

Post-Exposure Prophylaxis: Knowledge and Practice Among General Dental Practitioners in Hamadan, Iran

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Abstract

Background: Proper and timely post-exposure prophylaxis (PEP) after needle stick exposure to high-risk body fluids significantly reduces occupational transmission.

Objectives: This study was conducted with the aim of demonstrating the level of knowledge and practice amongst general dental practitioners in Hamadan city, Iran in 2013 - 14, in terms of prevention after dealing with blood-borne pathogens.

Materials and Methods: In this descriptive cross-sectional study, all general dental practitioners in Hamadan provided information on their preventative approach after dealing with blood-borne pathogens, via a pretested self-administered questionnaire in three parts. The first part consisted of demographic features, the second part (15 questions) demonstrated knowledge level, and the last part (5 questions) measured dentists' practice in terms of prevention after dealing with blood-borne pathogens. Data from the 82 questionnaires was analyzed using SPSS 16 software, Mann-Whitney, and chi-square test ($\alpha = 0.05$).

Results: The mean score of knowledge was 7.9 ± 2.522 (from a possible total score of 15). The lowest and highest scores were 2 and 14. 60.7% of the dentists had trained their staff; 58.8% of them accepted infected patients, and 65.9% had attended a PEP workshop. It was found that, of the demographic features, only gender had a significant correlation with level of knowledge ($P = 0.0001$).

Conclusions: This study revealed a low level of knowledge and practice regarding post-exposure prophylaxis, with the mean score of some respondents being below 50%.

Keywords: Post-Exposure Prophylaxis, Knowledge, Practice, General Practitioners

1. Background

Infection control principles are the first step in the prevention of transmissible diseases such as AIDS and viral hepatitis (1, 2). Based on official statistics released by the Iran health ministry, there are currently 1,200,000 cases of hepatitis B and C and 23,125 cases of HIV in Iran (3). According to a report by the world health organization, 40% of hepatitis B and C cases and 2.5% of HIV cases are a result of occupational contact (4). The costs of these diseases, and lack of a definitive treatment, make prevention the first priority. Unfortunately, despite knowledge of the risk of infection, needle stick injury is inevitable (5). Needle stick injury is defined as penetration of a sharp instrument into the body of a healthcare professional, exposing them to high-risk body fluids of patients (1, 2, 6). Cutaneous injuries are the most common cause of infection transmission from patient to dentist. The causes of such injuries have been reported as 37% from dental burs, 30% from syringes, 6% from orthodontic wires, 3% from suture needles, 1% from blades, and 2% from other sharp instruments (7, 8). Since high-risk exposure is unavoidable, den-

tists should be aware of post-exposure protocols to prevent infection (5). In a study performed by Moshrefian et al. in 2011, the knowledge and practice of dentists regarding HIV post-exposure prophylaxis was found to be insufficient (5). Gupta and Tak, in the same year, reported that dentists had accepted the infection control recommendations and general precautionary measures for HBV and HIV, but did not perform them thoroughly (9).

2. Objectives

Considering the increasing number of HIV and HBV cases, the aim of this study is to evaluate the knowledge and practice of general dental practitioners in Hamadan regarding post-exposure prophylaxis.

3. Materials and Methods

This cross-sectional analytic-descriptive study was conducted from 2013 to 2014. The target population was the general practicing dentists of Hamadan. Based on official information from the Iran medical council, there are

109 private dental offices in Hamadan. The exclusion criterion applied to those teaching at Hamadan dental school; accordingly, nine dentists were excluded from the study. Data was gathered via a structured self-administered questionnaire in three sections; a: demographic information about the dentists, b: their knowledge of the risks of exposure to pathogens (15 questions), and c: their practice in the event of exposure (5 questions). In order to check the validity of the questionnaire, ten oral medicine specialists and surgeons evaluated the questions with respect to the Likert scale.

The test-retest method was applied to check the reliability of the questionnaire. The Spearman rank correlation for grades of knowledge questions at two sessions was 83%; regarding the practice questions, the Kappa correlation was determined as 0.8 to 1 for each question that was suitable, statistics-wise. The questionnaires were passed to the general dentists by a dentistry student; the respondents were assured of the confidentiality of their answers.

In the first part of the questionnaire (knowledge), each question was graded with a positive mark for every correct answer and a zero for every incorrect answer. To enable comparison with other studies, the grades were converted to percentages. In the third part (practice), the score for each question was recorded according to age, gender, and years in practice. Statistical analysis was performed using the 16th version of the SPSS software. According to the Smirnov Kolmogorov test, regarding the normal distribution of knowledge scores, a hypothesis of normality was rejected (P value = 0.006). Therefore, non-parametric Mann-Whitney and Chi-square tests were applied to analyze the data; $P < 0.05$ was considered statistically significant. The results were summarized in frequencies and percentages, and are presented in next section.

4. Results

100 questionnaires were distributed to general practicing dentists; the overall response of the participants was 82%, consisting of 62 (75.61%) male and 20 (24.39%) female respondents. The minimum and maximum ages were 26 and 61, with a mean of 39.39 ± 8.13 . The minimum and maximum years in practice were 1 and 32, with a mean of 12 ± 7.02 . Working hours during the day were at least 2 and at most 16, with a mean of 6.62 ± 2.406 . There were 54 positive histories and 28 negative histories of injuries from sharp instruments and needles. There were 15 questions about knowledge; the mean score in this area among the dentists was 7.9 ± 2.522 . The minimum and maximum scores were 2 and 14. In Table 1, the questions posed in the second part of the questionnaire are listed, along with the percentages of correct and incorrect answers.

For question 8, a significant correlation was noted between the correct answer and the years in practice ($P = 0.04$). In other words, dentists with over ten years' experience had a higher level of knowledge. This correlation was not observed in other questions.

Questions 2 ($P = 0.008$) and 7 ($P = 0.024$) had a significant correlation with history of injury. Dentists with a positive history of injury gave more correct responses to question 7; they also gave the most correct answers to question 5 (47 out of 54 dentists), but the least correct answers to question 11 (only two). Dentists with a negative history of injury gave more correct responses to question 3. They also gave the most correct answers to question 5 (22 out of 28 dentists) and the least correct answers to question 11 (1 out of 28 dentists). A significant correlation was found between gender and questions 1 and 2 ($P = 0.001$); for both, males gave more correct responses. In fact, the most and least correctly answered questions by men were 5 (52 out of 62) and 11 (2 out of 62). The trend among female dentists was different. For them, the most correctly answered questions were 5 and 7 (17 out of 20) and the least was number 11 (only one correct answer).

The knowledge scores showed a significant correlation with gender in that males had a higher knowledge level ($P = 0.005$).

There was no significant correlation between working hours and needle injury ($P = 0.16$), while dentists with more years in practice had a greater history of injury (29 out of 40).

To evaluate practice, the following issues were surveyed: nurses' training, acceptance of infected patients, and attendance at preventative training programs.

The frequency of answers to the practice questions is shown in Table 3.

As it is shown in Table 4, most of the dentists had trained their nurses in the necessary precautions (74 dentists). 48 of them accepted infected patients, and 54 had attended a workshop for PEP.

A significant correlation was noted between question 1 and years in practice ($P = 0.007$). Dentists with more experience had trained their nurses. Questions 2 and 3 showed significant correlations with age and years in practice ($P = 0.038$).

5. Discussion

This study surveyed knowledge and practice toward PEP for HIV, HBV, and HCV in Hamadan city. The results revealed that dentists' knowledge score was less than 50%, which was in concordance with other surveys (5-7, 10-12). This may be due to insufficient training, both at universities and in retraining programs post-graduation. Other

Table 1. Frequency of the Answers in the Area of Knowledge of Post-Exposure Prophylaxis

| Knowledge Questions | Number | Correct Percentage | Number | Incorrect Percentage |
|--|--------|--------------------|--------|----------------------|
| 1. Which of the following infections is most easily transmitted after needle stick injury: HBV, HCV, or HIV? | 40 | 48.5 | 42 | 51.2 |
| 2. How high is the risk of HIV transmission after needle injury? | 57 | 69.5 | 25 | 30.5 |
| 3. How high is the risk of HBV transmission after needle injury? | 23 | 28 | 59 | 72 |
| 4. How high is the risk of HCV transmission after needle injury? | 44 | 53.7 | 38 | 46.3 |
| 5. Which one is not considered "high-risk" in terms of blood-borne transmission? | 69 | 84.1 | 13 | 15.9 |
| 6. What is the prescribed serologic test in HIV patients? | 57 | 69.5 | 25 | 30.5 |
| 7. What is the screening test for HBV? | 62 | 75.5 | 20 | 24.4 |
| 8. What is the screening test for HCV? | 31 | 37.8 | 51 | 62.2 |
| 9. What is the minimum protective level of Anti-Hbs in vaccinated personnel? | 25 | 30.5 | 57 | 69.5 |
| 10. What is the first step after being injured by a sharp instrument contaminated by a questionable patient? | 60 | 73.2 | 22 | 26.8 |
| 11. What is the most appropriate PEP time for HIV? | 3 | 3.7 | 79 | 96.3 |
| 12. What is the PEP protocol for a vaccinated professional with a protective level of Anti-Hbs? | 50 | 61 | 32 | 39 |
| 13. What is the PEP protocol for a vaccinated professional with a non-protective level of Anti-Hbs? | 53 | 64.6 | 29 | 35.4 |
| 14. How long does it take to detect the Ab after being injured by sharp instruments used on an HIV-infected patient? | 55 | 67.1 | 27 | 32.9 |
| 15. Where would you report to in the event of being injured by contaminated instruments? | 19 | 23.2 | 63 | 76.8 |

studies have mentioned factors such as the ignorance of occupational risks, lack of experience, and fatigue due to heavy workload (13). Kadeh et al. attained mean scores for dentists' knowledge, attitude, and practice as 51.45 ± 3.16 out of 63, 20.22 ± 3.74 out of 39, and 64.41 ± 4.49 out of 72, respectively (6). The current study indicates that 68.8% of respondents had a history of injury, and 29 out of 40 who worked more than six hours per day mentioned at least one injury from sharp instruments; this number was 23 for those working under six hours. While there was no significant statistical correlation between these two groups, the result was different from that of other studies (14). The knowledge score was higher in dentists aged over 35 than in their younger counterparts, but again this difference was not significant. It has been highlighted that such a result is due to over-35s having attended more retraining programs; this emphasizes the importance of regular practice updates in high risk occupations. In Chogle et al.'s and Moshrefian et al.'s studies, dentists under 35 had higher knowledge (5, 14), but Diprose et al. was in agreement with the current study (15). A previous history of injury showed a positive effect on knowledge in our study. Chen et al. reported the same result in England (16). Regarding knowledge questions, dentists answered more HIV and HCV questions correctly than HBV questions. 48.8% of the investi-

gated population were aware of the higher possibility of HBV transfer through needle stick, rather than HIV and HCV.

In Moshrefian et al. research into 103 dentists in Kerman, similar results were reported: 70.9% believed that HBV is transferred more easily than HIV (5). However, Esmaeeli's study differed from ours on this point. In his study on 150 general practitioners in Tehran, only 31% made the above comment (5). Kabir et al. reported that concerns about being infected with HBV and HCV were held by 69.4 ± 2.1 and 76.3 ± 2 out of 100, respectively (7). They did not look at HIV, which may be due to more training programs and information in Kerman. In the current study, the knowledge scores in the field of transmission after needle injuries for HIV, HBV, and HCV were 69.5%, 28%, and 53.7%, respectively. For HIV, this score was 20.4% in Moshrefian et al. study and 20% in Chogle et al.'s study, which are both lower than in our study. This fact implies that training and information programs in Hamadan have improved dentists' knowledge of HIV. Another noteworthy finding in our study was the overestimation on the part of 40% of the dentists for the transmission probability of HIV and HCV, while for HBV, this possibility was underestimated. This could be due to vaccination against HBV, and the lack of any vaccine for HCV and HIV, leading to greater concerns about

Table 2. Shows the Correlation Between Knowledge and Demographic Features

| Variables | Results of Mann-Whitney Test | | | |
|------------------------------|------------------------------|-----------|-------------------|---------|
| | Mean | Deviation | Mean of Knowledge | P Value |
| Age | | | | 0.006 |
| ≤ 35 | 39.88 | 2.533 | 7.62 | |
| > 35 | 42.65 | 2.525 | 8.08 | |
| Sex | | | | 0.005 |
| Male | 45.65 | 2.428 | 8.32 | |
| Female | 28.62 | 2.415 | 6.60 | |
| Years in Practice | | | | 0.523 |
| ≤ 10 | 38.55 | 2.577 | 7.73 | |
| > 10 | 41.87 | 2.540 | 8.06 | |
| History of Injury | | | | 0.123 |
| No | 35.93 | 2.539 | 7.18 | |
| Yes | 44.39 | 2.453 | 8.28 | |
| Working Hours Per Day | | | | 0.255 |
| ≤ 6 | 37.58 | 2.458 | 7.8 | |
| > 6 | 43.42 | 2.594 | 8.3 | |
| Hand | | | | 0.935 |
| Left | 42.25 | 2.787 | 8.17 | |
| Right | 41.44 | 2.519 | 7.88 | |

Table 3. Frequency of Answers with Respect to Years in Practice

| Questions | ≤ 10 Years in Practice | | > 10 Years in Practice | | P Value |
|-----------|------------------------|-----------|------------------------|-----------|---------|
| | Correct | Incorrect | Correct | Incorrect | |
| 1 | 17 | 16 | 22 | 25 | 0.678 |
| 2 | 25 | 8 | 30 | 17 | 0.257 |
| 3 | 10 | 23 | 12 | 35 | 0.638 |
| 4 | 15 | 18 | 28 | 19 | 0.212 |
| 5 | 25 | 8 | 43 | 4 | 0.064 |
| 6 | 21 | 12 | 35 | 12 | 0.298 |
| 7 | 23 | 10 | 37 | 10 | 0.359 |
| 8 | 8 | 25 | 22 | 25 | 0.040 |
| 9 | 12 | 21 | 13 | 34 | 0.408 |
| 10 | 25 | 8 | 34 | 13 | 0.732 |
| 11 | 2 | 31 | 1 | 46 | 0.566 |
| 12 | 20 | 13 | 29 | 18 | 0.921 |
| 13 | 19 | 14 | 33 | 14 | 0.243 |
| 14 | 24 | 9 | 31 | 16 | 0.520 |
| 15 | 9 | 24 | 9 | 38 | 0.392 |

Table 4. Answers to the Practice Questions

| Questions | Answers | Number | Percentage | Number | Percentage | Number | Percentage |
|--|---------|--------|------------|--------|------------|--------|------------|
| Have you ever attended a PEP training program? | Yes | 8 | 9.8 | 34 | 41.5 | 28 | 34.1 |
| Do you accept HIV/HBV/HCV patients? | No | 74 | 90.2 | 48 | 58.8 | 54 | 65.9 |
| Have you trained your nurses in the PEP protocols? | Total | 82 | 100 | 82 | 100 | 82 | 100 |

their transmission. As a result, 41.5% of dentists expressed a degree of unwillingness toward accepting infected patients. In the current study, 75.6% named Hbs-Ag as the screening tool for HBV, which was similar to Kakooee's result of 78.6% (17). While previous studies had not reported dentists' knowledge of the screening test for HCV, in the current study, 37.8% mentioned this test. The lack of a vaccine and definitive treatment for HCV adds to the necessity of training. Despite the low knowledge of HCV, 69.5% of respondents mentioned HIV-Ab through the ELISA test as the screening test for HIV. In Moshrefian et al. study, 56.3% of the dentists mentioned the necessity of prophylaxis for the prevention of HIV (5). Chogle reported that 42% of the dentists named Zidovudin as the prophylactic medicine (14). Although the HIV knowledge score in the current study was higher in earlier reports, it is still necessary to upgrade post-exposure prophylaxis. In our study, 30.5% of the participants knew that the post-vaccination protective level of HBV-Ab is 10 mIU/mL (18). As vaccine immunogenicity is 96%, it is wise to check the Ab level after being vaccinated (17). In Kabir et al.'s study, 60% of the investigated population had checked their hepatitis B surface antibodies (anti-HBs) and 83.8% were positive (7). Kakooee reported that more than half of the participants in her study (56.4%) had not checked their Ab titre. Other studies had similar findings. Geramipناه reported that among 97.9% of the vaccinated dentists, only 56.9% had checked their Ab titre (18). In Paul's study, this figure was 56.25% (54 out of 96 vaccinated dentists) (19). 43% of the dentists in Song's study had no idea about their Anti-Hbs condition (20). These researchers concluded that despite the general acceptance of vaccination, dentists had insufficient knowledge of the importance of serological tests after vaccination (19-21). The current study attained similar results; not only did respondents not know their Anti-Hb titre, they were also unable to analyze the results of the serological tests. 70% of the dentists in the current study did not know the minimum protective level of antibodies. Therefore, retraining programs must be held at dental faculties. Dentists aged over 35 had better practice regarding Ab titres than those under 35, which implies that retraining programs have been useful. Another hypothesis is that the elderly may be more conservative regarding self-

healthcare; Kakooee came to the same conclusion (17). 73% of participants correctly answered the question on the first step of post-exposure prophylaxis (43 out of 54 with a positive needle injury history and 17 out of 28 with a negative history). Although a positive history of injury did not cause a statistically significant difference, it seems that such an experience motivates dentists to learn practical solutions following injury. In contrast to our study, Moshrefian et al. (43.6%) and Kakooee (52%) reported lower knowledge (5, 17). In our survey, 3.7% of participants had correct knowledge of the proper time for post-exposure prophylaxis for HIV. In other studies, different results have been reported, such as 36.9%, 64%, 15%, and 71% (5, 15, 16, 22). Post-exposure prophylaxis should be started within one hour and continued for at least four weeks (9). It is crucial for dentists to remember that, even 72 hours after injury, prophylaxis is still efficient (23). Only 23% of dentists knew which therapeutic centers in their city handle issues of post-exposure prophylaxis; therefore, it is important to educate both dentists and other healthcare providers on this issue. Such injuries should be reported to these centers for proper follow-ups and reduction of transmission risk.

A significant proportion of respondents was found to have inadequate knowledge and practice regarding post-exposure prophylaxis. Therefore, formal retraining programs and a 24 hour PEP center must be included in the health ministry's policy. New strategies must also be considered to decrease the risk of occupational exposure for healthcare providers.

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Footnotes

Authors' Contribution: Study concept and design: Poorandokht Davoodi, acquisition of data: Maryam Torkaman, analysis and interpretation of data: Shahrbanoo Radi, drafting of the manuscript: Mina Hamian, critical

revision of the manuscript for important intellectual content: Mina Hamian, statistical analysis: Nasrin Rafieian, administrative, technical, and material support: Shahrbanoo Radi, study supervision: Poorandokht Davoodi and Nasrin Rafieian.

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