

# ASSESSMENT OF STUDENTS' KNOWLEDGE AND SURVEY OF INFECTIOUS DISEASES IN PAKISTAN

Original Research

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## ABSTRACT

**Background:** Hepatitis remains a major global health concern, contributing to over one million deaths annually. Despite being largely preventable through vaccination, education, and proper infection control, knowledge gaps persist among healthcare students, limiting their preparedness for clinical roles. Medical and Allied Health Sciences students are particularly vulnerable due to frequent patient contact, making it critical to assess their knowledge for effective public health outcomes.

**Objective:** To assess the level of knowledge regarding hepatitis among students of Medical and Allied Health Sciences and identify educational deficiencies across disciplines and academic levels.

**Methods:** An analytical cross-sectional study was conducted among 80 students, randomly selected from academic institutions. Data were collected using a structured, expert-validated, self-administered questionnaire consisting of 16 multiple-choice questions. The tool assessed knowledge about hepatitis types A–E, transmission, risk factors, symptoms, prevention, vaccination, and public health interventions. Demographic data, including age, gender, academic semester, and discipline, were also recorded. Data analysis was performed using SPSS Version 22, employing descriptive and inferential statistics, with significance set at  $p < 0.05$ .

**Results:** The mean age of participants was 24.5 years (range: 17–38). Females made up 53% of the sample, while males accounted for 47%. Students in semesters 10 and above scored highest (mean =  $59.1 \pm 15$ ), while those in semesters 1–3 had the lowest scores (mean =  $32 \pm 18$ ). Medical students had the highest knowledge scores (mean =  $49.2 \pm 21$ ), followed by Pharmacy ( $46 \pm 17.8$ ) and Dentistry ( $41.7 \pm 20.3$ ). No significant difference in knowledge was observed based on gender. Awareness of hepatitis B, C, and D was higher than that of hepatitis A.

**Conclusion:** Academic progression and field of study were positively associated with hepatitis knowledge, while gender had no impact. These findings underscore the urgent need to integrate structured hepatitis education across all health-related academic programs to ensure preparedness of future healthcare professionals.

**Keywords:** Cross-Sectional Studies, Education, Hepatitis, Health Knowledge, Preventive Health Services, Public Health.

## INTRODUCTION

Hepatitis remains a critical global health concern, ranking among the top five infectious causes of premature mortality worldwide (1). Viral hepatitis, particularly types B (HBV) and C (HCV), poses a substantial threat due to its dual nature—manifesting both acutely and chronically. Acute hepatitis is often marked by clinical symptoms such as jaundice, dark-colored urine, anorexia, profound fatigue, and tenderness in the right upper quadrant (2). In its chronic form, hepatitis can silently progress to severe liver complications, including cirrhosis and hepatocellular carcinoma (HCC), making early recognition and management essential (3). The World Health Organization (WHO) reports that hepatitis causes over one million deaths annually, placing an immense burden on global healthcare systems (4). Furthermore, an estimated two billion people have been infected with HBV, with over 350 million chronic carriers worldwide—figures that emphasize the pressing need for sustained public health interventions (5). Despite hepatitis being preventable, a significant gap persists in knowledge and awareness, even among those at the forefront of healthcare. Medical students, due to their direct and frequent contact with patients, are particularly vulnerable to occupational exposure, especially to HBV and HCV. Hence, their understanding of transmission routes, clinical manifestations, vaccination, and post-exposure prophylaxis is crucial for personal safety and effective patient care (6). Alarming, recent studies highlight deficiencies in the hepatitis-related knowledge of undergraduate medical students, underscoring an urgent need to revisit and enhance educational curricula (7). Similar patterns have been observed across various regions, pointing to a global deficit in hepatitis awareness among healthcare students (8). This not only threatens their well-being but may also hinder the broader goals of infection prevention and control in healthcare environments.

Healthcare professionals are expected to possess a comprehensive understanding of hepatitis—not only to manage affected patients but also to contribute to epidemiological control through informed practices (9,10). They play a pivotal role in minimizing the transmission of viral hepatitis within clinical settings and the wider community. Education, therefore, becomes a cornerstone in the global fight against hepatitis. Without proper training and awareness, future healthcare workers may fall short in implementing essential preventive strategies, such as vaccination, use of personal protective equipment, and adherence to infection control protocols (11). Recognizing this educational shortfall, the present study seeks to evaluate the level of knowledge among Medical and Allied Health Sciences students regarding viral hepatitis. By identifying specific areas of deficiency, the study aims to inform curriculum development and promote a more robust and responsive medical education system. The overarching objective is to foster a well-informed future healthcare workforce equipped to reduce hepatitis transmission, improve patient outcomes, and uphold global health standards.

## METHODS

This study employed an analytical cross-sectional design to assess the knowledge of hepatitis among students enrolled in Medical and Allied Health Sciences programs. The research was conducted within academic institutions to ensure a focused, relevant, and controlled environment for data collection. This setting was chosen to enhance the academic authenticity of participant responses and to better reflect the context in which such knowledge is typically acquired and applied. A total of 80 students were selected using a simple random sampling technique, ensuring proportional representation across different healthcare-related disciplines and academic years. Eligibility criteria included active enrollment in Medicine, Nursing, Pharmacy, Physiotherapy, or other Allied Health Sciences fields. Individuals from non-health-related programs or those unwilling to provide informed consent were excluded from the study. Data were collected using a structured, self-administered questionnaire comprising 16 multiple-choice questions (12). The questionnaire was designed to assess general and specific knowledge of viral hepatitis, including its various types (A, B, C, D, and E), transmission routes, clinical manifestations, preventive strategies, risk factors, and public health interventions. Demographic details such as age, sex, field of study, and academic term were also recorded. To ensure the content validity of the instrument, the questionnaire was reviewed and approved by experts in infectious diseases, epidemiology, and medical education, with adjustments made according to their feedback (12,13).

Prior to the main study, a pilot test was conducted with a small group of students to evaluate the internal consistency of the instrument. Cronbach's alpha was calculated to assess reliability, and the results indicated satisfactory consistency. During the primary data collection phase, students were approached in classroom or institutional common areas and were requested to complete the questionnaire independently. Trained facilitators were present to provide clarification when needed, without influencing the participants' answers. Ethical approval was obtained from the Institutional Review Board. All participants provided oral informed consent after being briefed

on the purpose of the study, the voluntary nature of their involvement, and confidentiality measures in place to protect their data. Data was entered and analyzed using IBM SPSS software (Version 22). Descriptive statistics such as means, standard deviations, and frequency distributions were used to summarize demographic characteristics and response patterns. Inferential analyses, including chi-square tests and independent-samples t-tests, were conducted to assess variations in knowledge across different demographic subgroups. A significant level of  $p < 0.05$  was adopted for all statistical tests.

## RESULTS

The demographic analysis revealed that the mean age of participants was 24.5 years, with ages ranging from 17 to 38 years. The gender distribution showed a slight predominance of females, who comprised 53% of the sample, while males accounted for 47%, indicating a relatively balanced representation. In terms of academic progression, the largest proportion of students (44%) were enrolled in semester 10 or above, followed by 25% in semesters 1–3, 18.5% in semesters 4–6, and 12.5% in semesters 7–9. Discipline-wise, Medical students represented the highest percentage at 28.6%, followed by Nursing (19.3%), Dentistry (13%), Pharmacy (9.6%), Health and Paramedical (10% each), Management (5%), and Rehabilitation (4.5%). This distribution indicates a diverse and academically varied sample, with a strong representation from clinical and allied health disciplines. Semester-wise analysis showed that students in higher academic levels exhibited greater knowledge of hepatitis. Those in semesters 10 and above constituted the largest group (44%,  $n=155$ ), with a mean knowledge score of  $59.1 \pm 15$ . Students in semesters 1–3 represented 25% ( $n=88$ ), with a mean score of  $32 \pm 18$ . Participants in semesters 4–6 accounted for 18.5% ( $n=65$ ), scoring  $36.6 \pm 17.9$  on average, while students in semesters 7–9 made up 12.5% ( $n=44$ ) and scored  $42.7 \pm 20$ . A statistically significant difference was observed between the 4th–6th and 10th+ semester groups, indicating a substantial increase in hepatitis-related knowledge with academic progression. However, the difference in scores between the 1st–3rd and 4th–6th semester groups was not statistically significant.

Analysis of knowledge by discipline revealed notable variation. Medical students comprised 28.6% ( $n=101$ ) of the sample and had the highest average score of  $49.2 \pm 21$ . Pharmacy students (9.6%,  $n=34$ ) scored  $46 \pm 17.8$ , followed by Dentistry students (13%,  $n=46$ ) with  $41.7 \pm 20.3$ . Nursing students (19.3%,  $n=68$ ) scored  $34.3 \pm 14$  on average. Health and Paramedical students each represented 10% of the sample ( $n=36$  and  $n=33$ ), with scores of  $38 \pm 15.5$  and  $35 \pm 13.5$ , respectively. Management students constituted 5% ( $n=18$ ), scoring  $34 \pm 10.5$ , while Rehabilitation students had the lowest representation (4.5%,  $n=16$ ) and the lowest average score of  $16 \pm 12.7$ . No statistically significant correlation was found between sex and hepatitis knowledge, indicating comparable levels of awareness among male and female participants. While the knowledge of hepatitis B, C, and D was higher among students, awareness of hepatitis A was noticeably lower. Additionally, no significant association was found between students' knowledge of hepatitis B, C, and D and their educational degree level ( $p=0.19$ ). These findings collectively suggest that academic progression and field of study are key determinants of hepatitis knowledge among students of Medical and Allied Health Sciences. Gender and degree level, however, did not significantly influence knowledge scores. A clear trend of increased knowledge in later semesters was observed, consistent with greater clinical exposure and academic experience.

**Table 1 Demographic data**

Variable	Frequency (%)	Mean Score $\pm$ SD
Mean Age (years)	-	24.5
Age Range (years)	17-38	-
Gender - Female	53%	-
Gender - Male	47%	-
Semester 1-3	88 (25%)	32 $\pm$ 18
Semester 4-6	65 (18.5%)	36.6 $\pm$ 17.9
Semester 7-9	44 (12.5%)	42.7 $\pm$ 20
Semester 10+	155 (44%)	59.1 $\pm$ 15

Variable	Frequency (%)	Mean Score ± SD
Medical	101 (28.6%)	49.2 ±21
Dentistry	46 (13%)	41.7 ±20.3
Pharmacy	34 (9.6%)	46 ±17.8
Nursing	68 (19.3%)	34.3 ±14
Health	36 (10%)	38 ±15.5
Paramedical	33 (10%)	35 ±13.5
Management	18 (5%)	34 ±10.5
Rehabilitation	16 (4.5%)	16 ±12.7

**Table 2 Semester wise frequency of the students**

Variables	Frequency	Score (Mean ± SD)
Semester		
1–3	88 (25%)	32±18
4–6	65 (18.5%)	36.6±17.9
7–9	44 (12.5%)	42.7±20
10+	155 (44%)	59.1±15

**Table 3 Discipline wise frequency of the students**

Variables	Frequency	Score (Mean ± SD)
Medical	101 (28.6%)	49.2±21
Dentistry	46 (13%)	41.7±20.3
Pharmacy	34 (9.6%)	46±17.8
Nursing	68 (19.3%)	34.3±14
Health	36 (10%)	38±15.5
Paramedical	33 (10%)	35±13.5
Management	18 (5%)	34±10.5
Rehabilitation	16 (4.5%)	16±12.7

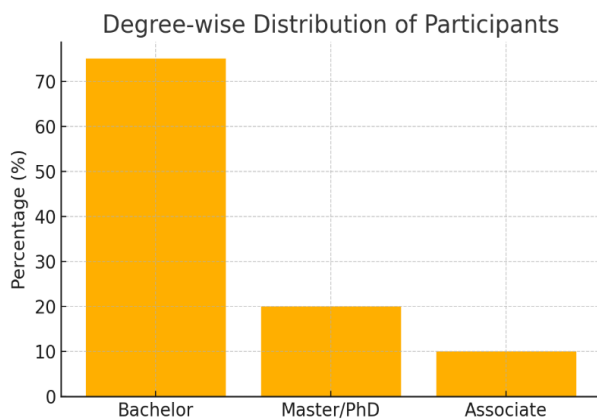


Figure 2 Degree-Wise Distribution of Participants

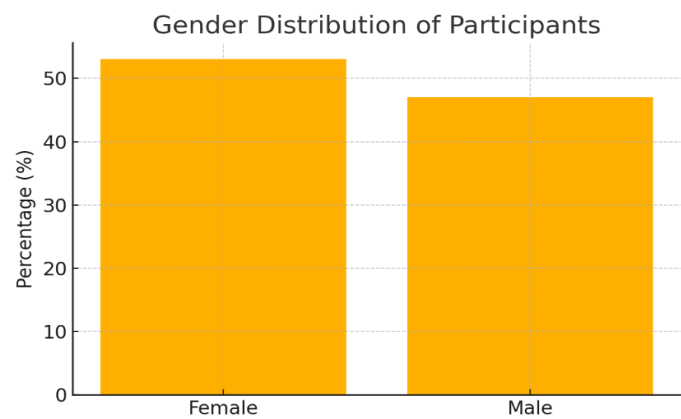


Figure 1 Gender Distribution of Participations

## DISCUSSION

The findings of this study revealed a positive association between increasing age, academic progression, and the level of knowledge regarding hepatitis among students of Medical and Allied Health Sciences. Older students and those in advanced semesters demonstrated higher awareness, which reflects the cumulative benefit of academic learning and clinical exposure over time. This trend has been consistently observed in previous literature, which emphasizes that advanced coursework and repeated exposure to relevant clinical content enhance comprehension of infectious diseases, including hepatitis (14,15). While the difference in knowledge between early and intermediate semesters was not statistically significant, a marked improvement was evident when comparing intermediate with final semesters, reinforcing the impact of longitudinal academic development. The lack of significant correlation between gender and hepatitis knowledge observed in this study aligns with several prior investigations that reported similar findings. Although some studies have suggested that females might demonstrate slightly higher engagement in health-related topics, the present study's balanced gender distribution appears to have neutralized any such disparity (16). This reinforces the notion that academic exposure, rather than gender, is the more decisive factor influencing knowledge levels in healthcare education settings.

Educational qualification also appeared to influence knowledge, with participants holding a bachelor's degree comprising the majority of the sample and demonstrating moderate awareness. A higher proportion of students with postgraduate qualifications showed improved understanding, although the difference was not statistically significant. This is consistent with findings that emphasize the role of academic maturity and research exposure in shaping disease awareness (17,18). Despite this, the role of associate degree holders remained marginal both in number and score, reflecting a potential gap in public health education at foundational academic levels. Discipline-wise analysis further highlighted the disparity in hepatitis-related knowledge, with Medical, Pharmacy, and Dentistry students outperforming those from non-clinical disciplines. Students from fields such as Management and Rehabilitation scored the lowest, underlining the lack of structured infectious disease education in non-medical curricula (19). This discrepancy draws attention to the critical need for cross-disciplinary public health integration, especially considering the broader societal role of non-medical graduates in spreading awareness and participating in preventive healthcare initiatives (Ministry of Health, Pakistan, 2024) (20). A tailored approach involving targeted training sessions and mandatory health modules could address this gap and expand disease literacy beyond clinical domains.

One of the strengths of this study was its inclusion of participants across various semesters and disciplines, allowing for a comparative understanding of knowledge distribution and gaps. The balanced gender representation further enhanced the generalizability of the findings. However, the study had several limitations. The sample size, although sufficient for cross-sectional analysis, was relatively modest and may not reflect the broader student population across different regions or institutions. Additionally, the cross-sectional nature of the study limited the ability to assess changes in knowledge over time or determine causality. The absence of item-wise analysis on questionnaire responses also restricted insight into which specific domains of hepatitis knowledge (such as transmission, symptoms, or prevention) were most deficient. This represents an area for improvement in future studies, where more granular data collection could yield actionable information for curriculum reform. Future research should explore longitudinal designs to track changes in students' hepatitis knowledge throughout their academic journey. Interventional studies assessing the impact of targeted educational programs,

workshops, or e-learning modules could provide further clarity on effective strategies to close identified gaps. It is also essential to examine knowledge retention and real-world application, particularly during clinical postings, where adherence to infection control practices becomes critical.

## CONCLUSION

This study highlights notable gaps in hepatitis-related knowledge among students of Medical and Allied Health Sciences, particularly those in lower academic years and non-medical disciplines. While academic progression was associated with improved understanding, awareness of hepatitis A remained comparatively lower than other types, indicating specific areas requiring attention. The absence of gender-based differences suggests that educational needs are consistent across male and female students. Given the critical role future healthcare professionals play in preventing and controlling hepatitis, there is a clear need to enhance awareness through structured educational initiatives. Integrating targeted hepatitis education into academic curricula and implementing awareness campaigns can serve as practical strategies to bridge existing knowledge gaps and strengthen public health preparedness.

### Author Contribution

Author	Contribution
Shumaila Khan	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Hira Shakoor	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Nazneen Qureshi	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Sajid Ullah Khan	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Rehman	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Ayesha	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Musa Khan	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Iqbal Khan	Writing - Review & Editing, Assistance with Data Curation
Waqar Saeed*	Writing - Review & Editing, Assistance with Data Curation
Muhammad Umair*	Writing - Review & Editing, Assistance with Data Curation

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