

A Study of Knowledge, Attitude, and Performance of General Dentists on AID, A Case Study of Bushehr Province

Mohammad Akhounzadeh Haghighi,

Assistant Professor, Department of Dentistry, Faculty of Dentistry, Bushehr University of Medical Sciences, Bushehr, Iran.

Sahel Ramezani*,

Department of Dentistry, Faculty of Dentistry, Bushehr University of Medical Sciences, Bushehr, Iran. E-mail: Sahelramzani1994@gmail.com

Farzin Nikoopour Deylami,

Department of Dentistry, Faculty of Dentistry, Rafsanjan University of Medical Sciences, Kerman, Iran.

Abstract--- Introduction: It needs to end this epidemic with a collective effort after 4 decades since the start of human immunodeficiency virus (HIV) infection. In this regard, dentists play a vital and effective role in preventing new infections and improving the health of people with HIV. This study aims to determine the level of knowledge, attitude, and performance of general dentists on AIDS in Bushehr province.

Materials and Methods: This study is a descriptive and analytical cross-sectional research that was conducted in 2017-2018. A questionnaire study was developed in two parts: demographic information and knowledge, attitude and performance questions, and its validity and reliability were checked and confirmed. A total of 106 general dentists in Bushehr province were sampled by the Clustering method. The data were analyzed using IBM SPSS Statistics 24 and descriptive statistics (mean and standard deviation), and inferential statistics (t-test, ANOVA, correlation coefficient, etc.).

Findings: In this study, the average score of dentists was 2.37 ± 2.25 (in the range of 1-3), the average attitude score was 2.30 ± 5.0 (in the range of 1-5), and the average performance score was 2.64 ± 25 (range 1-3) was obtained. Almost 58.4% did not accept the treatment of HIV-infected patients, even though most dentists believed in the professional and ethical duty to treat HIV-infected patients. There is a positive and significant correlation between the work experience of a dentist and participation frequency in continuing education courses with the knowledge score of the dentists (P-value of .000 for both cases). In addition, more working hours per week and employment in the private sector had a significant positive relationship with the dentist's attitude (P-value = 0.4 and P-value = .04, respectively). The results of this study did not show a statistically significant relationship between knowledge and attitude, and performance. According to the present study, the attitude of dentists in the field of AIDS was incomplete, and their knowledge and performance were relatively acceptable. Although serious weaknesses were seen in this field, there is a need to review and pay more attention to the policies and plans made, to match the training goals with the needs, review the necessary facilities, and use suitable practical models and training materials.

Keywords--- AIDS, Knowledge, General Dentists, Performance, Attitude, Bushehr Province.

I. Introduction

Human immunodeficiency virus (HIV) infection is a progressive deterioration of the immune system; as a result, the body will not be able to defend against diseases and opportunistic infections [1]. The target cells of this pathogen include CD4+ cells of the immune system. They are necessary to activate B lymphocytes and produce antibodies [2]. Acquired immunodeficiency syndrome (AIDS) refers to the most advanced stage of HIV infection [1], in which the number of CD4+ cells reaches below 200 (from the normal 1000) [2]. Currently, a person will be infected with 20 or more types of opportunistic infections such as hepatitis C and B, tuberculosis, and malignancies such as Kaposi's sarcoma, non-Hodgkin's lymphoma, invasive carcinoma of the cervix, lung and liver cancer, Hodgkin lymphoma [3] which are the leading causes of death in people with AIDS. From the reporting of the first case of HIV infection in Iran in 1365 [4, 5] until now, i.e., the fourth decade of the history of this disease, the prevalence of that is still growing by 10% in the country, despite the continuous efforts in the field of education and prevention of AIDS [6]. According to the Joint United Nations Program on HIV/AIDS (UNAIDS), in total, 1.76 million people have been infected with HIV, and 35 million people have died as a result of the beginning of the Pandemic until the end of 2016 [7]. In 2016, 1.8 million new cases of the disease were reported (that is, about 5000 infections per day) [8]. Also, according to the Iranian Research Center for HIV/AIDS in 2016, the number of people infected with HIV in

Iran is estimated to be around 35 thousand people, while more than 60% of infected people do not know about their disease. In total, 84% of the patients were men, and 16% were women [9]. HIV/AIDS epidemic is one of the challenges of health care systems all around the world due to social problems, high incidence and prevalence in the occupation age of the society, disability and mortality, and high care costs [10]. This epidemic affects not only the health of sick people but also the family, development, and economic growth of countries [8]. Although this disease does not currently have a definitive treatment, the development of antiretroviral therapies in recent years has significantly reduced mortality and increased life expectancy in affected people around the world [11]. This disease has also led to challenges such as social isolation, unhappy personal relationships, ineffective healthcare, vulnerable employment, poor housing, and financial problems [12].

However, in the last two decades, many dentists have not been willing to accept and treat HIV patients around the world [13-16]. Even in advanced countries such as the United States of America and Canada, the percentage of dentists who are willing to accept infected patients was relatively low [13]. While Center for Disease Control and Prevention estimated the average risk of HIV infection after skin contact with HIV-infected blood at about 0.3% (0.2-0.5%) and about 0.9% after mucous membrane contact with infected blood. The risk of virus transmission after contact with other liquids is also lower than the possible risk of the epidemic from blood [17, 18]. In this regard, the World Health Organization (1988) declared that all dentists are obliged to treat HIV-positive patients and avoiding treatment is not only unethical but also illegal [19, 20]. On the other hand, developing a good relationship with mutual respect between the dentist and the patient makes it easier for these patients to disclose (their) illnesses [5, 21]. Numerous studies in Iran and other countries regarding this lack of desire indicate factors such as the fear of the dentist and patients getting infected with the H1N1 virus, the fear of employees getting infected, and the fear of losing other patients [15, 20, 22, 23]. These factors can be attributed to the low level of awareness about this disease, the modes of transmission, proper infection control practices, and Non-compliance to professional responsibilities and ethical standards for the treatment of infected patients [20, 24]. This problem does not diminish the necessity and importance of implementing clinical precautions despite the low probability of HIV transmission in dental clinics between patients and dentists. Health personnel, especially dentists and their patients, are always exposed to blood-borne infections such as HIV due to contact with blood and other Bodily fluids [10, 25, 26]. Khanghahiet al. (2013) claimed that despite all the training, recommendations, and clinical guidelines provided, the level of awareness, attitude, and performance in the field of infection control in Iranian dentistry is still insufficient [27]. Vojdani et al. (2012) considered the knowledge, attitude, and performance of dentists to be weak in Shiraz city [25].

There is a statistically significant correlation between dentists' level of knowledge and skills and age [31]. Garus-Pakowska et al. investigated the level of knowledge and attitudes of Polish dentists regarding blood-borne infections. In Poland, to assess the level of knowledge and attitudes of dentists regarding blood-borne infections. A survey of 167 general dentists in Rasht, Rabiei, and Kazemnejad reported that most of them had poor knowledge about AIDS and hepatitis, and the majority had a positive attitude [28]. Omid Panah and Salehifar selected 120 general dentists, including 76 men and 44 women (mean age was 36.4 years) to measure the level of awareness of the general dentists of Kermanshah about the Oral manifestations of AIDS. In general, doctors' knowledge about HIV was very good (7.1%), good (23.3%), normal (48.3%), and poor (26.7%) respectively [29]. Wang et al. evaluated the mean level of HIV awareness of 477 dentists in Xi'an (China). Most dentists agreed on the need for rapid oral HIV tests in dental circumstances [30]. Garus-Pakowska et al. investigated the level of knowledge and attitudes of Polish dentists regarding blood-borne infections. In this study, the level of awareness was low. In total, 96% of dentists stated that they treat patients with HIV, HBV, and HCV with more caution, and only 25% were willing to accept the treatment of infected patients [32].

In this regard, this study aims to evaluate the level of knowledge, attitude, and performance of general dentists in Bushehr about AIDS as a sample of the Iranian Dental Community, so that new information can be provided to planners and policymakers in Dental Treatment Planning. At the same time, it should reflect the success rate of HIV/AIDS centers in education quality and improving the level of health awareness during this period.

II. Materials and Methods

This research is a cross-section study with descriptive-analytical that was conducted in Bushehr province (2013-16). It evaluated the level of knowledge, attitude, and performance of general dentists. The present study had three main variables (knowledge, attitude, and performance) about AIDS, and the relationship between demographic and social variables with the three mentioned variables was also examined.

The research tool used is a researcher-made questionnaire, which was compiled in two parts by using the literature review and existing internal and external questionnaires. The questionnaire validity was checked in a pilot study that was conducted on a sample of 28 general dentists in Bushehr province, and the reliability was confirmed by 8 professors and experts. The reliability of the questionnaire was also tested in a pilot study that was conducted on a sample of 28 general dentists in Bushehr province, and the reliability was confirmed. Cronbach's alpha coefficient

for questions of knowledge, attitude, and performance was 0.72, 0.74, and 0.74, respectively. A pilot study was designed and conducted to determine the reliability of the questionnaire and the sample size before conducting the present study. The P-value extracted from the pilot study was 78.1%, and according to the sample size formula in the study of dentists in Kerala state (India) [22], the sample size was 106 (The P-value in their study was estimated equal to 65.25%, but in our pilot study, this value was estimated at 78.1%, and we used our pilot study as the basic).

Random cluster sampling was used to select research samples. First of all, the list of cities that had hospitals, clinics, or dental offices in this state was selected as the main clusters (including the centers in Dashtestan, Bushehr, Ganaveh, Jam, Kangan, Dashti & Tangestan counties) and all the clusters were included in the study, then randomly selected from each cluster of active clinics, offices, and dentists were randomly selected from each cluster, and their knowledge, attitude, and performance were examined. Entry criteria include 1. general dentist in Bushehr province; General dentists who have an active clinic or are working in public and private clinics will be included in the study; and 2. there was interest and desire to participate in the research. Exclusion criteria included people who did not want to participate in the study.

The data were analyzed using IBM SPSS Statistics 24. Descriptive statistics (mean and standard deviation) and inferential statistics (t-test, ANOVA, correlation coefficient, etc.) were used for statistical analysis. Descriptive tests, including mean and standard deviation, were used to determine the average knowledge score, attitude, and awareness. Moreover, T-tests and ANOVA were used to determine the correlation between demographic variables and average knowledge, attitude, and performance. Pearson's correlation coefficient was used to measure the strength of a linear association between the variables of knowledge and attitude, and performance.

III. Findings

A total of 106 out of 120 distributed questionnaires were completed (88% response rate). Most of the 106 dentists participating in this study were male and married. The average score of knowledge, attitude, and performance of dentists was 2.37 ± 0.25 , 3.30 ± 0.50 , and 2.64 ± 0.25 , respectively. The minimum and maximum knowledge scores were 1.7 and 2.9 out of 3, respectively. The minimum and maximum attitude scores were 2 and 4.6 out of 5, respectively, and the minimum and maximum performance scores were 1.8 and 3 out of 3, respectively. It was found in response to questions 21 and 22 of performance that more than 50% of dentists use glutaraldehyde to wash their tools, and about 80% of them use autoclaves to sterilize their tools. There was no significant correlation between knowledge and attitude (P-value = .51), knowledge and performance (P-value = .06), and attitude and performance (P-value = .26) (Table 1).

Table 1: Correlation between Three Variables of Knowledge, Attitude, and Performance of Dentists in Bushehr Province, 2017

Variables		Knowledge	Attitude	Performance
Knowledge	Pearson's correlation coefficient	1	-0.06	-0.17
	P-value		0.51	0.06
Attitude	Pearson's correlation coefficient	-0.06	1	0.11
	P-value	0.51		0.26
Performance	Pearson's correlation coefficient	-0.17	0.11	1
	P-value	0.06	0.26	

The average knowledge score was the same among male and female participants (2.37). The average score of attitude and performance in men (3.35 ± 0.52 and 2.64 ± 0.27 , respectively) was slightly higher than that of women (3.22 ± 0.47 and 2.63 ± 0.23 , respectively). This difference was not significant (Table 2).

Table 2: Mean and Standard Deviation of Knowledge, Attitude and Performance Scores of Dentists in Bushehr Province by Gender, 2017

The variable	main	Sex	Number	Mean	standard deviation	p-value	Confidence interval	
							Lower bound	Upper bound
Knowledge		Man	62	2.37	0.26	0.93	-0.09	0.10
		Woman	44	2.37	0.25			
Attitude		Man	62	3.35	0.52	0.19	-0.06	0.32
		Woman	44	3.22	0.47			
Performance		Man	62	2.64	0.27	0.83	-0.08	0.11
		Woman	44	2.63	0.23			

The average score of knowledge, attitude, and performance of married dentists was 2.40 ± 0.26 , 3.32 ± 0.54 , and 2.65 ± 0.25 , respectively, which was slightly higher than the average scores of unmarried dentists (2.32 ± 0.24 , 3.26 ± 0.40 , and 2.61 ± 0.25 respectively). This difference was not significant (P-value < 0.5) (Table 3).

Table 3: Mean and Standard Deviation of Knowledge, Attitude and Performance Scores of Dentists in Bushehr Province by Marital Status, 2017

The mainvariable of maritalstatus	Number	Mean	Standard deviation	p-value	Confidence interval		
					Lower bound	Upper bound	
Knowledge	Single	35	2.32	0.24	0.15	-0.18	0.02
	married	71	2.40	0.26			
Attitude	Single	35	3.26	0.40	0.52	-0.24	0.12
	married	71	3.32	0.54			
Performance	Single	35	2.61	0.25	0.40	-0.14	0.06
	married	71	2.65	0.25			

There is no statistically significant relationship between attitude scores (P-value = 89) and the performance of dentists (P-value = 14) with their age. Although the P-value of knowledge was less than 0.5 but based on the post hoc test, this relationship was not significant (Table 4).

Table 4: Mean and Standard Deviation of Knowledge, Attitude and Performance Scores of Dentists in Bushehr Province by Age, 2017

Mainvariable	Age	Number	Mean	Standard deviation	p-value	Confidence interval	
						Lower bound	Upper bound
Knowledge	20–30 years	34	2.32	0.22	0.02	2.25	2.40
	31-40 years	36	2.32	0.22		2.25	2.40
	41-50years	30	2.44	0.31		2.33	2.56
	More than 50 years	6	2.60	0.24		2.34	2.85
Attitude	20–30years	34	3.28	0.45	0.89	3.12	3.44
	31-40 years	36	3.29	0.61		3.08	3.50
	41-50years	30	3.35	0.45		3.18	3.52
	More than 50 years	6	3.20	0.27		3.90	3.49
performance	20–30years	34	2.57	0.23	0.14	2.48	2.65
	31-40 years	36	2.70	0.26		2.61	2.79
	41-50years	30	2.37	0.26		2.57	2.76
	More than 50 years	6	2.57	0.20		2.35	2.79

There is no statistically significant relationship between the mean knowledgescore(P-value = 16), attitude (P-value = 10), and performance (P-value = 70) with the university from which the dentists graduated (Table 5).

Table 5: Mean and Standard Deviation of the Knowledge, Attitude and Performance Scores of Dentists in Bushehr Province by the University, 2017

Mainvariable	University location	Number	Mean	Standard deviation	p-value	Confidence interval	
						Lower bound	Lower bound
Knowledge	Shiraz	41	2.36	0.22	0.16	2.29	2.44
	Tehran	16	2.50	0.26		2.35	2.64
	Bushehr	15	2.36	0.21		2.24	2.48
	Esfahan	11	2.28	0.33		2.05	2.50
	Zahedan	7	2.24	0.22		2.03	2.45
	Yazd	5	2.54	0.15		2.35	2.72
	other	11	2.35	0.33		2.13	2.57
	Attitude	Shiraz	41	3.28		0.47	0.10
Tehran	16	3.044	0.48	3.18	3.70		
Bushehr	15	3.26	0.34	3.07	3.45		
Esfahan	11	3.36	0.52	3.01	3.72		

	Zahedan	7	3.27	0.39		2.91	3.64
	Yazd	5	2.66	0.71		1.77	3.55
	other	11	3.44	0.62		3.02	3.86
Performance	Shiraz	41	2.65	0.25	0.70	2.57	2.73
	Tehran	16	2.63	0.29		2.47	2.79
	Bushehr	15	2.58	0.23		2.45	2.70
	Esfahan	11	2.67	0.22		2.52	2.82
	Zahedan	7	2.65	0.25		2.42	2.89
	Yazd	5	2.81	0.22		2.53	3.08
	other	11	2.58	0.29		2.39	2.78

There is a direct and significant correlation between the mean knowledgescoreof dentists and their work experience (P-value = 0.00).It means that the knowledge score increases with the increase of work experience.The relationship between attitude score (P-value = 78) and performance score (P-value = 48) was not significant (Table 6).

Table 6: Mean and Standard Deviation of the Knowledge, Attitude, and Performance Scores According to the Working Experience of Dentists in Bushehr Province, 2017

Mainvariable	Working experience	Number	Mean	standard deviation	p-value	Confidence interval	
						Lower bound	Upper bound
Knowledge	0-10 years	61	2.32	0.23	0.00	2.26	2.38
	11-20 years	24	2.39	0.23		2.296	2.49
	21-30 years	21	2.51	0.30		2.38	2.65
Attitude	0-10 years	61	3.27	0.48	0.78	3.14	3.39
	11-20 years	24	3.33	0.64		3.06	3.61
	21-30 years	21	3.34	0.37		3.17	3.51
Performance	0-10 years	61	2.63	0.26	0.48	2.56	2.70
	11-20 years	24	2.69	0.22		2.60	2.79
	21-30 years	21	2.61	0.26		2.49	2.73

There was no significant difference between the score of knowledge (p-value = 0.59, attitude (P-value = 0.99), and performance (P-value = 0.2) of dentists in different groups in terms of the workplace county (Table 7).

Table 7: Mean and Standard Deviation of the Knowledge, Attitude, and Performance Scores based on Working Experience of Dentists in Bushehr Province, 2017

Mainvariable	Working location	Number	Mean	standard deviation	p-value	Confidence interval	
						Lower bound	Upper bound
Knowledge	Bushehr	69	2.37	0.26	0.59		
	Dashtestan	20	2.34	0.27		2.30	2.43
	Genaveh	10	2.33	0.24		1.97	2.58
	Other	7	2.52	0.07		2.15	2.50
Attitude	Bushehr	69	3.30	0.47	0.99	1.91	3.18
	Dashtestan	20	3.18	0.46		3.19	3.42
	Genaveh	10	3.32	0.56		2.12	3.76
	Other	7	3.24	0.51		2.92	3.73
Performance	Bushehr	69	2.66	0.23	0.20	-4.87	12.07
	Dashtestan	20	2.63	0.21		2.60	2.71
	Genaveh	10	2.71	0.25		2.37	2.96
	Other	7	2.53	0.32		2.53	2.89

There is a positiveand significant correlation between the attitude score and the number of working hours per week (P-value = 0.4), so the attitude score increases with the increase of working hours. There was no significant correlation between the knowledge score(P-value = 0.33) and performance (P-value = 0.16) with the working hours (Table 8).

Table 8: Mean and Standard Deviation of the Knowledge, Attitude, and Performance Scores of Dentists in Bushehr Province (Working Hours), 2017

Mainvariable	Workinghours	Number	Mean	standard	p-	Confidence interval
--------------	--------------	--------	------	----------	----	---------------------

				deviation	value	Lower bound	Upper bound
Knowledge	0-20 hours	17	2.38	0.23	0.33	2.26	2.50
	21-40 hours	49	2.33	0.24		2.26	2.40
	More than 41 hours	40	2.42	0.28		2.32	2.51
Attitude	0-20 hours	17	3.08	0.60	0.04	2.77	3.39
	21-40 hours	49	3.27	0.51		3.12	3.42
	More than 41 hours	40	3.43	0.40		3.30	3.56
Performance	0-20 hours	17	2.62	0.21	0.16	2.51	2.72
	21-40 hours	49	2.69	0.23		2.62	2.76
	More than 41 hours	40	2.59	0.29		2.49	2.68

There was no significant relationship between the number of patients with the knowledge scores (P-value = 27), attitude (P-value = 39), and performance (P-value = 50) of dentists (Table 9).

Table 9: Mean and Standard Deviation of Knowledge, Attitude and Performance Scores of Dentists in Bushehr Province with the Number of Patients Visit Per Week, 2017

Mainvariable	Number of patients	Number	Mean	Standard deviation	p-value	Confidence interval	
						Lower bound	Upper bound
Knowledge	0-20	22	2.30	0.24	0.27	2.19	2.40
	21-40	35	3.38	0.28		2.28	2.48
	More than 40	49	2.40	0.24		2.33	2.47
Attitude	0-20	22	3.31	0.62	0.39	3.04	3.59
	21-40	35	3.21	0.50		3.03	3.38
	More than 40	49	3.36	0.44		3.23	3.48
Performance	0-20	22	2.69	0.22	0.50	2.59	2.79
	21-40	35	2.64	0.25		2.55	2.73
	More than 40	49	2.61	0.26		2.54	2.69

The average attitude score of dentists in the private sector was higher than in the public sector, and there was a significant correlation between the employment sector and the attitude score (P-value = 0.01), but there was not a significant correlation between the knowledge (P-value = 0.36) and performance (P-value = 0.26) scores. P-value (Table 10).

Table 10: Mean and Standard Deviation of Knowledge, Attitude and Performance Scores of Dentists in Bushehr Province by Employment Sector, 2017

Mainvariable	Employment Agency	Number	Mean	standard deviation	p-value	Confidence interval	
						Lower bound	Upper bound
Knowledge	Public	33	2.32	0.29	0.36	2.22	2.43
	Private	51	2.39	0.22		2.32	2.45
	Both	22	2.42	0.28		2.29	2.55
Attitude	Public	33	3.24	0.43	0.01	3.09	3.40
	Private	51	3.43	0.48		3.30	3.57
	Both	22	3.07	0.55		2.82	3.31
Performance	Public	33	2.58	0.22	0.26	2.50	2.66
	Private	51	2.68	0.28		2.60	2.76
	Both	22	2.63	0.23		2.53	2.74

Increasing the frequency of attending continuous education courses improves the knowledge score of dentists, which is statistically significant (P-value = 0.00). The score of attitude (P-value = 0.52) and performance (P-value = 0.70) did not show any relationship with participation frequency (Table 11).

Table 11: Mean and Standard Deviation of Knowledge, Attitude, and Performance Scores of Dentists in Bushehr Province based on Participation Frequency in Continuing Education Courses, 2017

Mainvariable	Participation frequency	Number	Mean	standard deviation	p-value	Confidence interval	
						Lower bound	Upper bound
Knowledge	o-10 times	53	2.29	0.22	0.00	2.40	2.64
	11-20 times	23	2.38	0.23		2.23	2.74
	21-30 times	9	2.48	0.32		2.28	2.49
	More than 30 times	21	2.52	0.26		2.23	2.35
Attitude	o-10 times	53	3.27	0.48	0.52	3.23	3.66
	11-20 times	23	3.24	0.61		3.02	3.51
	21-30 times	9	3.26	0.31		2.98	3.51
	More than 30 times	21	3.45	0.47		3.14	3.40
Performance	o-10 times	53	2.62	0.27	0.70	2.62	2.77
	11-20 times	23	2.64	0.22		2.34	2.92
	21-30 times	9	2.63	0.37		2.54	2.74
	More than 30 times	21	2.70	0.17		2.54	2.69

There was no significant correlation between the knowledge scores (P-value = 0.59), attitude (P-value = 0.16), and performance (P-value = 0.33) of dentists with their willingness to re-engage in training courses (Table 12).

Table 12: Mean and Standard Deviation of Knowledge, Attitude and Performance Scores of Dentists in Bushehr Province According to their Willingness to Engage in Retraining Courses, 2017

Mainvariable	Willingness to participate	Number	Mean	standard deviation	p-value	Confidence interval	
						Lower bound	Upper bound
Knowledge	Yes	99	2.37	0.26	0.59	-0.18	0.02
	No	7	2.42	0.24			
Attitude	Yes	99	3.29	0.51	0.16	-0.24	0.12
	No	7	3.44	0.23			
Performance	Yes	99	2.65	0.23	0.33	-0.14	0.06
	No	7	2.48	0.42			

IV. Discussion

This study was conducted to evaluate the average score of knowledge, attitude, and performance of general dentists in Bushehr province concerning AIDS and to investigate the correlation between the knowledge score, attitude, and performance with demographic variables. In this study, dentists' attitudes were weak, and their knowledge and performance were relatively acceptable. Although there were major weaknesses. Swabi et al. (2007) reported the attitude score of Isfahan dentists and their performance score as 62.6% and 85.5%, respectively, which were consistent with the results of this study [33]. In the study of Jafari et al. (2018) in the Tehran metropolis, the average knowledge score was 76.5%, and the average attitude score was 50%, which had a weaker attitude despite the similarity of the knowledge score [5]. The results of the study by Lee et al. (2015) (awareness score was 79.4% and attitude score was 72%) were also consistent with the results of the present study [13]. A study by Mirzaei and Zajtakesh (2016) in Bushehr, Vojdani et al. (2011) in Shiraz, and two studies by Askarian (2006 and 2007) in Fars province assessed the level of knowledge and performance as weak, which contradicted the results of the present study [10, 23, 25, 26]. This superiority of the knowledge and performance level in the present study compared to previous studies reflects the positive impact of scientific and practical training and planning in this field. However, the existing weaknesses show the need for special revisions. There was no correlation between knowledge, attitude, and performance in this study, which was similar to the results of Mojabi et al. (2011) in Qazvin and Vojdani et al. (2012) in Shiraz. While in the study of Dania in Kerala, India (2013), there was a positive correlation between knowledge and attitude [15, 22, 25].

The results of the present study showed a significant improvement in the performance of dentists compared to the previous two studies, such that 99.1% of dentists always used masks and 95.3% used gloves in their activities. Dentists also showed serious weaknesses in this field, although they received a relatively acceptable performance score. For example, it was found that about 1.3% and 40% of dentists do not wash their hands before and after work, respectively, which was similar to the results of Askarian et al. [23]. It was also seen that the percentage of mask change among dentists was similar to Mirzaei's (around 50%) [10]. This showed a decrease of 36% in the study of Vojdani et al. [25]. It has been emphasized in the review studies conducted by the Center for Disease Control and

Prevention on the reported cases of occupational contact with blood in American dentists. According to the clinical guidelines of the Occupational safety and health administration (OSHA) in 2018, used needles should be placed in special puncture-resistant lids without recapping or bending them [34]. However, in this study, it was found that about 90% of dentists perform re-capping, and about 25% of them do not use the one-handed technique when Head Cap Needle Cap. In Askarian's study, almost 85% of the respondents performed re-capping, and nearly half of them did not use the one-handed technique during capping [23].

In the present study, most dentists considered the treatment of HIV/AIDS patients as their professional duty (84.9%) and moral responsibility (90.6%). However, only 58% of them were willing to accept the treatment of people with HIV. Almost 65% preferred to refer HIV-positive people, 57.5% even preferred to refer suspected HIV-positive people, and 78.3% believed that the treatment should be done only in special clinics. In Jafari et al.'s study, even though most agreed on the professional duty to treat HIV-infected patients, only 43% of the respondents agreed and fully agreed to accept the treatment of patients with HIV/AIDS, and about 57% referred these patients [5]. Therefore, in this perspective, respondents showed a weaker attitude. Mirzaei and Zahmatkesh also reported that most dentists (66%) refused to accept treatment, and 56.6% of them believed in the necessity of treatment in special centers that as reported by 94% in Askarian et al.'s study [10,23]. Another contradiction that was seen in the answers to the attitude questions was that despite the belief of 95.4% of dentists in assuming that all patients are infected, 41.5% did not have the same opinion about treating HIV-positive and HIV-negative patients. This problem is probably because dentists do not pay attention that HIV-infected people may be infected for various reasons, such as psychological pressure, fear of social stickers, sympathies, improper judgments, and not accepting their treatment that hides their illness, or perhaps the infected person is in the latent period of the disease and still does not know about his/her infection, while it can easily transmit it to others. This problem was also seen in the study of Wadjani et al. [25]. However, Askarian et al. reported that most dentists (93%) had similar views about treating all patients [23].

Although blood, semen, milk, and vaginal secretions are the main fluids that cause HIV transmission, the CDC has also proved the presence of HIV in Salivary and tear fluid. However, contact with secretions in tears and saliva has never been proven as a route of HIV transmission [28, 35]. Despite the widespread use of radiation in the discussion of sterilization of HIV-infected allografts and disposable medical and dental devices, in the cases of sterilization of HIV-infected devices, radiation is not able to inactivate the virus, but 50% of dentists in the current study give X-rays and ultraviolet rays. They considered the similar appropriate meaning to the results of the study by Vojdani et al. and Askari et al. [25, 26].

In the absence of cells, HIV is relatively weak and is easily inactivated. But when a cell is associated and in the presence of organic substances such as blood, it is difficult to inactivate them. Glutaraldehyde is probably the best disinfectant for inactivating HIV, inactivating HIV both in the presence and absence of cells. Ethanol and chlorine-based disinfectants such as sodium hypochlorite have also been widely used as HIV inactivators [36]. Only 35% of the respondents considered common solutions in dental medicine, such as glutaraldehyde and hypochlorite, suitable for disinfecting HIV-infected instruments, which was much less compared to the study of Vojdani et al. (57%) and Askari et al. colleagues (44.3%) [23, 25].

Finally, in response to the performance question, 89% of dentists considered autoclave, 2% Fur (dry heat oven), and 7% both as their sterilization methods. Ultrasonic was the least used with a rate of 9.9%, which indicates insufficient information about newer methods that are used for the inactivation of blood-borne viruses. In the study of Mirzaei and Zahmatkesh, both glutaraldehyde and sodium hydrochloride were the main disinfectants. In this research, 98.7% used autoclaves, and 27.3% used an oven, and other results were similar to the present study, except for the higher percentage of using an oven [10]. In the current study, there was a positive and significant correlation between the working experience of a dentist after graduation and participation frequency in continuing education courses, with the average knowledge score. That is, dentists with more experience obtained a higher knowledge score with more participation frequency in re-education courses. This problem reflects the significant impact of re-education courses on raising the awareness of dentists. There was no significant correlation between knowledge and other demographic variables such as age, gender, marriage, university, employment by county, number of patients, number of working hours, and employment sector.

In the attitude dimension, there was a significant correlation between the number of working hours of the dentist and the employment sector. That is, dentists with more working hours in the private sector showed a more positive attitude than those with fewer working hours in the public sector regarding the treatment of HIV-infected patients. This problem can be due to the access of private sector dentists to more equipment and facilities to comply with infection control standards as well as disinfection and sterilization of contaminated equipment. The correlation between attitude and working hours can also be explained in such a way that dentists who have a more positive attitude are less worried about contamination with less effort to separate prospective patients from other patients and

therefore have longer working hours. There was no statistically significant relationship between attitude and other variables. There was no significant difference in performance in different subgroups in terms of demographic variables. In proving the impact of continuing education courses, it can be mentioned the study of Jaafari et al. (2009) positively evaluated the impact of a training course on the average score of knowledge and attitude of dentists [21]. However, Faezi et al. did not find any correlation between the use of re-education courses and the knowledge score of the respondents, unlike these two studies. In this study, there was no correlation between age and gender with knowledge, which was consistent with the results of the study [37]. Vojdani et al. found a positive correlation between age and performance and awareness, and those older dentists had a lower level of awareness and better performance; and this difference in the result compared to the present study can be attributed to the difference in the average age of the two studies [25]. In the current study, the average age of dentists was lower than that in Shiraz county, so about 70% of the respondents were under 40 years old, and this excludes the effect of age on mental reserve. Vojdani et al. did not find any correlation between the employment sector and gender with knowledge and attitude, and performance, which complied with the present study [25].

V. Conclusion

In this study, it was found that the general dentists of Bushehr province have a relatively acceptable level of knowledge and performance in the area of HIV/AIDS, although there are serious deficiencies. Even though the majority of dentists believed in their professional and moral duty toward the treatment of HIV-infected patients, their attitude was considered as weak. More than half of them did not accept the treatment of the infected patients, which is the result of weakness in their knowledge and performance. Although this study clearly showed the impact of re-education courses on the awareness of dentists, to eliminate the defects of awareness and performance. To fill the gap between them and the attitude of dentists, there is a need to review and pay more attention to policy making and planning in the field of training methods and matching the training with the needs, reviewing the necessary facilities, and using the correct practical models and training materials. It is also necessary to improve the quality along with the implementation of regular and continuous evaluation programs of the current situation and to establish and implement more research on the role of each of the different and sometimes unknown causes in the lack of practical implementation of infection control principles.

References

- [1] Facts on HIV/AIDS [Internet]. Switzerland: World Health Organization; [updated 2015 May 10; cited 2018 August 20]. Available from: www.who.int/features/factfiles/hiv/facts/en/
- [2] HIV.gov [Internet]. United States: Centers for disease control and prevention; [updated 2017 May 15; cited 2018 August 20]. Available from: www.hiv.gov/hiv-basics/overview/about-hiv-and-aids/what-are-hiv-and-aids.
- [3] HIV Infection and Cancer Risk [Internet]. United States: National Cancer Institute; [updated 2017 September 14; cited 2018 August 20]. Available from: www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hiv-fact-sheet.
- [4] Tavvosi A, Zaferani A, Enzevaei A, Tajik P, Ahmadinezhad Z. Knowledge and attitude towards HIV/AIDS among Iranian students. *BMC public health*, 2004;4(1):17.
- [5] Jafari A, Khami M, Yazdani R, Mohammadi M. Knowledge and attitude of senior dental students towards HIV/AIDS. *J Dent Med.*, 2009;22(4):192-8.
- [6] Statistics of AIDS patients in Iran: https://kithiv.ir/aids_statistics
- [7] Fact sheet-latest statistics on the status of the AIDS epidemic [Internet]. Switzerland: UNAIDS; 2017 [updated 2018; cited 2018 August 20]. Available from: www.unaids.org/en/resources/fact-sheet.
- [8] The Global HIV/AIDS Epidemic [Internet]. United States: HIV.gov; 2016 [updated 2018 July 17; cited 2018 August 20]. Available from: www.hiv.gov/hiv-basics/overview/data-and-trends/global-statistics.
- [9] Statistics of HIV cases [Internet]. Iran: National AIDS Prevention Center of Iran; 2014. <http://aids.ir/post/1248>
- [10] Zahmatkesh S, Mirzaei K. A survey on the Knowledge, Attitude and Practices of dentists in Bushehr Province about HIV/AIDS. *ISMJ*, 2007, 10(1), 67-74.
- [11] Russell S, Seeley J, Ezati E, Wamai N, Were W, Bunnell R. Coming back from the dead: living with HIV as a chronic condition in rural Africa. *Health Policy Plann.*, 2007;22(5):344-7.
- [12] Grierson J, Pitts M, Whyte M, Misson S, Hughes A, Saxton P, et al. Living with HIV in New Zealand: Balancing health and quality of life. *NZMJ*, 2004, 117(1200), 1017.
- [13] Li R, Dong W, He W, Liu Y. Chinese dental students' knowledge and attitudes toward HIV/AIDS. *J Dent Sci.*, 2016, 11(1):72-8.
- [14] Sadeghi M, Hakimi H. Iranian dental student's knowledge of and attitudes towards HIV/AIDS patients. *JDE*, 2009, 73(6), 740-5.

- [15] BorhanMK, EsfahaniM, Hashemi S. Evaluation of knowledge, attitude and practice of general dental practitioners regarding HIV positive patients in qazvin. *Journal of medical council of I.R.I.* 2012;29(4):353-359.
- [16] Khosravanifard B, Rakhshan V, Ghasemi M, Pakdel A, Baradaran-Eghbal S, Sheikholeslami R, et al. Tehran dentists' self-reported knowledge and attitudes towards HIV/AIDS and observed willingness to treat simulated HIV-positive patients. *East.Mediterr. Health J.*, 2012;18(9):928.
- [17] Kuhar DT, Henderson DK, Struble KA, Heneine W, Thomas V, Cheever LW, et al. Updated US Public Health Service guidelines for the management of occupational exposures to human immunodeficiency virus and recommendations for postexposure prophylaxis. *Infect Contr Hosp Epidemiol.*, 2013;34(9):875-92.
- [18] Center for disease control and prevention. Possible transmission of human immunodeficiency virus to a patient during aninvasive dental procedure. *MMWR.*, 1990;39(29):489.
- [19] Patil PB, Sreenivasan V, Goel A. Knowledge of HIV/AIDS and attitude of dental students towards HIV/AIDS patients: A cross-sectional survey. *Journal of education and ethics in dentistry*, 2011;1(2):59.
- [20] McCarthy GM, Koval JJ, MacDonald JK. Factors associated with refusal to treat HIV-infected patients: the results of a national survey of dentists in Canada. *Am J Publ Health.*, 1999;89(4):541-5.
- [21] Jafari A, Yazdani R, Khami MR, Mohammadi M, Hajiabdolbaghi M. Effect of an educational course at an Iranian Dental School on students' knowledge of and attitudes about HIV/AIDS. *JDE*, 2012;76(6):792-9.
- [22] Dhanya R, Hegde V, AnilaS, Sam G, Khajuria RR, Singh R. Knowledge, attitude, and practice towards HIV patients among dentists. *J Int Soc Prev Community Dent.*, 2017;7(2):148.
- [23] Askarian M, Mirzaei K, McLaws M-L. Attitudes, beliefs, and infection control practices of Iranian dentists associated with HIV-positive patients. *AJIC*, 2006;34(8):530-3.
- [24] Maupomé G, Acosta-Gío E, Borges-Yáñez SA, Díez-de-Bonilla FJ. Survey on attitudes toward HIV-infected individuals and infection control practices among dentists in Mexico City. *AJIC*, 2000;28(1):21-4.
- [25] Vojdani M, Farzin M, Derafshi R, Safari A, Madadi G. Knowledge, attitude and performance of dentists in Shiraz in relation to AIDS. *J Isfahan Dent Sch.*, 2012;8(4):365-375.
- [26] Askarian M, Mirzaei K, Cookson B. Knowledge, attitudes, and practice of Iranian dentists with regard to HIV-related disease. *Infect Contr Hosp Epidemiol.*, 2007;28(1):83-7.
- [27] Khanghahi BM, Jamali Z, Azar FP, Behzad MN, Azami-Aghdash S. Knowledge, attitude, practice, and status of infection control among Iranian dentists and dental students: a systematic review. *JODDD*, 2013, 7(2), 55.
- [28] Rabiee M, Kazennezhad E. Knowledge and Attitude of General Dentists Regarding HIV and Hepatitis Infections in Rasht. *Res Med Educ.*, 2012;4(1):58-67.
- [29] Omidpanah N, Salehifar N. Evaluation of Knowledge Regarding to Oral Manifestation of AIDS among General Dentists in Kermanshah,2014. *J Fasa Univ Med Sci.*, 2015;5(2):237-247.
- [30] Wang L, Santella AJ, Huang R, Kou L, You L, Zhang X, et al. Knowledge of HIV and willingness to conduct oral rapid HIV testing among dentists in Xi'an China. *PloS one*, 2015;10(3):e0119274.
- [31] Ngaihte PC, Santella AJ, Ngaihte E, Watt RG, Raj SS, Vatsyayan V. Knowledge of human immunodeficiency virus, attitudes, and willingness to conduct human immunodeficiency virus testing among Indian dentists. *IJDR*, 2016;27(1):4.
- [32] Garus-Pakowska A, Górajski M, Szatko F. Knowledge and Attitudes of Dentists with Respect to the Risks of Blood-Borne Pathogens—A Cross-Sectional Study in Poland. *Int J Environ Res Public Health*, 2017;14(1):69.
- [33] Savabi O, Hasankhani A, Mohamadikhah Z. The Attitude and Practice of Dentists in Relation with HIV and HBVInfected Patients in Isfahan Province. *Iranian Journal of Medical Education*, 2011;10(5):868-85.
- [34] Needlestick and Sharps Injuries. Canada: Occupational safety and health administration; [updated 2018 July 26; cited 2018 August 20].
https://www.ccohs.ca/oshanswers/diseases/needlestick_injuries.html.
- [35] HIV Transmission [Internet]. United States: Centers for disease control and prevention; [2018 August 13; cited 2018 August 20]. Available from: www.cdc.gov/hiv/basics/transmission.html.
- [36] Block SS. Disinfection, Sterilization, and Preservation [Internet]. 10th ed. Philadelphia: Lippincott Williams & Wilkins; 2001 [cited 2018 August 20]. Available from:
https://books.google.com/books/about/Disinfection_Sterilization_and_Preservat.html
- [37] FaeziM, AminiM, JalayerNN, Najafi RS. Determination of knowledge of the final year dental students studying at tehran dental schools about aids and related factors in 2010-2011. *Journal of medical council of I.R.I.* 2013;30(4):351-359.