



**THE RELEVANCE OF PREVENTION AND IMPROVEMENT OF MEASURES  
FOR THE TREATMENT OF HEPATITIS B VIRUS TRANSMISSION THROUGH  
DENTAL INSTRUMENTS**

**K.R. Abdurakhmonova, J.E. Allamberganova, Sh.F. Salimova, R.Sh. Soatalieva**

Assistant of the Department of Clinical Immunology, and Microbiology of Tashkent State  
Medical University, Tashkent, Uzbekistan.

**e-mail;** [karima.abdurahmonova1990@gmail.com](mailto:karima.abdurahmonova1990@gmail.com)

Student of the 2<sup>nd</sup> Faculty of General Medicine of Tashkent State Medical University,  
Tashkent, Uzbekistan.

**e-mail;** [jasminaallamberganova16@gmail.com](mailto:jasminaallamberganova16@gmail.com)

Student of the 2<sup>nd</sup> Faculty of General Medicine of Tashkent State Medical University,  
Tashkent, Uzbekistan.

**e-mail;** [salimovashahina5@gmail.com](mailto:salimovashahina5@gmail.com)

Student of the 2<sup>nd</sup> Faculty of General Medicine of Tashkent State Medical University,  
Tashkent, Uzbekistan.

**e-mail;** [ruxshonabonusoataliyeva@gmail.com](mailto:ruxshonabonusoataliyeva@gmail.com)

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**Abstract.** Hepatitis B is a serious public health concern and one of the most prevalent infectious diseases in Nepal. It spreads when tainted blood or other bodily fluids come into touch with mucous membranes or torn skin. Dentists and junior physicians are especially vulnerable to hepatitis B contamination. The purpose of this study is to determine dentistry students' understanding of hepatitis B transmission and prevention. Additionally, new medical professionals in Nepal lack knowledge about hepatitis B infection transmission, prevention, and post-exposure prophylaxis. This increases the risk of chronic hepatitis B infection for both patients and practitioners, which is needless given that low-cost and simple preventive measures can almost completely eliminate the danger. Given that dentistry students are more likely to contract Hepatitis B, it is crucial to prevent the infection from spreading in dental settings. The hazards associated with performing dental treatments should be understood by the dental students, and they should take the necessary precautions to stop the disease from spreading. Planning preventative health education programs benefits from knowledge and awareness of the various ways this disease is transmitted. This will aid in the management of this illness through preventive measures. Patients and dentists will be shielded against the unintentional spread of this illness by dental education that places a strong focus on infection control procedures. The purpose of this study was to ascertain the dental students' knowledge, opinions, and preventive practices regarding the safety measures used in daily practice to prevent the spread of Hepatitis B infection in India. This was done because there was little literature available to assess the knowledge and opinions of Indian dental students towards preventive strategies to control infectious diseases. The knowledge, opinion, and preventive practice scores were also examined for potential correlations.

**Keywords.** Epidemiology, immunization, preventive, treatment guidelines, and public health, hepatitis B, dental students, vaccination.



**Introduction.** One of the most significant communicable illnesses in Nepal's healthcare settings is the hepatitis B virus (HBV). It is also a serious worldwide health issue. Exposure to infectious blood or bodily fluids through the skin or mucosa can spread HBV. Health care professionals (HCP) may come into contact with HBV through contaminated medical or dental equipment, needlestick injuries, or blood and/or saliva on cuts or mucosal surfaces. HBV is contagious on environmental surfaces for at least seven days and can spread even when there is no visible blood. Infectious pathogens can spread in a dental setting through ingestion, injection, inhalation, or skin or mucosa contact. The goal of infection prevention and control strategies is to stop or reduce the spread of pathogenic agents from patients to dental healthcare professionals and vice versa. Additionally, infection control prevents infections from spreading outside of dental offices. All patients must take standard precautions, and those who are at risk of spreading infectious diseases—primarily airborne infections—must take transmission-based precautions. Healthcare professionals run the danger of getting sick and spreading it to other patients. Since 1982, there has been an effective Hepatitis B vaccine [1-5]. The vaccine has a 95% success rate in avoiding hepatitis B-related infection, chronic illness, and liver cancer. In the absence of confirmed vaccination, hepatitis B immunoglobulin in addition to immunization may be necessary following exposure to a known hepatitis B positive source. Comprehensive, evidence-based guidelines for managing hepatitis B virus (HBV) infection are provided by the updated EASL Clinical Practice Guidelines. The guidelines cover hepatocellular carcinoma surveillance, post-transplant care, HBV reactivation prophylaxis, diagnostics, treatment goals, treatment indications, therapeutic options, post-transplant care, HBV prevention strategies, open questions, and future research directions. They are organized into ten thematic sections. With approximately 250 million people afflicted and a high death rate from cirrhosis and hepatocellular carcinoma, chronic HBV continues to be a major global health concern. The significance of early diagnosis, risk classification based on viral and host characteristics, and customized antiviral medication are emphasized in these guidelines. Simplified methods, immunization, and screening are prioritized in order to meet worldwide HBV elimination goals. The guidelines also discuss emerging biomarkers and evolving definitions of functional and partial cure. The guidelines, which were created through a Delphi approach, expert consensus, and a review of the literature, are intended to give healthcare professionals from all specialties with useful tools to maximize HBV care and results globally [6-11]. Diagnostics, patient evaluation and treatment indications, antiviral therapy options, monitoring strategies, HCC surveillance, special population considerations, prophylaxis of HBV reactivation (HBVr), and ultimately the prevention of HBV infection are just a few of the many topics covered by the guideline. In order to improve patient outcomes, it highlights the significance of screening, routine follow-up, early intervention, and individualized care. This guideline also tackles a critical issue that affects areas with little resources, such as many portions of Asia and Africa. The guideline examines methods for streamlining HBV treatment while preserving effectiveness in light of the difficulties encountered in these regions, where healthcare resources may be limited. This guideline seeks to improve HBV infection management globally by recognizing the various healthcare environments around the globe [12-18]. Dentists are constantly at danger of percutaneous injuries since they handle numerous sharp devices on a regular basis. The dentist is exposed to the patient's blood and potentially infectious pathogens when they sustain a percutaneous injury. Human immunodeficiency virus (HIV), hepatitis B (HBV), and hepatitis C viruses (HCV) are bloodborne infections that dental professionals should be concerned about. However, the presence of the virus in the community and working conditions determine the occupational risk of bloodborne viruses. Since dental students are more likely to contract



Hepatitis B, preventing the disease's spread is crucial in the dental field. Dental students should take the necessary precautions to stop the spread of this illness and be conscious of the hazards associated with performing dental operations. Planning preventative health education campaigns requires knowledge and awareness of the various ways this disease can spread. By employing preventive measures, this will aid in the disease's control. Dental education that places a strong focus on infection control procedures will shield both patients and dentists from the unintended spread of this illness [19-22]. The purpose of this study was to ascertain the dental students' knowledge, opinions, and preventive practices regarding the safety measures used in daily practice to prevent the spread of Hepatitis B infection in India. This was done because there was little literature available to assess the knowledge and opinions of Indian dental students regarding preventive strategies to control infectious diseases. Additionally, any correlation between the knowledge, opinion, and preventive practice scores was investigated [23-26].

**The main purpose** of the presented manuscript is to briefly analyze, based on the results of reputable scientific research, the relevance of improving measures for the prevention and treatment of hepatitis B virus transmission through dental equipment.

**Blood or other bodily fluids can spread blood-borne viruses.** Saliva poses very little risk of transmission unless it is tainted with blood. Human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) are the most prevalent blood-borne viruses. All three viruses have the potential to produce grave and potentially fatal illnesses, particularly if they are not treated or are discovered too late. HIV weakens the body's defenses against infections by attacking the immune system. In the UK, there were an estimated 89,400 HIV-positive individuals in 2016. It's crucial to remember that 12% of people are thought to be ignorant that they have HIV. Hepatitis B and C are liver-infecting viruses that, if untreated, can result in liver cancer and failure. In the UK, 214,000 people are thought to have chronic HCV [3-7]. An estimated 180,000 persons in the UK are thought to be chronically infected with hepatitis B. These three infections can have long-term asymptomatic carrier states and are frequently sneaky. As a result, there may be long-lasting and concealed hazards of transmission to other individuals. Hepatitis B symptoms occur during the acute phase, which lasts one to three months. Many HBV carriers, however, do not exhibit any symptoms. There are frequently no symptoms associated with acute hepatitis C. People may be asymptomatic and unaware that they are infected for up to ten years during the HIV latency phase. Combining two or three antiviral drugs can effectively treat people with chronic hepatitis C and result in viral eradication. Antivirals can be used to treat chronic hepatitis B in order to prevent liver damage. This won't always get rid of the infection, though, and some patients could require ongoing care. Viral suppression, or the reduction of a person's viral load to an undetectable level, can be achieved by antiretroviral therapy [9-14].

**Transmission routes.** When a vulnerable person comes into contact with contaminated blood or other bodily fluids, blood-borne viruses can spread. This exposure can happen through mucous membranes, torn tissues, or the blood itself. Therefore, direct contact with contaminated bodily fluids, sexual contact, or mother-to-child contact during the time just before and after birth are all possible routes of transmission. Not everyone who comes into contact with a blood-borne virus will contract it [6-11].

**Transmission at work.** Because blood-borne viruses can spread through contact with bodily fluids (mostly blood), they are especially significant in primary care dentistry. Blood-borne viruses from ill patients can spread to dental personnel, particularly those performing exposure-prone procedures. The most frequent mechanisms of exposure in dental practice are needlestick injuries (30% of exposures) and other sharps injuries (50% of exposures). Although



they are far less frequent, there is also a chance of mucocutaneous transmission, such as eye splashes, and blood-borne viral transmission from a bite or scratch. The published estimates of risk of transmission are substantially higher than the observed rates of occupational blood-borne virus transmission in healthcare workers after percutaneous exposure. In actuality, no cases of HIV or HBV transmission have been documented [2-7]. This is predicated on voluntary reporting of substantial occupational exposure to the Public Health England surveillance system. The success of the hepatitis B immunization program for healthcare workers and the efficient control of exposures, which stops the spread of blood-borne viruses among healthcare workers, are probably the reasons for the difference. In order to accurately assess the risk of transmission and seroconversion (the formation of antibodies for blood-borne viruses), dental team members must report events as soon as possible. It's also crucial to remember that if a person with a blood-borne virus receives antiviral therapy and their viral load is lowered, the chance of transmission to a healthcare worker through an exposure accident is significantly decreased [21-25].

**Avoidance.** Preventing exposure in the first place and providing prompt clinical care after any exposures are the main strategies to lower the spread of blood-borne viruses. A complete dental office infection control strategy, a strong sharps protocol, universal cross-infection precautions, hepatitis B virus immunization for the dental team, and post-vaccination blood tests to confirm appropriate immunization are examples of preventive measures. **Universal safety measures.** The best strategy to reduce the spread of blood-borne viruses is to implement universal infection control measures. This is due to the possibility that individuals may be unaware that they have a blood-borne virus. The Department of Health's best practice guidance, Health Technical Memorandum 01-05: Decontamination in primary care dental practice, mandates that dental clinics have infection control policies and procedures [9-16]. **Lessen vulnerability.** Standard health examinations, including HIV, HBV, and HCV testing, are required for all new clinical employees. All dental workers should be immunized against HBV, according to national guidelines, and there is an excellent vaccine that is 85–90% effective. When it comes to the most recent details on the hepatitis B vaccination process, dental team members should consult occupational health. **Policy for local infection control.** The practice's infection control policy should outline what needs to be done for personal safety as well as when to put on and take off PPE. Hand hygiene and skin care are examples of personal protection, while disposable gloves, aprons, masks, face and eye protection, and appropriate footwear are examples of personal protective equipment [18-25].

**Dental professionals are regularly exposed to potentially infectious pathogens** that represent an occupational risk because of the nature of their employment. To reduce the transmission of illnesses, vaccination, appropriate PPE use, and disinfection and sterilization guidelines should all be strictly adhered to. The dental office must have procedures in place to reduce percutaneous injuries, explain them to new hires, and have them updated and reviewed on a regular basis. In the event of an accident, a risk assessment and exposure protocol should be followed. Since dental healthcare professionals and their patients are susceptible to infections and disease transmission, infection control procedures, ongoing education, and vaccination should be strengthened [5,6,9]. Cross-contamination between patients should be avoided by using appropriate sterilizing methods. When working in a clinical setting, treating each patient, transferring between clinical and non-clinical areas, processing dental equipment, and leaving the office to go home at the conclusion of a workday, we must always keep infection control in mind. In addition to ensuring patient and staff safety, this reduces the danger of infection transmission [21,22,24].



**Handling a healthcare professional who has an infection.** Protecting their own, their coworkers', and patients' health and safety is a moral and legal obligation for all healthcare professionals. Members of the dental team who have blood-borne viruses should be encouraged to work in primary care dentistry and are required to notify their line manager. Disclosure of confidential information is encouraged. If a member of the dental team believes they have been exposed to a blood-borne virus infection through an incident at work or outside of the workplace, it is their responsibility to seek professional guidance regarding the necessity of getting tested. It is necessary to consult an occupational physician for expert advice [5-13]. It is thought that there is very little to no chance of HIV transmission from an infected healthcare professional to a patient. If an HIV-positive dentist is on combination antiretroviral medication and has a plasma viral load of fewer than 200 copies per milliliter, they can undertake exposure-prone operations. If a dentist is hepatitis B e antigen negative and has a hepatitis B DNA level less than 200 IU per millilitre, they can undertake exposure-prone operations while on ongoing oral antiviral medication. Dental professionals who have been treated for hepatitis C with antiviral therapy may perform exposure-prone procedures if they have responded to the treatment by developing antibodies against the hepatitis C virus but have not tested positive for the hepatitis C RNA virus for at least six months following the end of treatment. Dental practitioners who have blood-borne viruses must be registered with the UK Advisory Panel Occupational Health Monitoring Register, have their viral load checked every three months, and be under the joint supervision of a consultant occupational physician and their treating physician [20-27].

**Discussion.** The results of this investigation show three things. First, there are insufficient vaccination rates among aspiring dentists and physicians in Kathmandu at this college; second, students lack a solid understanding of how to prevent HBV transmission; and third, they lack knowledge about how to properly handle a possible infectious body fluid or blood exposure in the event that it does occur. One of the most frequent injuries sustained by dentists and medical professionals is from needle sticks or other sharp objects [1,5,6,10]. Depending on the source person's Hepatitis B e Antigen (HBeAg) status, one study found that the rate of HBV transmission by needle stick injuries was about 2%. Since dental students are more likely to contract Hepatitis B, prevention of the disease's spread is crucial in dental practice. Dental students should take the necessary precautions to stop the spread of this illness and be aware of the hazards associated with performing dental operations. Planning preventative health education programs benefits from knowledge and awareness of the various ways that this disease can spread. By employing preventive measures, this will aid in the disease's management [3,7,9,12,13]. Dental education that places a strong focus on infection control procedures will shield both patients and dentists against the unintentional spread of this illness. The purpose of this study was to ascertain the dental students' knowledge, opinions, and preventive practices regarding the safety measures used in daily practice to prevent the spread of Hepatitis B infection in India. This was done because there was little literature available to evaluate the knowledge and opinions of Indian dental students regarding preventive strategies to control infectious diseases. Additionally, the study looked for any correlation between the ratings for knowledge, opinion, and preventive practice. The results' generalizability may be questioned because the study was conducted in a single institution. The cross-sectional aspect of the study design is one of its main limitations. Due to the cross-sectional nature of the study design, we are unable to generalize the findings and say that consistently similar results will be obtained [13,15,17,18]. However, we found that third-year students had better knowledge, followed better preventive practices, and believed that as the years of academic study increase, the students tend to forget things and ignore the protocols. Before the findings can be broadly applied, more long-term



research with people from many universities may be necessary because there may be more factors that the authors were unable to identify [22-28].

**Conclusions.** This study is a crucial first step in figuring out what HCPs in Nepal are being taught about HBV prevention. It showed how little was known about post-exposure treatment and prevention. Due to their ignorance of their protected status, the majority of students are more likely to contract HBV. There is a cost-effective solution to this serious public health problem.

Effective methods to prevent the spread of HBV include safe injection procedures and the elimination of needless and dangerous injections. All HCPs should be required to understand health education and policy about vaccination and Hepatitis B prevention. HCPs need to learn more about the common safety measures that must be followed before beginning any process. Additionally, they must be aware that the immunization effectively prevents Hepatitis B and that, in the event of an unintentional exposure, post-exposure treatment is available.

The Hepatitis B virus was found to have an excellent overall knowledge score. Third-year students had much better preventive behaviors and general understanding. The knowledge and preventive practices score showed a slight association. Since the majority of children were not vaccinated against Hepatitis B, it is necessary to create effective regulations to reduce the risk of Hepatitis B for undergraduate students.

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