

Research Article

Knowledge and risk perception towards human immunodeficiency virus and hepatitis B infections among medical students

M Mehndiratta¹, R Kar¹, E A Almeida¹, A Goel², R Mehndiratta³

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Abstract

Background and objectives: Nosocomial human immunodeficiency virus (HIV) and hepatitis B virus (HBV) infections are common occupational hazards transmitted through infected needle-stick injuries. Younger medical students are at a higher risk of exposure mainly because of their inexperience and ignorance. Both these infections are preventable if standard precautions and protocols for post-exposure prophylaxis are followed. The present study assesses the knowledge, and risk perception among medical students and interns towards HIV and HBV infections, to guide instructors in planning appropriate training programmes.

Methods: Following approval of the institutional ethics committee of University College of Medical Sciences, Delhi, India, (UCMS) undergraduate medical students and interns were invited to respond to an indigenously designed questionnaire regarding HIV and HBV infections. Participation was voluntary and anonymous. The students were assessed vertically.

Results: There was a gradual increase in the awareness regarding HIV and HBV infection with each passing academic year. The percentage of total questions answered correctly was highest (91.1%) in internship and lowest (71.5%) in the first semester. Awareness regarding HIV was greater as compared to HBV infection in all the groups. Interns had maximum awareness of post exposure prophylaxis available for both HIV and HBV infections. Ninth semester students scored the highest on pre-exposure prophylaxis for HBV infection. Overall, the interns were the most aware.

Conclusion: Students' knowledge on HIV and HBV infections improves as these areas are covered in greater detail during exposure to clinical disciplines. An early clinical exposure

¹ University College of Medical Sciences, Delhi-110093, India

² Dr. BR Ambedkar State Institute of Medical Sciences, India

³ Skin and Laser Clinic, New Delhi, 110092, India

Address for correspondence: Dr. Mohit Mehndiratta, Room No. 217, Department of Biochemistry (2nd Floor), University College of Medical Sciences, Delhi-110093. Telephone +91-9818446356.

email: drmohitucms@gmail.com  <https://orcid.org/0000-0002-0822-6544>

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module for first year medical students in the Competency Based Medical Education curriculum may provide an opportunity to improve awareness, to reduce infection and subsequent morbidity. The students have greater awareness of HIV than HBV, though the risk of transmission is higher for the latter. Thus, shortcomings in imparting knowledge about hepatitis B must be identified and rectified.

Keywords: HIV, Hepatitis B, Awareness, Medical Students, Clinical Exposure.

Introduction

Medical students are a part of the health care delivery system and are exposed to the same degree of risk as any other health care worker when they come in contact with patients and contaminated instruments. They may sometimes be the first level of contact between patients and medical care. They are expected to undertake activities related to patient care from the beginning of their clinical postings.

Acquired immunodeficiency syndrome (AIDS) was first diagnosed in the United States in 1981. It remains the leading cause of mortality in humans, with 90% of all infected cases occurring in the developing world, and the number of newly infected cases rising every year.¹ Hepatitis B is a serious blood borne infection that affects the liver and is caused by the hepatitis B virus (HBV). The major methods of transmission of human immunodeficiency virus (HIV) and HBV infections include unprotected sexual contact, abuse of injectable drugs, sharing of contaminated needles, transfusion of contaminated blood and blood products, mother-to-child transmission (prenatal and while breastfeeding), and occupational exposure among health care workers.² In spite of the establishment and implementation of 'standard precautions', healthcare workers may experience accidental occupational exposure to HIV and HBV. In order to minimize the risk of infection, clear guidelines for post-exposure-prophylaxis (PEP) are available.³

Under the previous medical curriculum, the MBBS course in India was divided into first year (semester 1 & 2), second year (semester 3, 4 & 5), third year Part 1 (semester 6 & 7) and third year Part 2 (semester 8 & 9) with clinical exposure increasing over successive years. First and second year included the pre and para clinical subjects where there is minimal interaction with patients. Maximum clinical exposure was in the third year where the medical students visit the wards, outpatient department (OPD) and operation theatre. After completing the third year Part 2 examination, students have to undergo 1 year of compulsory internship during which they are posted to all clinical departments on a rotational basis. The chance of needle-stick injury is highest during this period for two reasons. Firstly, the students come in contact with patients regularly in the OPD, wards and operation theatres. Secondly, they draw blood samples from patients admitted to the wards and send them to the laboratory for investigations ordered by the consultant. This study was conducted on medical students who were following this curriculum.

Competency based medical education (CBME) approach has been recently introduced, where 'competency' is defined as 'the ability to do something successfully and efficiently'.⁴ CBME is an approach to ensure that the graduates develop the competencies required to fulfill the patients' needs in society. It de-emphasises time-based training and promises greater accountability, flexibility and learner- centeredness.⁵ It is an approach in which the focus of teaching-learning and assessment is on real-life medical practice. The major changes included

the listing of several competencies that an Indian medical graduate should possess at the end of training and some new components such as the foundation course, electives, integrated learning, and early clinical exposure.⁶ One of the key objectives of the newly introduced CBME is early clinical exposure. It is defined as an 'authentic human contact in a social or clinical context that enhances learning of health, illness and/ or disease, and the role of the health professional'.⁶ This change results in exposure of the students to potential infections much earlier than in the previous curriculum. Therefore, it becomes more important to gauge their awareness and stress on following standard precautions right from the beginning of the MBBS course.⁷

HIV and hepatitis B are the most dreaded blood-borne diseases to which medical graduates are exposed and the risk increases if they are unaware of the potential dangers and the strict precautions that should be followed to reduce the risk. A few studies have evaluated the knowledge and practices followed by medical students while dealing with patients.^{1,8,9} However, to the best of our knowledge, no study has assessed the awareness and risk perception of students about the two diseases simultaneously. Knowledge being defined as 'the theoretical or practical understanding of a subject' and risk perception being defined as 'Risk as it is assessed through individual judgment'. The present study was done to assess the knowledge and risk perception of medical students and young graduates towards HIV and HBV infections so that appropriate education and training programs could be designed and implemented.

Methods

Undergraduate medical students and interns of UCMS and Guru Teg Bahadur Hospital were invited to complete a questionnaire (including 39 questions) to explore their knowledge and perceptions towards the methods of transmission of HIV and HBV infections. Ethical clearance was obtained from the Institutional Ethics Committee of UCMS. The work was carried out in accordance with the Declaration of Helsinki. 1st semester, 3rd semester, 5th semester, 9th semester MBBS students and interns (n = 130, 107, 116, 83, 34 respectively) of the UCMS were enrolled. As participation was on a purely voluntary basis, no sample size calculation was done (purposive sampling).¹⁰ All those students who wished to participate were enrolled. A participant information sheet was provided, and informed consent obtained from all the participants.

A self-administered anonymous questionnaire (Supplementary Table-page 9) consisting of 39 questions (22 on HIV and 17 on HBV) was used to collect information based on basic knowledge of the disease, modes of transmission, availability of vaccines, needle-stick injuries and post-exposure prophylaxis. The responses to the questions consisted of 'Yes', 'No' and 'Don't know' options. Of the 22 questions on HIV, 16 questions assessed knowledge of the student while 6 judged their risk perception. Of the 17 questions on hepatitis B, 12 questions assessed knowledge of the student while 5 judged their risk perception. A Microsoft Excel sheet was prepared for 1st, 3rd, 5th and 9th semester MBBS students and interns, and then vertically assessed. For each correct response, 1 point was given and for each incorrect and "don't know answer", 0 point was given. A maximum score of 39 could be achieved by each respondent. No statistical tests were used, and results were displayed as percentages.

Results

Awareness of HIV and HBV infection increased with the passing of every academic year (Table 1). Interns had the highest awareness rate (91.1%) with however a deficiency of 8.9%. Students in the first semester were least aware (71.5%) with a deficiency rate of 28.5%.

Table 1: Comparison of correct responses received

	1 st semester	3 rd semester	5 th semester	9 th semester	Interns
Overall awareness	71.5% (93/130)	74.7% (80/107)	85.3% (99/116)	90.3% (75/83)	91.1% (31/34)
Deficiency	28.5%	25.3%	14.7%	9.7%	8.9%

With regard to the two infections, the students were more aware of HIV (85.5%) compared to HBV (74.1%). The awareness rate of HBV infection was lowest among students in the first and third semesters (Table 2).

Students and interns had greater awareness about the modes of transmission of HIV as compared to HBV infection, with interns being most aware (Table 2).

Table 2: Comparison of knowledge of HIV & HBV

Basic knowledge of HIV & HBV					
	1 st semester	3 rd semester	5 th semester	9 th semester	Interns
HIV	79.20% (103/130)	82.24% (88/107)	87.90% (102/116)	91.56% (76/83)	94.11% (32/34)
HBV	61.50% (80/130)	64.4% (69/107)	82.70% (96/116)	89.15% (74/83)	88.20% (30/34)
Knowledge regarding modes of transmission of HIV & HBV					
	1 st semester	3 rd semester	5 th semester	9 th semester	Interns
HIV	87.69% (114/130)	87.80% (94/107)	90.50% (105/116)	94.40% (78/83)	97.0% (33/34)
HBV	66.1 % (86/130)	77.50% (83/107)	79.30% (92/116)	89.15% (74/83)	91.10% (31/34)

With regard to needle stick injury and its management, the intern batch scored higher in their knowledge of risk of transmission and PEP, while students in the first semester were least aware of these aspects (Table 3). Here again, awareness was more for HIV as compared to HBV.

Table 3: Risk perception on occupation exposure and PEP

Likelihood of infection post needle stick injury					
	1 st semester	3 rd semester	5 th semester	9 th semester	Interns
HIV	66.19% (86/130)	80.30% (86/107)	87.0% (101/116)	94.00% (78/83)	100% (34/34)
HBV	52.30% (68/130)	67.28% (72/107)	84.40% (98/116)	87.90% (73/83)	94.11% (32/24)
Post exposure prophylaxis					
	1 st semester	3 rd semester	5 th semester	9 th semester	Interns
HIV	57.60 % (75/130)	57.90% (62/107)	81.80% (98/116)	94.00% (78/83)	97.00% (33/34)

HBV	55.40% (72/130)	58.80% (63/107)	83.60% (97/116)	86.74% (72/83)	97.00% (33/34)
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With regard to pre-exposure prophylaxis for HBV (i.e., vaccination), awareness was highest in students in the 9th semester, followed by the batch of interns, and first semester students again scored the least (Table 4).

Table 4: Awareness regarding HBV vaccination

	1 st semester	3 rd semester	5 th semester	9 th semester	Interns
HBV vaccination	76.9% (100/130)	83.1% (89/107)	87.9% (102/116)	95.2% (79/83)	88.2% (30/34)

Discussion

Awareness of the modes of transmission of infectious diseases, disease progression and standard precautions goes a long way in the reduction of the risk of infection. Even though medical students and interns of our college were aware of HIV and HBV infections, the awareness rate was not optimum (the desired value is 100%). The intern batch who are just a step away from being full-fledged, practicing doctors and have maximum contact with patients, scored 91.1%. This shows that they are at a higher risk of contracting these diseases due to lack of awareness. A previous study in medical students reported an average knowledge score of 10.63 out of 16 with respect to HBV infection¹¹ and a 100% awareness rate of HIV/AIDS among 1st year MBBS students.¹² It was also seen that the overall awareness increased progressively from the first semester to the intern group, indicating that the students gained more knowledge in this regard with each passing year in the medical school.

The overall awareness of HBV (74.1%) was found to be less than that for HIV (85.5%) in all groups. This can be attributed to an increased focus of the government and health care system to improve awareness of HIV in the general population. Individuals also actively seek information about HIV given the dreaded nature of the disease and the stigma attached to it. A study done in 2016 on health care workers found a similar result.¹³ Even basic knowledge of HBV and its transmission was found to be particularly lacking in students in the first and third semesters. Knowledge of vaccination against HBV ranged from 76.9% to 95.2% in all groups, which was concurrent with the findings of Alhowaish *et al.*¹⁴

Studies have reported varying levels of awareness of HBV infection. In a study done in health care workers (including medical students), overall knowledge was found to be 68% and only 40% knew the correct precautions that should be taken in order to prevent needle-stick injuries.¹⁵ A cross-sectional study conducted among pre-medical students reported a high level of knowledge in these students.¹⁶ A recently conducted study reported an 84.8% rate of awareness of HBV infections in medical students in their pre-clinical years.¹⁷ These studies, along with our study show that greater efforts are needed to increase the level of awareness of HBV in medical students and health care workers.

Risk perception also goes a long way in disease prevention. The more dangerous we perceive a task or incident to be, greater is the care and caution taken while executing that task. Needle stick injury is the most common mode of transmission of these diseases in medical personnel. However, the risk perception of needle-stick injuries and PEP of both HIV and HBV was

particularly low in students in the first and third semesters. It is therefore important that these students are taught about standard precautions, which should be included in the syllabus at an earlier stage, ideally from the first year of the MBBS course.

A possible explanation of this low-risk perception could be that students in these early semesters hardly received any clinical exposure under the old curriculum. They were still studying the basic sciences and therefore did not understand the importance of integrating what they were being taught with the clinical aspects of medicine. As the saying goes 'Ignorance is bliss' and as these students did not know the risk associated with a particular task, they were more likely to be less careful in tasks associated with a higher risk. Students' knowledge of HIV and HBV in the preclinical years can be considered to be on par with that of the general public i.e., knowledge which comes from awareness programs/posters aimed for the public at large. This could also explain why their knowledge about HIV is greater as compared to HBV infection, as majority of awareness campaigns are focused on HIV, and not on HBV. Awareness of HBV infection is mostly derived from the mandatory protocol for vaccination against hepatitis B in most medical colleges. Sadly, many colleges are more focused on following the vaccination protocol rather than creating awareness of the same. Seminars and workshops on HBV infection, along with measures to prevent needle-stick injuries and their management (if they occur) should be arranged in the hospital premises and students motivated to attend these. This has become even more vital with the introduction of early clinical exposure under the new curriculum.⁵

We propose that every medical institute should have a department for student health, that would undertake the responsibility of testing, vaccinating, monitoring vaccine response and providing PEP for HBV. This may be an important step towards achieving the goal of the World Health Organization for the eradication of Hepatitis B. This study highlights the fact that more efforts should be directed in the generation of awareness about HBV as its transmission rate is higher than HIV.¹⁸ Medical students and health care workers should take an active part in HIV and HBV awareness programmes regularly. In this way, the students and the public can work together to minimise the risk of transmission of these dreaded diseases.

The limitation of this study is that there was no intervention planned to assess the gain in knowledge following the intervention. With the introduction of early clinical exposure under the new CBME curriculum we are planning a study with an intervention and will assess the gain in knowledge as the batch progresses academically.

Conclusions

This study shows that there is a lack of awareness about HIV and HBV amongst medical students and interns. The deficiency was more apparent in the students of pre-clinical years. According to the new curriculum, the students will have earlier interaction with patients, right from the initial semesters. Thus, it is imperative that their vaccination, training, and sensitisation to standard precautions be completed at the beginning of the course and monitored at regular intervals.

Each medical college should aim for an awareness rate of 100%, not only among medical students but also among healthcare staff as well. This would help in realising WHO's aim of eradication of hepatitis B by 2030. Also, the inculcation of correct safety practices for the use of sharps and following standard precautions at an early stage of medical education would go

a long way in the prevention of the transmission of HIV and hepatitis B, not only in health care workers but also in the society.

Declarations

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Conflicts of Interest: Authors declare there are no conflicts of interest in publishing this article.

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Ethics statement: Ethical approval was taken from the Institutional Ethics Committee of University College of Medical Sciences prior to enrolment of participants. Informed consent was taken from each participant prior to enrolment.

Author contributions:

MM was actively involved in designing the study, acquisition, analysis and interpretation of the data collected. He was involved in revising the content and has given final approval for the same. He has agreed to be held accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

RK was actively involved in acquisition, analysis and interpretation of the data collected. He was involved in revising the content and has given final approval for the same. He has agreed to be held accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

EAA was involved in analysis and interpretation of the data. He was actively involved in drafting the content and has given his final approval. He has agreed to be held accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

AG was actively involved in designing of the study and interpretation of the data. He was involved in revising the content and has given final approval for the same. He has agreed to be held accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

RM was actively involved in designing of the study. She was involved in revising the content and has given final approval for the same. She has agreed to be held accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Supplementary Table: Survey questions/statements:

Please don't write your name or roll no on this sheet of paper. Your responses will be kept confidential. There are thirty-nine (39) questions and you have to choose (tick) the response that you think is most appropriate. If you don't know the answer you may mark the choice as Don't Know. If you do not wish to answer any of the questions included in the questionnaire, you may skip them and move on to the next question.

HIV infection is a caused by a virus.	YES	NO	Don't know
HIV infection is a caused by bacteria.	YES	NO	Don't know
We still don't know what HIV is.	YES	NO	Don't know
HIV and AIDS are the same thing.	YES	NO	Don't know
There is a decreased white cell count [CD4+T-Lymphocyte] because of HIV infection and hence immunity decreases.	YES	NO	Don't know
Most patients infected with HIV present with grievous diseases like Kaposi sarcoma.	YES	NO	Don't know
Most patients infected with HIV present with common infections like Tuberculosis.	YES	NO	Don't know
HIV can be transmitted via air, water, sharing clothes, glass, etc.	YES	NO	Don't know
HIV can be transmitted from infected mother to the unborn child.	YES	NO	Don't know
HIV infected mothers milk has the potential to transmit HIV to her baby.	YES	NO	Don't know
Major routes of transmission of HIV are unprotected sex, infected blood transfusion, needle sharing by drug addicts.	YES	NO	Don't know
Major route of transmission is through food and contaminated water.	YES	NO	Don't know
Condom can prevent sexual transmission of HIV.	YES	NO	Don't know
HIV infected patients can donate blood.	YES	NO	Don't know
HIV can be spread by oral sex or anal sex.	YES	NO	Don't know
Vaccination against HIV protects against its infection.	YES	NO	Don't know
If one gets pricked from the same needle that was used to collect blood from the HIV infected patient there are chances of getting HIV infection.	YES	NO	Don't know
If one gets pricked from the same needle that was used to collect blood from the HIV infected patient there is no chance of getting HIV infection.	YES	NO	Don't know
Post exposure prophylaxis is available against HIV infection.	YES	NO	Don't know
If one gets pricked from the same needle that was used to collect blood from the HIV infected patient immediate action is needed like taking post exposure prophylaxis.	YES	NO	Don't know
If one gets pricked from the same needle that was used to collect blood from the HIV infected patient no action is needed.	YES	NO	Don't know
Do you think that by being in a medical profession you are at a higher risk of getting infected by HIV?	YES	NO	Don't know
Hepatitis B is a viral disease.	YES	NO	Don't know
Hepatitis B is a bacterial disease.	YES	NO	Don't know
We still don't know what causes Hepatitis B.	YES	NO	Don't know
There is a decreased white cell count [CD4+T-Lymphocyte] because of Hepatitis B infection and hence immunity decreases.	YES	NO	Don't know
Most patients infected with Hepatitis B presents with grievous diseases like Kaposi sarcoma.	YES	NO	Don't know
Most patients infected with Hepatitis B presents present with common infections like Tuberculosis.	YES	NO	Don't know
Hepatitis B can be transmitted via air, water, sharing clothes, glass, etc.	YES	NO	Don't know
Major routes of transmission of Hepatitis B are unprotected sex, infected blood transfusion, needle sharing by drug addicts.	YES	NO	Don't know
Major route of transmission is through food and contaminated water.	YES	NO	Don't know
Condom can prevent transmission of Hepatitis B.	YES	NO	Don't know
Hepatitis B infected patients can donate blood.	YES	NO	Don't know
Vaccination against Hepatitis B protects against its infection.	YES	NO	Don't know
If one gets pricked from the same needle that was used to collect blood from the Hepatitis B infected patient there is no chance of getting Hepatitis B infection	YES	NO	Don't know
Post exposure prophylaxis is available against Hepatitis B	YES	NO	Don't know
If one gets pricked from the same needle that was used to collect blood from the Hepatitis B infected patient immediate action is needed like taking post exposure prophylaxis.	YES	NO	Don't know
If one gets pricked from the same needle that was used to collect blood from the Hepatitis B infected patient no action is needed.	YES	NO	Don't know
Do you think that by being in a medical profession you are at a higher risk of getting Hepatitis B.	YES	NO	Don't know