

Knowledge and awareness about hepatitis B virus and infection control among dental students.

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ABSTRACT

Background: Hepatitis-B virus (HBV) is a global health threat and a recognized occupational hazard in dentistry, where exposure to blood, saliva, and sharps is routine. Dental students, who commence patient care early in their training, must be adequately informed about HBV transmission, vaccination, and infection-control measures. This research assesses the level of knowledge and awareness regarding HBV among dental students in Western Maharashtra, while also analyzing differences in performance across various academic years.

Methods: A descriptive cross-sectional survey was directed among 108 dental students (3rd year, 4th year, interns, postgraduates) using a validated 10-item questionnaire. Items assessed awareness, transmission, high-risk groups, symptoms, vaccination schedule, PPE use, sterilization, and sharps safety. Correct answers scored 1 point each, yielding a composite knowledge index (0–10). Descriptive statistics, Kruskal–Wallis tests, and chi-square analyses were applied.

Results: General HBV awareness was high (97.2%), but only 60.2% correctly identified the 0–1–6 month vaccine schedule. Mean knowledge score was 6.59 ± 1.56 , with higher scores among interns and postgraduates. There are no significant statistical differences observed ($p = 0.2236$). PPE awareness approached significance ($p = 0.055$). Knowledge about Vaccine schedule was significantly associated with academic year ($p = 0.049$).

Conclusion: While HBV awareness is strong, mastery of preventive details—especially vaccination scheduling and PPE use—is inconsistent. Structured infection-control training and mandatory vaccination policies are recommended to bridge the knowledge–practice gap.

Keywords: Hepatitis-B virus (HBV), Dental students, Infection prevention and control (IPC), Vaccination awareness, Personal protective equipment (PPE), Knowledge–practice gap, Western Maharashtra, Occupational health, Immunization schedule, Cross-sectional study

INTRODUCTION

Hepatitis--B virus (HBV) remains a pressing public health challenge, affecting an estimated 254 million people worldwide and causing approximately 1.1-million deaths occurred annually from chronic liver disease, cirrhosis, and hepatocellular carcinoma.[1] HBV is a highly infectious, partially double-stranded DNA virus, caused primarily through contact with infected blood and body fluids. Common modes include unsafe injections, transfusion of unscreened blood, sexual contact, and Upward transfer between a mother to child.[2]

The World Health Organization (WHO) aims to eliminate viral hepatitis as a public health threat by 2030, targeting a 90% reduction in new infections and a 65% reduction in mortality.[3] This requires high vaccination coverage, effective infection prevention and control (IPC) measures, and robust occupational safety programs.

Healthcare workers, especially dentists, are two to ten times more likely to acquire HBV than the general population.[4,5] Dentistry involves close patient contact, aerosol generation, and the use of sharp instruments, all of which increase the risk of percutaneous and mucosal exposure.[6]

India, classified as an intermediate endemicity region, harbors 35–40 million carriers.[6] While national programs have improved vaccination coverage, uptake among healthcare

trainees is inconsistent. [2, 7-10] Studies across Kurdistan [1], Malaysia [3], Syria [4], Saudi Arabia [6] show that general HBV awareness is often high, but detailed preventive knowledge is lacking.

Dental students in Western Maharashtra represent a diverse academic and clinical spectrum. Assessing their HBV knowledge by academic year can guide curricular interventions and institutional policies to enhance both theoretical and practical infection control competencies.

MATERIALS AND METHODS

This descriptive cross-sectional questionnaire study was conducted among dental students in Western Maharashtra. Using stratified sampling, all academic levels were represented.: 3rd year (n = 34), 4th year (n = 27), interns (n = 35), and postgraduates (n = 12).

A validated 10-item self-administered questionnaire assessed:

1. General awareness of HBV
2. Modes of transmission
3. High-risk groups
4. Symptom recognition
5. HBV susceptibility among dental professionals
6. HBV vaccination as prevention
7. Correct vaccination schedule (0–1–6 months)
8. PPE awareness
9. Preventive clinical measures
10. Other related preventive practices

Multiple-response items required all correct choices and no incorrect selections for a correct score. One point was awarded per correct answer, generating a 0–10 composite knowledge index.

Data analysis involved the application of descriptive statistics, Kruskal-Wallis tests to assess differences in mean knowledge scores, and chi-square tests to explore associations among categorical variables. Ethical approval was secured, and informed consent was obtained from all participants.

RESULTS

Participant Characteristics

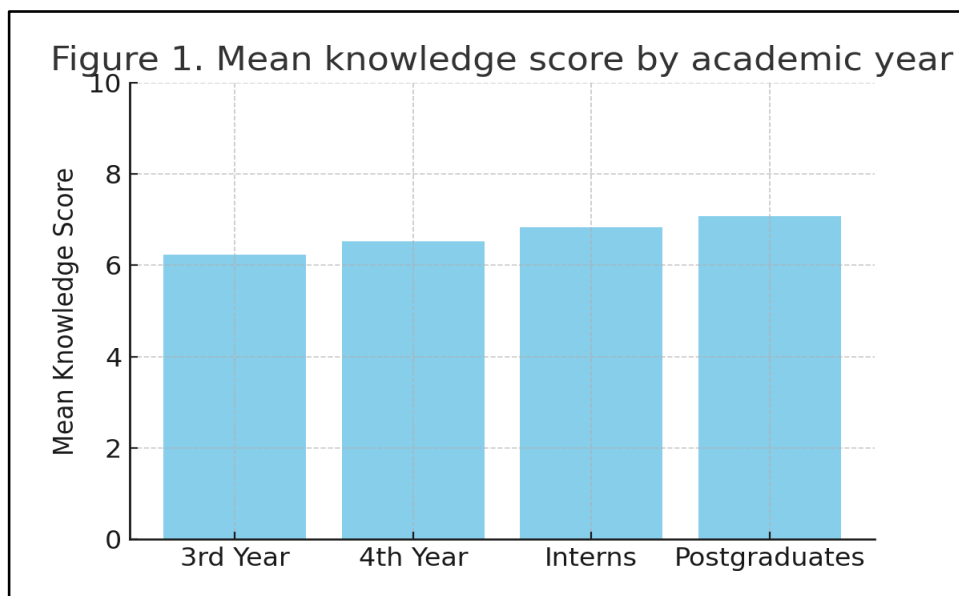
The study included 108 participants: 31.5% 3rd year, 25.0% 4th year, 32.4% interns, and 11.1% postgraduates. Mean knowledge score for the cohort was 6.59 ± 1.56 (range 1–9).

Knowledge Index by Academic Year Table 1. Knowledge index by academic year

Academic Year	N	Mean	SD	Min	Max
3rd Year	34	6.23	1.63	3.0	9.0
4th Year	27	6.52	1.78	1.0	9.0
Interns	35	6.83	1.27	4.0	9.0
Postgraduates	12	7.08	1.50	3.0	8.0

The trend shows increasing scores with academic progression, but differences were not statistically significant ($p = 0.2236$).

Figure 1 Caption: Mean knowledge score by academic year, showing an upward but non-significant trend from 3rd year to postgraduate level.



Item-Wise Performance

Table 2. Percentage of correct responses from each survey item

Item	Correct (%)
General awareness of HBV	97.2
Awareness of dentists' susceptibility	97.2
Awareness of preventive clinical measures	86.1
PPE awareness	79.6
Vaccine schedule (0–1–6 months)	60.2
Symptom recognition	25.0
Most likely to get infected	0.0

Figure 2 Caption: Item-wise correct response rates showing strong general awareness but notable gaps in vaccine schedule knowledge and symptom recognition.

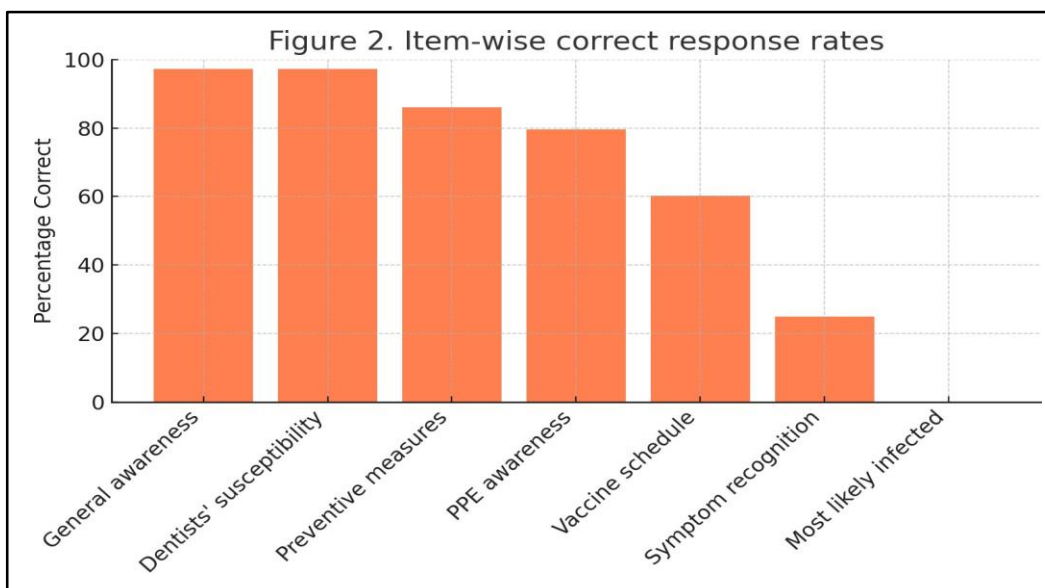
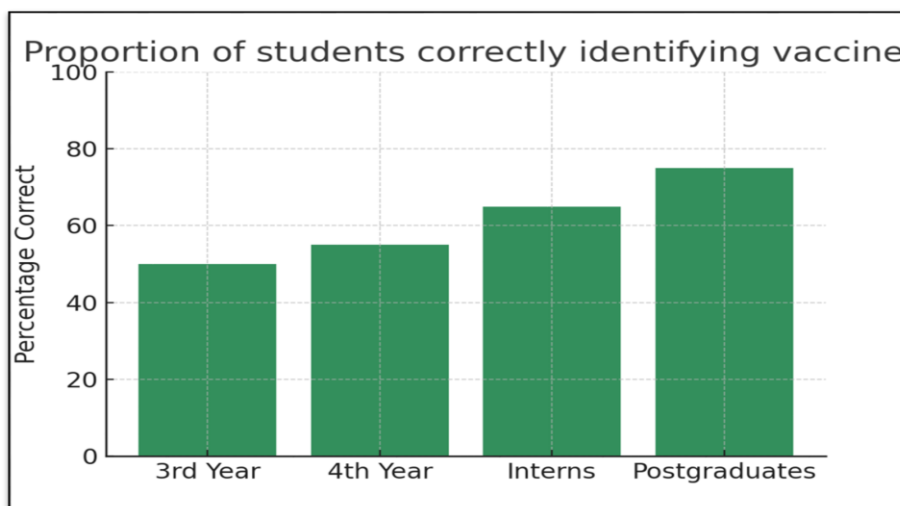


Table 3. Chi-square association results for selected items

Item	p-value	Interpretation
Vaccine schedule	0.049	Significant difference by academic year
PPE awareness	0.055	Approaching significance
Others	>0.05	No significant difference

Figure 3 Caption: Proportion of students correctly identifying the vaccine schedule by academic year, highlighting higher accuracy among interns and postgraduates.



DISCUSSION

General Awareness and Knowledge Levels

Study findings and results shows that almost all participants (97.2%) were aware of HBV, which is consistent with results from Kareem et al. in Kurdistan [1], Benarji et al. in India [2], and Upadhyay et al. in Malaysia [3], all of whom reported general awareness levels above 90%.

This is encouraging, as awareness is the first step toward effective prevention. However, awareness alone is not sufficient to guarantee safe practices. In our study, gaps persisted in areas requiring precise knowledge, such as symptom recognition

(25% correct) and vaccine scheduling (60.2% correct).

Students may encounter limited clinical exposure to symptomatic cases during their training, primarily because hepatitis B virus (HBV) often presents without symptoms in its early stages. This lack of experience could contribute to their difficulties in identifying the associated signs of the disease. This mirrors findings from Al-Fandi et al. in Syria [4],

Who noted low symptom recognition rates despite high awareness of HBV transmission modes.

Vaccination Awareness and Coverage

Vaccination is the single most effective method of preventing HBV infection. WHO recommends the three-dose 0–1–6 month schedule, which achieves over 90% seroconversion.[3] In our study, only 60.2% of students could identify this schedule correctly.

This proportion is higher than the 48% reported by Khan et al. in Pakistan [11] but lower than the 75% observed by Sharma et al. among Indian dental interns.[8] The significant association between academic year and vaccine schedule knowledge ($p = 0.049$) suggests that clinical exposure and advanced coursework improve understanding. Nevertheless, completion of the full vaccine series remains a challenge globally. Studies from Saudi Arabia [6], Nigeria [12], and multiple African nations [15] have documented incomplete vaccination despite high awareness, often due to cost, lack of institutional mandates, and limited on-site vaccine availability.

PPE and Infection Prevention and Control Practices

Our results indicate that 79.6% of participants were aware of PPE use as a preventive measure. Although relatively high, this result indicates that one in five students still lacked PPE awareness—a concerning gap in a high-risk profession. Evidence from Alhumaid et al. in Saudi Arabia [6] and Okeoma et al. in Nigeria [12] shows similar trends, with PPE use being inconsistent even when knowledge is adequate. Barriers to proper PPE usage include perceived inconvenience, cost, and a false sense of security after vaccination. As suggested by Kohn et al.[5], comprehensive PPE training, regular simulation exercises, and integration of PPE checks into clinical audits can improve compliance.

Knowledge–Practice Gap

An important outline that emerges from our study and supporting literature is the knowledge–practice gap—the disconnect between theoretical-knowledge and practical-

Application of preventive measures. This gap may be caused due to several factors:

- Insufficient hands-on IPC training in pre-clinical years
- Lack of role modeling by faculty in consistently following PPE and sterilization protocols
- Inadequate feedback on IPC adherence during clinical postings Upadhyay et al. [3] in Malaysia observed that while students could accurately list preventive measures, compliance with sharps disposal and vaccination completion was inconsistent.

Curriculum and Policy Implications

Our results underline the need for targeted curriculum enhancements:

Structured IPC modules in the pre-clinical curriculum, including simulated sharps injuries and post-exposure protocols.

Mandatory HBV vaccination at enrollment with a maintained vaccination registry to ensure full coverage before clinical exposure.

Regular refresher sessions on PPE and sterilization, reinforced through practical demonstrations and competency assessments.

On-site vaccination programs and institutional policies that remove cost and accessibility barriers.

Monitoring systems that track both vaccination coverage and IPC compliance among students.

Evidence from Mahesh et al. [10] and Kumar et al. [13] suggests that early and continuous IPC training enhances students' perceived importance of immunization and preventive practices. Institutions adopting these approaches are more likely to achieve universal vaccination coverage and consistent PPE use.

Strengths and Limitations

Strengths of this study results include a validated questionnaire, stratified sampling across multiple academic levels, and a transparent scoring rubric for complex multiple-response items.

The study has several limitations, including reliance on self-reported data, which can lead to biases such as recall or social desirability effects. Additionally, the cross-sectional design restricts the ability to draw causal conclusions, and the focus on a single institution may limit the applicability of the findings to broader populations. To address these issues, future longitudinal research could follow the same group over time to assess how changes in the curriculum influence knowledge and preventive practices related to HBV.

CONCLUSION

HBV awareness among dental students is high, but preventive knowledge gaps persist. Addressing these through early, structured IPC training and institutional vaccination policies is essential to protect future dental professionals.

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