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Awareness of Tunisian dentists about occupational blood exposure and HBV vaccination: a survey

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Abstract

Introduction : Dentists are at high risk of occupational exposure to blood-borne infections, particularly hepatitis B virus (HBV) and hepatitis C virus (HCV). Despite the availability of an effective HBV vaccine, gaps in knowledge, vaccination coverage, and post-exposure prophylaxis (PEP) practices may persist among dental professionals.

Objective: This study aimed to assess the level of knowledge, immune status regarding HBV infection, and post-exposure prophylaxis practices related to HBV and HCV among Tunisian dentists.

Methods: A cross-sectional survey was conducted in 2022 among Tunisian dentists using a self-administered online questionnaire. The survey included socio-demographic data, knowledge and practices related to HBV vaccination and immune status, and management of occupational blood exposure. Data were analyzed using descriptive statistics.

Results: A total of 230 dentists participated (mean age: 28 ± 6.6 years; 77.8% female). Most participants (92.6%) had received at least one dose of the HBV vaccine; however, only 30% completed the recommended three-dose vaccination schedule. While 81.3% correctly identified an anti-HBs antibody level >100 IU/L as protective for healthcare workers, only 35.2% were aware that HBV vaccination also protects against hepatitis D virus. Occupational blood exposure to HBV-positive patients was reported by 4.8% of respondents. Among them, 63.6% performed adequate immediate wound care, and only 18.2% received hepatitis B immunoglobulins. Knowledge regarding appropriate post-exposure treatment was insufficient among dentists without prior exposure.

Conclusion: Although initial HBV vaccination coverage among Tunisian dentists was high, completion of the full vaccination schedule and awareness of appropriate post-exposure prophylaxis remain suboptimal. Strengthening continuous education programs and reinforcing vaccination follow-up are essential to improve occupational safety in dental settings.

Keywords:
Dentists; Hepatitis HBV; HCV; Occupational blood exposure; Vaccination; Post-exposure prophylaxis

INTRODUCTION

Hepatitis is an inflammation of the liver mainly caused by B and C viruses which are the most fearful infections[1]. Dentists are particularly vulnerable to several blood-borne diseases, including hepatitis B and C. They are particularly exposed to that infection in the dental setting since their ease of transmission. Dental workers can be in contact with blood, saliva, contaminant particles, droplets, aerosols and small sharpinstruments. Therefore, they are 2.5 to 10 times more likely to become infected with hepatitis B and C viruses (HBV, HCV) than the general population. They are also more exposed to the contamination than all healthcare professionals.

The main accident in routine dental practice isneedle stick injury and the risk for viral hepatitis transmission by needle stick injury varies from 1.5-2% for HCV to 30-50% for HBV in non-immune individuals.[1]

HBV infection can be highly preventable by currently accessible safe and effective vaccine that offers a 98-100% protection as stated by WHO, but unfortunately, there is no effective vaccine against HCV infection has yet been developed [2] .

The Centers for DiseaseControl and Prevention (CDC) has proposed recommendations that include precautions and transmission-based isolation security protocols that aim to ensure a healthy working atmosphere and prevent infection spread [3] .

Therefore, the objective of the present study was to assess the level of knowledge, the immune status regarding hepatitis B virus infection, and the post-exposure prophylaxis practices related to hepatitis B and C viruses among dental professionals.

MATERIAL AND METHODS

This was a cross-sectional study conducted in 2022 among Tunisian dentists.

A self-administrated online questionnaire was used for the study. Data were collected from the participants -after taking their permissions- via Google Forms sent out by email. The participation was completely voluntary, and the anonymity was ensured, no personal identifiers or occupational data were collected. The questionnaire content and objectives were explained and participation in the online survey was considered as an informed consent.

The questionnaire was inspired from the relevant literature [4–6]and translated in French language since the academic cursus is in French.

The questionnaire consisted of three major parts: socio-demographic information, immune status and post-exposure prophylaxis regarding HBV and HCV infections.

The form was made up of 10 questions. To assess immune status, 7 items were used which evaluate both knowledge and practice toward immunization and vaccination to provide protection from HBV infection. The second part of the survey, post-exposure prophylaxis, included 3 questions which interested in the immediate prophylactic act against blood exposure accident and then the treatment.

Data analysis was carried out in the Statistical Package for the Social Sciences (SPSS) version 20. The results were analyzed using frequencies and percentages.

RESULTS

Totally, 230 participants participated in the study. The mean age was 28± 6.622 years old. Most of them were females (77,8%). The survey showed that 55% of participants were working in the university hospitals, 32% in the private sector and only 13% in the public sector. Most of the study respondents had less than 5 years of experience (74%) while 14% of them had more than 10 years and only 12% had between 5 and 10 years.

The present survey showed that 81.3% stated that health care professionals are considered immunized when the level of anti-HBs antibodies is more than 100 IU/L. Most of them (91.3%) stated that HBV vaccine can't protect against HCV. Around the half (50.9%) stated that 3 doses of HBV vaccine should be taken. Only 35.2% correctly answered that HBV vaccine protects against HDV (Table 1).

Table 1: Distribution of correct answers about immune status

QUESTION	Frequency (n)	Percent (%)
1.A person is considered immunized when the level of anti-HBs antibodies is more than 100 IU/L.	187	**81.3**
2.HBV vaccine protects against HCV	210	**91.3**
3.HBV vaccine protects against HDV	81	**35.2**
4.Have you received the first dose of HBV vaccine?	213	**92.6**
5.How many doses did you get? 3 doses	69	**30**
6.How many doses of HBV vaccine should you take?	117	**50.9**
7.Did you think that the dosing interval you had follow the protocol (1,3, 6 months...)?	118	**51.3**

Most of the participants (92.6%) received the first dose of HBV vaccine. However, only 30% of them received 3 doses, as the recommended protocol, and 6.5% received 4 doses (figure 1).

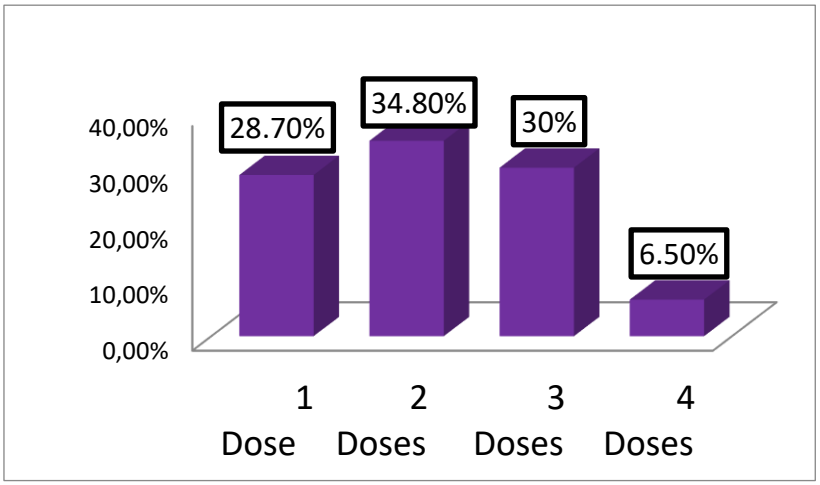

Figure 1: Different Hepatitis B vaccination schedules received by the participants

Among 230 participants, only 11 people (4.8%) reported that they had experienced at least one occupational blood exposure while caring for an HBV positive patient. Seven among them (63.63%) immediately washed the injury with water, soap and then used an antiseptic. Only 4 of them (36.36%) cleaned it with water. Regarding treatment, 6 of them (54.54%) received a vaccination and only 2 were treated by immunoglobulins (18.18%).

The study revealed that among the 219 participants who hadn't experienced occupational exposure many of them tried to answer about this part although they didn't have a needle injury. Almost (80%) thought that the immediate prophylactic conduct against a blood exposure accident is washing with water, soap and then using an antiseptic (Table 2). Regarding the adequate treatment, 82.19% of them did not answer, 10.95% chose vaccination, 5.47% chose immunoglobulins (injection of one dose of HB Ig) and only 1.36% choose both vaccination and immunoglobulins.

Table 2: Distribution of Answers of participants who didn't experience occupational exposure, about post-exposure prophylaxis

Questions	Propositions	Frequency (n)	Percent (%)
1.What was the immediate prophylactic act against this blood exposure accident?	Simple washing with running water	7	**3.19**
	washing with soap	11	**5.02**
	Wash with water, soap and then use an antiseptic.	174	**79.45**
	No answer	27	**12.32**
2.What was the treatment?	Vaccination	24	**10.95**
	immunoglobulins (injection of one dose of HBs)	12	**5.47**
	Vaccination+Immunoglobulins	3	**1.36**
	No answer	180	**82.19**

DISCUSSION

Since the dentists are exposed to occupational blood exposure in the dental setting, the immune status presents an important public health concern.

Most of respondents (91.3%) stated that HBV vaccine can't protect against HCV. Actually, there is no effective vaccine that gives protection against HCV.

Only 35.2% correctly answered that HBV vaccine protects against HDV. In fact, Hepatitis D virus (HDV) is an RNA-defective virus that does not exist independently. It requires HBV for replication and has the same sources and modes of spread as HBV. It can co-infect simultaneously with HBV, or it can superinfect those who are already chronic HBV carriers. Hence, prevention of HDV infection is similar to HBV prevention and is highly dependent on HBV vaccination. This is confirmed with WHO reports; safe and effective vaccines are available to prevent HBV. This vaccine also prevents the development of hepatitis D virus (HDV)[7].

Most participants recognized that health care professionals are considered immunized when the level of anti-HBs antibodies is more than 100 IU/L. In fact, in Tunisia, according to the updates of the Tunisian recommendations in October 2019 by the Tunisian Society of Gastroenterology (TSGE) and the Tunisian Society of Infectious Pathology (TSIP), an anti-

HBs level is considered protective if it is greater than or equal to 10 IU/L. For health care workers, an anti-HBs level higher than 100 IU/L is strongly recommended.

HBV vaccination has been recommended by the WHO as primary prevention strategy for the infection among healthcare workers [8]. In Tunisia, hepatitis B vaccination was officially introduced for healthcare professionals in 1992, as part of national occupational health policies.

These recommendations are reflected in the findings of the present study, which demonstrated a high HBV vaccination coverage among participants who had received the first dose of HBV vaccine in the faculty, since HBV vaccination is mandatory requirement by the Tunisian dental and medical faculties.

Nevertheless, 63.5% of participants had an incomplete vaccination (partial vaccination), and may still vulnerable or not completely protected against the virus. In fact, the standard primary course of HBV vaccine consists of three doses, given mainly at 0 months, 1 month, and 6 months after the first injection.

The literature showed different results about vaccination among dentists and dental students (Table 2). Despite high coverage of the first hepatitis B vaccine dose, completion rates have remained consistently moderate to low.

Table 2: Immune status of dental students and/or dentists in previous studies (HBV vaccination) with high rate.

The study	Percentage of dentists who received the first dose of HBV vaccine	Population	Percentage of complete vaccination
Tehran, Iran, Alavian Sm et al. [9]	94.9%	dentists	74.8% and only 47.9% of them have been checked for HBV antibodies after vaccination
Brazil, Resende VL et al. 2010 [10]	Not mentioned	dentists	73.8%
Tahran,B.Khosravanifard et al. , 2014 [1]	88.3%	dentists	Not mentioned
Saudi Arabia, Khalil H. 2015 [11]	94.5%	dentists	Not mentioned
China, Li X et al. 2015 [4]	Not mentioned	dental undergraduates, and graduates	65.8% and 58.53% respectively
Benin city, Nigeria, Saheeb BDO et al., 2003 [12]	Not mentioned	dental surgeons	20%
Japan, Yumiko Nagao et al., 2008 [13]	39.7%	dentists	Not mentioned
Qazvin, Iran, Jalaleddin Hamissi et al. [14]	51.2%	dentists	48,1%

According to an Iranian study, it's important to note that even in dentists with 100% HBV vaccine coverage, a positive anti-HBs titer was insufficient[15]. Thus, checking post-vaccination anti-HBs level or seroconversion (Seroconversion is the appearance of antibodies against HBV in the blood in an amount sufficient to ensure immunity) should be obligatory and subjects with low anti-HBs levels tested at least one month after their last vaccine dose (< 10 mIU/mL), with a negative analysis of both hepatitis B surface antigen (HBsAg), and hepatitis

B core antibody (anti-HBc) should be considered as nonresponders and followed[16].
The percentage of healthcare workers who remained unprotected after 3 doses of vaccination ranged from 5.85 % to 20.9 % [10,17].This difference in sero-protection is often attributed to many factors that apparently affect the anti- HBs' concentration. In fact, age, obesity and time of vaccination [17,18] have a negative impact on the amount of antibodies developed after the immunization schedule is finished. The number of doses received raises the concentration of anti-HBs. It has been shown that the anti-HBs concentration decreased rapidly within the first year after primary vaccination and more slowly thereafter.
The conditions for immunizing health professionals against hepatitis B are currently still set by the decree of 26 April 1999:

- 3 injections (0-1-6 months).
- if the first vaccination was given before the age of 25, there is no need for a booster.
- if the primary vaccination was given after the age of 25 and there is no anti- HBs antibody assay showing a value greater than 10 IU/L, the booster at 5 years of age should be given, followed by a serological check 1 to 2 months later (68). The booster dose is given after the primary vaccination sequence and is intended to provide rapid protective immunity.

Determining the surface antibody level for hepatitis B (anti-HBs) after primary vaccination means not only the need for offering booster, but also, it's necessary to decide the need for post exposure prophylaxis if a dentist is accidentally exposed on a single occasion to material infected with hepatitis B virus. According to existing science evidence, booster vaccination against HBV for all immunologically potent adults is not recommended for long-term protection, however antibody titers for HBV in immune-compromised individuals should be controlled and additional vaccine doses administered when the level declines to less than 10 mIU/ml.
Among 230 participants in this survey, only 11 people (4.8%) reported that they had experienced at least an occupational exposure to blood while caring for an HBV positive patient. This low rate may be related to the short period of clinical practice experience of students and explained by the lack of attention they paid to avoid any accident while manipulating sharp, cutting and prickly instruments. In addition, this may reflect the significance of continuous medical education programs in improving the health behaviors among dental health care workers.

Almost 80% of them thought that the immediate prophylactic act against a blood exposure accident is washing with water, soap and then using an antiseptic.

Post-exposure prophylaxis for occupational exposures (e.g., needlesticks) in dentistry follows these key steps per U.S. Public Health Service and Quebec guidelines: [8,19]

- Immediate care: Wash wounds with soap and water; flush mucous membranes with water/saline (avoid bleach/alcohol to prevent irritation).
- Report and assess: Document the incident, evaluate risk based on material type, entry site, and severity; test known sources for HBsAg/anti-HCV or assess unknown sources.
- Source evaluation and PEP for HBV: Depends on source status and exposed person's vaccination (e.g., initiate HBV vaccine + HBIG if unvaccinated/unresponsive; no treatment if vaccinated with ≥10 mIU/mL anti-HBs).
- Follow-up: Test anti-HBs 1-2 months post-vaccine for HBV; for HCV, check anti-HCV/ALT at 4-6 months and HCV RNA at 4-6 weeks.

This study had some limits. In fact, no blood samples or any serologic testing were performed to assess if self-reported vaccination among the participants dentists reflected their real immunization and antibody status. Further studies confirming the antibody titters in dentists are needed.

Conclusion

This study showed some gaps between knowledge and real awareness of dentists regarding HBV infection risk in the dental setting. Furthermore, dentists should be aware about their vaccination patterns and complete the immunizationschedule as the recommended protocol, to maintain an immunization threshold. They should be motivated for vaccination to enhance their occupational safety. Thus, educational programs should be implemented to improve preventive strategies in the dental setting.

Conflicts of interest: authors declare that there are no conflicts of interests

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