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Knowledge, Attitude and Practice of Dentists towards Prophylaxis after Exposure to Blood and Body Fluids

S Shaghaghian¹, S Pardis²,
Z Mansoori³

Abstract

Background: Post-exposure prophylaxis plays an important role in prevention of blood-borne diseases after occupational exposures.

Objective: To evaluate the knowledge, attitude and practice of dentists towards post-exposure prophylaxis.

Methods: In a cross-sectional study, 140 dentists in Shiraz were selected through a systematic randomized sampling. They filled out a self-made questionnaire including 30 knowledge, 4 attitude and 10 practice questions. Mean of knowledge and percentage of various items of attitude and practice were reported.

Results: The mean±SD knowledge score of dentists was 18.5±6.2. Knowledge had a significant relationship with the level of education ($p<0.001$), attending infection control seminars ($p<0.001$), and working in public clinics ($p<0.001$). A total of 63 (43%) dentists believed that immediate washing of the exposed area has no effect on the prevention of hepatitis and AIDS. Of the studied dentists, 13%, 11%, and 34% believed that prophylaxis after exposure to patients' blood had no effect on prevention of human immunodeficiency virus (HIV), hepatitis B virus, and hepatitis C virus infections, respectively. Only 170 (53%) exposed dentists immediately washed the exposed area and only 43 (13.4%) of them evaluated the source patient for risk factors of hepatitis and AIDS.

Conclusion: Knowledge, attitude and practice of dentists working in Shiraz towards post-exposure prophylaxis are not desirable. Interventions to raise their awareness are therefore warranted.

Keywords: Post-exposure prophylaxis; Occupational exposure; Body fluids; Dentists; Knowledge; Attitude; Professional Practice

Introduction

Occupational exposure is defined as contamination of a health care worker (HCW) with patient's blood or body fluids (BBF) during his/her professional practice.¹ These exposures, which are common among HCWs, include sharp

injuries, mucocutaneous contamination, and bites. It is estimated that 385 000 sharp injuries occur in the United States' hospitals annually.¹ These exposures are an important hazard for HCWs because they can result in the transmission of blood-borne pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), and

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¹ Assistant Professor, Department of Dental Public Health, School of dentistry, Shiraz University of Medical Sciences, Shiraz, Iran

² Assistant Professor, Department of Oral and Maxillofacial Pathology, School of dentistry, Shiraz University of Medical Sciences, Shiraz, Iran

³ Undergraduate student, School of dentistry, Shiraz University of Medical Sciences, Shiraz, Iran



Correspondence to Soheil Pardis, DMD, Assistant Professor, Department of Oral and Maxillofacial Pathology, School of dentistry, Shiraz University of Medical Sciences, Shiraz, Iran
Tel/fax: +98-711-627-0325

E-mail: pardiss@sums.ac.ir

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human immunodeficiency virus (HIV).¹ Although avoiding exposures is very important for preventing transmission of the pathogens, post-exposure prophylaxis (PEP) is also an essential element of programs to prevent infection and is important for HCWs' safety.²

PEP includes procedures that should be done after exposure to patients' BBF to prevent probable microorganism transmission.² These procedures include immediate washing of the exposed area; determination of risk associated with exposure; evaluation of the source patient for acquired immune deficiency syndrome (AIDS), HBV and HCV; injection of hepatitis B vaccine and immunoglobulin; consumption of antiretroviral drugs; and evaluation and follow up of the exposed HCW.³ Each of these procedures is indicated under a certain circumstance and several studies have shown their efficacy.^{2,4} The study of Cardo, *et al*, showed that consuming zidovudine after injury with a needle contaminated by HIV-positive patient's blood reduced the risk of HIV transmission by approximately 80%.⁴ After exposure to HBs-Ag⁺ blood, injecting either hepatitis B vaccine or immunoglobulin alone can reduce the risk of HBV infection by nearly 70%, according to the Center for Disease Control and Prevention (CDC) guidelines.²

Dentists are more prone to occupational exposure because of close contact with the patients' oral cavity, using sharp instruments and operating with high speed rotary instruments, which produce infectious aerosols.^{5,6} According to a previous study, 73% of dental students at Shiraz University of Medical Sciences had been injured with a sharp instrument at least once during their clinical practice.⁷ These facts highlight the importance of dentists' knowledge about PEP.

Several worldwide studies have shown inappropriate knowledge, attitude, and practice of HCWs regarding PEP. A study

conducted in Iran revealed unsatisfactory knowledge of medical specialists about occupational transmission of blood-borne viruses.⁸ Similarly, another study mentioned a low level of knowledge among Iranian dentists about the characteristics of HIV infection and its route of transmission.⁹ In London, only 76% of junior doctors were aware that PEP would reduce HIV transmission.¹⁰ In Scotland, 16% of HCWs had not been immunized against HBV, although they were at risk of BBF exposures.¹¹ In Brazil, 44% of dentists after sharp injury and 14% of them after mucosal contamination with potentially infectious fluids investigated whether the source patient was carrier of blood-borne viruses or not, and only 11% of them sought medical care after occupational exposure.¹²

Recently, there is an increasing attention towards occupational hazards in HCWs and in order to reduce the hazards, several protocols and guidelines have been established in developed countries.¹ However, to the best of our knowledge, there is no precise information on the dentists' behavior after BBF exposure in Iran. To enhance the HCWs safety and establish local guidelines, more information is necessary. We therefore conducted this study to assess the knowledge, attitude, and practice of dentists working in Shiraz towards PEP.

Materials and Methods

This cross-sectional study was conducted in Shiraz, the main referral center for patients in southern Iran, from January to April 2012. In this study, 160 dentists were selected based on a list provided by the Oral Health Office of Shiraz University of Medical Sciences. According to the list, 593 dentists were practicing in public and private clinics and offices in Shiraz. We selected one out of three dentists through a systematic random sampling. Undergraduate and postgraduate dental students

For more information on factors influencing compliance with infection control practice in Japanese dentists see www.theijoem.com/ijoem/index.php/ijoem/article/view/298



Table 1: Relationship between dentists' demographic information and their knowledge about post-exposure prophylaxis (n=145)

Demographic information	Frequency (%)	Knowledge Score (Mean±SD)	p value
Sex			
Men	96 (66.2)	18.0±6.4	0.16
Women	49 (33.8)	19.5±5.7	
Level of education			
General Practitioner	123 (84.8)	17.7±6.0	<0.001
Dental Specialist	12 (15.2)	22.9±5.5	
Service Providing Center			
Public Clinic	35 (24.1)	21.1±4.5	<0.001
Private Clinic	14 (9.7)	10.7±1.4	
Private Office	96 (66.2)	18.7±6.3	
Attending infection control seminar			
Yes	55 (37.9)	21.4±4.3	<0.001
No	90(62.1%)	16.7±6.5	
The place of receiving the last educational degree			
Type 1 universities*	102 (70.3)	18.7±6.3	0.635
Type 2 and 3 universities†	43 (29.7)	18.1±6.2	
Years of practice			
Less than 15 years	95 (65.5)	19.3±6.4	0.031
More than 15 years	50 (34.5)	17.0±5.7	

*Type 1 universities are those located in large cities—Tehran, Shiraz, Isfahan, and Mashhad.

†Type 2 and 3 universities include those located in small cities, eg, Hamedan, Kerman, Yazd, etc.

and dentists who were educated abroad were excluded from the study. After the researchers explained the objectives of the study and ensured the dentists regarding the confidentiality of the presented information, 145 dentists consented to participate in the study and filled out the questionnaires through interviewing.

The questionnaire was prepared by evaluating and combining questionnaires of other studies and CDC guidelines.^{2,3,10,12-17} The questionnaire was then reviewed by some dentistry professors affiliated to Shiraz University of Medical Sciences, approving the face validity of the questionnaire. Reliability of the questionnaire was assessed by a pilot study on 30 dentists filling out the questionnaire twice, two weeks apart. The test-retest reliability revealed a Cronbach's α of 0.88. The questionnaire consisted of two parts—one part on dentists' demographic information and another part made up of 30 questions about knowledge, four questions about attitude, and 10 questions regarding practice.

Data were analyzed by SPSS® for Windows® ver 18. The mean of total correct answers to the knowledge questions was regarded as dentists' knowledge score. Likewise, the percentage of each answer to the questions related to the attitude and practice was recorded as the dentists' attitude and practice scores. We evaluated the relationship between the knowledge and dentists' demographic information by *Student's t* test for independent samples and one way ANOVA (followed by Tukey's HSD as the *post hoc* test). *Student's t* test for independent samples was also used to evaluate the relationship between the subjects' knowledge and practice. The relationship between the dentists' attitude and practice with attending infection control seminars was assessed by χ^2 test. A p value <0.05 was considered statistically significant.

Results

Description of the Study Sample

Of 160 dentists invited for interview, 145 accepted to participate in the study (response rate of 90.6%). They included 96 (66.2%) men and 49 (33.8%) women. The

dentists were 123 (84.8%) general practitioners and 12 (15.2%) specialists (Table 1). Although all participants had been vaccinated against HBV, only 97 (66.9%) had checked their level of immunity (all developed acceptable antibody titers).

Dentists' Knowledge about PEP

The mean±SD dentists' knowledge score about PEP was 18.5±6.2 (range: 7–30). There was no significant difference between the male and female dentists in terms of their knowledge (p=0.16), and between that of the dentists graduated from type 1 as compared to types 2 and 3 universities (p=0.635). However, specialists had a significantly (p<0.001) higher level of knowledge than general practitioners. Furthermore, a higher level of knowledge was observed in those dentists who had attended infection control seminars (p<0.001) and those with <15 years of practice (p=0.031) (Table 1).

Dentists' Attitude towards PEP

Nineteen (13.1%) dentists considered PEP ineffective in reducing the risk of acquiring AIDS. Sixteen (11%) and 50 (34.5%) dentists considered PEP ineffective for prevention of HBV and HCV infections, respectively. None of the dentists believed that PEP is completely effective in preventing hepatitis and AIDS (Table 2). Sixty-three (43.4%) dentists believed that immediate washing of the contaminated

TAKE-HOME MESSAGE

- Occupational exposure is defined as contamination of a health care worker (HCW) with patient's blood or body fluids during his/her professional practice.
- These exposures are an important hazard for HCWs because they can result in the transmission of blood-borne pathogens such as hepatitis B virus, hepatitis C virus, and human immunodeficiency virus.
- Dentists are more prone to occupational exposure because of close contact with the patients' oral cavity, using sharp instruments and operating with high speed rotary instruments, which produce infectious aerosols.
- Our study showed undesirable results on dentists' knowledge, attitude and practice towards post-exposure prophylaxis.
- It seems that enhancing the knowledge of dentists is not sufficient for changing their behavior and other interventions should also be considered.

body area with water is ineffective in preventing hepatitis and AIDS. Dentists attending the infection control seminars had a more desirable attitude towards the effectiveness of immediate washing; 47 (85%) of 55 dentists who had attended infection control seminars vs 35 (39%) of 90 dentists who had not attended the seminars believed that immediate washing of the contaminated body area was effective in their prevention (p<0.001).

Table 2: Dentists' attitude regarding the effectiveness of post-exposure prophylaxis (PEP) after sharp injury with contaminated instruments (n=145)

Effectiveness of PEP after sharp injury with contaminated instruments	n (%)				
	None	Low	Moderate	High	Complete
With HIV contaminated instruments	19 (13.1)	104 (71.1)	21 (14.5)	1 (7)	0 (0)
With HBV contaminated instruments	16 (11.0)	66 (45.5)	51 (35.2)	12 (8.3)	0 (0)
With HCV contaminated instruments	50 (34.5)	82 (56.6)	12 (8.3)	1 (7)	0 (0)

Table 3: Dentists' practice after exposure to the patients' blood and body fluids (n=145)

Occupational Exposure	Number of exposures	n (%)					
		Immediate washing	Delayed washing	Topical disinfection	Patients' risk factor evaluation	Patients' screening for HIV, HBV, HCV	Nothing done
Cutaneous contamination by blood	84	52 (62)	31 (37)	3 (4)	3 (4)	2 (2)	2 (2)
Cutaneous contamination by saliva	138	45 (32.6)	90 (65.2)	0 (0)	6 (4.3)	0 (0)	3 (2.2)
Mucosal contamination by blood	11	4 (37)	0 (0)	0 (0)	1 (9)	0 (0)	7 (64)
Mucosal contamination by saliva	9	6 (67)	1 (11)	0 (0)	1 (11)	0 (0)	2 (22)
Sharp injury	79	63 (80)	0 (0)	61 (77)	32 (41)	22 (28)	0 (0)
Total	321	170 (52.9)	122 (38.0)	64 (19.9)	43 (13.4)	24 (7.4)	14 (4.3)

Dentists' Practice regarding PEP

The studied dentists had a total of 321 BBF exposures. However, only a few of them received PEP (Table 3). Immediate washing of the contaminated skin (hand and face) and mucous membranes (eye, nose and mouth) was done by 52 (62%) and 4 (37%) dentists, respectively. Only 4 (5%) dentists evaluated the contaminated skin for any existing erosion, ulceration or dermatitis. Sixty-one (77%) dentists disinfected their skin after sharp injury and 51 (65%) dentists squeezed the injured area to induce bleeding.

Other preventive measures were also performed by only a few dentists. Of dentists who underwent sharp injuries (n=79), only 32 (41%) evaluated the source patient for risk factors of hepatitis and AIDS, and 22 dentists (28%) checked the source patients' HBs Ag or HIV Ab or HCV Ab status. Of those dentists who experienced mucosal contamination with blood (n=11), 7 (64%) did not receive any preventive measures (Table 3).

Of participants, 13 dentists had been injured with sharp instruments contaminated with high risk patients' blood. All of these dentists were vaccinated against HBV after injury, irrespective of their previous state of immunity. However, only seven dentists received hepatitis B immunoglobulin. These 13 dentists were also followed by checking HBs Ag, HIV Ab, and HCV Ab. Nevertheless, only seven of these dentists checked their source patients for these tests. Unfortunately, none of these 13 dentists consumed anti-retroviral drugs.

Thirty-one dentists had been injured with sharp instruments contaminated by blood of unknown source patients. None of them received HBV vaccine, immunoglobulin or anti-retroviral drugs. Besides, only 8 (26%) of them were followed for acquisition of HIV, HCV or HBV.

Relationship between Dentists' Knowledge and their Practice

Dentists' practice after BBF exposures was related to their knowledge about PEP.

Dentists who immediately washed the exposed site after BBF exposures (sharp injury and cutaneous contamination with blood and saliva) had a significantly ($p < 0.001$) higher knowledge level than those dentists who did not. Moreover, the interventions that promote the knowledge improved the dentists' practice. Those who had attended infection control seminars immediately washed the contaminated site after mucosal contamination with blood ($p = 0.007$), cutaneous contamination with blood ($p < 0.001$), and cutaneous contamination with saliva ($p < 0.001$) more often than those dentists who had not attended the seminars.

Discussion

Our study showed undesirable results on dentists' knowledge, attitude and practice towards PEP.

Dentists' Knowledge about PEP

In the current study, we found an inadequate level of knowledge about PEP in the dentists studied. This finding confirmed previous results on the knowledge of HCWs.^{10,13-15} It indicates a need to establish the necessary interventions to increase dentists' knowledge about PEP. Previous studies indicate that educational interventions can increase HCWs' knowledge about PEP.^{11,18} In our study, dentists who had attended infection control seminars had higher levels of knowledge. However, only 38% of them had attended the seminars. These findings show the insufficiency of educational programs for dentists and emphasize dentists' need for more training in PEP. These programs are more necessary for general dental practitioners who had lower levels of knowledge in our study and also in the study conducted by Askarian, *et al.*⁹ Furthermore, our study emphasized that dentists with more years of practice need further education. This may be due

to the fact that infection control was not previously taught in dental schools in Iran. The course has been incorporated in dental school curriculum since a few years ago.

Dentists' Attitude towards PEP

Our study, similar to other studies,^{10,16} showed that the dentists' attitude towards PEP is not pertinent. Of the studied dentists, 43% believed that immediate washing of the contaminated area was ineffective in prevention of hepatitis and AIDS and 13% considered PEP to be ineffective in reducing the risk of acquiring AIDS. In the study conducted by Chen, *et al.*, 3% of junior doctors in London that had potential HIV exposures, did not seek any advice regarding PEP since they thought it was ineffective.¹⁰ Only 61% of the staff of Mulago Hospital in Uganda, believed that PEP could reduce the chance of acquiring AIDS.¹⁶ The dentists' attitude towards PEP can be improved by increasing their knowledge. As our study revealed, 85% of the dentists who had attended infection control seminars (compared to the 39% of those who had not) believed that immediate washing of contaminated area was effective in prevention of hepatitis and AIDS. Although increasing knowledge is effective, it is necessarily not sufficient for lack of a linear correlation between the knowledge and attitude.¹⁹ Therefore, educational strategies that focus on dentists' beliefs and attitude should be instituted to make the dentists realize the importance of PEP.

Dentists' Vaccination against HBV

In our study, all participants had received hepatitis B vaccine. However, only 33% of them checked their antibody titers after vaccination. Other studies also showed similar results. For example, only 60% of Iranian medical specialists⁸ and 89% of African HCWs²⁰ checked their post-vaccination antibody titers. It seems that HCWs

For more information on knowledge, awareness and compliance with universal precautions among health care workers in the West Indies, Jamaica see www.theijoem.com/ijoem/index.php/ijoem/article/view/43



do not realize the importance of checking the antibody titer after vaccination, while this is crucial in making rapid decision after BBF exposure.

Dentists' Practice regarding PEP

The participating dentists did not manage their occupational exposures adequately, according to the CDC guidelines.² CDC highly recommended immediate washing of the exposed area, however, only 62%, and 37% of the dentists immediately washed their blood contaminated skin and mucous membranes, respectively. In a similar study in Brazil, much higher percentage of dentists (98%) washed the exposed areas.¹² In our study, 77% of the dentists who were injured with sharp instruments used topical disinfectant solutions; 64% of them squeezed the injured area to induce bleeding. However, none of these measures is recommended by CDC.²

Almost 5% of the dentists whose skin was contaminated with blood evaluated their skin for abrasions, dermatitis or ulcerations. Only 40% of the dentists who had sharp injuries evaluated the source patient for risk factors of hepatitis and AIDS. None of the dentists who were injured with sharp instruments that had been contaminated with blood of high risk or unknown source patients, consumed anti-retroviral drugs. Other studies also showed inadequate management of occupational exposures. For example, Ayrancy, *et al*, showed that 62% of nurses did not seek any medical assistance after needle stick injuries.²¹ Garci, *et al*, reported that only 11% of the exposed dentists and 3% of the exposed dental assistants sought medical care.¹² In the study of Owolabi, *et al*, only three of 13 HCWs who had exposure to body fluids from HIV-positive patients, received PEP.¹³ Another study showed that although many of the personnel of the surgery ward sustained sharp injury, only 28% of them were ever concerned

with any advice on PEP.¹⁶ Davanzo, *et al*, found that 26%, 40%, and 33% of HCWs of Padua University who were exposed, respectively, to the blood of HBV-positive, HCV-positive, and HIV-positive patients completed their follow-up.²² According to a systematic review, many studies reported that alarming number of dentists and dental personnel did not report their injuries, and thus, failed to engage in an appropriate follow-up program.²³

World Health Organization (WHO) reported that by December 1997, there had been 95 definite and 191 possible cases of occupationally acquired HIV infection among HCWs.²⁴ This finding highlights the need for strategies to change the behavior of HCWs after an occupational exposure. These strategies are of paramount importance for dentists because of the high rate of their exposures. Dental students should be adequately trained in management of occupational exposures during the academic years of their study. Furthermore, infection control authorities should enhance the dentists' knowledge about PEP through conducting regular seminars on infection control. This is recommended because compliance with infection control instructed at dental school may not extend into practice life.²³ Moreover, we found that dentists who immediately washed the exposed areas, compared to their counterparts, had higher levels of knowledge and more likely attended the infection control seminars.

Askarian, *et al*, showed that a large number of dental students' exposures were not followed even though the infection control courses had been incorporated into their dental school curriculum.⁷ Agaba, *et al*, also showed that although the Nigerian family physicians had adequate awareness and good attitude towards HIV PEP, less than 25% of the exposed cases received PEP.¹⁷ Therefore, it seems that enhancing the knowledge of dentists is not sufficient

for changing their behavior and the following interventions are also recommended:

- Guidelines for the management of occupational exposure should be revised according to the local culture of HCWs.
- Posters of PEP guidelines should be available in every dental office for easy access whenever needed.
- Special centers should be established for following up the exposed HCWs and for supervision on PEP managements.
- Dentists should be familiar with the availability of these centers and their facilities to encourage prompt reporting of accidental occupational exposures.
- Dentists should be informed that any delay in reporting their occupational exposure may jeopardize the proper handling of occupational exposure.
- Anti-retroviral drugs and hepatitis B vaccine and immunoglobulin should be available for administration as soon as possible.

One of the limitations of our study was that in evaluating the dentists' practice, we trusted their personal statements, which might be different from their real practice. Moreover, this research was a cross-sectional study and thus suffered from all limitations of this type of the study.

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