# HEPATITIS B VACCINATION AMONG DENTAL HEALTHCARE WORKERS IN ERBIL CITY

Rebaz Tahir Lak [a]

Submitted: 18/8/2020; Accepted: 1/7/2021; Published: 21/6/2021

## ABSTRACT

### *Background*

Approximately 350–400 million people have been diagnosed with chronic hepatitis B virus (HBV) worldwide. It is assumed that dentists and dental staff can be infected and, simultaneously, transmit the virus to their patients more easily comparing to other professions

### *Objectives*

This study aimed to identify the status of hepatitis B vaccination among health personnel working in the dentistry field and define their risky behaviors in daily practice

### *Methods*

In this cross-sectional study, a self-administered questionnaire was filled by the respondents between November 2019 and January 2020. To ensure the representativeness of the sample and generalization of the results, a cluster sampling method was performed to select the study sample, and three out of the five dental polyclinic centers were selected.

### *Results*

Two-thirds (66.4%) of the subjects received the three full doses or more of the vaccine while one-third (33.6%) of them either did not receive the vaccine at all or have received incomplete doses of the recommended schedule. The majority of the respondents (85.8%) reported some sort of mucocutaneous injuries, including needle sticks or syringes and sharp cuts. There was a statistically significant association between vaccination status and dental centers, departments, occupation of the dental healthcare workers and p values were less than 0.005.

### *Conclusion*

Suboptimal vaccination coverage combined with a high proportion of exposure to injuries and discrepancies in vaccination rates among different dental centers, departments and specialties mandate the health authority to improve vaccination coverage and target unvaccinated and at-risk personnel.

**Keywords:** *HBV, Hepatitis B Vaccine; Dentists; Dental Healthcare Workers; Erbil City.*

[a] Kurdistan Board of Medical Specialties, Erbil, Kurdistan Region, Iraq.

Correspondence: rebazlak2020@gmail.com

https://doi.org/10.17656/jsmc.10307

## INTRODUCTION

Worldwide approximately 350–400 million people suffer from chronic hepatitis B virus (HBV). It is assumed that dentists and dental staff can be infected and able to transmit the virus to their patients more than any other profession. In terms of prevalence, hepatitis is divided into three areas: "low prevalence area, which means <2%, an intermediate area 2–8% and high prevalence area >8%"; due to their population vulnerability to HBV most of the countries, including Iraq, fall within the second category [(1)].

HBV remains an imminent infectious hazard for health workers. The workers in this field are four times more susceptible to be infected with hepatitis B comparing to the general population [(2)]. Nevertheless, Hepatitis B is even more common among dentists, especially oral surgeons, endodontists, periodontists, and other dental workers. HBV mainly utilizes "blood, saliva, and nasopharyngeal secretions" for transmission; and it is largely concentrated in the gingival sulcus [(3)]. Dentistry is historically regarded as one of the health professions with the greatest risk of HBV exposure with infection rates among dentists that are 3-10 times higher than the general population [(4)] and what offsets this calculation is vaccination which is by far the most effective preemptive tool to prevent HBV. The present vaccine, besides immunity, also protects against hepatocellular carcinoma [(5)].

According to the national Iraqi plan to control viral hepatitis for 2017, the dental healthcare workers (DHWs) at different health and dental centers are at great risk to acquire and develop hepatitis B especially the dentists, for that reason they must receive the complete doses of the vaccine to be protected against the disease. The national schedule for them will be three doses of 20microgram at the first visit, after one month, and the third one after six months from the first dose.

The outstanding American Dental Association deems vaccination against HBV indispensable for health workers [(6)]. The World Health Organization (WHO) stresses the importance of vaccination as well, and it stresses the vulnerability of health care workers to HBV. In the beginning hepatitis B vaccines containing HBsAg made by recombinant DNA techniques in yeast, after meeting of experts in 1985 a new set of requirements were discovered, with progression vaccines made by recombinant techniques from mammalian cells beside yeast cells in 1988[(7)]. Nowadays vaccines that contain HBsAg only replace the recombinant DNA techniques that are required for the hepatitis B vaccine.Even with three doses of vaccine hepatitis B remains a health problem in developing countries which causing about one million deaths globally. Regarding the safety of vaccination, the Global Advisory Committee confirmed the excellent safety of the hepatitis B vaccine. There are a lot of studies found that there are no severe side effects to the hepatitis B vaccine, and there is no evidence that other vaccines interact with hepatitis B vaccine [(8)].

In addition to vaccination, for their safety dentists should also be aware of these patients that have oral manifestations like; bleeding disorder, jaundice of mucosal membrane, fetor hepaticas, petechial, business, gingivitis, strophic tongue, and. Regarding Vaccination, if interruption occurred between HBV vaccine doses the serial dose is not restarted the other next dose must be given as soon as possible.

This research is important because it sheds the light on the most vulnerable medical group to HBV infection- the dental workers. Moreover, to the extent of the researcher's knowledge, no such study has so far targeted DHWs in Erbil, with a compelling description of their subjection to HBV vaccination and examination of the risk they persistently encounter.

The study aimed at identifying the status of hepatitis B vaccination among health personnel working in the dentistry field, defining the risky behaviors and procedures that are common among dentistry employees, and finding out the association between vaccination status and occupational parameters including their specialties and departments.

## SUBJECTS AND METHODS

The self-administered questionnaire contained information about their age, gender, occupation, vaccination status, anti-Hepatitis B surface (anti-HBs) titer, and some risk factors and behaviors related to hepatitis B. The study was conducted between November 2019 and January 2020. A total of 289 subjects were enrolled in the study. Ethical approval was obtained from the Research Ethics Committee at Kurdistan Board of Medical Specialties. The purpose of the study and questionnaire was explained to all participants, verbal consent was obtained from all of them, and confidentiality and anonymity of data were ensured.

There are five Dental Polyclinic Centers (DPCs) working as tertiary dental facilities in Erbil city, they attend and treat patients from all primary health care

centers throughout Erbil province. To ensure the representativeness of the sample and generalization of the results, a cluster sampling method was performed to select the study sample, three out of the five DPCs were selected using simple random technic than the three clusters were studied thoroughly, the three randomly chosen DPCs were Dentistry College, Khanzad and Hawler DPCs. All the medical and dental staff were included in the research, except the administrative personnel who did not have any contacts with the patients were not recruited.

Data entered and analyzed using Statistical Package for Social Sciences version 25 (SPSS Inc., Chicago, Illinois, USA). Descriptive analyses were expressed as frequencies and percentages and the inferential results were compared between the subjects with different variables using a statistical significance level of $\leq 0.05$ and analyzed using Pearson Chi-square or Fisher's exact tests if necessary.

## RESULTS

Out of the 289 dentistry health workers (DHWs), 41.5% of them were from dental clinics of Dentistry College, 31.1% from Khanzad, and 27.3% of them were affiliated to Hawler DPC. Most of the participants (74.4%) were dentists, followed by 12.8% of dental laboratory technicians, 9% assistant dentists, 2.4% nurses, and finally only 1.4% from other specialties.

More than half (52.2%) of the respondents were female while 47.8% were male, with a mean ± standard deviation of 35.10 ± 7.78 years. On average, the participants had 17.3 years of formal education and professional training and worked for approximately 10.53 years. Most (66.4%) of the study sample have received three doses or more of hepatitis B vaccine, 17.6% two doses, 5.3% only one dose while 10.7% of the DHWs have not received any dose of the vaccine. Thereby, two-thirds of the DHWs have received the full doses of the vaccine (three doses according to national guidelines), while one-third (33.6%) of them either did not receive the vaccine at all or have received the suboptimal dose of the recommended schedule (one or two doses only). Surprisingly the duration since the last vaccine was 4.23 years on average. Only one-third of the study sample (33.6%) had a document to prove they received the vaccines. None of the respondents stated that they had hepatitis B but less than half of them (44.3%) did serological investigations to make sure they are not infected with hepatitis B and approximately a close percentage (46.7%) did anti-HBs titer to know their level of antibodies. The striking finding was only a few subjects (2.4%) who knew that they are protected against the disease and their titer was more than 100 IU/ml. At least 56.4% of the subjects have exposed to syringe injuries, 18.3% had sharp cuts, 8% had both syringes and sharp cuts while 3.1% of the respondents had other sorts of injuries, but 14.2% did not have any types of injuries during their lifetime work. The vast majority of DHWs (95.5%) were using gloves regularly and 94.5% of the respondents sterilized the instruments at their clinics and departments and finally, most of them (78.9%) did not screen their patients for HBV ,(Table 1). The findings of Table 2 show that there was a significant statistical association between vaccination status and dental centers, departments, occupation and. The majority (81%) of DHWs at Hawler DPC were fully vaccinated followed by Khanzad DPC in which 70% of the health staff were fully vaccinated against hepatitis B while only 54.2% of Dentistry College DPC staff were completely vaccinated according to the guidelines.

The majority of DHWs in the implant (88.2%), pedodontics (87.5%), and oral surgery (75.7%) departments have received the full schedule vaccines in contrary the personnel in endodontic (30.8%), pedodontics (37.5%), and prosthodontics (48.9%) reported the least vaccination rates. Departments of diagnosis, X-ray, periodontics and orthodontic recorded 56.5%, 60%, 67.4% and 69.6% full vaccination coverage rates respectively. Regarding occupation of the personnel, about three quarters of the dentists and workers of (other) specialties have received the full dose of the vaccine, followed by nurses who had a vaccination rate of 57.1%, in contrast to that the dental laboratory technician and assistant dentists had the worst vaccination coverage of 45.9% and 26.9% consecutively.

**Table 1. Anti-HBs titer and risk factors related to hepatitis B.**

| Variables | Categories | Frequency | Percent |
|---|---|---|---|
| **Vaccine doses** | 0 | 31 | 10.7 |
| | 1 | 15 | 5.3 |
| | 2 | 51 | 17.6 |
| | ≥ 3 | 192 | 66.4 |
| **Vaccination status** | None or sub-optimal | 97 | 33.6 |
| | Full doses | 192 | 66.4 |
| **Documentation of receiving the vaccine** | Documented | 97 | 33.6 |
| | Not documented | 192 | 66.4 |
| **Serological investigation** | Yes | 128 | 44.3 |
| | No | 161 | 55.7 |
| **Anti-HBs titer** | Yes | 135 | 46.7 |
| | No | 154 | 53.3 |
| **Titer level (IU/ml)** | Not done or not known | 282 | 97.6 |
| | Above 100 | 7 | 2.4 |
| **Injuries** | No | 41 | 14.2 |
| | Syringes | 163 | 56.4 |
| | Sharp cuts | 53 | 18.3 |
| | Syringes and sharps | 23 | 8 |
| | Others | 9 | 3.1 |
| **Regular use of gloves** | Yes | 276 | 95.5 |
| | No | 13 | 4.5 |
| **Sterilization of instruments** | Yes | 273 | 94.5 |
| | No | 16 | 5.5 |
| **Screening of patients** | Yes | 61 | 21.1 |
| | No | 228 | 78.9 |
| **Total** | | 289 | 100 |

**Table 2. Association between vaccination status and dental centers, departments, occupation, and use of gloves.**

| Variables | Vaccination status | | P |
|---|---|---|---|
| | Fully vaccinated | None or sub-optimal | |
| **Dental centers** | | | |
| Khanzad DPC | 63 (70%) | 27 (30%) | 0.001 |
| Dentistry College DPC | 65 (54.2%) | 55 (45.8%) | |
| Hawler DPC | 64 (81%) | 15 (19%) | |
| **Departments** | | | |
| Endodontic | 20 (30.8%) | 45 (69.2%) | |
| Oral surgery | 28 (75.7%) | 9 (24.3%) | |
| Diagnosis | 13 (56.5%) | 10 (43.5%) | |
| Orthodontic | 16 (69.6%) | 7 (30.4%) | |
| Periodontics | 29 (67.4%) | 14 (32.6%) | 0.023 |
| Prosthodontics | 23 (48.9%) | 24 (51.1%) | |
| Implant | 15 (88.2%) | 2 (11.8%) | |
| Pedodontics | 3 (37.5%) | 5 (62.5%) | |
| X-ray | 6 (60%) | 4 (40%) | |
| Pediatrics | 14 (87.5%) | 2 (12.5%) | |
| **Occupation** | | | |
| Dentists | 161 (74.9%) | 54 (25.1%) | |
| Assistant dentist | 7 (26.9%) | 19 (73.1%) | 0.001 |
| Laboratory technician | 17 (45.9%) | 20 (54.1%) | |
| Nurse | 4 (57.1%) | 3 (42.9%) | |
| Others | 3 (75%) | 1 (25%) | |
| **Total** | 192 (66.4%) | 97 (33.6%) | |

## DISCUSSION

Researches in the Middle East found that the prevalence of HBsAg ranged from 3% to 11% in Egypt. Iraq is not safe from HBV too: out of 36620 blood donors in Missan Governorate, 0.12% diagnosed positive for HBsAg, and 0.2% of 69915 samples from blood donors in Basra confirmed positive too [2].HBV can be transmitted in numerous ways. Concerning dental workers, however, besides skin injury that is the most common factor for infection in general, "the majority of HBV infections among dental practitioners occur from infected blood or body fluids coming in contact with mucosa or existing breaks in the surface of the skin". When dental workers are exposed to patients who are positively diagnosed with HBV, they can be quipped with a temporary immunity through utilizing hepatitis B immune globulin (HBIG). Still, HBIG may be merely used as an adjunct to HBV vaccination, and, partly, they can be used for the dental workers who interacted with HBsAg positive blood or fluid. HBsAg, nevertheless, is to be jointly administered with HBV vaccination for the infants whose mothers are positively diagnosed with the virus. Furthermore, HBIG is difficult to supply and expensive to buy. Hence, as argued, it cannot substitute the vaccination [8].

This study defined and characterized the prevalence of hepatitis B virus (HBV) vaccination among dental health workers in Erbil city. It primarily targeted Dentistry College, Khanzad, and Hawler DPCs with each of their relevant departments. Exactly 289 DHWs were observed and interviewed for having received the vaccine.

Usually, the HBV vaccination ought to be taken in three doses according to the national guidelines. Our study showed that out of the 289 DHWs, 192 (66.4%) were observed to be fully vaccinated, while the rest 97 (33.6%) either did not receive the vaccine or have received the incomplete or suboptimal dose of the recommended dose (one or two doses only).

This finding was lower than that of a study done by Edgar et al during 2002-2003 who discovered that among at-risk health care workers in the United States 75% had received three or more doses of the hepatitis B vaccine,[1]. even in a neighboring country like Iran in a study that targeted Iranian dentists in 2014, the researchers concluded that among the vaccinated individuals 87.9% had received three doses of the vaccine [2]. On the contrary Mahgoub et al did a study among vaccinated healthcare workers in Khartoum, Sudan in the current year and concluded that the proportion of subjects who completed all three doses of vaccine or more was 56.6% [3], likewise in a developed country like Sweden, too, only 40% of HCWs out of six departments in a university hospital were fully vaccinated [4].

Throughout our observations, we came across several findings. First, both gender and marital status were largely irrelevant to the HBV vaccination of DHWs. Second, dentists among DHWs had the highest awareness rates about vaccination. This study revealed that 161 (74.9%) of the interviewed dentists had been vaccinated, and merely 54 (25.1%) did not receive the vaccination. The vaccination rates among the other DHWs, however, are remarkably low: 7 dental assistants (26.9%), 17 lab assistances (45.9%), and 4 nurses (57.1%) had been fully vaccinated. This finding was somehow in line with Nasir Musthtaq et al research in Pakistan. Their research asserts that 90% of the dentists in their focus group were vaccinated, but, among the dental assistants and technicians, the vaccination rate was 16% [5]. This suggests that dentists had the highest awareness among DHWs in this respect.

In this research, the association between the occupation and vaccination rates of DHWs resulted in an affirmative statistically significant result (p: 0.001). The results of our study were supported by Talaat et al who found that vaccination coverage was highest among professional staff and lowest among housekeeping staff in Egypt[6], and Reddy et al who discovered the highest frequency of vaccination was seen among dentists and least amongst dental lab technicians and other workers while investigating the prevalence of hepatitis B vaccination among oral health care personnel in Mysore City, India [7].

Thirdly, this study revealed that more than half of the study subjects 163 (56.4%) had a positive history of injuries caused by needles sticks, or syringes,18.3% had sharp cuts, 8% had combined syringes and sharp cuts while 3.1% of the respondents had other types of injuries. So except for the minority of the subjects (14.2%) all other DHWs (85.8%) had some sort of skin damages.

Needle injuries do indeed remarkably facilitate the transmission of HBV to the DHWs. In a study focused on dentists and dental assistants in Yemen, AL Kassem MA Abbas et al found that the prevalence of needle

stick injuries accounted for 45.6% of his focus group; almost twice as much of the prevalence of exposure to mucous membrane and skin [8]. According to that research, 83% were injuries due to sharp objects, from which 52% were a hollow bore and 13% were exposed to mucocutaneous and/or bites by the patients [9]. Another study claimed that 63% of the subjects reported at least one percutaneous injury in the last year and 73% over their working lifetime [10]. Dentists who received vaccination developed immunity and they have no risk for infection but those unvaccinated if exposed to a single needle stick or cut the risk of infection in blood ranges from (6-30%) although depends on HBeAg of individual [11]. Among the health care workers needle stick injury and low vaccination contribute to the highest cause of hepatitis B. That is why training health care workers how to handle a needle and sharp objects and their vaccination is required for the prevention of hepatitis B. According to one study, about 87% of injuries were due to syringes, dental instruments, needle sutures. Although using protecting barriers sterilization, disinfection, operatory clean up, management of injuries, written protocol for instrument processing can provide safety [12].

Concerning the departments' variables, we noticed that DHWs in the oral surgery, pediatrics, and implant departments, received the vaccines most abundantly compared to the others. Twenty-eight of DHWs (75.7%) in the oral surgery, 15 (88.2%) in the implant department, and 14 (87.5%) in the pediatrics department took the proper HBV vaccine doses; the vaccination rates have been more or less significant in the other departments as well. The tasks of these two departments might be associated with more exposure to blood compared with other departments and the distribution of personnel of certain specialties like dentists was more among those departments.

In conclusions, the self-reported percentage of hepatitis B vaccination among DHWs in Erbil city was 66.4%, which was lower than the national guidelines and recommendations of vaccinating all the staff. There were significant variations in the vaccination rates among different DPCs, departments, and specialties; this mandates the health authorities and hospitals to identify methods to improve hepatitis B vaccination coverage levels and target vaccination programs towards unvaccinated and at-risk DHWs. High rates of needle stick injuries and low vaccination coverage contribute highly to HBV infections among DHWs. Prevention of occupational infection with blood-borne pathogens should be a priority to the national program for the promotion of infection control. Training of DHWs on safe handling and collection of needles and sharps and hepatitis B vaccination of all DHWs is required to reduce transmission.

## REFERENCES

1- Taher C, Saleh G. Prevalence and Characterization of Hepatitis B and Hepatitis C Infection among Blood Donors in Erbil. Cihan University-Erbil Scientific Journal. 2020;4(1), 45-51.

2- Ciorlia LA, Zanetta DM. Hepatitis B in healthcare workers: prevalence, vaccination and relation to occupational factors. Brazilian Journal of Infectious Diseases. 2005 Oct;9(5):384-9.

3- Krasteva A, Panov VE. Hepatitis B and C in dentistry. Journal of IMAB–Annual Proceeding Scientific Papers. 2008 Aug 8;14(2):38-40.

4- Younai FS .Health Care–Associated Transmission of Hepatitis B & C Viruses in Dental Care (Dentistry). Clinics in Liver Disease. 2010; 14 (1): 93-104.

5- Chang MH, Chen DS. Prevention of hepatitis B. Cold Spring Harbor perspectives in medicine. 2015 Mar 1;5(3):a021493.

6- Kohn WG, Harte JA, Malvitz DM, Collins AS, Cleveland JL, Eklund KJ. Cover story guidelines for infection control in dental health care settings—2003. The Journal of the American dental association. 2004 Jan 1;135(1):33-47.

7- World Health Organization. Weekly epidemiological record [Internet]. Geneva. Apps.who.int. 2020 [cited 11 July 2020]. Available from: https://apps.who.int/iris/bitstream/handle/10665/255841/WER9227.

8- Simard EP, Miller JT, George PA, Wasley A, Alter MJ, Bell BP, Finelli L. Hepatitis B vaccination coverage levels among healthcare workers in the United States, 2002-2003. Infection control and hospital epidemiology. 2007 Jul 1;28(7):783-90.

9- Momeni N, Akhoundi MS, Alavian SM, Shamshiri AR, Norouzi M, Mahboobi N, Moosavi N, Jazayeri SM. HBV vaccination status and response to hepatitis B vaccine among Iranian dentists, correlation with risk factors and preventive measures. Hepatitis monthly. 2015 Jan;15(1).

10- Mahgoub AE, Hamadalnil Y, Mohammed O, Nakhleh R, Khair MM. A cross-sectional study on Hepatitis B immune status among vaccinated healthcare workers in Khartoum, Sudan. Sudan Journal of Medical Sciences. 2020 Apr 8;15(1):35-42.

11- Dannetun E, Tegnell A, Torner A, Giesecke J. Coverage of hepatitis B vaccination in Swedish healthcare workers. Journal of Hospital Infection. 2006 Jun 1;63(2):201-4.]

12 - Mushtaq N, Awan MH, Ali A, Khalid S, Awan MH. Prevalence of hepatitis b vaccination status among dentists and dental assistants. Pakistan Oral and Dental Journal. 2018 Nov 25;38(3):327-9.

13 - Talaat M, Kandeel A, El-Shoubary W, Bodenschatz C, Khairy I, Oun S, Mahoney FJ. Occupational exposure to needlestick injuries and hepatitis B vaccination coverage among health care workers in Egypt. American journal of infection control. 2003 Dec 1;31(8):469-74.

14- Reddy V, Bennadi D, Kshetrimayum N, Reddy CV, Satish G, Kura U, Yadavalli G. Prevalence of hepatitis B vaccination among oral health care personnel in Mysore city, India. Oral health and dental management. 2014 Sep 1;13(3):652-5.

15- Abbas Al Kasem MA, Al-Kebsi Abbas M, Madar Ebtihal M, Al-Shamahy Hassan A. Hepatitis B Virus among Dental Clinic Workers and the Risk Factors Contributing for its Infection. On J Dent & Oral Health. 2018;1(2).

16- Gyawali P, Rice PS, Tilzey AJ. Exposure to blood borne viruses and the hepatitis B vaccination status among healthcare workers in inner London. Occupational and environmental medicine. 1998 Aug 1;55(8):570-2.

17- Kermode M, Jolley D, Langkham B, Thomas MS, Crofts N. Occupational exposure to blood and risk of bloodborne virus infection among health care workers in rural north Indian health care settings. American journal of infection control. 2005 Feb 1;33(1):34-41.

18- Gupta N, Tak J. Needlestick injuries in dentistry. Kathmandu University Medical Journal. 2011;9(3):208-12.

19- Shah SM, Merchant AT, Dosman JA. Percutaneous injuries among dental professionals in Washington State. BMC Public Health. 2006 Dec 1;6(1):269.