

Evaluation of the awareness of the clinical and epidemiological significance of hepatitis B virus
among health care students

Jenna M. Paul, B.Sc.

Supervisor Dr. Thomas I. Michalak, M.D., Ph.D.

Faculty of Medicine, Memorial University of Newfoundland

No sources of funding were obtained for this study

No conflicts of interest

Abstract: Hepatitis B virus (HBV) infection affects millions of people worldwide with a massive global burden of disease. Students must understand the clinical significance and epidemiology of HBV infection and associated diseases. This study attempts to assess the knowledge and awareness of HBV infection and its clinical and pathological consequences among several types of health care students at Memorial University of Newfoundland, St. John's, Newfoundland and Labrador, Canada including medical, pharmacy and faculty of medicine graduate students. Overall, the data collected through this questionnaire determined that there is a poor level of knowledge of HBV and its infection in medical and graduate medical students. There is a good level of knowledge of these subjects in pharmacy students. Despite the fact that approximately 1% of the population in North America is affected by HBV, students should be aware of the long lasting consequences of this infection and global burden it has on the health care system.

Introduction: Hepatitis B virus (HBV) infection affects an estimated 240-400 million people worldwide, and unvaccinated health care workers and health care students are at risk of infection through interactions with patients. The virus itself is included in the family *Hepadnaviridae*, and possesses an envelope (HBV surface antigen, HBsAg) and double stranded circular DNA genome (1). Fortunately, most Canadians are vaccinated against HBV. Most health care students are required to be vaccinated against HBV and are, therefore, not at risk for infection. However, there is limited published research assessing the knowledge of Canadian health care students of viral hepatitis B transmission, prevalence and risk factors. Students must understand the clinical significance and epidemiology of HBV infection and associated diseases, such as chronic hepatitis B, liver cirrhosis, liver failure and HBV-induced hepatocellular carcinoma (HCC), as well as the global burden of these diseases. HCC is known to be the fifth most frequently diagnosed cancer,

as well as the third most common cause of mortality in cancers worldwide (2). It is estimated that 1 million people die every year from diseases associated with HBV infection, such as cirrhosis and liver failure (3). This study will attempt to assess the knowledge and awareness of HBV infection and its clinical and pathological consequences among health care students at Memorial University of Newfoundland, St. John's, Newfoundland and Labrador, Canada.

Methodology:

Study Site and Population

This study evaluated the knowledge of health care students, including medical, pharmacy and the Faculty of Medicine graduate students at Memorial University located in St. John's, Newfoundland and Labrador. Nursing students were not included in the analysis as approval had not been granted by the School of Nursing to distribute the research survey. The students who participated were from all years of their study, provided they were currently enrolled in a health care related program. The questionnaire was distributed through email to the students enrolled in these study programs, and we to date we have received a total of 54 responses from students of various backgrounds.

Ethics

Ethics approval was granted for the project by the Human Research Ethics Board (HREB) in Newfoundland and Labrador.

Study design and period

A structured questionnaire was distributed using the survey monkey platform in May 2018. In addition to basic demographic questions, this study will included 13 questions assessing the knowledge of students on the general, epidemiological and clinical aspects of HBV and hepatitis B. The survey took students less than 5 minutes to complete. Prior to completing the survey, participants were provided with the risks and benefits of the study, and other information pertaining to the study through a letter of information distributed with the initial email invitation to complete the survey. Each student received a grade for the number of questions that was answered correctly. Students were placed into the following categories based on their response to the questions: (1) Excellent knowledge: with 90% or more questions answered correctly; (2) Good knowledge with 70% or more of questions answered correctly, or (3) Poor knowledge when less than 70% of questions are answered correctly. This assessment of knowledge about HBV infection and hepatitis B was developed through the modification of a previous studies conducted by Abdela *et al.* 2015 (4) , Allhowaish *et al.* 2017 (5) , Demiss *et al.* 2018 (6), Jaquet *et al.* 2017 (7), Noubiap *et al.* 2013 (8). The questions in the referred study assessed students' knowledge of HBV transmission, risk factors and prevention.

Data collection

The data was collected using survey monkey, an online survey tool. The data will be stored as per Memorial University regulations for 5 years, with data available only to the researchers involved. Following this period, the data will be destroyed.

Data analysis

Statistical analysis was used by applying descriptive statistics, such as frequencies and percentages of correct answers for each question and evaluation of significant differences using two-tailed Student *t* test. *P* values equal of smaller than 0.05 will be considered significant.

Results

At the time of data analysis, a total of 52 students had completed the survey, which included 35 medical students, 10 pharmacy students and 7 graduate students. Medical students correctly answered 67.4% of the questions asked, while pharmacy students correctly answered 71.0% of questions, and graduate students correctly answered 64.3% of questions.

Table 1. Mean grades received by students of various health care programs on the survey of knowledge and awareness of hepatitis B virus and its infection.

Program	Number of students	Mean grade received
Medicine	35	67.4%
Pharmacy	10	71.0%
Graduate	7	64.3%

An independent *t*-test was conducted using IBM SPSS Statistics 2015 to compare the grade received on the survey by medical students to the grade received by pharmacy students and graduate students in biomedical sciences, as well as comparing graduate and pharmacy students. There was no significant difference found in the grades received by medical students (Mean=[M] =67.4%, SM =1.46) and the grade received by pharmacy students (M=71.0%, SM=1.73)

conditions $t(43) = -0.654, P = 0.516$. There was also no significant difference found in grade received by medical students ($M = 64.7\%$, $SM = 1.46$) and the grade received by graduate students ($M = 64.3\%$, $SM = 0.976$) conditions $t(40) = 0.542, P = 0.591$. There also was no significant difference found in the grade received by pharmacy students ($M = 71\%$, $SM = 1.73$) and graduate students ($M = 64.3\%$, $SM = 0.976$) conditions $t(15) = 0.924, P = 0.370$.

Means were also compared between medical students of different years. First year medical students received a mean grade of 72.9%, while second year students received a mean grade of 65.0%, third year students received a mean grade of 70.0%, and fourth year students received a mean grade of 68.0%. As there were only 10 pharmacy students and 7 graduate students in total who completed the survey, the mean grades received by these students at different stages of their training were not compared.

Table 2. Mean grades received by medical students at different years of study on the survey assessing knowledge and awareness of hepatitis B virus and its infection

Year of study	Number of students	Mean grade received
First	7	72.9%
Second	20	65.0%
Third	3	70.0%
Fourth	5	68.0%

An independent t -test was conducted using SPSS to compare the grade received on the survey by first year medical students to the grade received by second, third and fourth year students. This was done to see if medical students gained knowledge about HBV and hepatitis B throughout their training. There was no significant difference found in the grades received by

first year medical students ($M=72.9\%$, $SM=1.60$) and the grade received by second year medical students ($M=65.0\%$, $SM=1.40$) conditions $t(25)=1.24$, $P=0.228$. There was no significant difference found in the grades received by first year medical students ($M=72.9\%$, $SM=1.60$) and the grade received by third year medical students ($M=70.0\%$, $SM=2.64$) conditions $t(8)=0.216$, $P=0.834$. There also was no significant difference found in the grades received by first year medical students ($M=72.9\%$, $SM=1.60$) and the grade received by fourth year medical students ($M=68.0\%$, $SM=0.834$) conditions $t(10)=2.23$, $P=0.553$.

Of the students surveyed, 9.8% knew that more than 200,000 people in Canada have chronic hepatitis B, 37.3% knew that 1-2 billion people worldwide have serologically evident exposure to HBV, 68.6% knew that IV drug injection was the most common mode of HBV transmission in North America, 88% knew that HBV could be transmitted sexually, 78.4% knew that HBV infection has the potential to cause HCC, 80.4% knew that if a patient has no detectable HBV they can have an HBV infection, 74.0% knew that you can be infected if the concentration of HBV in body fluid is less than 100 per mL, 50% knew that HBV DNA, anti-core antibodies and no HBV surface antigen indicates occult HBV infection, 98% agreed that the HBV vaccine is effective in preventing infection, and 61.2% knew that currently available therapies for HBV cannot completely eliminate HBV from infected patients (Table 3).

Table 3. Knowledge of health care students at Memorial University of Newfoundland of HBV

Questions	Correctly answered (%)	Incorrectly answered (%)
How many people have chronic hepatitis B in Canada?	9.8%	90.2%
How many individuals in the world have molecularly or serologically evident exposure to HBV?	37.3%	62.7%
Which mode of transmission is the most common in North America?	68.6%	31.4%
Can HBV be transmitted sexually?	88.0%	12.0%
Does HBV have the potential to cause hepatocellular carcinoma?	78.4%	21.6%
If a patient has no detectable HBV surface antigen in their blood, could he or she have an HBV infection?	80.4%	19.6%
A patient cannot be infected if the concentration of virus particles in body fluid (such as plasma, serum or whole blood) is less than 100 per mL.	74.0%	26.0%
The presence of which indicates asymptomatic (occult) hepatitis B virus infection?	50.0%	50.0%
Is the HBV vaccine effective in preventing infection?	98.0%	2.0%
Can currently available therapies completely eliminate HBV from infected patients?	61.2%	38.8%

Several of the questions in the survey were not included in determining the grade received by the students, as there was no correct answer assigned to these questions. 88.5% of students who completed the survey replied that they received the HBV vaccination, while 9.6% of students (5 students) replied that they were not vaccinated against HBV (Table 4). One student opted to not respond to the question.

Table 4. Proportion of students in health care programs who responded that they have been vaccinated for hepatitis B virus

Program	% Students who responded “Yes”	% Students who responded “No”	% Students who failed to respond
Medicine	91.4%	5.7%	2.9%
Pharmacy	90.0%	10.0%	0.0%
Graduate	71.4%	28.6%	0.0%

Of those who responded that they had been vaccinated against HBV, 4.44% claimed to have received one dose of vaccination, 37.78% received two doses, 42.22% received three doses of vaccinations, and 15.56% of participants were unsure of how many vaccinations they had received.

Students were also asked if they believed that they could be at risk of contracting HBV. Of those surveyed, 20.0% answered yes, 58.0% answered no, and 22.0% replied that they were not sure if they could be at risk for HBV infection.

Interpretation

Both graduate and medical students were found to have a poor level of knowledge (< 70%), while pharmacy students were found to have a good level of knowledge of hepatitis B virus and hepatitis type B (>70%). The number of correctly answered responses was counted for each individual survey participant and the mean of these grades was determined which was used

to classify the level of knowledge of the participants into the following categories poor (<70%), good (70%-90%), and excellent (>90%). These values were modeled after similar research conducted by Abdela *et al.* 2015 (4).

There was shown to be no overall improvement in level of knowledge between first year medical students to fourth year medical students. First and third year medical students had a good level of knowledge of hepatitis B virus (>70%), while both second and fourth year students had a poor level of knowledge (< 70%). This finding may be attributed to the fact that first year students receive teaching on infectious disease during the time period that this study was completed, and therefore these students would have a better recall of the recently learned information regarding HBV infection. As medical students progress through their training, their recall of information learned several years ago may be significantly decreased.

Overall, the attitude of students at Memorial University of Newfoundland towards prevention of HBV infection is favorable. 88.5% of students from all programs surveyed responded that they had been vaccinated for HBV, while a surprising 9.6% of students responded that they had not been vaccinated. For students working directly with patients in the health care field, vaccinations against HBV are recommended (or required by some institutions). For students and health care workers who are not vaccinated, there is a risk of HBV infection if incidentally exposed to body fluids of infected patients. 98.0% of students agreed that the HBV vaccination was effective in preventing infection, while 2.0% of students responded that the HBV vaccination was not effective in preventing infection. Vaccination has been one of the most important methods to decrease the transmission of the virus in general population. The HBV vaccine is currently available as it is safe and 95% effective in preventing HBV infection (9). 20.0% of students felt that they could be at risk for HBV infection, while 58.0% felt that they

were not at risk. Health care students and trainees in the medical profession can be exposed to HBV and therefore, they must be vaccinated to prevent infection with this virus. Unvaccinated individuals may have an increased risk of becoming infected and became chronic carriers of the virus, as they do not have experience or training and they may be involved in accidental exposures (4), which could be asymptomatic (10). As many students and health care professionals travel internationally to provide health care, these individuals must take the precautions necessary to prevent HBV transmission when in contact with infected patients.

This study has limitations in that it was done through online questionnaire and, therefore, it cannot be guaranteed that students were not using additional resources to answer questions correctly. As well, students may have had difficulty with recall of information regarding their vaccination history and these results may therefore be inaccurate. However, the results of this study highlight the importance of both increasing and refreshing the acquired knowledge, as well as increasing awareness of HBV and its consequences among health care students at Memorial University of Newfoundland.

Overall, the data collected through this questionnaire has determined that there is a poor level of knowledge of HBV and its infection in medical and graduate medical students. There is a good level of knowledge of these subjects in pharmacy students. Despite the fact that approximately 1% of the population in North America is affected by HBV, students should be aware of the long lasting consequences of this infection and global burden it has on the health care system. As future health care providers, students should also be able to advocate for the necessity of the vaccination and, thus, prevent the spread of HBV infection. The higher rates of this viral infection in Northern Canada also means that students should be much more familiar with consequences of this infection in order to provide better diagnosis and care to these patients.

In addition, it is highly encouraged that unvaccinated health care students receive vaccination for HBV to prevent its contraction during their training and career.

References

1. Chen, L., Zhao, H., Yang, X., Gao, J. Y., & Cheng, J. (2014). HBsAg- negative hepatitis B virus infection and hepatocellular carcinoma. *Discovery Medicine*, 18(99), 189.
2. Huang, X., & Hollinger, F. B. (2014). Occult hepatitis B virus infection and hepatocellular carcinoma: A systematic review. *Journal of Viral Hepatitis*, 21(3), 153-162.
3. Gerlich, W. H. (2013). Medical virology of hepatitis B: How it began and where we are now. *Virology Journal*, 10, 239.
4. Abdela, A., Woldu, B., Haile, K., Mathewos, B., & Deressa, T. (2016). Assessment of knowledge, attitudes and practices toward prevention of hepatitis B virus infection among students of medicine and health sciences in northwest Ethiopia. *BMC Research Notes*, 9(410).
5. Alhawaish, M., Alhawaish, J., Alanazi, Y., Alshammari, M., Alshammari M., Alshamarer, N. *et al.* (2017). Knowledge, attitudes and practices toward prevention of hepatitis B virus infection among medical students at Northern Border University, Arar, Kingdom of Saudi Arabia. *Electronic Physician*, 9(9), 5388-5394.
6. Demsiss, W., Seid, A., & Fiseha, T. (2018). Hepatitis B and C: Seroprevalence, knowledge, practice and associated factors among medicine and health science students in Northeast Ethiopia. *PloS One*, 13(5).
7. Jaquet, A., Wandeler, G., Tine, J., Diallo, M., Manga, N. *et al.* (2017). Prevention and Care of Hepatitis B in Senegal; Awareness and Attitudes of Medical Practitioners. *The American Journal of Tropical Medicine and Hygiene*, 97(2), 389-395.

8. Noubiap, J., Nansseu, J., Kengne, K., Tchokfe N.S., Agyingi, L. (2013). Occupational exposure to blood, hepatitis B vaccine knowledge and uptake among medical students in Cameroon. *BMC Medical Education*, 13, 148.
9. World Health Organization. 2016. Hepatitis B Fact sheet. Accessed: June 7th 2018.
10. Raimondo, G., Allain, J.P., Brunetto, M.R, Buendia, M.A., Chen, D.S., Colombo, M. *et al.* (2008) States from the Taormina expert meeting on occult hepatitis B virus infection. *Journal of Hepatology*, 49:652-657.