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Exploring educational and promotional opportunities for implementing oral rapid human immunodeficiency virus testing among dentists in India

R. Yashoda, Manjunath P. Puranik, Soni Rajput¹

Abstract:

CONTEXT: Human immunodeficiency virus (HIV) is a public health problem in India. Dentist plays an important role in diagnosing since oral lesions are common in HIV-positive patients and have an ethical responsibility to provide treatment to them.

AIMS: This study aims to explore educational and promotional opportunities for implementing oral rapid HIV testing (ORHT) among dentists in Bengaluru, India.

SETTINGS AND DESIGN: A cross-sectional study was conducted among 300 dentists. Dentists were included from private practice, dental practice in general hospital, and dental teaching/hospitals.

SUBJECTS AND METHODS: A 43-item questionnaire was used to assess demographics, educational knowledge on HIV and ORHT, attitude toward HIV patients, and willingness to promote ORHT and perceived barriers of performing ORHT.

STATISTICAL ANALYSIS USED: The data were evaluated using SPSS 22. Student's *t*-test, Chi-square, Pearson correlation, and binary logistics were used keeping *P* value at 5%.

RESULTS: Mean age of the participants was 38.97 ± 7.69 years with equal distribution of gender and practice. Majority were postgraduates (63.0%) and having general practice (56.6%). Although two-thirds of the participants belong to high score category, the mean knowledge level is below 50%. Mean score of knowledge was 10.70 ± 2.5 . One hundred and thirty (43.3%) dentists were aware of ORHT, and 228 (76%) thought that ORHT was needed in the dental clinic. Dentist having specialty practice felt more accepting of ORHT (odds ratio = 2.455, 95% confidence interval 1.186–5.463). The lack of knowledge and training was the main barrier (39%) to conduct ORHT.

CONCLUSIONS: The level of knowledge of the dentist about HIV/AIDS was acceptable. Majority of the dentist thought that ORHT is needed in a dental clinic. Overall, there was positive attitude toward HIV patients and ORHT.

Keywords:

Dental setting, human immunodeficiency virus, India, oral rapid human immunodeficiency virus testing, promotional opportunity

Introduction

Human immunodeficiency virus (HIV)/AIDS is a major global public health issue, with 36.9 million people living with HIV at the end of 2017. Around 0.8% (0.6%–0.9%) of adults aged 15–49 years

worldwide are living with HIV.^[1] India is the third largest country having people living with HIV/AIDS, accounting for 2.2 million people.^[2] AIDS virus is human T-lymphotropic virus type 3 or lymphadenopathy-associated virus, a retrovirus usually called HIV. It attacks the CD4+ T lymphocytes in infected humans, which results in immunosuppression.^[3]

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Department of Public Health Dentistry, Government Dental College and Research Institute, Bengaluru, Karnataka, ¹Department of Public Health Dentistry, Goa Dental College and Hospital, Bambolim, Goa, India

Address for correspondence:

Dr. Soni Rajput, No. 8, Department of Public Health Dentistry, Goa Dental College and Hospital, Bambolim - 403 802, Goa, India.
E-mail: sonirajput1190@gmail.com

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HIV testing is not done on a routine basis in India whereas country like the US, its mandatory. Due to this, there was an improvement in early diagnosis, start of care on time and enabling patients to access for antiretroviral therapy, in the bargain, there was a reduction in infectivity, morbidity, and mortality.^[4-6] Oral health is an essential aspect for overall medical care for HIV, and it is important for improving the quality of life among them.^[7]

During dental clinical procedures, blood and saliva exposure occur frequently, hence both patients and dentist are at a risk of blood-borne infection such as HIV.^[8] However, the possibility of HIV transmission is very low.^[9] Furthermore, most of the lesions of HIV infection are present orally during initial stages, the dental setting can be considered as an ideal setting for testing of HIV.^[3]

Various test kits are available that use blood for testing. Rapid tests for HIV gives result on the spot instead of sending the sample to the laboratory. However, rapid testing will depend on the type of practice, financial resources, patient acceptance, and staff support.^[10] HIV testing using saliva is a new noninvasive method. This oral rapid HIV testing (ORHT) technology permits fast, simple, minimally invasive, cost-effective way to screen for HIV serostatus in which dental setting provide a perfect venue.^[11]

There are ample of studies in literature regarding knowledge and willingness toward HIV/AIDS screening using blood in the dental setting.^[7,12-16] However, very few studies have assessed willingness to use ORHT in the dental setting.^[4-6,10] Dentist in couple of studies was willing to conduct ORHT^[5,10] while other two studies reported that dentist was comfortable using blood test instead of saliva.^[4,6]

Owing to the alarming increase spread of HIV in India, the present study aimed to explore educational and promotional opportunities for implementing ORHT among dentists in Bengaluru, India.

Subjects and Methods

Study design and participants

A cross-sectional questionnaire study was conducted among dentists in Bengaluru from February to April 2017. Ethical approval was obtained From Institutional Ethical Committee and was carried in full accordance with the World Medical Association Declaration of Helsinki. All participants signed an informed consent.

The sample size calculation was accomplished using an online database software program (Raosoft®, Inc.,

6645 NE Windermere Road, Seattle, WA, USA; www.raosoft.com) with 95% confidence interval (CI) and study population size of 1078 and was found to be 284; it was rounded off to 300. Majorly, three types of dental practice are present in India: private practice, dental practice in the general hospital, and dental teaching/hospitals. Stratified cluster sampling was employed considering the type of practice as a cluster. List of dental teaching/hospitals,^[17] dental practice in general hospital, and private clinic list^[18] was prepared, from each cluster dental practices were selected randomly, and all dentists working in these practices were included till the sample size was met.

Data collection

The questionnaire was based on previous studies^[4,10] with some modifications and the addition of new questions to suit the Indian scenario. Face validity and content validation were done with the help of panel of experts. Internal consistency was also assessed using Cronbach's alpha, and it was found to be good ($\alpha = 0.82$) during a pilot survey.

Questionnaire consisted of 43 questions, assessing demographics (6 items), dental practice (6 items), behavior toward HIV patients (2 items), educational knowledge on HIV/AIDS and ORHT (21 items), attitude toward HIV patients and willingness to promote ORHT (6 items), and perceived barriers of performing ORHT (2 items).

Self-administered questionnaires were distributed to the dentists in their respective practices. Questionnaires were collected immediately and checked for its completeness. It took 10–15 min for them to complete the questionnaire.

Statistical analysis

Data collected were entered into an Excel format, and statistical package for the social sciences, version 22 (IBM Corporation, SPSS Inc., Chicago, IL, USA) was used for statistical analysis. The correct answer in knowledge domain was allotted score of 1 (range 0–21), attitude questions responses were based on 3-point Likert scale (agree = 1, uncertain = 2, and disagree = 3) (range 6–18). Based on the median of knowledge domain, scores were dichotomized as “high score” and “low score.” Attitude scores were dichotomized as “yes” (agree) and “no” (disagree) based on responses of the necessity of oral rapid HIV in the dental setting.

Descriptive statistics with frequency, mean, and standard deviation were computed. Difference between the groups was tested using Student's *t*-test for continuous variable and a Chi-square statistics for the categorical variable. Pearson's correlation was used to explore the relationship between knowledge and attitude score. Unconditional logistic regression was used to analyze

factors affecting knowledge and attitude. A *P* value was set at 5% using two-tailed test with 95% CI.

Results

The response rate was 100%. The mean age of the study participants was 38.97 ± 7.69 years (25–58 years) with equal distribution of gender and practice. Majority were postgraduates (63.0%) and having general practice (56.6%). Most of them reported up to 80 patients in a week in their practice. 18% reported that they had direct contact with blood; 31% had a sharp injury and 58.0% were injured once in the last year. 69% reported that they probably treated patients with HIV/AIDS and 70.3% knew their HIV status [Table 1].

Most of the questions were answered correctly by study participants (>80%) except questions related

to virology, infection control measures, treatment, and about ORHT (04.7%–57.7%). Mean knowledge score was 10.70 ± 2.5 ; 98 (32.6%) were in the low-score group; 202 (67.3%) were in high-score group. Age, gender, educational level, dental specialty, type of practice, possibility to treat HIV patients, and knowing their HIV status was associated with knowledge score [Table 1].

More than half (57.0%) of the participants responded that if they come across HIV patient; they would treat patient cautiously in an isolated room after patient agreement; 22.3% will treat them like any other patient; 15.3% will refer them to a specialist and 5.3% will not be comfortable in treating HIV-positive patients. When asked how they feel while advising preliminary HIV test to their patient more than half (52.7%) reported comfortable [Table 2].

Table 1: Participant characteristics and HIV knowledge scores

Characteristics	Total (n=300)	HIV Knowledge Score		P
		Low Score (n ₁ =98)	High score (n ₂ =202)	
Age in years, M (SD)	38.97 (7.69)	37.29 (7.34)	39.81 (7.75)	0.008
Gender				
Male	150 (50.0)	41 (27.33)	109 (72.66)	0.04
Female	150 (50.0)	57 (38.0)	93 (62.0)	
Educational level				
Graduate	111 (37.0)	46 (41.44)	65 (58.55)	0.01
Postgraduate	189 (63.0)	52 (27.51)	137 (72.48)	
Designation				
Professor	5 (1.7)	1 (20.0)	4 (80.0)	0.15
Associate Professor	20 (6.7)	5 (25.0)	15 (75.0)	
Assistant Professor	50 (16.7)	5 (10.0)	45 (90.0)	
Lecturer	25 (8.3)	1 (4.0)	24 (96.0)	
Dental specialty				
General practice	170 (56.66)	78 (45.88)	92 (54.11)	0.001
Specialty	130 (43.33)	20 (15.38)	110 (84.61)	
Type of practice				
Private practice	100 (33.3)	37 (37.0)	63 (37.0)	0.001
Dental practice in general hospital	100 (33.3)	49 (49.0)	51 (51.0)	
Dental teaching/hospitals	100 (33.3)	12 (12.0)	88 (88.0)	
Patients seen in a week				
1-40	136 (45.3)	44 (32.35)	92 (67.64)	0.34
41-80	135 (45.0)	48 (35.55)	87 (64.44)	
>80	28 (9.3)	6 (21.42)	22 (78.57)	
Contact with blood				
Yes	54 (18.0)	13 (24.07)	41 (75.92)	0.13
No	246 (82.0)	85 (34.55)	161 (65.44)	
Sharp injury				
Yes	93 (31.0)	25 (26.88)	68 (73.11)	0.15
No	207 (69.0)	73 (35.96)	134 (64.73)	
Possibility to treat HIV patients				
Yes	208 (69.3)	57 (27.40)	151 (72.59)	0.003
No	89 (31.0)	41 (46.06)	48 (53.93)	
Awareness about HIV status				
Yes	211 (70.3)	48 (22.74)	163 (77.25)	0.001
No	89 (29.7)	50 (56.17)	39 (43.82)	

Table 2: Participant characteristics and attitudes towards rapid HIV testing

Characteristics	Total (n=300)	Necessity of rapid HIV testing		P
		Yes (n ₁ =228)	No (n ₂ =72)	
Age in years, M (SD)	38.97 (7.69)	39.39 (7.82)	37.70 (7.19)	0.10
Gender				
Male	150 (50.0)	121 (80.66)	29 (19.33)	0.05
Female	150 (50.0)	107 (71.33)	43 (28.66)	
Educational level				
Graduate	111 (37.0)	86 (77.47)	25 (22.52)	0.64
Postgraduate	189 (63.0)	142 (75.13)	47 (31.33)	
Designation, n (%)				
Professor	5 (1.7)	5 (100.0)	0	0.32
Associate Professor	20 (6.7)	19 (95.0)	01 (5.0)	
Assistant Professor	50 (16.7)	45 (90.0)	05 (10.0)	
Lecturer	25 (8.3)	20 (80.0)	05 (20.0)	
Dental specialty				
General practice	170 (56.66)	117 (68.82)	53 (31.17)	0.001
Specialty	130 (43.33)	111 (85.38)	19 (14.61)	
Type of practice				
Private practice	100 (33.3)	68 (68.0)	32 (32.0)	0.001
Dental practice in general hospital	100 (33.3)	71 (71.0)	29 (29.0)	
Dental teaching/hospitals	100 (33.3)	89 (89.0)	11 (11.0)	
Patients seen in a week				
1-40	136 (45.3)	108 (79.41)	28 (20.58)	0.32
41-80	135 (45.0)	97 (71.85)	38 (28.14)	
>80	28 (9.3)	22 (78.57)	06 (21.42)	
Contact with blood				
Yes	54 (18.0)	29 (53.70)	25 (46.29)	0.001
No	246 (82.0)	199 (80.89)	47 (19.10)	
Sharp injury				
Yes	93 (31.0)	68 (73.11)	25 (26.88)	0.43
No	207 (69.0)	160 (77.29)	47 (22.70)	
Possibility to treat HIV patients				
Yes	208 (69.3)	165 (80.48)	43 (20.67)	0.02
No	89 (31.0)	60 (67.41)	29 (32.58)	
Awareness about HIV status				
Yes	211 (70.3)	174 (82.46)	37 (17.53)	0.001
No	89 (29.7)	54 (60.67)	35 (39.32)	
Knowledge scores				
Low score	98 (32.7)	69 (70.40)	29 (29.60)	0.11
High score	202 (67.3)	159 (78.71)	43 (21.28)	

Mean attitude score was 13.03 ± 1.91 (score range 6–18). 45% of the participants were having a negative attitude toward HIV patients. Majority supported HIV testing in a dental setting (86.3%), willing to undergo training (89.7%), or conduct ORHT in their dental setting was 79%. In multiple logistic regression, participants knowledge about their HIV status (OR = 4.010, 95% CI 2.274–7.072) predicted high knowledge [Table 3].

There was statistically significant positive moderate correlation ($r = 0.31$, $P < 0.001$) between knowledge score and attitude score. 79% were willing to conduct ORHT in their practice. HIV testing keep community and staff safe (41.3%) was the main reason was supporting ORHT in dental clinic followed by its part of routine

dental care (24%), doctor and patient will know the status (13.7%), result will come on the spot (11.7%), and convenience (9.3%).

21% were not willing to conduct ORHT. Lack of proper knowledge and training was major barrier (39.33%) followed by dealing with staff fear about HIV patients (23.66%), fear of nonacceptance by the patient (15.66%), financial burden in practice (14.0%), and increase in personal risk (07.33%) [Figure 1].

Discussion

HIV targets the immune system. As the proportion of HIV-positive people increase, their demand for dental

Table 3: Predictors of HIV knowledge scores

Predictors	β	SE	OR	95% CI		P
				Lower	Upper	
Age	0.357	0.283	1.430	0.821	2.491	0.207
Gender	0.278	0.269	1.321	0.780	2.237	0.301
Educational level	0.265	0.319	1.303	0.698	2.434	0.406
Dental speciality	0.133	0.381	0.875	0.415	1.846	0.726
Type of practice						
Private practice	0.341	0.383	1.407	0.664	2.983	0.373
Dental practice in general hospital	0.147	0.400	1.158	0.528	2.538	0.714
Possibility to treat HIV patients	0.384	0.294	1.468	0.825	2.613	0.192
HIV status	1.389	0.289	4.010	2.274	7.072	<0.001

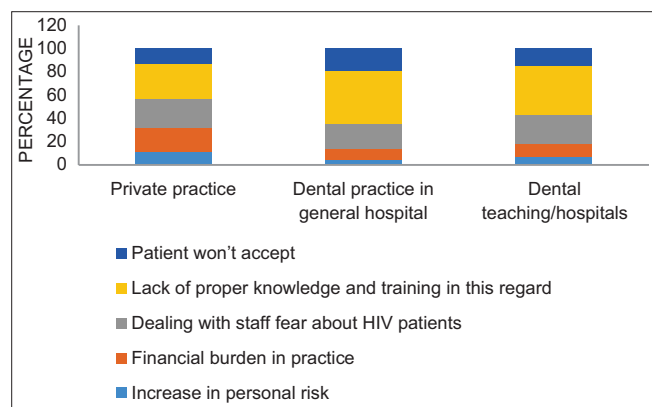


Figure 1: Perceived barriers to rapid HIV testing by dental setting

care will increase.^[7] HIV-infected patients may ask for care from a dentist since oral lesions are evident for them. With the development of new technologies, saliva has been suggested for screening HIV. Hence, it is necessary to assess the educational knowledge, attitude, and willingness of dentist to promote ORHT in India.

This study was conducted among dentists with aged 25–58 years (mean = 38 years) which was in line with few studies.^[4,10,12,14,16,19] This wide range of age group help in involving both old and new practitioners in the study, especially to check the updating of knowledge among the old practitioners. There was an equal distribution of gender which corroborated with four studies^[4,10,16,20] whereas other studies reported a higher proportion of females.^[12,15,21-23] There was equal distribution of dentist working in dental teaching institute, private practice and dental wing in general hospital which was similar to a study^[16] while other studies reported a higher proportion of dentists working in dental teaching institutes,^[10] private practice,^[12] and public sector.^[22] Most of them saw up to 80 patients per week which was higher when compared to one of the studies.^[16]

Very few had direct contact with the patient’s saliva or blood during dental procedures, whereas earlier study reported a higher proportion.^[4] Less than one-third had a history of sharp injuries which was similar to a

study^[23] whereas a study reported a higher proportion with a history of sharp injuries.^[4] 69% believed that they might have treated HIV patients unknowingly which is comparable to a study in China.^[4]

Although two-thirds of the participants belonged to high score category, the mean knowledge level is below 50%. This depicts the inadequate knowledge about HIV and ORHT among participants. HIV transmission is possible only if certain body fluids like blood, comes in contact with a damaged tissue or are directly injected into the bloodstream (from a needle or syringe).^[24] Majority had knowledge about this which was in agreement with other studies.^[4,7,13,20-22] It takes usually 6 weeks to 3 months to develop antibodies to HIV antigens after being infected. In some individuals, it may take 6 months or longer, though rare.^[25] Very few were aware about the duration of the development of antibodies to HIV antigen that was similar to a study^[22] whereas study done in Jordan reported a higher level of awareness.^[21] Some participants believed that carrying anti-HIV antibodies indicates immunity against the disease. Inadequate knowledge may explain less emphasis on virology of HIV during their graduation.

Enzyme-linked immunosorbent assay detects HIV antibodies which the body starts producing between 2 and 12 weeks after becoming infected with HIV. Western blot is the most common test followed by indirect fluorescent antibody and HIV viral load measurements.^[24] Majority of the participants were aware of these tests. Postexposure prophylaxis (PEP) means taking antiretroviral medicines after being potentially exposed to HIV to prevent becoming infected. PEP must be started within 72 h after a recent possible exposure.^[24] Less than half of the participants knew about PEP.

The Centre for Disease Control and Prevention (CDC) recommends standard precautions for the care of all patients, regardless of their diagnosis or presumed infection status.^[24] Very few knew about standard precautions. There is limited scientific evidence to rule in or out a meaningful relationship between HIV status and

complications arising from invasive dental procedures.^[26] Most of the participants believed that invasive dental procedures would increase the complications in HIV patients.

For blood and saliva spills, absorbent material should be used to soak the spill followed by broad-spectrum disinfectants such as 10% bleach (1 part of bleach with 9 parts of water) and left on the material for 10–30 min. Hands should be washed for at least for 15 s.^[27] Less than one-third of the participants answered correctly. All infectious material should be disposed in puncture proof bag with a biological waste symbol.^[28] More than two-thirds of the participants were aware of this stipulation.

ORHT provides results in 20 min. Swab is used to collect the saliva sample between the teeth and upper and lower gingiva. Like other rapid tests, it is not reliable during the window period. Very few were having knowledge about ORHT compared to other studies.^[4,10] A regimen for pep for HIV with three drugs (the combination of transcriptase and protease inhibitors) are preferred.^[24] Less than one-third had knowledge about HIV treatment. In multiple logistic regression, awareness about their HIV status was the only factor found to be associated with knowledge. While other factors remained insignificant with their association with knowledge. Most of the participants were having favorable attitude toward HIV and ORHT testing and were willing to perform ORHT in their dental clinic. Results were similar to few studies.^[4,10,16,22] In multiple logistic regression, those who were having specialty practice had more positive attitude toward ORHT, this could be due to better knowledge, well-equipped practice and set up to handle the situation. However, participants those who had less blood/saliva exposure had a negative attitude depicting lack of confidence to tackle the situation. The main finding of this study was that higher the knowledge scores favorable was the attitude toward ORHT. This demands the need for improving knowledge about HIV and ORHT.

The main reason that prompted participants' willingness for conducting ORHT was "it will keep community and staff safe." Whereas lack of knowledge emerged as the main barrier for conducting ORHT in their dental setting and was similar to couple of studies.^[16,22]

To best of our knowledge, this study is the first of its kind in India to assess the knowledge, practice, and willingness to conduct ORHT by dentists. Although it was a questionnaire study where social desirability and response bias can be expected. Its clarity, simplicity, and comprehensiveness may be considered as its strength and would have achieved reasonable degree of validity.

Moreover, selection of study participants was done carefully to include an equal number of participants with regard to gender and dentists from three major practices; coming in contact with a broad range of patients which will facilitate extrapolation of the research findings.

Overall, the educational knowledge and attitude of the dentists toward ORHT can be improved by CDE programs to update the recent advances in the field to boost their confidence and willingness to adopt newer technologies for providing safe and efficient dental treatment procedures. As this technique is still not practiced in India, perception of the dentist toward ORHT is only imaginary. Hence, further studies can be taken up among the dentists once the products are easily available and technique is into practice.

Conclusions

Although there was an acceptable level of knowledge among dentist, still there is a need to improve the knowledge in some areas such as virology, infection control, prophylactic drugs, and ORHT. Dentist with a positive attitude toward HIV patients and ORHT were willing to promote ORHT in their clinic.

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Conflicts of interest

There are no conflicts of interest.

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