exposed to infectious biological materials, incomplete HBV immunisation represents a significant occupational health hazard.¹³ These findings are consistent with those of Bhujade *et al.*,¹⁴ who similarly identified gaps in immunisation completeness among healthcare workers in a teaching hospital setting. Although national guidelines and institutional policies stipulate complete HBV vaccination prior to clinical placement, enforcement appears inconsistent across institutions.¹⁵

Chhabra *et al.*¹⁶ reported that while medical and nursing students in Uttarakhand demonstrated good awareness of HBV, only approximately 70% were fully vaccinated and misconceptions about transmission persisted. This parallels the present study's findings of 73.4% full vaccination and notable gaps in antiviral therapy knowledge. Fatehpuria *et al.*¹⁷ similarly documented incomplete vaccination and low confidence in clinical management among medical students in Udaipur, echoing our observation that nearly one-fourth of interns lacked confidence in handling HBV-positive patients.

Despite broad recognition of HBV vaccine safety and the protective role of infection control guidelines, a significant minority (14.7%) considered glove use unnecessary prior to procedures. Siyad *et al.*,¹⁸ in a study from Mumbai, found high recognition of HBV vaccine safety but inadequate compliance with vaccination schedules and barrier precautions, mirroring the attitudinal inconsistencies noted here. The finding that only 64.4% endorsed nursing barrier precautions further highlights the need for behavioural reinforcement strategies that extend beyond knowledge dissemination alone.

Table 4: Association between socio-demographic variables, vaccination status, and knowledge category (n = 177)

Variable	Good knowledge n (%)	Poor knowledge n (%)	Chi-square	p-value
Gender				
Male (n=102)	84 (82.4%)	18 (17.6%)	1.24	0.265
Female (n=75)	65 (86.7%)	10 (13.3%)		
Vaccination Status				
Fully vaccinated (n=130)	114 (87.7%)	16 (12.3%)	5.87	0.015*
Partially vaccinated (n=47)	35 (74.5%)	12 (25.5%)		
Residence				
Urban (n=115)	99 (86.1%)	16 (13.9%)	2.18	0.140
Rural (n=62)	50 (80.6%)	12 (19.4%)		

* Statistically significant ($p < 0.05$); Chi-square test applied.

The association analysis revealed a statistically significant relationship between complete vaccination status and good knowledge ($p = 0.015$), suggesting that interns who are better informed are more likely to have completed their vaccination series. This aligns with the theoretical underpinning of KAP studies: that higher knowledge levels can positively influence health practice, though the direction of causality cannot be established in a cross-sectional design.^{5,6} No significant association was found between gender or residence and knowledge, indicating that knowledge deficits are not confined to any particular demographic subgroup.

The near-universal absence of formal HBV-specific training during internship constitutes a systemic deficiency in the clinical curriculum. Incorporating structured infection-prevention modules into internship orientations, with periodic competency assessments, is essential to address this gap.^{9,10,19} Recent national policy frameworks, including the Government of India's National Viral Hepatitis Control Programme (NVHCP), provide institutional guidance for improving HBV prevention infrastructure, yet implementation at the level of individual teaching hospitals requires strengthening.²⁰

Public Health Implications

The findings of this study carry significant public health implications. Medical interns represent the next generation of India's healthcare workforce. Gaps in HBV knowledge and incomplete vaccination not only endanger interns themselves but also constitute a potential infection risk to patients in their care. Mandatory, documentation-verified HBV vaccination prior to clinical placement backed by institutional and regulatory enforcement is a priority recommendation. Furthermore, integration of KAP-based assessments into medical curriculum evaluation frameworks would facilitate continuous monitoring and targeted intervention. At a broader level, findings from this study contribute to the evidence base informing the National Viral Hepatitis Control Programme and state-level occupational health policies in Uttar Pradesh.

Limitations

Several limitations of this study merit acknowledgement. First, the cross-sectional design precludes causal inference; associations observed between variables do not establish directionality. Second, the study was conducted at a single tertiary care institution in western Uttar Pradesh, limiting the generalisability of findings to medical interns in other regions or institutional

types. Third, data were collected *via* a self-administered questionnaire distributed through Google Forms, introducing the possibility of social desirability bias, whereby participants may have over-reported favourable knowledge or practices. Fourth, vaccination status was based on self-report and was not independently verified through immunisation records. Despite these limitations, the study provides valuable baseline data on HBV-related KAP among medical interns in a resource-representative setting.

Conclusion

Medical interns at UPUMS, Saifai, Etawah, demonstrated commendable knowledge of HBV infection and its transmission pathways. Nevertheless, the persistence of incomplete HBV vaccination among more than one-quarter of interns, coupled with attitudinal inconsistencies regarding standard precaution adherence and lack of confidence in managing HBV-infected patients, highlights critical deficiencies in practice readiness. These gaps underscore the urgent need for mandatory, competency-assessed infection-prevention training within internship curricula, reinforced by strict institutional and governmental enforcement of complete HBV immunisation prior to clinical practice commencement. The statistically significant association between vaccination completion and knowledge further emphasises that educational interventions and vaccination mandates are mutually reinforcing strategies. Routine, periodic KAP surveys should be institutionalised to monitor progress and guide targeted, context-sensitive public health interventions.

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Conflict of Interest

The authors declare no conflicts of interest.

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