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## KNOWLEDGE, ATTITUDE AND PRACTICE OF HEPATITIS B VIRUS INFECTION AMONG DENTISTS

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## KNOWLEDGE, ATTITUDE AND PRACTICE OF HEPATITIS B VIRUS INFECTION AMONG DENTISTS

### Abstract

*Dentists are at high risk for contracting Hepatitis B virus (HBV), which leads to severe liver disease. Proper infection control measures are supposed to be in place to avoid transmission, especially with the exposure to blood that dentists are at risk of. A cross-sectional study with quantitative method using a valid research questionnaire. A convenience sample of 101 dentists from around Lebanon participated in the study. The results showed that 83% of the participating dentists were vaccinated yet only 21% received the required dose for prevention against HBV. The dentists had moderate to high knowledge of HBV infection control measures, negative attitudes towards treating HBV exposed patients, as well as good practices of standard precautions. The results showed that there was a difference association between gender and vaccination ( $P=0.04$ ). The results also showed that there was no remarkable association between years of experience and HBV infection prevention knowledge, however there was a significant association between gender, vaccination status and practices if infection control measures ( $P=0.00$ ). The dentists report good KPA of infection control measures yet reinforcement is needed to ensure proper prevention of transmission of HBV in dental practice.*

## 1. INTRODUCTION

Infection with hepatitis B virus (HBV) is a global health-care concern, especially in developing countries. It is one of the most prevalent recurrent viral infections, which can infect people. It is believed that about 2 billion people are diagnosed, and that more than 350 million are chronic virus carriers (WHO, 2017). While being vaccine-preventable, hepatitis B can lead to chronic illness and increase the likelihood of death from cirrhosis and hepatic cancer. Throughout undeveloped and developing countries, contamination of hepatitis B is prevalent. The largest incidence, according to the WHO, is in the West Pacific region and the African region (6.2 percent and 6.1 percent respectively). Whereas America's WHO area is the least contaminated with 0.7 percent incidence (Padrisa & Castellanos, 2013). Statistical data from the Saudi Ministry of Health (MOH) indicated that viral hepatitis is known as the second most popular viral infection after chickenpox with a high prevalence rate of 19.8 per 100,000 individuals (Abdo et al., 2012). HBV infection can cause a wide range of liver diseases, ranging from acute hepatitis to chronic hepatitis, cirrhosis in the liver and hepatocellular carcinoma (Hollinger & Liang, 2001).

Hepatitis B Virus (HBV) has several propagation methods, from infected mothers to their neonates, or through contact with infected blood or semen. Moreover, it may be transmitted by using unsafe injections, blood transfusion, or dialysis (WHO, 2017). The high incidence of HBV infection occurs in young adults, and the bulk of HBV infections are obtained by unsafe sex or exchange of needles used by addicts (Leggat et al., 2007). Due to the highly sensitive virological screening of donor blood, one in 2,300,000 is at risk of developing HBV infection from a blood transfusion. Five per cent of health-related injections worldwide remained unsafe (Yadav et al., 2017). This holds with it the risk of cross-infection in healthcare institutions. 14.4 percent and 1.4 percent of hospital workers are estimated to be infected with HBV and HCV, respectively (Meehan & Mishler, 2020). Clinical workers, especially support staff employed in clinical facilities, are a high-risk demographic for severe, life-threatening diseases such as HIV and HBV. Close contact with blood and other body fluids is by far the most popular or regular risk faced by healthcare workers during patient care (Alam et al., 2019). Surveys in the United States have revealed that the possibility of contracting HBV from an HBV+ patient after being stuck with a needle ranged from 27% to 37%. Furthermore, the possibility of HCV from an infected person having been stuck with a needle ranged from 3 to 10 percent. The efficacy for hepatitis B propagation is high. For starters, HBV can be spread to a vulnerable host by unintended splash in the eye of as little as 10–8 ml of infected blood (Saint et al. 2019).

Consequently, dental health workers and dental assistants are at elevated risk of infection with multiple microorganisms, such as HBV and HCV, herpes simplex virus, Aids, mumps, measles, and rubella (Lamb et al., 2019). This possibility may be exacerbated by accidental injuries during inpatient care (Halboub et al., 2015), therefore a philosophy of precautionary measure should be introduced among those students and the procedure of infection control should be enforced. This environment is the dental schools' duty to provide effective infection control procedures and to teach dentists how to defend themselves and their patients, as well as the cornerstone of decent working conditions (Al Maweri et al., 2015).

A number of researches around the world have measured the level of knowledge, attitudes and practices of dentists about guidelines and procedures for infection control, found unsatisfactory response, and stressed the need for further development of this kind of knowledge and practice. In Lebanon, data on HBV knowledge and attitudes of dentists are lacking. Therefore, this study was conducted to investigate the knowledge, attitudes, and practices regarding HBV infection among dental practitioners in Lebanon. The results of this study might imply positive ramifications for change of practice and spreading awareness among dentists though identifying the gaps and implementing the proper interventions.

## 2. MATERIALS AND METHODS

### Research Design

A descriptive cross-sectional research design was used in this study. This research design allows the researcher to gather quantitative and objective data at one point in time, thus enabling the detection of trends and phenomena that are prevalent among the research sample (Busk, 2014).

**Sample**

A convenient sample of overall 101 dentists from various clinical settings in Lebanon were recruited in this study. Convenience sample was used due to the availability and accessibility of dentists who are willing to take part in the study (Etikan et al., 2016).

**Setting**

The setting of the study was the dental clinics of the approach dentists around various areas and regions of Lebanon.

**Inclusion Criteria**

The inclusion criteria specified that for dentists to be eligible to participate in this study they should have been practicing dental healthcare delivery for at least one year to overcome any reality shock of practice variables.

**Tool**

Data was collected using a pre-tested self-administered questionnaire composed of 24 items. The questionnaire consisted of four main sections:

- 1) "Socio-demographic characteristics" including gender, age, marital status, vaccination status and years of experience.
- 2) "Knowledge" consisted of thirteen questions on dentists' HBV infection-related knowledge (twelve yes/no questions, each of which had a correct answer, and one self-efficacy question with four options for participants to evaluate their own knowledge of infections and standard precaution methods).
- 3) "Attitudes" toward patients with HBV infection. Subjects rated their agreement on a given statement over five scales: strongly disagree, disagree, neutral, agree, and strongly agree.
- 4) "Practices" regarding dentists' infection control practices including their vaccination status, exposure to HBV and precautionary methods.

It took the respondents approximately ten minutes to complete the questionnaire. A pilot testing of the questionnaire was conducted on 10 dentists and the questions were revised accordingly. The questionnaire was also tested for internal consistency (reliability) by Cronbach's Alpha test and a score of 0.725 was obtained. The overall results of validity and reliability of the newly developed tool for infection control measures revealed that it is valid and reliable to be employed. The content validity was also proven in the literature where its elements were analyzed by specialists and the construct validity was evaluated by CFA. SPSS was used to analyze reliability, and Cronbach's Alpha was 0.754 ( $> 0.7$ ) (Li et al., 2015).

**Data Analysis**

Data was entered and analyzed in Statistical Package for Social sciences (SPSS software version 25). Results were expressed in means and percentages, represented in tables. All statistical tests were deemed significant at p value of  $< 0.05$ .

**Ethical Considerations**

The following ethical requirements were taken into consideration during the study:

- Permission to carry out the study from Ethics Committee of Beirut Arab University was procured.
- Anonymity of the study subjects was maintained; no names were recorded during data collection and reporting.
- Verbal consent was obtained from each of the participating dentists at the respective clinical settings.

**Procedure**

After procuring approval from the responsible authority referred to as institutional Review Board (IRB number: ECO-R-55), the researcher has approached the dentists with the study proposal and explained the aim of the study. The researchers explained to the potential subjects that the data collection proves will be anonymous, where the questionnaires will be handed to the participants on

sealed unidentified envelopes and will be collected back by a research assistant in sealed envelopes so that the data entry process wouldn't disclose the identity of the participant and bias the process. Upon that, the researcher obtained informed consent from the dentists after evaluating their eligibility according to the inclusion criteria. A pilot study was carried out to test the applicability of the research questionnaire, where 10 dentists were included in the pilot sample. After that, the data was collected using the previously referenced research questionnaire. After data collection, SPSS was used for analysis and results were interpreted.

**Table 1: Sociodemographic data**

		N	%
Gender	Female	55	54.5
	Male	46	45.5
Marital Status	Single	39	38.6
	Married	62	61.4
Have you been vaccinated for HBV?	NO	18	17.8
	YES	83	82.2
If you have been vaccinated, how many doses have you received?	1	51	50.5
	2	25	24.8
	3	21	20.8
	4	2	2.0
	6	2	2.0
If no, which of the following is the most suitable reason?	Apathy	27	26.7
	Cost	3	3.0
	Fear of side effects	1	1.0
	Lack of knowledge	33	32.7
	Other reasons	37	36.6
Did you check for antibodies after vaccination?	NO	90	89.1
	YES	11	10.9

### 3. RESULTS

#### Socio-demographic Characteristics

The study was conducted over the span of 4 months (September 2020-December 2020). The study included one hundred and one dentists (N=101) from different areas of Lebanon, where 55 (54.5%) of them were females while 46 (45.5%) were males. Thirty nine (38.6%) of the participants were single, while 62 (61.4%) of them were married. The participants were asked if they were vaccinated against HBV or not. The results have shown that 18 (17.8%) of the dentists were not vaccinated while 83 (82.2%) of them were. In addition, the results of the descriptive analysis showed that 51 (50.5%) of the dentists received only one dose of the HBV vaccine while only 21 (20.8%) of them received the required three doses. The analysis also showed that 33 (32.7%) of the dentists did not receive the vaccine due to lack of knowledge, while 27 (26.7%) due to apathy, and 37 (36.6%) due to undecided other reasons. What is also noteworthy is that 90 (89.1%) of the dentists that have been vaccinated did not check the antibodies after, while only 11 (10.9%) of them did that (Table 1).

#### Knowledge of Dentists regarding HBV

A descriptive analysis was carried out to determine the level of knowledge among dentists regarding hepatitis B virus (HBV) infection prevention and control measures. The results showed that 63 (62.4%) of the dentists reported that HBV cannot be transmitted through saliva, while 73 (72.3%) of them reported that HBV can be transmitted from dentist to patient. In addition, the results showed that 94 (93.1%) of the dentists indicated that HBV can be transmitted from patient to patient, while

80 (79.2%) of the participants claimed that HBV can be transmitted through dental treatments. Moreover, 83 (82.2%) of the dentists reported that dentists are at higher risk of HBV infection than the general population, whereas 51 (50.05%) of the sample think that the risk of HBV transmission through needle-stick injury is lower than that of HIV. 68 (67.3%) of the participants indicated that HBV is sensitive to low temperature, dryness and ultraviolet ray, while 74 (73.3%) noted that HBV vaccines is the most effective way to be immune against it. Further, 51 (50.5%) of the sample reported that a high titer hepatitis B immune globulin (HBIG) can be used in emergency prevention, while 47 (46.5%) agreed that the prevalence of HBV is lower than 5% in Lebanon. Finally, 74 (73.3%) agreed that HBV transmission from patient to dentist can be prevented by wearing gloves, while 67 (66.3%) agreed that soaking dental burs in multienzyme abluent (now applied) can eliminate all HBV (Table 2).

**Table 2: Knowledge of Dentists regarding HBV**

		N	%
HBV can be transmitted through saliva.	NO	63	62.4
	YES	38	37.6
HBV can be transmitted from dentist to patient	NO	28	27.7
	YES	73	72.3
HBV can be transmitted from patient to patient (e.g. non-sterile medical devices)	NO	7	6.9
	YES	94	93.1
HBV can be transmitted through dental treatments	NO	21	20.8
	YES	80	79.2
Dentists are at higher risk of HBV infection than the general population	NO	18	17.8
	YES	83	82.2
There is a higher risk of HBV transmission than HIV through needle-stick injury	NO	51	50.5
	YES	50	49.5
HBV is sensitive to low temperature, dryness and ultraviolet ray	NO	33	32.7
	YES	68	67.3
HBV vaccines is the most effective way to be immune against it	NO	27	26.7
	YES	74	73.3
A high titer hepatitis B immune globulin (HBIG) can be used in emergency prevention	NO	50	49.5
	YES	51	50.5
The prevalence of HBV is lower than 5% in Lebanon	NO	54	53.5
	YES	47	46.5
HBV transmission from patient to dentist can be prevented by wearing gloves	NO	27	26.7
	YES	74	73.3
Soaking dental burs in multienzyme abluent (now applied) can eliminate all HBV	NO	34	33.7
	YES	67	66.3

### Attitudes of Dentists regarding HBV

Another descriptive analysis was carried out to determine the attitudes of dentists regarding HBV. The results showed that 38(37.6%) strongly agreed and 29 (28.7%) agreed that they have moral responsibility to treat patients with HBV infection, while 32 (31.7%) strongly agreed and 28 (27.7%) agreed that they will treat patients with HBV infections. In addition, 25 (24.8%) were neutral and 28 (27.7%) strongly disagreed that they are able to treat HBV infected patients, while also 33 (32.7%) strongly disagreed and 22 (21.8%) disagreed that they would let dentists treating patients with HBV treat their teeth. Further, 93 (92.1%) of the dentists strongly agreed that they have rights to know their patients' HBV infection status, while 71 (70.3%) strongly agreed that they are worried about being infected with HBV by their patients (Table 3).

**Table 3: Attitudes of Dentists regarding**

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
"I have moral responsibility to treat patients with HBV infection"	N	13	5	16	29	38
	%	12.9	5	15.8	28.7	37.6
"I will treat patients with HBV infection"	N	14	7	20	32	28
	%	13.9	6.9	19.8	31.7	27.7
"I can safely treat patients with HBV infection"	N	28	16	25	11	21
	%	27.7	15.8	24.8	10.9	20.8
"I will let dentists treating patients with HBV treat my teeth"	N	33	22	18	13	15
	%	32.7	21.8	17.8	12.9	14.9
"Dentists have rights to know their patients' HBV infection status"	N	0	2	2	4	93
	%	0	2	2	4	92.1
"I am worried about being infected with HBV by my patients"	N	5	2	15	8	71
	%	5	2	14.9	7.9	70.3

### Practices of Dentists regarding HBV

Further, another descriptive analysis has been carried out to determine the practices of dentists towards HBV. The results of the study showed that 83 (82.2%) indicated that they always use gloves while treating patients, while 65 (64.4%) always use oro-nasal masks. In addition, 56 (55.4%) indicated that they never use protective eye wear, while 48 (47.5%) never use face masks. Moreover, the results show that 61 (60.4%) of the participants indicated that they never use disposable caps while 50 (49.5%) of them indicated they always use gowns during practice (Table 4).

**Table 4: Practices of Dentists regarding HBV**

		Always	Mostly	Sometimes	Rarely	Never
Gloves	N	83	15	1	0	2
	%	82.2	14.9	1	0	1
Oro-nasal masks	N	65	14	6	7	9
	%	64.4	13.9	5.9	6.9	8.9
Protective eye wear	N	16	7	8	14	56
	%	15.8	6.9	7.9	13.9	55.4
Face masks	N	20	8	6	19	48
	%	19.8	7.9	5.9	18.8	47.5
Disposable caps	N	14	6	10	10	61
	%	13.9	5.9	9.9	9.9	60.4
Gowns	N	50	16	10	4	21
	%	49.5	15.8	9.9	4	20.8

The participants were also asked about the proposed methods to improve their knowledge regarding HBV. The results showed that 52 (51.5%) of the dentists proposed meetings as a valid method to enhance knowledge, while 36 (35.6%) indicated that visual media is an appropriate tactic to improve dentists' knowledge (Table 5).

**Table 5: Methods to improve your knowledge about Hepatitis**

	N	%
Books	6	6
Journal	7	6.9
Meetings	52	51.5
Visual Media	36	35.6

### Inferential Statistics

A Chi-square test was carried out to determine if there is an association between vaccination status and the years of experience, age and gender of the participating dentists. The results of this test showed that there was no association between years of experience, age, marital status and vaccination status. Yet, the results showed there was an association between gender and vaccination status where a p-value of  $P=0.04$  was recorded (Table 6).

**Table 7: Chi Square Knowledge regarding HBV**

	Gender	Marital Status	Vaccination Status	Years of Experience
HBV can be transmitted through saliva.	0.17	0.32	0.51	0.16
HBV can be transmitted from dentist to patient	<b>0.05*</b>	0.40	<b>0.00*</b>	0.29
HBV can be transmitted from patient to patient (e.g. non-sterile medical devices)	0.52	0.81	<b>0.00*</b>	0.61
HBV can be transmitted through dental treatments	0.83	0.11	<b>0.00*</b>	0.96
Dentists are at higher risk of HBV infection than the general population	0.14	0.11	<b>0.00*</b>	0.12
There is a higher risk of HBV transmission than HIV through needle-stick injury	<b>0.05*</b>	<b>0.00*</b>	0.13	0.68
HBV is sensitive to low temperature, dryness and ultraviolet ray	0.19	<b>0.06*</b>	0.08	0.82
HBV vaccines is the most effective way to be immune against it	<b>0.01*</b>	<b>0.01*</b>	<b>0.00*</b>	0.07
A high titer hepatitis B immune globulin (HBIG) can be used in emergency prevention	0.09	<b>0.00*</b>	0.27	0.19
The prevalence of HBV is lower than 5% in Lebanon	0.33	0.72	<b>0.02*</b>	0.35
HBV transmission from patient to dentist can be prevented by wearing gloves	0.22	0.79	0.91	0.54
Soaking dental burs in multienzyme abluent (now applied) can eliminate all HBV	<b>0.02*</b>	<b>0.00*</b>	0.60	0.06

**Table 6: Difference in Practices according to participant characteristics**

	Gender	Marital Status	Years of Experience	Age
Vaccination Status	<b>0.04</b>	0.61	0.27	0.83

A Chi-Square test was carried out to determine if there is an association between knowledge of dentists regarding HBV and gender, marital status, years of experience and vaccination status. The results of the analysis showed that there was a significant association between almost all knowledge statements on one hand and the participant characteristics on the other hand where p-values  $P<0.05$  were recorded (Table 7).

An independent t-test was carried out to determine if there is a difference among the participating dentists on the level of HBV knowledge according to gender, marital, status and vaccination status. The results showed that there was a significant difference between males and females on the level of the statement indicating “I will treat patients with HBV infection”, where a p-value of  $p=0.01$  was recorded. In addition, the results showed that there was a significant difference between single and married dentists on the level of “Dentists have rights to know their patients’ HBV infection status” ( $P=0.00$ ) and “I am worried about being infected with HBV by my patients” ( $P=0.00$ ). Further, the results showed that there was a significant difference between vaccinated and non-vaccinated dentists on the level of “I am worried about being infected with HBV by my patients” where a p-value of  $p=0.00$  was recorded (Table 8).

**Table 8: Difference in Attitudes according to participant characteristics**

	Gender	Marital Status	Vaccination Status
“I have moral responsibility to treat patients with HBV infection”	0.06	0.81	0.00
“I will treat patients with HBV infection”	<b>0.01*</b>	0.97	0.14
“I can safely treat patients with HBV infection”	0.35	0.19	0.42
“I will let dentists treating patients with HBV treat my teeth”	0.39	0.18	0.88
“Dentists have rights to know their patients’ HBV infection status”	0.31	<b>0.00*</b>	<b>0.00*</b>
“I am worried about being infected with HBV by my patients”	0.78	<b>0.00*</b>	0.12

Another independent T- test was carried out to determine if there is a difference in practices of HBV among dentists according to gender, marital, status and vaccination status. The results showed that there was a significant difference between males and females on the level of the use of oro-nasal masks while delivering dental care where a p-value of  $p=0.00$ . In addition, the results also showed that there was a significant difference between single and married dentists as well as between vaccinated and non-vaccinated dentists on various levels practice where p-values  $< 0.05$  were recorded (Table 9).

**Table 9: Difference in Practices according to participant characteristics**

	Gender	Marital Status	Vaccination Status
Gloves	0.81	0.07	<b>0.05*</b>
Oro-nasal masks	<b>0.01*</b>	<b>0.01*</b>	0.13
Protective eye wear	0.34	<b>0.05*</b>	<b>0.00*</b>
Face masks	0.85	<b>0.04*</b>	<b>0.00*</b>
Disposable caps	0.08	<b>0.01*</b>	<b>0.00*</b>
Gowns	0.26	0.31	0.95

#### 4. DISCUSSION

The results of our study showed that the majority of the dentists were vaccinated for HBV. The percentage of non-vaccinated participants in this research is lower than 32 percent published among Malaysian dental professionals (Rajmoorthy et al., 2019) and lower than 27.7 percent recorded among healthcare professionals in India (Nagpal et al., 2019), 22 percent identified among health care workers in Lahore (Sufia, 2019) but higher than 10 percent reported among dentists living in Montes Claros, southeast Brazil (Garbin et al., 2019). Lithuanian public dental professionals (Tavoschi et al., 2019) and dental health workers in Korea (Kaviani & Kia, 2019) report below 50.8 percent and 37 percent, respectively. The reality that most of the participants in this survey were young and had less years of practice may be responsible for the low vaccination rate as Mbaawuaga et al. (2019) stated in a research of Nigerian doctors and dentists that unvaccinated workers were more likely to be surgeons or dentists under 37 years of age and had less years of professional operation, which is comparable to our results where our mean age was 37.7 years.

The results of this study also showed that the majority of those who were not vaccinated reported that they did not get vaccinated due to lack of knowledge and other unspecified reasons. This was comparable with Azodo et al. (2012), where lack of knowledge and ability was one of the main obstacles identified among the unvaccinated respondents. This was contrasted with the reports

of Ibekwe and Ibeziako (2016) and Okeke et al. (2018), who identified lack of opportunity among health workers and medical students in Enugu, South-East Nigeria, as their primary reason for non-vaccination. In this research, apprehension of the vaccine's side effects was not a major barrier to hepatitis-B vaccination and this is contrary results from several trials in the Greater Glasgow Area Health Board, Malaysia, Rhode Island, and the United States (Rostamzadeh et al., 2018).

The results of our study showed that only 21% of the sample received the three obligatory dosages of HBV vaccine and the majority did not check for antibodies after vaccination. It is noteworthy that the percentage of the respondents who had received three doses (complete dose) of the hepatitis-B vaccine in this study is lower than 86% reported among health workers in tertiary care hospital (Brailo et al., 2011) as well as lower than the 85.7% reported among dental professionals of the Military Hospital, Riyadh (Paul, 2015) 73.8% and 74.9% among Brazilian dentists (Garbin et al., 2019) 56.2% reported among Italian dentists (Costa et al., 2019) and 35.9% reported among Lithuanian general dental practitioners (Tavoschi et al., 2019). The percentage of complete hepatitis vaccination among dentists in Lebanon in this study was also lower than the figures reported in Nigerian studies (Ibekwe et al., 2016). Previously, 53.8 percent of health care workers in a secondary hospital in southwestern Nigeria were reported (Mbaawuaga et al., 2019), and 48.1 percent of dental professionals in Lagos, Ibadan, Ife, and Benin were recorded (Utomi, 2015). Healthcare professionals in Nigeria, who are anticipated to have a high level of knowledge and susceptibility to hepatitis B infection, have been revealed to have shown the greatest indifference for the vaccination program, and this is a possible explanation for the outcome of this study (Fatusi et al., 2016).

In addition, the results of this study showed that the participating dentists had moderate to high knowledge regarding the infection prevention and control measures of HBV. This is incompatible with Rabiee et al. (2012) estimating that 67 and 30% of dentists have low to average awareness of HBV transmission and management strategies and HCV infections respectively. Kakouei et al. (2017) have shown that lack of knowledge on the value of sterilization may contribute to transmission of pathogens. Leon et al. (2019) have shown that 93 % of participants have little or no awareness of prevention measures. Alshigh et al. (2019) have observed that only 16 % of dentists used conventional recommendations for prevention. Some reactions in dentistry to infectious patients are accidental, and can be avoided by paying attention to recommendations for infection control. In some situations, when contact and exposure are unavoidable prompt vaccine and good behaviour will effectively prevent infection and related adverse effects. Xinyi et al. (2015) also found that all participants in the sample obeyed normal distribution with respect to degree of HBV information. While most medical practitioners have strong or average knowledge of HBV, a higher percentage of dental interns had good knowledge and a limited yet considerable amount of dental interns had good knowledge. Yet this research was compatible with our survey in which 89.43 percent of dental students had good or excellent skills, highlighting the effectiveness of pre-clinical infection control education. Whereas, no dental graduate in the seventh and eighth years had a low level of knowledge which indicated the need for continued education in infection control.

The results of our study also showed that the participating dentists have negative to moderate attitudes towards treating patients with HBV or even going to a dentist who treats patients with HBV. The study also showed that the participants expressed fear towards contracting HBV from patients. This is compatible with Askarian et al. (2016) who also claimed that a mild to extremely high fear and anxiety of transferring HBV to oneself or other patients has been found among dentists, notwithstanding approval of HBV care by dentists. Results from the studies on dentists revealed that the factors such as the fear of transmitting infection to their families and other personnel, the fear of losing other patients due to the fear of disease transmission from infected patients to other patients, the high expenses of recommended actions to prevent and control HBV infection if the test is positive, and last but not least, lack of moral responsibility to treat this group of patients were observed to play a significant role in rejecting HBV patients by dentists (Azodo, 2012). Rabiee et al. (2012) reported that 26.3 percent of dentists had a negative attitude and 73 percent of dentists had a positive attitude regarding HBV cases. In addition, dentists' positive attitude towards handling high-risk patients and a strong level of concern towards their safety and the risk of infection spread to others is similar to previous experiments' findings. The higher level of awareness can reduce the negative attitude of people towards infections with HBV, HCV and HIV / AIDS.

Moreover, the results of this study showed that the dentists were practicing standard precautions such as wearing gloves and oro-nasal mask yet did not adhere fully to the prevention practices against HBV such as wearing disposable caps, face masks, and protective eye wear. In accordance with our findings, Ajami et al. (2019) found that 27% of participants registered poor practice, 60% demonstrated fair practice, and 12% indicated good practice with respect to HBV infections. Saglam et al. (2014) reported using gloves by 48.5%, while Burke reported using gloves by 60%. To prevent cross-contamination, wearing gloves is an important protective way. Use dental tools carelessly may result in increased risk of cross-contamination by breach or hole in the glove or even hand cutting. A research on infection control by Amsterdam dentists found that participants paid close attention to using preventive coatings, masks and gloves but less attention was given to equipment sterilization (Fay, 2020). In the current research, the experience of dentists with regard to protective coatings indicated more informal use of protective equipment, which may be attributed to the affordability of this equipment. Askarian et al. (2016) observed that human behaviour was low to standard safety procedures given the participants' appropriate awareness and attitude, suggesting that comprehension of infection control methods and positive attitude as standards of exposure management are not sufficient to prevent infection. A sequence of comprehensive exposure management systems for health care professionals, especially dentists, should be introduced to minimize or eliminate the risk of transmission of infections to both dentists and patients.

The results of this study also showed that there was an association between gender and vaccination status while there was no association between work experience and vaccination status.

This was aligned with Resende et al. (2010) where there were no variations with regard to professional experience with regards to immunization status. This can be linked to the fact that all three dental institutions give their patients an immunization plan before beginning dental practice, which indicates why most dentists, particularly those recently graduated, are being vaccinated. This same study also showed that there was a higher predominance of hepatitis B vaccination among female dentists, dentists who use IPE and those who reported using illicit drugs (Resende et al., 2010).

Further, our results showed that there is a difference association between knowledge and gender and marital status. This is incompatible with Rostamzadeh et al. (2018), a finding confirmed by Jafari et al. (2019), which noticed no significant difference between the level of knowledge and class. Nevertheless, Rabiee et al. (2012) suggested a significant relationship between men and women in the level of knowledge: the degree of female awareness was greater than that of males. Our results also showed that there is no association between knowledge and work experience, which was inconsistent with Rostamzadeh et al. (2018) which found that that longer work experience was associated with higher knowledge. Rabiee et al. (2012) showed a strong association between level of knowledge and work experience. As such, the impact of 5-year training on the target population will lead to higher skills and more work experience at older ages. Compared to previous analyses it has been shown that work experience has no effect on attitude and practice (Tabshian, 2016). Furthermore compatible with our findings which found that there is a difference in attitudes among dentists by gender, Rabiee et al. (2012) reported that female dentists have a negative attitude towards HVB patients. The disparity might be due to the fact that greater knowledge contributes to negative attitude towards these patients being studied.

## 5. CONCLUSIONS AND RECOMMENDATIONS

Dentists are at high risk of contracting various sorts of infections and mainly HBV due to their constant contact with blood. This reality demands dentists to be cautious in their management and poses various infection and prevention control measures in their practice. These measures should be governed by knowledge, practices, and attitudes in order to prevent the transmission of infection. This study revealed that the participating dentists are in their majority vaccinated against HBV; however, a minority have received the full-required doses for prevention. The study also revealed that the dentists have moderate to considerably significant knowledge regarding the measures to be taken concerning HBV infection including that for vaccination, standard precautions, and equipment management. However, the study showed that the dentists had a negative attitude represented by fear from treating or dealing with patients or healthcare professionals exposed to HBV. Finally, the study revealed that the dentists had good adherence to standard precautions yet lack certain practices for HBV prevention. Upon the results of this study, it is recommended that national campaigns for HBV vaccination to be implemented tackling all healthcare professionals and especially dentists. Such campaigns can enforce follow up with healthcare facilities and healthcare professionals to submit

required evidence of complementing all requirements of vaccination. Educational sessions for dental practitioners are recommended to fortify knowledge and encourage proper practices of infection prevention and control regarding HBV infection. Infection control audits to dental clinics shall be placed into practice to ensure the proper prevention of transmission. Further research studies in this field is also recommended with larger sample sizes in order to further explore the variation in perceptions among different populations.

### Limitations

The limitations of this study are represented by the non-probability convenience sampling that is used in the methodology of this study in addition to the limited sample size available which impedes the generalization of the results. Another limitation would be that this study did not investigate the impact of different specialties of dentistry on their knowledge, practice and attitudes.

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