INTRODUCTION

Human immunodeficiency (HIV) is a disease which results in decreased chemotaxis, defective granuloma formation and maintenance, impaired antigen processing and presentation, and generalized loss of CD4+ T cells. Acquired immunodeficiency syndrome (AIDS) is a globally emerging public health problem. India alone accounts for over 2.5 million people living with HIV with an estimated prevalence of 0.91%.\(^1\)\(^,\)\(^2\)

The risk of occupational transmission of the virus from a patient to a health-care provider has been estimated at 0.3% after a single percutaneous exposure to HIV-infected blood.\(^3\)

We can improve the medication tolerance/effectiveness, treatment success rate, and quality of life by providing good oral care to HIV-positive individuals.\(^3\)\(^,\)\(^4\) With improved survival rates, in the near future more HIV-positive patients will seek dental care.\(^5\)

Previous reports have shown that approximately 90% of the HIV infections among health-care workers occur in developing countries where occupational safety is a neglected issue.\(^6\)\(^-\)\(^8\)

Aims and Objectives: Discrimination by some health care workers, including dentists, against human immunodeficiency virus (HIV) infected persons has been noted. The main aim of the present study was to assess the knowledge, attitude, and practice towards HIV patients among the dentists of Trichur district, Kerala.

Materials and Methods: A cross-sectional survey was conducted among 206 dentists practicing in Trichur district of Kerala. Data was collected using a pretested, self-administered 26-item questionnaire and was statistically analyzed using SPSS software version 20.

Results: Out of 206 participants, 39.3% were unwilling to treat HIV patients. A statistical significance was found between willingness to treat HIV infected patients and age groups (\(P = 0.0001\)) as well as between the willingness to treat HIV infected patients and ethical responsibility (\(P = 0.0001\)).

Conclusion: Staff fears and increased personal risk are found to be the most frequently reported concerns in treating HIV patients among dentists of Trichur district, Kerala. Senior dentists showed more reluctance to treat HIV positive individuals.
In the last two decades all over the world, many dentists do not treat HIV-positive individuals.\textsuperscript{[9-11]}

Unwillingness to treat patients with HIV by the dentists has been associated with inadequate knowledge of disease process, transmission, diagnosis, and treatment of HIV infected patients which in turn has led to fear regarding contagion or AIDS phobia.\textsuperscript{[12-16]}

Dental faculty should act as a role model for the dental students regarding the dental treatment of AIDS patients.\textsuperscript{[17,18]} In the studies conducted in various countries,\textsuperscript{[17-20]} although satisfactory knowledge level among the study participants was there, a stigma was reported regarding the treatment of HIV/AIDS patients. Studies done in South Africa, Brazil, Japan, and Sudan demonstrated that dental students had insufficient knowledge regarding HIV, its mode of transmission, and management of HIV positive patients.\textsuperscript{[16,21-23]}

Lack of knowledge, fear of contracting the infection during the course of treating HIV infected patients, resistance of support staff, and perceived lack of clinical skills act as barriers to treating HIV positive individuals among dentists.\textsuperscript{[24,25]}

The studies done in India by Aggarwal et al.\textsuperscript{[26]} and Fotedar et al.\textsuperscript{[27]} have demonstrated good knowledge score among the dental students. According to the World Health Organization (WHO), HIV-positive patients should be treated.\textsuperscript{[28-30]} Despite all these recommendations, dentists are reluctant to treat HIV/AIDS patients because of lack of knowledge and ignorance about the disease.\textsuperscript{[31-37]} Infectious diseases' including HIV/AIDS and cross-infection control should form a part of the dental course curriculum.\textsuperscript{[1,38]}

The studies done till date in Kerala to assess the knowledge and attitude of dentists towards HIV are rare. The purpose of the present study was to assess the knowledge, attitude, and practice towards HIV patients among the dentists of Trichur district, Kerala.

**Materials and Methods**

A cross-sectional survey was conducted among the registered dental practitioners of Trichur district, Kerala using a pretested 26-item questionnaire. Out of the 26 questions, 5 questions were based on sociodemographic factors and the rest were knowledge, attitude, and practice questions. A pilot study was conducted to determine the sample size. The sample size was estimated to be 206. The sample size was calculated by using the formula $n = \frac{Z^2 \cdot p(1-p)}{e^2}$.

The correct knowledge response rate was estimated to be at $65.25 = (1.96^2) \times 65.25 \times 34.75/(65.25 \times 10/100)^2 = 204.59$.

The data collection was done by direct interviews, telephoning, and mailing. A written informed consent was obtained from all the study participants. Ethical clearance was obtained from AJ Ethics committee prior to beginning the study. A convenient sampling method was undertaken for data collection. The questionnaire consisted of 5 questions based on sociodemographic factors, 9 questions on knowledge, 9 questions on attitudes, and 5 questions on practice. Participants who were legally registered dental practitioners of Trichur district, Kerala were included in the study. Participants who were unwilling to participate in the study were excluded. The study was conducted for a period of 6 months from January to June 2013.

The reliability of the questionnaire was determined to be 0.87. The questionnaire was checked for validity by two professionals. The statistical analysis was done using the IBM Statistical Package for the Social Sciences software version 20, and the statistical test used here was the chi-square test.

**Results**

In the present study, out of 206 study participants, 67% and 70.4% agreed that if they treated patients with HIV or AIDS, they would be placed at an increased personal risk and that it would be difficult to deal with staff fears about patients with HIV/AIDS, respectively. In the present study, 89.6% disagreed that they do not have an ethical responsibility to treat patients with HIV. In the present study, 60.7% of the participants were willing to treat HIV patients. A total of 46.4% of dentists agreed that, if they treat patients with HIV/AIDS, other patients may discontinue treatment in their dental office.

Only 4.4% correctly answered the question “What is the risk of contracting HIV infection from an HIV-contaminated needlestick injury.” In the current study, 60.7% of the dentists agreed that it is possible to be infected with HIV by mother’s breast milk. In the present study, 69.9% of the study participants knew that white lesions on the lateral parts of the tongue with fissured or hairy surface is HIV manifestation. Only 60.5% knew that positive anti-HIV findings indicated that a patient suffered with HIV.

In the present study, out of 38 study participants who agreed that they did not have an ethical responsibility to treat HIV infected patients, 89.5% were unwilling to treat HIV infected patients. A statistical significance was found to exist between q12 (I am willing to treat HIV infected patients) and q6 (I don’t have an ethical responsibility to treat HIV infected patients) ($P = 0.0001$).
In the present study, 10% of the study participants agreed that they used hard containers for disposing sharps.

Table 1 shows that, out of 81 study participants who were unwilling to treat HIV infected patients, 39.5% were in the age group of 50–59 years. A statistical significance was found to exist between q12 (I am willing to treat HIV infected patients) and age groups ($P = 0.0001$).

Table 2 shows that, as attitude towards HIV patients increases, knowledge and practice towards HIV also increases. As knowledge towards HIV patients increases, practice also increases.

Table 3 shows that there is a significant difference between males and females regarding attitude and knowledge with females showing an increase in both attitude and knowledge towards HIV ($P = 0.048$ for attitude and $P < 0.001$ for knowledge, $t$-test).

Table 4 reveals that as age increases knowledge, attitude, and practice towards HIV is significantly reduced ($P < 0.001$, $F$–$F$ test).

Table 5 shows that there is a significant difference in the attitude and knowledge among dentists in rural, urban, and semirural areas ($P = 0.001$; $vhs$).

**DISCUSSION**

In the current study, 70.4% of the dentists agreed that it would be difficult to deal with staff fears about patients with HIV. This is the most frequently reported concern regarding HIV. This is comparable to the study done by Bodadhe *et al.*[39] in India where 61.4% agreed to the same.

In a study conducted by Mc Carthy *et al.*[40] in Canada, staff fears was the second frequent reported concerns to HIV. This difference can be attributed to the differences between Canadian and Indian population.

In the present study, 67% of the dentists agreed that they would be placed at greater personal risk if they treat HIV patients. This is similar to the study done by Mc Carthy *et al.*[40] where 62% agreed to the same.

In the present study, 46.4% of dentists agreed that, if they treat patients with HIV/AIDS, other patients may discontinue treatment in their dental office. This finding is in coherence with the study done by Bodadhe *et al.*[39] where 49.7% of the dentists agreed to the same.

In the present study, 60.7% of the study participants were willing to treat HIV patients. This is consistent with

### Table 1: Age group versus q12 (I am willing to treat HIV infected patients)

| Age groups | I am willing to treat HIV infected patients (q12) | Total (%) |
|------------|--------------------------------------------------|-----------|
|            | Agree (%) | Disagree (%) |                   |
| 23-29 years | 40 (32)   | 1 (1.2)      | 41 (19.9) |
| 30-39 years | 52 (41.6) | 4 (4.8)       | 56 (27.18) |
| 40-49 years | 28 (22.4) | 19 (23.5)     | 47 (22.8) |
| 50-59 years | 4 (3.2)   | 32 (39.5)     | 36 (17.5) |
| >60 years   | 1 (0.08)  | 25 (30.9)     | 26 (12.6) |
| Total       | 125 (100) | 81 (100)      | 206 (100) |

Chi-square value = 128.090, df = 4; $P = 0.0001$

### Table 2: Correlations between attitude and knowledge, attitude, and practice and knowledge and practice

| Attitude | Knowledge | Practice |
|----------|-----------|----------|
| R        | 0.807     | 0.275    |
| P        | <0.001 (vhs) | <0.001 (vhs) |
| N        | 206       | 206      |

### Table 3: Knowledge, attitude, and practice versus gender

| Gender | N    | Mean  | Std deviation | $t$   |
|--------|------|-------|---------------|------|
| Attitude |      |       |               |      |
| Male   | 94   | 54.711| 28.773        | 1.998|
| Female | 112  | 61.735| 21.882        | $P=0.048$ (sig) |
| Knowledge |      |       |               |      |
| Male   | 94   | 52.364| 18.117        | 5.039|
| Female | 112  | 64.980| 17.723        | $P<0.001$ (vhs) |
| Practice |      |       |               |      |
| Male   | 94   | 44.894| 25.684        | 0.134|
| Female | 112  | 44.464| 20.217        | $P=0.893$ (ns) |

### Table 4: Knowledge, attitude, and practice versus age group

| Age group | N     | Mean  | Std deviation | $F$   | $P$  |
|-----------|-------|-------|---------------|-------|------|
| Attitude  |       |       |               |       |      |
| 23-29     | 41    | 81.882| 11.528        | 76.57 | <0.001 vhs |
| 30-39     | 56    | 73.469| 16.215        |       |      |
| 40-49     | 47    | 52.584| 12.320        |       |      |
| 50-59     | 36    | 42.857| 19.765        | 6.11  | <0.001 vhs |
| >60       | 26    | 21.978| 17.719        |       |      |
| Knowledge |       |       |               |       |      |
| 23-29     | 41    | 75.068| 13.784        | 115.16| <0.001 vhs |
| 30-39     | 56    | 71.429| 6.982         |       |      |
| 40-49     | 47    | 59.102| 8.388         |       |      |
| 50-59     | 36    | 44.753| 15.139        |       |      |
| >60       | 26    | 28.205| 5.649         |       |      |
| Practice  |       |       |               |       |      |
| 23-29     | 41    | 50.244| 22.857        | 6.11  | <0.001 vhs |
| 30-39     | 56    | 51.429| 19.765        |       |      |
| 40-49     | 47    | 45.957| 23.559        |       |      |
| 50-59     | 36    | 36.111| 22.838        |       |      |
| >60       | 26    | 30.769| 18.957        |       |      |
the study done in UAE by Haroun et al.,[41] where 59% of the students responded that the university should treat HIV infected personnel or students.

This can also be correlated with the study reported by Sharma et al.[42] where 60% of the dentists showed positive attitudes towards HIV patients. In contrast, in the study conducted by Aggarwal et al.,[43] only 39.23% of the study participants were willing to treat HIV infected patients.

Only 4.4% of the study participants correctly answered the question of the risk of contracting HIV infection from an HIV-contaminated needlestick injury. This is in accordance with the Bodadhe et al.,[39] where only 10.9% correctly answered this question.

In the current study, 60.7% of the dentists knew that it is possible to be infected with HIV by mother’s breast milk. This is similar to the study done by Li et al.[44] among Chinese students, where majority of the students answered correctly about the routes of transmission and also in contrast to the study done by Rehan et al.[45] in Pakistan where 47.3% students answered incorrectly regarding the mode of transmission. This may be due to the difference in study population and the difference in training given at the under graduate level and at the continuing education level.

In the present study, only 67% of the study participants knew that AIDS cannot be diagnosed using urine and only 78.6% knew that AIDS can be diagnosed using blood. This is lower than the study conducted by Park et al.[46] in Korea where 98% and 87% of the dentists correctly answered these questions, respectively.

In the present study, 10% agreed that they used hard containers for disposing sharps, whereas in the study conducted by Borax et al.,[47] no one has reported to follow that practice. A statistical significance was found to exist between willingness to treat HIV patients and age groups. Respondents younger than 30 years were least likely to refuse to treat HIV infected patients. This is similar to the study done by Mc Carthy et al.[40] in Canada. This may be because of the fact that they had received more formal training related to HIV than older dentists.

There is a significant difference between males and female dentists in attitude and knowledge, with females showing an increase in positive attitude and knowledge towards HIV than males; however, in studies by Aggarval et al.[26] and Hashemipour et al.,[48] there was no significant gender difference. There was a positive correlation between knowledge and attitude, which is similar to the study done by Mc Carthy et al.[40] As age increases, knowledge, attitude, and practice towards AIDS decreases probably because the junior dentists had received more formal training related to HIV than older dentists had. In the present study, dentists practicing in urban areas showed significant increase in positive attitude and practice, which is similar to the study done by Bodadhe et al.[32] This may be because of the readily available emergency facilities in urban areas.

One of the main limitation of the study was that the results of the study are based on subjective assessment. There is no actual judgement of their attitudes and practices towards HIV patients. As the participants were selected according to convenient sampling from a single district, the results cannot be generalized to the general population of India. One of the main concerns of the study was regarding the effect of age and sex of the dentists on the knowledge and attitude level towards HIV patients. Another was the effect of knowledge score of dentists on attitudes towards HIV patients.

Further studies can be done to assess the effect of continuing dental education programs/health education related to HIV on the attitudes, knowledge, and practice among dentists.

**Conclusion**

In this study, there was discrimination by dentists against HIV-infected persons. Staff fears and increased personal risk are found to be the most frequently reported concerns in treating HIV patients among dentists of Trichur district, Kerala. Senior dentists showed more reluctance to treat HIV positive individuals. Another alarming finding is that only very few dentists reported that they knew how to treat an HIV patient safely. Moreover most of the dentists were not treating all patients as if they would treat an HIV positive patient. Further, the HIV status of many patients are unknown. The dentists should make decisions with regard to the type of dental treatment provided. Dentists should not refuse to treat a patient solely based on their HIV positive status.[33]
Continuing dental education has to be given to reduce the dentists’ refusal to treat HIV infected patients.\cite{33}

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**CONFLICTS OF INTEREST**

There are no conflicts of interest.

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