ORIGINAL RESEARCH

Knowledge, Attitude, and Practice of Hepatitis B Vaccination among Dentists in Lebanon

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Abstract

Background: The hepatitis B virus (HBV) is a serious occupational hazard for healthcare workers, including dentists. The purpose of this study is to assess dentists' knowledge, attitude, and practice (KAP) with respect to hepatitis B vaccination.

Materials and methods: A cross-sectional survey of a representative sample of dentists ($n = 349$) from Lebanon was carried out. Participants' knowledge of hepatitis B, attitudes toward vaccination, and immunization habits were assessed using a standardized questionnaire. To examine the data, descriptive statistics were used, and associations between variables were investigated using appropriate statistical tests.

Results: The study found that most participating dentists are HBV-vaccinated. These dentists boast a basic to a significantly substantial understanding of HBV infection prevention strategies, such as immunization, routine preventive measures, and handling equipment. Notwithstanding the generally positive attitudes towards vaccination, a proportion of dentists lacked some HBV prevention practices, specifically with respect to conducting regular follow-ups of anti-HBs titer levels and getting booster vaccination doses when warranted.

Conclusion: This study sheds light on the KAP of hepatitis B immunization among Lebanese dentists. The findings emphasize the significance of focused educational efforts in view of improving awareness and encouraging a more thorough understanding of the benefits of vaccination. The study provides useful data that can be used to influence public health policies as well as activities aimed at increasing hepatitis B vaccination rates among dental professionals in Lebanon.

Keywords: Dentists, Hepatitis B, Questionnaire, Vaccination.

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Introduction

Hepatitis B, an insidious blood-borne ailment induced by the hepatitis B virus (HBV), wreaks havoc on the liver and on its functioning, thus triggering long-term deleterious consequences on hepatic structures.[1] Hepatitis B virus infection constitutes a global health concern, particularly accentuated in economically disadvantaged regions.[2] According to the World Health Organization, approximately 240 million individuals worldwide suffer from the chronic form of the disease, resulting in 690,000 annual deaths from complications and sequelae such as liver cancer or cirrhosis which can be directly attributed to the inexorable progression of hepatitis B.[3]

Notwithstanding the availability of effective hepatitis B vaccination since the early 1980s, hepatitis B remains a consequential source of chronic affliction, increasing the risk for mortality resulting from cirrhosis and hepatic malignancy.[2] Identified as a major and salient risk factor for HBV transmission amongst all the acknowledged modes of transmission, occupational exposure increases the prevalence of serologic markers indicative of past or current clinical or subclinical hepatitis B infection among specific cohorts of healthcare professionals than in the general population.[3,4] Evidently, dental healthcare professionals and oral surgeons exhibit the highest rates of HBV infection relative to their healthcare counterparts, with infection rates three to four times higher than those of the general population.[5] Epidemiological studies underscore prevalence rates of 24, 17, and 16% among oral surgeons, dental hygienists, and general dentists, respectively.[4]

Dentists and dental surgeons, in view of their routine and regular exposure to blood and bodily fluids during dental procedures, have a higher susceptibility to blood-borne pathogens, including hepatitis B.[5] Dentists routinely have contact with patients in enclosed environments where aerosols from handpieces and ultrasonic scalers are generated, which further compounds this susceptibility.[6] Additionally, the utilization of sharp instruments increases the risk of exposure to blood-borne pathogens, with percutaneous injuries in dental settings significantly contributing to the spread of serious infections.[1,6]

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In the realm of periodontal practice, blood, saliva, and nasopharyngeal secretions constitute vectors for HBV transmission, with the gingival sulcus harboring the greatest intraoral concentration of hepatitis B infection.[7] An association has further been found between periodontal disease, the severity of bleeding, suboptimal oral hygiene, and heightened risks for HBV transmission.[7] Hence, dentists should be knowledgeable of and vigilant about the necessary precautions and preventive measures for this disease within the realm of dental practice.[3]

Within dental and hospital-based oral health programs, maintaining an optimal level of immunity emerges as a crucial element of paramount significance for disease prevention and infection control.[6] Two categories of diseases prevail in settings where oral healthcare is provided: Those mandating active immunization due to the specifically unique hazards associated with providing dental care and those that may warrant immunoprophylaxis due to unique circumstances.[6] Pre-exposure vaccination emerges as the preeminent strategy for averting and mitigating the risk of nosocomial infections as well as their associated morbidity and mortality, conferring not only individual protection but also communal herd immunity.[8,9] Moreover, it has been proven that higher vaccination rates lead to lower virus-related morbidity and mortality.[9]

Initiating hepatitis B vaccination during the initial professional training of oral healthcare practitioners or students is strongly advocated, given their purportedly heightened susceptibility during this point in time.[6] Furthermore, periodic post-vaccination serological assessments are strongly encouraged for oral healthcare professionals to ascertain the maintenance of a requisite antibody titer to the HBV.[6] The Centers for Disease Control and Prevention (CDC) state that hepatitis B immunity is linked to a post-vaccination anti-HBs titer ≥10 mIU/mL even though the duration of conferred protection and the necessity for booster vaccinations remain the subject of persistent uncertainties.[10,11] Administered after a primary series, booster vaccinations aim to optimize and strengthen immunity, offering protection against breakthrough infections, with anti-HB titers experiencing a rapid hike over 3–5 days following the booster shot.[12]

The outcomes of numerous studies conducted throughout the world consistently depict an inadequate response and insufficient adherence to infection prevention guidelines and procedures, thus underscoring the need for further investigation and improvement in this area.[2]

The overall hepatitis B immunization rate among dental staff and dental professionals presents a disconcerting panorama and a bleak picture, underscored by a conspicuous scarcity of comprehensive data and a significant lack at the national level in terms of the relevance and applicability of vaccination protocols for dental surgeons and their potential ramifications on the risks of contamination and susceptibility to infectious diseases.

In Lebanon, there exists a dearth of information in terms of information revealing the perception and awareness of hepatitis B among dentists. The purpose of this study is to investigate the knowledge, attitudes, and behaviors of dental practitioners regarding HBV infection within the Lebanese context.

Materials and Methods

Survey

Sample Size and Recruitment of Subjects

The study population comprised dental surgeons distributed throughout the Lebanese territory ($n = 349$). All dentists in Lebanon employed by hospitals, clinics, or medical facilities were invited to take part in the research. Invitations were extended to dental surgeons affiliated with the three national universities, learned societies, the Order of Dentists of Lebanon, and national scientific events.

As to the inclusion criteria, they encompassed any dental surgeon practicing within the Lebanese territory, with sampling considerations made for professional experience, age, gender, and geographical distribution. Exclusion criteria precluded the participation of dental surgeons presenting contraindications to vaccination, such as those suffering from multiple sclerosis and/or autoimmune diseases.

Study Design and Target Population

Between February and October 2023, a comprehensive cross-sectional survey employing the snowball sampling approach to explore the landscape of hepatitis B vaccinations among Lebanese dentists was conducted. The study protocol had previously received the unanimous approval of the Research Ethics Board of the University of Saint Joseph (USJ) of Beirut (Reference number: USJ-2019-206). The survey included a representative national sample of 349 dentists, reflecting the broader population of dental practitioners in the country. Invitations were extended electronically an email communication, and participants received a link containing a concise overview of the study's context, its objectives, the voluntary nature of participation, assurances of anonymity and confidentiality, along clear instructions for completing the questionnaire.

Data Collection

The survey questionnaire (see Appendix I) was meticulously crafted by the authors subsequent to an extensive review of pertinent literature and the latest international vaccination data. The original questionnaire, addressing crucial aspects of dentists' knowledge and adherence to vaccination protocols, was initially formulated in English.

A rigorous review of the questionnaire's initial draft was undertaken by an impartial committee comprising five professionals with expertise in epidemiology, dentistry, and infection control procedures. This committee assessed the relevance of items to the backgrounds and areas of expertise of dentists. Following thoughtful deliberations, a final draft of the questionnaire was developed. Subsequently, the content was translated and adapted into Arabic by professional translators, resulting in the availability of the final version in both Arabic and English.[13]

Procedure

A comprehensive questionnaire aimed at gauging the relevance and timing of currently existing protocols was diligently devised and completed (see Appendix I). Invitations were extended to all licensed dental practices in Lebanon, asking practitioners to provide comprehensive details about their personal and professional profiles, followed hygiene practices at their respective dental clinics, their adherence to infection control guidelines, their immunization status, and a general assessment of hepatitis B knowledge. An accompanying email was dispatched, explaining the study's objectives as previously outlined. After the questionnaires were sent out, there was a 4–5-month timeframe during which responses may be submitted.

Upon completion and submission, each individually filled-out questionnaire underwent data aggregation, with all records

securely stored in a password-protected database. To warrant the clarity of the survey, a pilot study involving 5 dentists was carried out, with participants reporting no issues in understanding the questionnaire. The average time required for completion amounted to 7 minutes.

The study's structured questionnaire consisted of a total of 27 questions divided into 4 distinct sections that aimed to assess in a comprehensive manner various facets and areas pertinent to the dental profession. The first section consisted of five questions and centered on demographic data, covering gender, age, marital status, contact details of the dental office, and professional seniority, thereby establishing essential baseline factors for the subsequent analyses. The second section, dedicated to knowledge assessment, incorporated a series of yes/no questions designed to establish dentists' vaccination history against nine vaccine-preventable diseases presented as one question. Additionally, the remaining three questions in this section sought to gauge their comprehensive understanding of vaccination-related aspects, inclusive of importance, risk factors, preventive measures, routes of transmission, and the significance of sterilization techniques.

The third section which comprised eight questions, it transitioned to the practical aspect, evaluating dentists' adherence to and utilization of diverse prophylactic and protective measures. These encompassed inquiries pertaining to personal protective equipment, sterilization measures, and the use of sanitizers and disinfectants within both the clinical and work environments. Finally, the ten questions of the fourth section specifically focused on hepatitis B, probing into elements such as the vaccine *per se*, its protective titer, and other relevant details pertaining to blood exposure accidents (BEA).

Statistical Analysis

The statistical analysis was performed using IBM SPSS statistics version 25.0. A descriptive analysis was first carried out; quantitative variables were described using their means and standard deviations (SD) and qualitative variables were presented according to their frequencies and percentages.

Results

Sample Characteristics

Our questionnaire yielded an approximate response rate of 50%. A cohort comprising 349 dentists actively participated in the study (n = 349), with an average age of 37.4 ± 14.0 years. In terms of professional experience, 36.4% of the sample (n = 127) possessed less than 5 years of experience, 18.6% (n = 65) reported five to ten years of experience, and 45.0% (n = 157) had accumulated over ten years of professional practice.

Vaccination Knowledge and Uptake

An overwhelming consensus emerged among the survey participants, with 98.9% (n = 345) recognizing the vital role played by vaccination in the context of dental surgery. In terms of actual vaccination uptake, hepatitis B demonstrated the highest adoption rate at 94.3% (n = 329), closely followed by rubella at 88.8% (n = 310) and DTP at 88% (n = 307). Conversely, the influenza vaccine exhibited the lowest uptake, with 53.0% of participating dentists having received this vaccine (n = 185).

With respect to the timeframe since the last hepatitis B booster was administered, the sample mean was 7.64 ± 6.7 years. Further details on vaccination uptake are presented in Figure 1.

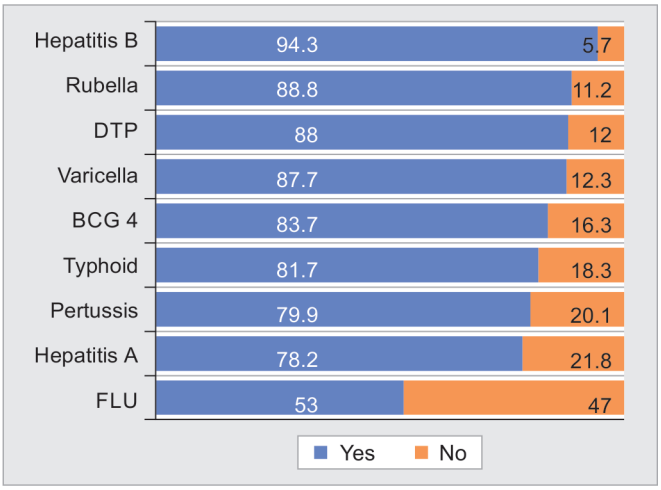

Fig. 1: Vaccination uptake among participating dentists (n = 349)

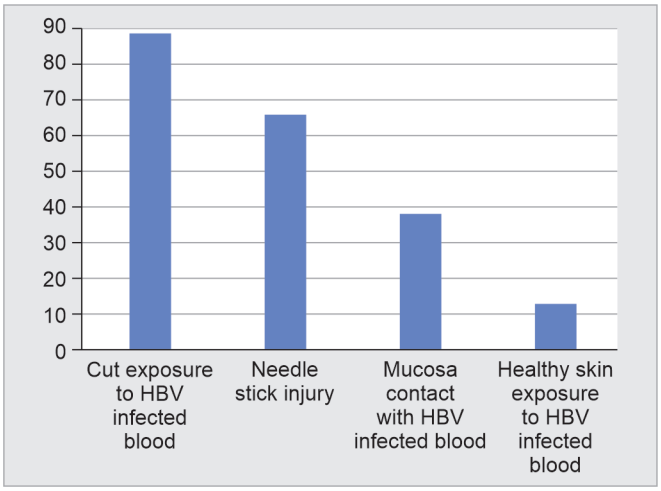

Fig. 2: Mode of transmission of hepatitis B as selected by dentists in percentage (n = 349)

With regard to the perceptions related to transmissible diseases, specifically tuberculosis, and hepatitis B, our study yielded the following results. Of the surveyed dentists, 98.6% (n = 344) acknowledged the need for immunization against the HBV for dental practitioners. Additionally, 82.5% of respondents (n = 288) expressed the belief that dentists are at a higher risk of contracting tuberculosis. Similarly, 82.8% of participants (n = 189) expressed their apprehension with respect to potential hepatitis B infection. As to the perceptions of dentists concerning the mode of hepatitis B transmission, they are represented in Figure 2.

Infection Prevention Measures

With regard to the adopted infection prevention measures, 98.6% of the participants (n = 344) reported following international sterilization standards within their practice. As for the sterilization equipment used, survey results are presented in Table 1.

Moreover, all participants reported using disposable gloves, 97.7% reported wearing medical scrubs (n = 341), and 92.6% reported wearing protective goggles (n = 323) (Fig. 3). Furthermore, 87.1% of participants asserted that they systematically sanitize their

Table 1: Sterilization equipment used ($n = 349$)

Sterilization equipment	*n (%)*
Autoclave	123 (35.2)
Hot air oven	18 (5.2)
Cold sterilization	1 (0.3)
Autoclave and cold sterilization	116 (33.3)
Autoclave, cold sterilization and ultrasonic cleaners	2 (0.6)
Autoclave and hot air oven	15 (4.3)
Autoclave, hot air oven and cold sterilization	56 (16.0)
Autoclave, hot air oven, cold sterilization and ultrasonic cleaners	1 (0.3)
Hot air oven and cold sterilization	15 (4.3)
Hot air oven, cold sterilization and steam	1 (0.3)

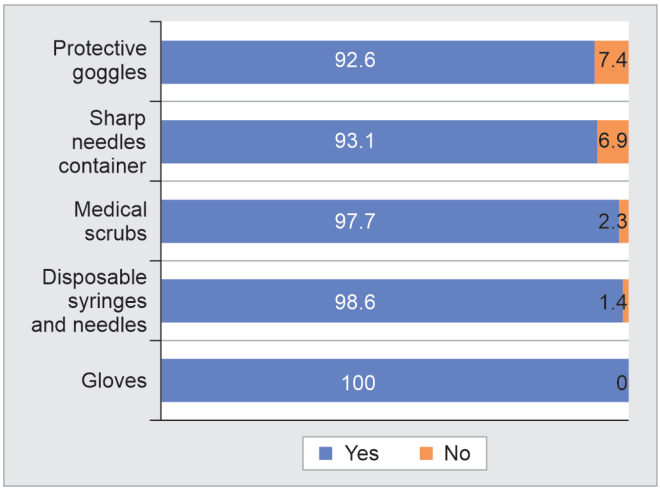

Fig. 3: Means of protection used at the workplace ($n = 349$)

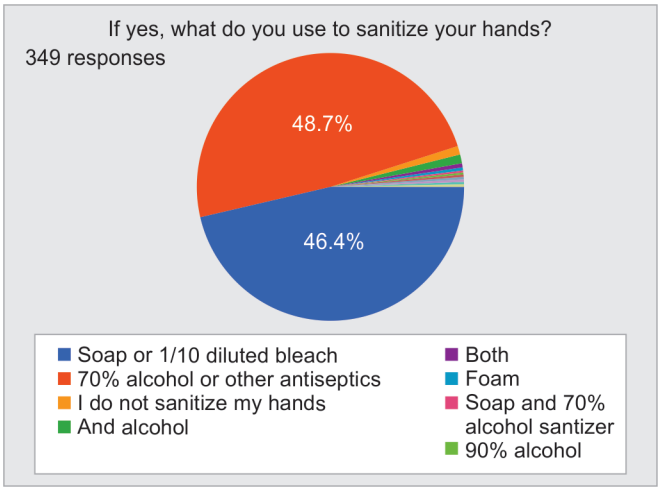

Fig. 4: Methods of hand disinfection used at the workplace

hands ($n = 304$), 12.0% ($n = 42$) often sanitize their hands and 0.9% ($n = 3$) never do it.

Of the survey respondents, 48.7% ($n = 170$) reported using 70% alcohol as a means of hand sanitization and hygiene, whilst 46.4% ($n = 162$) reported using soap or 1/10 diluted bleach (Fig. 4).

Workplace Disinfection

Regarding workplace disinfection, 93.1% of the participants ($n = 325$) reported performing it daily, while 6.9% ($n = 24$) indicated carrying it once a week.

This study clearly demonstrates numerous lacks which need to be addressed at the national level with respect to knowledge, attitudes, and perceptions of HBV and to measures aiming at enhancing infection control and prevention measures amongst Lebanese dentists.

Discussion

Hepatitis B virus infection poses a significant public health concern, especially for health professionals, including dentists, who are more likely to encounter these viruses than the general population, placing them among the higher-risk groups.[14] This study aimed to provide a comprehensive analysis and description of knowledge, attitudes, and practices regarding immunizations among a representative random sample of dental healthcare professionals in Lebanon. The results were assessed to ascertain the efficacy of taking prophylactic measures against infectious diseases.

The findings demonstrate a consensus among participating dentists, with 98.9% ($n = 345$) affirming the necessity of vaccinations for dental surgeons. This aligns with previous studies, such as the one conducted in Europe by Maltezou and Poland, which reported that 91.8% of dental students deemed immunizations mandatory for dental professionals.[15] Moreover, Qabool et al. noted an encouraging attitude toward vaccination in 85.37% of 164 dental healthcare professionals in Pakistan.[16] In Italy, Giuseppe et al. reported a highly favorable attitude, with Italian dentists assigning an average score of 8.5 to the effectiveness of vaccinations in reducing infectious diseases.[8]

With respect to vaccine uptake, our results revealed the highest adoption for hepatitis B (94.3%; $n = 329$), followed by rubella (88.8%; $n = 310$) and DTP (88%; $n = 307$), while the flu vaccine exhibited the lowest uptake at 53.0% ($n = 185$). With respect to the uptake of the hepatitis B vaccine specifically, our results are in harmony with those in Italy where Garbin et al. reported that 95.9% of dental surgeons reported receiving the HBV vaccination.[3] On the other hand, our results exceeded those reported by Giuseppe et al., who found that 85.7% of dentists received a hepatitis B vaccination, and 56.1% received a rubella vaccine.[8] Additionally, Maltezou and Poland reported lower full vaccination rates among dental students, specifically 45.9% against hepatitis B, 84% against tetanus-diphtheria, and 70.6% against rubella.[15]

In terms of perceptions of Hepatitis B, 98.6% ($n = 344$) of dentists deemed the Hepatitis B vaccine necessary, aligning with the study by Giuseppe et al. in which 95.7% of Italian dentists concurred with the importance of hepatitis B immunization for dentists.[8]

Furthermore, our results indicated that 82.8% of dentists ($n = 189$) expressed their concern about contracting hepatitis B. This is consistent with the findings in Iran of Askarian et al., revealing that dentists, notwithstanding their approval of HBV care, experience varying degrees of worry and anxiety about transmitting HBV.[17] In Lebanon, Al Bakri et al. similarly reported dentists' concerns about acquiring HBV from patients.[2]

While investigating the interpretation of hepatitis B transmission modes, 88% recognized exposure to HBV-infected blood as the most typical route. Going decrescendo, 65% mentioned needle-stick injury, 38% mentioned mucosa contact with infected blood, and 13% mentioned healthy skin exposure to HBV-contaminated

blood. This is in contrast with Tariq et al.'s findings in Iran, where sharps or needlestick injuries were most frequently reported.[18] Variability in perceptions was also evident in studies conducted in India by Benarji et al. who reported that blood, sexual contact, and oral fluids were identified as the modes of transmission by 63.9, 21.5, and 42%, respectively, and Kareem et al. who stated that a total of 72.6% of respondents in Iraq said HBV infection is spread by saliva, and 78.8% said it is spread through needle sharing, thus highlighting diverse views on modes of transmission.[19,20]

In terms of infection control practices, all participants in our study reported using disposable gloves, 97.7% wearing medical scrubs, and 92.6% wearing safety goggles. These results exceed those reported by Al Bakri et al., where 82.2% used gloves, and 64.4% used oro-nasal masks.[2] Similarly, In Iran, Hamissi et al. found that 97.5% of dentists reported routine use of gloves, 61.3% of dentists reported wearing protective clothing on a regular basis, whereas 44.4% reported wearing eye protection on a regular basis.[1] The study conducted on dental students by Kareem et al. also indicated adherence to safety precautions, such as using protective masks (93.5%), gloves (82.8%), hand washing (90.1%), and wearing gowns (96.0%).[20]

Moreover, 87.1% of our participants reported always disinfecting their hands, with 48.7% using 70% alcohol and 46.4% using soap or 1/10 diluted bleach. This is in harmony with findings in India by Naik et al., where 51% of dentists frequently cleaned their hands with soap and water, and 44.6% used alcohol-based hand sanitizers.[21] In New York, Myers et al. reported that 86% of participants used antimicrobial soap in their practice setting while 24% used alcohol-based hand sanitizers.[22]

A number of limitations should be acknowledged in interpreting the findings of this study. Firstly, the data were collected through self-reporting, introducing the potential for bias, since participants might have provided responses they deemed professionally acceptable and expected. Secondly, the reliance on a representative random sample of dental healthcare professionals in Lebanon might not fully capture the diversity within this professional cohort, potentially limiting the generalizability of the findings. Furthermore, the study focused on dentists' perceptions, practices, and attitudes, and did not explore underlying factors influencing these behaviors. Finally, the study did not assess the impact of educational interventions or specific training on dentists' knowledge and practices, which could be a fruitful area for future research. Despite these limitations, this study provides valuable insights into the current landscape of perceptions and practices related to Hepatitis B and immunizations among dental healthcare professionals in Lebanon.

Conclusion

Dentists, due to their regular exposure to blood, face a significant risk of contracting diseases, particularly HBV. This study reveals that most participating dentists are HBV-vaccinated and possess a solid understanding of HBV infection prevention strategies, including immunization and routine preventative measures. While adhering to standard precautions, a number of dentists lack specific HBV prevention practices, such as regular follow-up of anti-HBs titer levels and timely booster vaccinations, essential for sustained protection due to continuous exposure to blood-borne pathogens. The study advocates for a unified effort to enforce a mandatory Hepatitis B Vaccination Program amongst all dental professionals, with suggested integration of vaccination and titer level monitoring as prerequisites for Dental Association membership and affiliation renewal.

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Appendix I

The questionnaire used in the survey was originally written in English and then translated into Arabic by professional translators. The original English version is attached to this article.