



ORIGINAL ARTICLE

Chinese dental students' knowledge and attitudes toward HIV/AIDS



Rui Li*, Wenhong Dong, Wei He, Yiming Liu

Department of Stomatology, The First Affiliated Hospital of Zhengzhou University, Zhengzhou University, Zhengzhou, PR China

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KEYWORDS

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Abstract *Background/purpose:* Oral care is vital to human immunodeficiency virus (HIV)-positive individuals. As future dentists, it is pertinent that dental students have sufficient knowledge and a positive approach toward this disease. The purpose of this study was to assess HIV/AIDS-related knowledge and attitudes among clinical dental students in central China.

Materials and methods: This survey was conducted on 103 dental students in the final year of a 5-year program. A structured questionnaire with 50 questions examining their knowledge under various categories and 17 questions examining their attitudes toward the disease was employed.

Results: The survey was completed by 92.2% (95/103) of the students. The results revealed that more than half of the respondents demonstrated a good level of knowledge, although few exhibited an excellent level. The mean scores on knowledge was 79.41 ± 6.3 out of a maximum possible score of 100, and there was no significant difference regarding sex. Despite their good level of knowledge, the majority (93.68%) displayed a negative attitude (nonprofessional attitude) toward HIV/AIDS.

Conclusion: These findings might help to define strategies to improve the quality of education among Chinese dental students and suggests that there is a need to address student misconceptions and attitudes toward the disease.

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* Corresponding author. Department of Stomatology, The First Affiliated Hospital of Zhengzhou University, Zhengzhou University, No.1 Jianshe Road, Zhengzhou 450000, He'nan, PR China.
E-mail address: liruisichuan@163.com (R. Li).

Introduction

Since the first report on human immunodeficiency virus (HIV) and consequent AIDS appeared in the early 1980s, new infections have continued despite continued prevention-education efforts.¹ Oral health is an essential aspect of overall medical care for individuals with HIV and oral care is important for improving the quality of life of HIV-positive individuals.^{2,3} However, the AIDS epidemic generated discrimination and prejudice toward HIV-infected patients. Health professionals increasingly fear the danger of infection from interaction with these patients.⁴ During most dental therapeutic procedures, blood and saliva are often involved, which may contain infectious pathogens and microorganisms.^{5,6} Although there is a small chance of HIV transmission during dental procedures, many dentists are reluctant to treat patients infected by HIV.⁷ Surprisingly, HIV-positive patients have been refused treatment by some dentists.^{8,9} The reason may be ignorance of HIV-related knowledge and the risk of transmission during dental procedures.⁶ Currently, it is both unethical and unlawful for a dentist to refuse to treat an HIV-positive individual.¹⁰ Some research indicates that as the knowledge of HIV increases, willingness to treat HIV-positive patients may also increase.^{11,12} Unfortunately, recent studies have found that the HIV/AIDS-related knowledge of dental students is low, particularly in relation to transmission. Many of these students were uninformed regarding management of HIV/AIDS patients.^{6,13–15} Even in developed countries such as the U.S. and Canada, the percentage of the dentists and dental students willing to treat HIV-positive individuals was relatively low.^{16,17}

With improved survival rates due to the success of antiretroviral therapies, it is expected that more HIV-positive individuals will require increasingly competent and compassionate health care, including oral care, in the near future.^{2,18} Dental students represent a dynamic and highly educated group in society. As future health care providers, they are expected to play a crucial role in the treatment of HIV-positive patients, as well as in health education. Therefore, it is important for dental students to improve their knowledge to enable diagnosis and management of HIV/AIDS patients in order to have a more positive attitude toward these patients. Furthermore, as their knowledge increases, dental students may understand methods of infection control and how to prevent HIV transmission.^{5,6}

Henan province is located in central China and is one of the most seriously affected areas of HIV/AIDS infection in China.¹⁹ This is largely due to the population consisting of former blood plasma donors who were inadvertently infected with HIV through flawed procedures common in the early 1990s until the practice was banned in 1997.²⁰ According to general surveys conducted in 1997 and 2001, the prevalence rates ranged from 15.0% to 44.4% among residents in some of the most severely affected counties in Henan province.^{21,22} However, few studies have focused on the knowledge and attitudes of dental students toward HIV/AIDS in China, especially from Henan province. The purpose of this study was to assess Chinese dental student knowledge of HIV/AIDS, attitudes about related issues, such as ethical obligations, and willingness to treat HIV-positive individuals in Henan province, central China.

Materials and methods

This survey was conducted on 103 dental students in a 5-year course, with the first 4 years spent in preclinical courses. Students in their final year of training participated in the present study. Based on previous studies, a self-administered, structured questionnaire was used as the survey instrument.^{4,23} Approval for this study was obtained from the Research and Ethical Committee of The First Affiliated Hospital of Zhengzhou University. Our research has been conducted in full accordance with the World Medical Association Declaration of Helsinki. All participants signed an informed consent agreement, which was approved by the ethics committee review board.

The questionnaire was completed by the students and all returned questionnaires have been included. The questionnaire was based on previous studies with some modifications⁴ and was composed of six domains: (1) the virus (HIV) and the disease (AIDS); (2) potential routes of transmission; (3) oral lesions associated with HIV; (4) risk groups; (5) HIV transmission in the dental setting; and (6) attitudes toward HIV-positive individuals.

The first five parts assessed student knowledge. There were 50 questions designed, with each allowing three kinds of responses to be chosen: yes, no, or don't know.

Wrong answers and "I don't know" answers were both counted as incorrect responses. Hence, a total score could range from 0 (no correct answers) to 100 (all answers correct: $50 \times 2 = 100$). Scores <70, between 70 and 80, between 80 and 90, or >90 denoted weak, moderate, good, or excellent knowledge, respectively.⁴ The final portion assessed the attitude of the students and was based on 17 questions, with answers to each rated on a five-point Likert scale that suggested the degree of agreement or disagreement with each statement (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). Student attitude scores were counted from 1 to 5, with the total score ranging from 17 to 85. Scores >75, between 50 and 75, and less than 50 were considered positive, negative, and passive attitudes, respectively. Negative and passive attitudes were considered nonprofessional. A higher score reflects tolerance towards HIV-positive individuals and a positive professional attitude.

The data were evaluated by Student *t* test using SPSS 17.0 (SPSS Inc., Chicago, IL, USA), when applicable. A *P* value < 0.05 was considered statistically significant.

Results

The response rate to the survey was 92.2% (95/103). Of the respondents, 65 (68.4%) were women and 30 (31.6%) were men. The mean age was 23 ± 2 years (mean \pm standard deviation) and the male/female ratio was approximately 1:2. Table 1 shows the scores by sex of the first five parts related to the knowledge of HIV/AIDS.

Knowledge

The answers were first tabulated as the score and were further analyzed by demographic parameters (sex) by

Table 1 Sex-based scores for the first five areas of the survey related to the knowledge of HIV/AIDS.

Knowledge of HIV/AIDS	Male	Female	P
The virus (HIV) and the disease (AIDS)	11.87 ± 3.60	12.89 ± 2.98	0.148
Potential transmission routes	17.07 ± 1.80	17.26 ± 1.92	0.641
Oral lesions associated with HIV	23.00 ± 4.39	22.52 ± 3.52	0.572
Risk groups	17.87 ± 1.74	18.65 ± 1.07	0.008
HIV transmission in the dental setting	8.53 ± 1.28	8.58 ± 1.46	0.868
Total scores	78.33 ± 1.01	79.91 ± 0.82	0.259

HIV = human immunodeficiency virus.

means of the Student *t* test. The total mean score on knowledge was 79.4 ± 6.3 , with the male students scoring 78.3 and female students scoring 79.9. Sex did not have a significant impact on their knowledge (Table 1; $P < 0.05$). It was surprising that only 2.1% of respondents scored >90 , indicating excellent knowledge. Additionally, 51.6% of students exhibited good knowledge scores, with 42.1% considered moderate and 4.2% considered weak.

Knowledge regarding HIV and AIDS

The majority of students correctly answered at least six questions in this category, however, none correctly answered all questions about the virus and disease process. The mean score was 12.57 ± 3.2 , with a maximum possible score of 20, and 87.3% of students stated that T lymphocytes were primarily affected in AIDS, while only 27.3% of the students were aware that an HIV carrier meant an individual who carried anti-HIV antibodies. Surprisingly, only 64.2% were aware of the average time interval between HIV infection and detection of HIV antibodies in blood or other fluids.

Potential routes of transmission

The average score for this section was 17.2 ± 1.9 . The majority of students correctly answered questions concerning the potential routes of HIV transmission, specifically through sharing devices, such as razor blades and surgical tools with an infected person, or receiving blood transfusions, organs, breast milk, sperm or vaginal fluid from an infected person. However, more than half (54.7%) of the students regarded mosquito bites as a possible transmission route. Also, nearly one-third of the students had the misconception that the mucus or nasal fluid of an infected person is infectious.

Oral lesions associated with HIV

Disappointingly, none correctly answered all the items in this category. Most students were aware of the common HIV-related oral lesions, such as Kaposi sarcoma, oral candidiasis, and oral hairy leukoplakia. The mean score for this section was 22.6 ± 3.8 , with maximum possible score of 30. The knowledge of HIV-associated oral lesions is shown in Table 2.

Table 2 Knowledge of oral lesions associated with HIV/AIDS.

Oral lesions associated with HIV	Correct responses (%)
Oral candidiasis	96.84
Oral Kaposi's sarcoma	100
Oral hairy leukoplakia	98.95
Herpes simplex	80.00
Xerostomia	14.74
Salivary gland infection	68.42
Histoplasmosis	67.37
Crohn's disease	80.00
Necrotizing gingivitis	95.79
Oral melanotic hyperpigmentation	15.79
Papilloma	89.47
Aggressive periodontitis	89.47
Non-Hodgkin's lymphoma	93.68
Condyloma	65.26
Herpes zoster	77.89

HIV = human immunodeficiency virus.

Knowledge related to risk groups

Intravenous drug users, homosexual persons, patients with frequent blood transfusions, prostitutes, and people with multiple sexual partners were regarded as high-risk groups by all dental students. However, only 46.3 of the students perceived hairdressers to be at a higher risk of HIV infection. The mean score for this section was 18.4 ± 1.3 , with maximum possible score of 20.

HIV transmission in the dental setting

The mean score for this section was 8.5 ± 1.4 , with maximum possible score of 10. Nearly three-quarters of students considered aerosol inhalation as means of HIV transmission if the aerosol contained the blood of HIV-positive individuals. The knowledge related to HIV transmission in the dental setting is shown in Figure 1.

Attitudes

The results indicated that the mean score of student attitudes was 61.2 ± 6.3 (negative). The majority (93.7%) expressed predominantly negative attitudes, with 2.1% positive and 4.2% passive. Essentially, only 2.1% of the dental students exhibited professional attitudes. Table 3 shows the attitudes of the students toward the disease.

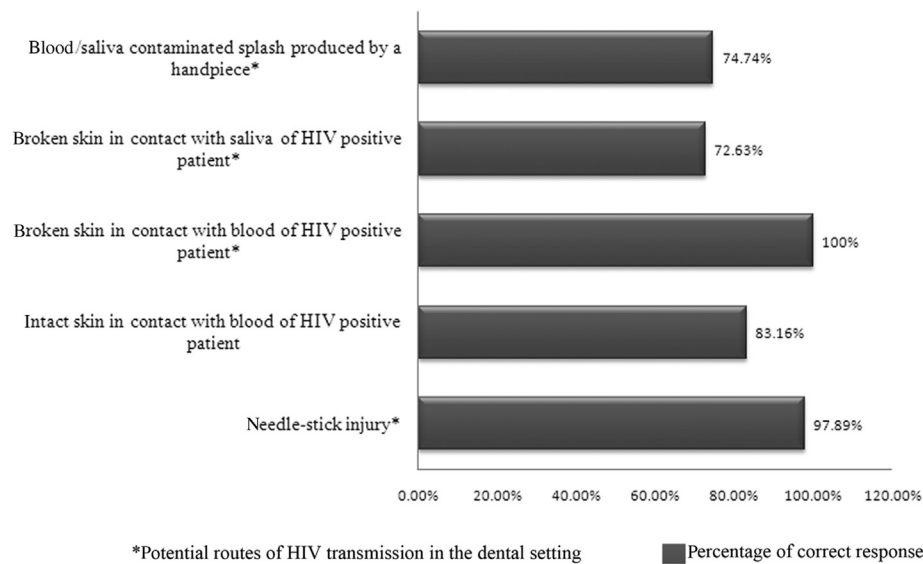


Figure 1 Knowledge regarding HIV transmission in a dental setting. HIV = human immunodeficiency virus.

Table 3 Responses of Chinese dental students to questions about their attitudes toward HIV/AIDS patients, by percentage of total respondents.

Attitude statement	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
I have the right to know if my patients are infected by HIV	82.11	13.68	4.21	—	—
People infected with HIV should not be isolated in a special center	24.21	27.37	34.74	8.42	5.26
I can safely treat HIV/AIDS patients	30.53	32.63	28.42	8.42	—
All dental patients should be considered potentially infectious	33.68	35.79	20.00	10.53	—
They must be supported, treated and helped to improve community health	55.78	40.00	2.11	2.11	—
A blood test should be taken for diagnosis of HIV infection in all dental patients	36.84	18.95	33.68	10.53	—
I am not concerned that in future we will find that AIDS can be transmitted in ways now thought to be safe	11.58	27.37	33.68	14.74	12.63
HIV/AIDS patients can live with others in the same place	35.79	38.95	18.95	2.10	4.21
My professional education has provided me with enough information to treat HIV/AIDS patients	8.42	51.58	24.21	15.79	—
I would be willing to perform mouth-to-mouth resuscitation during CPR if HIV/AIDS patients need it	2.10	26.32	37.89	27.37	6.32
I believe I have no right to refuse to treat an HIV/AIDS patient	30.53	42.10	8.42	14.74	4.21
I am obligated to treat HIV/AIDS patients	25.26	46.32	24.21	4.21	—
I am not concerned that working with HIV/AIDS patients may endanger my health	6.32	29.47	18.95	33.68	11.58
I don't worry about being infected with HIV by my patients	4.21	6.32	21.05	37.89	30.53
I will treat HIV/AIDS patients	18.95	44.21	32.63	2.11	2.10
I would not inform an AIDS patient's sexual partner against the patient's wishes	16.84	14.74	28.42	29.47	10.53
HIV/AIDS patients can lead a normal life	26.32	43.16	16.84	11.58	2.10

HIV = human immunodeficiency virus.

Discussion

As the number of HIV-positive people increases, their need for dental care will increase. HIV-infected individuals have the right to ask for medical care from dentists. For these patients, oral lesions are common.^{5,24} Valid knowledge about HIV/AIDS is important for dental students who are developing themselves into future stomatologists in this field.²³ Previous studies found that students with improved HIV-related knowledge tended to have a greater willingness to work with AIDS patients.^{2,25} However, knowledge may have little relationship with their attitudes or practices. In our study, the majority of student scores were good or excellent, however, the willingness to treat HIV-positive individuals was nonprofessional.

In the present study, a rather surprising finding indicated that only about half of the students knew the average time interval between HIV infection and detection of HIV antibodies in blood or other fluids, which was similar to results from a study by Ryalat et al.⁵ Additionally, there was considerable ambiguity as to whether an individual carrying HIV antibodies constitutes an HIV-carrier. Disappointingly, some students even thought that carrying anti-HIV antibodies indicated immunity against the disease. These results indicate that the dental students had inadequate knowledge of HIV virology and need substantial improvement in their education regarding the disease, which has also been reported in similar studies.^{15,26}

It is notable that the majority of students (91.6%) knew the possibility of transmission by breast milk containing HIV, which is the most common route of mother-to-fetus transmission, with most occurring postnatally.²⁷ However, many students (nearly 50%) mistakenly thought that HIV can be transmitted by mosquito, and one-quarter thought that people could get infected by sharing public facilities, such as swimming pools and public toilets. A study conducted by the Centers for Disease Control and Prevention showed no clear evidence supporting HIV transmission by insects, such as mosquitoes. HIV survives for only a short period inside an insect, meaning that there exists no proper environment for virus colonization and replication.²⁸ Aside for these misconceptions, students had a better understanding of other potential transmission routes.

Administration of proper dental care to HIV/AIDS patients must be based on precise recognition of oral lesions associated with HIV/AIDS.⁵ Chinese stomatological students have a good overall knowledge of the oral manifestations of HIV/AIDS relative to dental students in countries where AIDS is endemic.^{5,26} Currently, approximately 40 oral manifestations of HIV infection have been reported.²⁹ It is satisfactory that most students know the major oral manifestations of AIDS: Kaposi sarcoma, oral candidiasis, and oral hairy leukoplakia. However, students need to broaden their knowledge and recognize the association between AIDS and less common oral lesions, such as oral melanotic hyperpigmentation, non-Hodgkin's lymphoma, and salivary gland disease.²⁹ However, not every HIV patient has symptoms associated with diseases, such as Kaposi sarcoma, oral candidiasis, and oral hairy leukoplakia, and these classic oral manifestations may also be seen in patients not infected by HIV/AIDS.

Students have a good knowledge pertaining to high-risk groups, however, most did not know that hairdressers are also included in this group. These findings were similar to previous studies.⁴ Blood and body fluids on equipment, instruments, or work surfaces can transmit infection during hairdressing procedures. If the operators or clients have open cuts, sores, or broken skin, contraction may occur.³⁰

It is also possible to transmit HIV/AIDS during dental operation procedures.¹⁴ Blood/saliva-contaminated splash/spatter produced through inhalation of aerosol emitted from hand pieces could transmit HIV.³¹ However, in previous studies and perhaps due to the rarity of clinical infections reported as a result of this route, very few students knew that inhalation of aerosol emitted from hand pieces could transmit HIV, which was in contrast with our results.^{31,32} This possibility cannot be totally excluded and students should be aware that patient oral fluid and blood can be aspirated into a hand piece and in the absence of water-quality control, the dentist or new patient could contract the microbes of previous patients.³³ In one study, more than half the students believed that such a transmission route did not exist, suggesting that it was not completely understood.¹³ About 27.3% thought that contact with saliva contaminated with blood of AIDS patient was not sufficient to transmit HIV. Although exposure to saliva has never been proven to transmit HIV, saliva is usually contaminated with invisible blood.³⁴ Therefore it is not hard to understand why contact with saliva would result in clinical infection.

Taken together, these observations regarding the knowledge of HIV/AIDS indicate that oral medical students need substantial improvement in their education concerning the disease. Studies in other developing countries showed that their students had enough knowledge of certain aspects, however, requirements for improved teaching methods in other fields was identified.^{13,14}

Disappointingly, the majority of students (93.7%) showed negative (nonprofessional) attitudes toward patients infected with HIV, with only 2.1% showing a positive attitude. This is emphasized by the fact that more than half (68.4%) of the students in our study agreed or strongly agreed that there existed a high risk of HIV infection in everyday patient treatment. About a third of the students stated that it is possible for a dentist to become infected if they give CPR to HIV/AIDS patients, resulting in their unwillingness to perform mouth-to-mouth resuscitation. However, the risk of infection in this case is extremely low. Published reports revealed that mouth-to-mouth resuscitation cannot result in HIV infection in the absence of blood.³⁵ Furthermore, glandular saliva has the ability to inhibit HIV infection.³⁶ However, due to inadequate knowledge, benefits to the patient do not outweigh the small potential risk of transmission. Kuthy et al.²⁵ demonstrated the importance of treating patients with HIV and that student willingness to treat these patients increased with clinical experience. Given that none of the students in this study had previous clinical experience, their attitudes and willingness may be improved as their clinical experience and related knowledge increases.

A primary reason why students are afraid of providing dental care to HIV/AIDS patients may be overestimation of HIV transmission risk.³⁷ Although students have considerable knowledge and practical skills enabling them to cope with HIV patients, they are overwhelmed by the fear of potential transmission.¹³ Consequently, only 63.1% of students believed they could safely treat HIV/AIDS patients, and over half expressed concern that working with AIDS patients might be dangerous.

It is notable that only 18.9% believed that they had the right to refuse to treat HIV/AIDS patients, which was different from studies among students at Kuwait University and professors in a Brazilian dental school.^{23,38} In fact, dentists are required to provide treatment for all patients, even for HIV-positive ones. In order to treat all patients, they have an obligation to remain current on advances in the medical field.^{23,38}

Most students felt that every patient should be considered an HIV-carrier and potentially infectious. Some patients conceal their illness out of fear of being discriminated against and turned down from treatment. This increases the fear for occupational exposure on the part of doctors. Given these considerations, strict measures on infection control precautions must be carried out.

The findings of this study should be interpreted with caution, since the level of willingness to treat HIV/AIDS-infected patients was low. Through increasing student knowledge about HIV, this study aims to change future doctor attitudes and eliminate the discrimination against people infected with HIV/AIDS. Similarly, in a study in Iran, only 1% of dental students exhibited positive attitudes toward HIV/AIDS-infected patient treatment, meaning that professional attitudes on this subject remain poor despite the excellent/good knowledge of students.⁶ Furthermore, the fact that increased professional knowledge does not translate to acceptance of HIV/AIDS patients has also been shown in other studies.^{6,39} Given these considerations, other educational methods should also be applied. It is possible that negative attitudes might change through face-to-face contact with people having a stigmatizing condition.⁴⁰ Therefore, efforts should be made to invite HIV/AIDS-infected people to colleges in order to talk to students about their illnesses. Following such talks, positive changes in student perceptions have been observed.⁴¹ Additionally, Seacat et al¹⁸ also found that creating partnerships between local AIDS service organizations and dental schools helped remove stigmas associated with the disease.¹⁸

In summary, our study demonstrated that the majority of students displayed a negative attitude toward HIV/AIDS. Hence, these findings may imply that there is a need to improve educational methods to more clearly address misconceptions and attitudes toward the disease among Chinese dental students. However, the present study did not include dental students from other parts of China or from other grades and the sample size was relatively small. Future studies are encouraged to conduct this study among dental students in other dental schools throughout China.

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

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