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Study of Knowledge, Attitude and Practice of Dentists and Dental Assistants about HIV Infection and Dentists' Knowledge of Oral Manifestations of HIV

Maryam Dehghanian [a] **Simin Tahmasbi** [b]*

[a] Department of Health Services Management, Sh.K.C, Islamic Azad University, Shahrekord, Iran.
[b] Department of Nursing, Sh.K.C, Islamic Azad University, Shahrekord, Iran

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***Corresponding Author:**
Simin Tahmasbi

Email:
tahmas.s2004@gmail.com

Tel:+98 09133814926

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ABSTRACT

Background: HIV/AIDS can be transmitted in healthcare settings including dentistry. Therefore, specific strategies are necessary to prevent its spread. This study aims to examine the for Knowledge Attitude and Practice of dentists and dental assistants regarding HIV infection and their knowledge of the oral manifestations of AIDS in public and private dental centers in Shahrekord.

Methods: A cross-sectional survey was conducted in 2021 in Shahrekord, Iran, involving 108 dentists and 104 dental assistants through a census sampling method. Data were collected using validated questionnaires assessing knowledge, attitude, and performance regarding HIV/AIDS, as well as awareness of oral manifestations. Data analysis was performed using SPSS software, version 20

Results: According to the results, the mean scores for Knowledge Attitude and Practice of dentists were 16.18 ± 2.06, 53.73 ± 7.19, 70.04 ± 5.13, respectively. The average knowledge, attitude, and practice scores for dental assistants were 14.77 ± 2.1, 50.2±6.10, and 62.96 ± 5.11. There was no significant relationship between the knowledge and practice of dentists and dental assistants regarding HIV infection.($P > 0.05$). However, there was a significant relationship between dentists' knowledge of HIV infection and their knowledge of oral AIDS manifestations ($p < 0.001$). Conversely, no significant relationship was found between dentists' attitudes and practice and knowledge of oral AIDS manifestations ($p < 0.05$). Among the demographic data, only the age and work experience of dentists with knowledge of AIDS were significant ($p < 0.05$).

Conclusion: The knowledge of dentists and dental assistants regarding AIDS is moderate, emphasizing the need for continuous training. Dentists scored higher in knowledge, attitude, and practice compared to dental assistants. However, the lack of a significant relationship between knowledge and practice suggests that theoretical education alone is insufficient, highlighting the importance of practical training.

Keywords: Knowledge, Attitudes, Practice, Dentists, Dental Assistants, HIV, Oral Manifestations, Private Practice, Health

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Introduction

Human immunodeficiency virus (HIV) infection is a global public health concern worldwide. Disease control has improved dramatically in recent years. In 2021, there were approximately 38.4 million people worldwide with HIV (*Global Statistics*, 2023). Of these, 36.7 million were adults and 1.7 million were children, which claimed 40.1 million lives thus far(*HIV*, 2023). According to the latest estimates (2023), approximately 46,000 individuals are living with HIV in Iran, with 2,800 new infections reported in that year. The mode of transmission has shifted from predominantly injection drug use to sexual transmission. Between 2022-2023, Iran expanded HIV treatment, testing, and prevention services, procuring an estimated 1.75 million rapid HIV test kits and 3.3 million condoms to drive prevention (UNAIDS, 2023).

HIV spreads in a variety of ways, including unprotected sexual intercourse, contaminated needles (mainly concerning health care staff), tissue donation, and vertical transmission (Abiadh et al., 2022). People with HIV may suffer from various problems in the head and neck areas, including ears, nose, neck, and mouth. The highest prevalence (94%) was associated with oral lesions (Bakhshaee et al., 2014).

All types of oral lesions were observed in HIV-positive patients. These lesions include dry mouth, oral candidiasis, hairy leukoplakia, periodontal diseases, Kaposi sarcoma and linear gingival erythema(Tarozzi et al., 2024). Oral lesions are one of the first signs of HIV infection, which predicts the progression of the infection and its transformation. All health-related professionals should have sufficient knowledge about the oral manifestations of AIDS (Lomelí-Martínez et al., 2022). Early diagnosis and appropriate treatment of oral lesions play an important role in the general health of patients in a way that can significantly reduce death rate(Getawa et al., 2021).

The highest prevalence of blood-borne diseases has been reported among dentists, nursing staff, dialysis unit staff, laboratory staff, and physicians (Rostamzadeh et al., 2018). Dentists are influenced more by different infections. Healthcare centers such as dental clinics lack effective infection control practices(Rostamzadeh et al., 2018).

If healthcare workers do not use proper infection control methods, they would be endangered by HIV infection from patients and vice versa(AlMuzaini et al., 2015). Therefore, the adequacy of dental healthcare workers in maintaining appropriate infection control levels is vital. They are also involved in daily dental procedures (Golkari et al., 2020).

Several studies have investigated the principles of infection control among dentists(Khanghahi et al., 2013; Sufiawati et al., 2021), nurses (Boakye & Mavhandu-Mudzusi, 2019) and students (Tarkang et al., 2019). The results of these studies showed poor knowledge of the dentists' principles of infection control. Studies have also shown that approximately 90% of HIV infections among healthcare workers occur in developing countries, where professional safety is a neglected issue (Ji et al., 2022; Kassa et al., 2016; Saadeh et al., 2020). Research on knowledge and performance of HIV/AIDS among dental healthcare workers is limited or outdated(AlMuzaini et al., 2015; Kitaura et al., 1997). It was confirmed that the knowledge and performance of dental assistants were moderate and good, respectively, (Naghsh, 2018) .However, invasive procedures in dentistry can prepare a pathway for HIV transmission(Prabhu et al., 2014).

Knowledge, attitude, and practice of dentists and dental assistants are prerequisites for effective preventive interventions. Therefore, this study aims to investigate knowledge, attitudes, and practices of dentists and dental assistants regarding HIV infection and dentists' knowledge of oral manifestations of AIDS in public and private dental centers in Shahrekord, Iran.

Methods

This was a cross-sectional and analytical study conducted in Shahrekord, Iran. A total of 108 dentists and 104 dental assistants from both public and private sectors were included in the study

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using a census sampling method. Dental assistants play a critical role in supporting dentists by preparing patients, sterilizing instruments, assisting during procedures, taking dental impressions, and educating patients about oral hygiene. The inclusion criteria were a minimum of six months of work experience in a dental clinic and willingness to participate, while the exclusion criteria were incomplete questionnaires or unwillingness to participate. Data were collected using a researcher-made questionnaire developed by Jafari et al (2021). The questionnaire consisted of three parts. The first part included demographic questions about age, sex, marital status, work experience, and work type. The second part consisted of 45 questions, with 7 questions related to knowledge about the HIV virus, 17 questions about attitude, and 21 questions about practice. Participants responded to these questions using a 5-point Likert scale ranging from "completely agree" to "completely disagree." The scores for knowledge, attitude, and practice ranged from 3-21, to 17-85, and 21-105, respectively. The questionnaire's reliability was confirmed with Cronbach's alpha of 0.72 (Jafari et al., 2021).

In addition, this study assessed oral lesion demonstrations of AIDS using a researcher-made questionnaire developed by Omidpanah and Salehi. This questionnaire consisted of 28 yes/no questions, with scores ranging from 0 to 28(Omidpanah & Salehifar, 2015). Data analysis was performed using SPSS (version 20). Descriptive statistics such as numbers, percentages, means, and standard deviations were used to present the data. Normal distribution of the data was assessed using the Kolmogorov–Smirnov test. Spearman correlation coefficients, Mann–Whitney U test, and Independent T Test were used for data analysis. A two-tailed probability value of $P < 0.05$ was considered statistically significant.

Results

A questionnaire was distributed to dentists and dental assistants at public and private dental centers. It includes the dimensions of knowledge, attitude, and practice. Additionally, a separate questionnaire on oral manifestations of AIDS was also distributed. The response rates for the dentists' self-reports and dental assistants were 95%and 97%, respectively. In terms of demographic information, 63.6% of dentists and 97.1% of dental assistants were male and female, respectively. Additionally, the majority of dentists (45.7%) and dental assistants (39%) were within the age range of30-39. Furthermore, a significant proportion of dentists (69.8%) and dental assistants (51%) were married. Finally, the majority of the dentists (28.9%) and dental assistants (55.4%) had 1-4 years of work experience.

Table 1 shows that 63.6% of dentists were male and 97.1% of dental assistants were female. The majority of both dentists (45.7%) and dental assistants (39%) were within the age range of30-39 (Table 1).

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Table 1. Socio-demographic characteristics of dentists and dental staff

	Participants		N (%)
Sex	Dentists	Male	68(36.4)
		Female	39(63.6)
	Dental assistants	Male	3(2.9)
		Female	101(97.1)
Age (year)	Dentists	20-39	69(65.7)
		40-59	24(32.4)
		More than 60	2(1.9)
	Dental assistants	20-39	94(94)
		40-59	6(6)
		More than 60	0
Marital Status	Dentists	Single	31(29.3)
		Married	74(69.8)
	Dental assistants	Single	53(51)
		Married	51(49)
Work experience (year)	Dentists	1-9	53(54.7)
		10-19	20(20.6)
		20-29	18(18.5)
		More than 30	6(6.2)
	Dental assistants	10-19	64(86.5)
		20-29	8(10.8)
Education	Dentists	General	82(76.6)
		Specialty	25(23.4)
	Dental assistants	High school diploma	39(38.3)
		BS	57(55.8)
		MS	6(5.9)

Table 2 presents the mean scores according to participant type. Dentists showed low scores for oral manifestations of AIDS, but high scores for knowledge, and moderate scores for attitude and practice. Dental assistants also showed moderate scores for KAP (Table 2). The Kolmogrov-Smirnof test was used to assess normal distribution. However, the scores of the KAP questionnaire for AIDS among dentists and dental assistants did not have a normal distribution. Therefore, non-parametric tests were used for this category of questionnaires (Table 2).

Table 2. Mean and standard deviation of knowledge, attitude, and practice of the participants and oral manifestation of AIDS

Participants		Mean ±SD	Level	Min-Max
Dentists	Oral manifestation	7.12±3.43	Low	1-14
	Knowledge	16.18±2.06	High	10-21
	Attitude	53.7±7.19	Moderate	44-63
	Practice	70.04±5.13	Moderate	57-85
Dental assistants	Knowledge	14.77±2.11	Moderate	9-19
	Attitude	50.2±6.10	Moderate	40-54
	Practice	62.96±5.11	Moderate	54-82

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There are no significant differences in the knowledge, attitude, and practice of dentists. However, there is a significant difference in knowledge and practice of dental assistant dentists between public and private centers (Table 3).

Table 3. Mean score of knowledge, attitude and practice of dentists in private and public enters

KAP		Knowledge			Attitude			Practice		
		Mann-Whitney U								
	Centers	Mean rank	Sum of ranks	P-value	Mean rank	Sum of ranks	P-value	Mean rank	Sum of ranks	P-value
Dentists	Public	31.30	475.500	0.89	51.65	-1.51	0.12	33.04	501.000	0.87
	Private	34.84			56.36			33.78		
Dental assistants	Public	37.93	202.500	0.012	50.23	-1.60	0.17	41.20	396.500	0.03
	Private	56.59			55.30			49.41		

Table 4 shows a positive correlation between dentists' knowledge and their practice regarding HIV oral manifestations, as determined by the Spearman test. Specifically, the correlation for knowledge was significant (p = 0.001), while the correlation for practice was also significant (p = 0.039) (Table 4).

Table 4. Relationship between KAP and AIDS oral manifestations in dentists

	Knowledge		Attitude		Practice	
	r	P	r	P	R	P
Oral manifestations of AIDS	0.366	0.001	0.045	0.61	0.199	0.039

P > 0.05

Among the demographic variables, no significant differences were found in dentists' and dental assistants' knowledge and practice regarding HIV based on gender or marital status (p > 0.05). However, age (p = 0.013) and dentists' professional experience (p = 0.023) were significantly associated with HIV/AIDS knowledge.

Discussion

In this study, it was found that regardless of job category, sex, marital status, or workplace (private or public), dentists showed moderate scores in attitude and practice, and high scores in knowledge. In contrast, dental assistants scored moderately in all three areas of the KAP. However, a significant difference was observed in the knowledge and practice of dental assistants between public and private centers. Overall, there was a positive correlation between dentists' knowledge and practice regarding the knowledge of oral manifestations of HIV.

Knowledge

In this study, dentists' knowledgewas consistent with findings from other studies(Prabhu et al., 2014). However, other studies indicated a poor level of HIV/AIDS knowledge among dentists(Abiadh et al., 2022).Lee et. al. discovered that 63% of the participants had little to no knowledge of standard precautions (Lee et al., 2017). In a study conducted in Sanandaj, researchers found that only 16% of the dentists adhered to standard precaution guidelines (Rostamzadeh et al., 2018). These results strongly support the need for a separate course for dentists to acquire theoretical and practical knowledge for treating patients with bloodborne diseases, such as HIV/AIDS. On the other hand, it is possible that dentists may be concerned and cautious when treating HIV patients, but they may not prioritize understanding how HIV/AIDS is transmitted or dedicating enough time to enhance their

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knowledge in this area.

Dental assistants had a moderate level of knowledge about HIV. The level of knowledge was considerably higher among the caregivers in the public dental centers compared to caregivers in private centers. Health workers ought to be alert about the fact that HIV could be transmitted by injuries caused by sharp dental devices, such as needles or scalers, in case the latter are contaminated with an infected patient's blood. Therefore, the protocols should be followed accordingly. In one study in dental hospitals in Kuwait University Dental Center (KUDC) and clinics of Ministry of Health (MOH) in Kuwaiti, the authors found that dental assistants at KUDC had significantly more knowledge about HIV/AIDS than their counterparts at MOH centers (AlMuzaini et al., 2015). This finding differs from that of the current study. This difference can be attributed to different settings and protocols used in dental clinics in Kuwait. KUDC primarily addresses complicated cases and requires less specific information.

A study found that Pakistani dental assistants had limited knowledge in most areas of dental asepsis in the workplace (Mahdi et al., 2021). This raises concerns regarding infection control and cross-infection practices in dental settings which revealed that dental assistants in private dental clinics in Kelantan have limited knowledge of certain aspects of infection control (Abas, 2022). In Gorgia, only 37.3% reported being well informed on infection control guidelines, indicating a need for continuous HIV professional education to improve the quality of care provided to HIV-infected patients(Kochlamazashvili et al., 2018).

Overall, different levels of knowledge presented in international research can be accounted for by the impact of different media sources (TV, social networks, etc.), healthcare systems, and education programs varying from country to country. Curricula in medical and dental schools, professional development, public health courses, and work policies shape the knowledge of HIV transmission and prevention among healthcare workers.

Attitude

According to Miriam Webster, the definition of 'attitude' is a mental position or a feeling or emotion towards a fact or state. Additionally, the theory of planned behavior has established a strong connection between people's attitudes and their actions (referred to as the link between KAP). In this study, the authors observed that dentists and dental assistants had a moderate attitude towards HIV/AIDS infections, which is consistent with previous research (Abiadh et al., 2022; Sufiawati et al., 2021). However, studies have reported different results(Singh et al., 2022).

This difference could be attributed to several factors. These factors may include variations in the samples, such as differences in age and population size of the cities where the studies were conducted (e.g., Tehran, Shiraz versus Shahrekord)(Askarian et al., 2006).

Additionally, differences in educational backgrounds of the participants (e.g., dentists versus dental students)(Abiadh et al., 2022; Khanghahi et al., 2013), as well as cultural disparities across different countries(Fonseca et al., 2023), could also contribute to the variation observed. Furthermore, the frequency of AIDS-related education through media channels might play a role in the differences observed (e.g., the Islamic Republic of Iran versus Japan, where there is a 94% rate of AIDS-oriented education through television)(Giuliani et al., 2023).

Practice

In this study, the practice scores of dentists and dental assistants were found to be at a moderate level, which is consistent with the results of other studies(Dhanya et al., 2017).In contrast, in a study conducted in Iraq, certain deficiencies in infection control practices among dentists were reported, which were much lower than those reported in other developing countries(Al-Sandook et al., 2010). In a study in Tehran, 85.3% of the dentists refused to admit patients with HIV/AIDS. Of

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these, 78.6% referred to patients elsewhere for treatment, while 20 (6.7%) refused to refer to them (Khosravanifard et al., 2012). By contrast, In a study conducted in Zahedan, dentists achieved an optimal average practice score of 95%(Kadeh et al., 2014). This difference may be attributed to the infection control training in recent years.

While dentists' willingness to treat patients with HIV/AIDS can be influenced by their level of knowledge, it is important to note that this is not the sole factor determining their decision (Sufiawati et al., 2021).

The current study found a significant difference in the knowledge and practice of dental assistants between public and private centers.

Dental assistants play a crucial role in daily dental procedures, making it essential for them to be well versed in infection-control methods to minimize the risk of transmission to patients in a healthcare setting. In Japan, a study carried out in 1997 found that more than 90% of dental healthcare workers who participated expressed a need for further education on HIV, particularly regarding its prevention and transmission (Kitaura et al., 1997).

According to the dentists who participated in the current study, there was a positive correlation between knowledge of oral manifestations of HIV and their level of knowledge and practice. However, the level of knowledge of oral manifestations of HIV/AIDS among dentists varies by region. Several studies have found that most dentists have a good level of knowledge, positive attitudes, and appropriate behaviors towards HIV/AIDS (Yashoda et al., 2019). In another study, a study on Iranian dental students revealed that nearly 90% of them were aware of oral lesions in HIV-positive patients. (Mohamadi et al., 2020). In contrast, dentists' knowledge regarding oral manifestations of HIV in Shiraz was surprisingly low(Askarian et al., 2006). A study conducted in South Africa, where HIV/AIDS is highly prevalent, found a need for comprehensive training on the diagnosis and management of HIV-related oral lesions, including training for other healthcare professionals such as nurses and community health workers (Ramphoma & Naidoo, 2014).

The present study found no significant differences in dentists' and dental assistants' knowledge and practice regarding HIV based on gender or marital status. This was while age and dentists' professional experience were significantly associated with HIV/AIDS knowledge. A study in Tunisia identified a high negative correlation between HIV knowledge and age among dentists which implies that knowledge reduces with aging. Additionally, dentists with less than five years of experience had a higher score on knowledge (Besbes Amira, 2022). Another study in **Indonesia** showed that years of experience were a factor influencing dentists' HIV-related knowledge, which is also consistent with the study's findings(Saruksuk Astri Suryani Pasaribu, 2024). On the other hand, some studies have documented gender variations.

Future research should address the limitations of self-reported data, while elaborating on the efficacy of various educational interventions in improving KAP among dental professionals.

Conclusion

This study highlights moderate KAP level on HIV/AIDS knowledge, attitudes, and practices among Shahrekord dentists and dental assistants. While important, it is notable that the knowledge level among dentists was very high, and their attitudes and practices are only medium according to the KAP scores, as it is with dental assistants. This study also points out important differences between public and private centers regarding the knowledge and practice of dental assistants. There is a positive correlation between knowledge of oral manifestations of HIV and practice among dentists. In view of the fact that dental professionals play a key role in the prevention of HIV transmission within healthcare settings, it is necessary that appropriate knowledge and skill enhancement among them be supported through focused training programs. This would support not only good infection control practices but also the delivery of quality care to patients. Future research should

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address these limitations of self-reported data, while elaborating on the efficacy of various educational interventions in improving KAP among dental professionals.

The strengths of this study include the meticulous selection of the design and methods to facilitate replication. Nonetheless, it is crucial to acknowledge that the data collection process relied on the participants' self-reporting. Therefore, the authors cannot provide absolute assurance regarding the accuracy of the responses as there could have been a social desirability bias. Moreover, the authors had no control over who completed the forms or sought further information owing to their limited knowledge.

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Conflicts of Interest

The authors declared no conflicts of interest in this study**.**

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Ethical considerations

Measures were taken to ensure that ethical issues were observed in this research from the finding stage to the later stages. This involved assuring participants of their rights to give informed consent, explaining matters pertaining to the study, seeking permission from necessary authorities for sampling, observing privacy and/or anonymity of the participant's information and correctly reporting the outcomes.

Code of ethics

IR.IAU.FALA.REC.1399.026

Authors' Contributions

M.D and S.T implemented the study; S.T devised methodology; M.D collected data; M.D analyzed data; S.T wrote the original draft; S.T did the review and editing; M.D found the resources, and S.T did the supervision.

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