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Original Article

Post-exposure prophylaxis awareness for HIV in India

Mansha Bakshi^a, Reema Malhotra^b, Rahul Bhola^{c,*}, Amit Gupta^a,
Salil Pawah^a, Hemant Kumar^d

^aSudha Rustagi College of Dental Sciences and Research, Faridabad, Haryana 121002, India

^bUniversity of Delhi, Delhi 110007, India

^cPrivate Clinician, Dr. Bhola's Dental Clinic, Faridabad, Haryana 121005 India & Independent Consultant & Researcher, Calgary AB T3B 2V4, Canada

^dHaryana Civil Dental Services, Haryana 121002, India

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ABSTRACT

Aim: The study was designed and conducted to evaluate awareness and attitude towards the use of post-exposure prophylaxis (PEP) for accidental exposure to human immunodeficiency virus (HIV) among dental students in India.

Method: A cross-sectional survey was conducted using a self-developed close-ended questionnaire containing 10 questions on HIV and AIDS-related knowledge, sources of information and methods needed to educate dental students regarding HIV.

Sample: The sample consisted of 600 undergraduate dental students in dental colleges from six different dental colleges, spread over in cities in National Capital Region of Delhi (NCR), India. 63.5% were females and 36.5% were males – all within the age range of 18–22 years.

Analysis: Responses were exposed to descriptive statistical analysis using SPSS version 18. Results were expressed as means, standard deviations and percentage frequencies on inter-item as well as combined score basis with graphical representation.

Results: The study highlighted that the undergraduate students have only moderate level knowledge about PEP for HIV/AIDS with a mean awareness score of 57.94%. About two-third level of disagreement was obtained about the fact that PEP-related information was taught at the college level and that anti-PEP drugs were available at clinics.

Conclusion: Suggestive measures in the direction of greater emphasis on HIV/AIDS and its PEP in the dental curriculum and training emerge necessary with three quarter agreement about revision in teaching. With only 60% sample willing to treat HIV patients, a greater sensitivity about this much-stigmatized population must also be ensured through an exposure to diverse patient population and regulation of ethical practices for dentists.

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* Corresponding author at: Private Clinician, Dr. Bhola's Dental Clinic, Faridabad, Haryana 121005 India & Independent Consultant & Researcher, Calgary AB T3B 2V4 Canada. Fax: +1 403 220 8618.

E-mail address: bhola.rahul@gmail.com (R. Bhola).

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1. Introduction

India is one of the leading countries with human immunodeficiency virus (HIV) infection and acquired immuno deficiency syndrome (AIDS). National AIDS Control Organization (NACO),¹ in its 2013–2014 annual report, offers current epidemiological scenario of HIV in India. The prevalence of HIV for general population in 2012–2013 was 0.35%, with an overall reduction by 57% in the last decade. Despite these figures, India continues to be the third largest HIV afflicted country with more than 2.1 million HIV positive cases. This high prevalence rate in India is estimated to give rise to about 50 million HIV cases by 2025.²

Occupational exposure among oral health care workers (OHCWs) to HIV is one of the important routes of transmission of the virus.³ Although the risk of transmission of HIV in dental care setting is reported to be low, it does not, however, indicate a zero risk. Dental professionals can be accidentally exposed to the virus and other blood-borne pathogens in the course of treating patients.^{4,5} Currently available data suggest that risk of HIV transmission via saliva is low, but blood contamination of the saliva increases this risk.⁶

Dental health care settings require specific strategies to prevent the disease transmission among OHCWs and their patients.⁷ Fear of HIV contagion generates major concerns among OHCWs and may produce a barrier to successful educational efforts towards the disease. This might lead to a variety of adverse outcomes such as an absolute unwillingness to treat HIV/AIDS patients.⁸ A study among medical students in the United States of America revealed that over half of the students believed that treating AIDS patients might be hazardous, partly attributing their fears to the inadequate educational training.⁹ Similar results were observed in studies conducted in various developing countries such as Turkey, Kenya, Brazil, Singapore, South Africa and Iran.^{10–14}

Oral lesions, such as candidiasis, hairy leukoplakia and Kaposi's sarcoma are commonly found in patients with HIV infection.^{15,16} It is a moral and ethical duty of a dentist and OHCW to provide quality care and treatment to all patients without discrimination.¹⁷ Similarly, many dental associations such as Canadian Dental association, American Dental Association, etc., have issued mandatory recommendations for OHCWs to provide quality care to patients with infectious diseases, including Hepatitis and AIDS.⁸ Considering that around 90% of the HIV transmission among the health care workers takes place in developing countries, a PEP protocol would effectively enable dentists to handle occupational HIV exposures in their clinics.^{18,19} Research indicates that Indian dental scene lags behind in adequate awareness pertaining to Post-Exposure Prophylaxis for HIV.^{20,21} However, through literature we come to arrive at a dearth of ample studies on awareness level prevalent among subjects. In lieu of an ignorant picture that emerges for the Indian dental scene, it becomes urgent to further explore the exact nature of current attitudes towards HIV exposure among the patient population.

2. Methodology

2.1. Objective

To assess the degree of awareness and nature of attitudes to use post-exposure prophylaxis (PEP) for accidental exposure

to human immunodeficiency virus (HIV) among dentistry students in India.

2.2. Tool

The survey instrument consisted of a well-structured questionnaire in English medium. It contained 10 closed-ended questions on broad themes of HIV and AIDS-related knowledge, sources of information and methods needed to further educate dental students regarding HIV. It was ensured that the questionnaire was brief, simple to understand and easy to administer. Each test item was to be numerically rated on a 5-point Likert scale ranging from strongly agree, agree, not sure, disagree to strongly disagree (Appendix 1). Lesser rating scale value indicated greater agreement and awareness, and as we moved on the right end of the continuum with a greater value, the disagreement also increased. Convergent validity was ascertained by conducting a pilot study on a sample of 100 dentistry students, prior to the main study, and drawing a comparison between total percent score of each subject on the present questionnaire and the rating of AIDS awareness and dental protocol given by their supervisors. A Pearson rank correlation coefficient of $R = 0.81$ was obtained, which is likely to depict a steeper slope in a scattergram. The questionnaire was also reviewed by dental experts, health administrators and an ethical committee to assess the validity of the tool for research purposes among dental students.

2.3. Sample

The participants of this study included 600 dentistry students from National Capital Region (NCR) of Delhi, India. To ensure a better representation of the population, the sample was selected randomly from six different dental colleges, spread over in cities of New Delhi, Faridabad, Ballabgarh, Ghaziabad, Gurgaon and Noida. A total of 100 students, both males and females, were selected from each college. It was also ensured that all the subjects were third- and fourth-year students enrolled in Bachelor of dental surgery (BDS) course and fell within the age range of 18–22 years. About 339 of these respondents were females, making it 63.5% of the sample population and 195 or 36.5% were males.

2.4. Procedure

A cross-sectional survey was conducted across various dental colleges. The responses of each subject were recorded on all the 10 items. Score 1 was given to strongly agree and score 5 to strongly disagree category. Higher score showed lesser agreement and awareness to the statement made. It was ensured that all the participants understood the items and gave their spontaneous answers. Anonymity of participants and confidentiality of responses were ensured under the supervision of teaching assistants. The entire survey was carried within 3 consecutive days to ensure consistency of responses with respect to time and minimize variability due to chance errors, thereby ensuring greater reliability of responses.

2.5. Analysis

After the survey, the scores of each subject on each item were summed to determine their total raw score. Raw score values

for total scores ranged from 10 to 50. These scores were then exposed to descriptive statistical analysis using Statistical Package for the Social Sciences version 18 (SPSS version 18). The results were expressed as means, standard deviations and percentage frequencies on inter-item as well as combined score basis. Graphical representations such as bar diagrams and Gaussian curve better depicted the results for research purposes.

3. Results

Out of the 600 students, 534 completed the questionnaire successfully. Thus, a response rate of 89% was achieved at the end of 3 days. A combined mean Likert rating of 2.103 was obtained on a 5-point scale, suggesting a moderately low degree of disagreement value, i.e. 42.06%, as shown in Table 1. About 57.94% preference or cognitive readiness towards post exposure HIV prophylaxis was observed. This is further exemplified by the fact that 8 out of 10 statements had a mean score of lower than 50%, falling more on the higher awareness side. These overall scores can be taken as highly reliable with a low variability SD measure of 0.98. An item-wise break-up of mean Likert ratings and their corresponding mean percentages were also obtained. Item 2 “I was taught about PEP before entering clinic” and item 10 “Post-exposure prophylaxis medication is available in dental clinics” obtained highest disagreement weightages of 61.6 and 64.8 respectively, whereas item 3 “Should more emphasis be given to teaching about PEP in curriculum” was agreed the maximum, with the least disagreement score of 25.8% only, as can be seen from Table 1. The dispersion of these mean scores ranged from 0.61 to 1.37. Next, an item-wise analysis of percentage frequency for various rating scale categories was determined. Further, item 3 “Should more emphasis be given to teaching about PEP in curriculum” obtained maximum “strongly agree” score of 77%, with a weightage of 1 and item 10 obtained maximum “strongly disagree” responses with 23.6% of the population choosing it. In totality, Fig. 2 depicts a positively skewed curve, with a majority of 40.16% of the sample of dental students showing high agreement, followed by 30.91% with moderately high agreement, 13.09% with neutral answers, 10.12% with moderately low agreement and a minority of 5.75% showing extremely low agreement to the questions pertaining to AIDS preventive awareness in dental procedures.

4. Discussion

The objective of this study was to assess the degree of awareness and nature of attitudes among dental students, pertaining to the use of post exposure prophylactic measures against HIV. A cross-sectional survey was conducted on a sample of 600 subjects from Delhi NCR across a span of 3-consecutive days. A self-constructed tool consisting of 10 items was used, that was responded on a 5-point Likert rating scale. Descriptive analytic computations were carried thereupon. The results of this study revealed several interesting findings about the knowledge and opinion about the PEP for HIV among the dental students.

Knowledge about hepatotropic viruses and HIV/AIDS is crucial for health care professionals because of the increasing prevalence of these infections. Occupational risk of these infections is well known in medical and dental workers, especially during professional training period. Studies suggest that accidental needle sticks are associated with the greatest risk of occupational transmission of blood-borne pathogens such as HIV.²² In the Indian scenario, it is found that the majority of these injuries take place at junior level such as students, interns and junior residents. This accounts for one of the major reasons for delivering knowledge about post-exposure prophylaxis for HIV, especially at student level.

In general, the results of this study indicate that Indian dentistry students had fairly moderate degree of knowledge of PEP. This comes across, considering an awareness score of 57.94%, suggesting that the remaining dentistry undergraduates were lagging in their information base as well as positive attitude towards adopting preventive measures, with a disagreement mean of 42.06% (Table 1). This assessment was facilitated by a delineation of the questionnaire into two categories of statements pertaining to awareness about and attitudes towards HIV & PEP measures, as quoted in the objective. Though these two terms sound synonymous, they also refer to cognitive or informative and perceptive or behavioural dimensions of treatment. The following subdivision helps to place various questions of the survey in two broad categories as described above. While questions 1, 2, 4, 5, 6, 9 and 10 deal with awareness i.e. current information and dissemination of knowledge through teaching on Post-Exposure Prophylaxis Awareness for HIV, questions 3, 4, 6, 7 and 8

Table 1 – Item-wise description of mean awareness.

Item No.	Mean Likert rating	Mean percentage lack of awareness	SD	Qualitative description of awareness level
1	2.44	48.8	1.15	Moderate
2	3.08	61.6	1.34	Low
3	1.29	25.8	0.61	High
4	1.62	32.4	0.84	High
5	1.46	29.2	0.61	High
6	1.69	33.8	0.81	High
7	2.15	43	1.25	Moderate
8	2.29	45.8	1.06	Moderate
9	1.77	35.4	0.78	High
10	3.24	64.8	1.37	Low
Grand Total	2.103	42.06	0.98	Moderate

deal with dentists' attitude and cognitive readiness to treat patients with HIV using PEP measures. Thus, one set based on 'awareness' addresses the range of medical information as disseminated or possessed by budding dentists, and the other based on 'attitudes' addresses the opinions, willingness as well as preparedness to implement their dentistry-related skills and techniques.

As explained above, the initial part of the questionnaire based on awareness involved questions pertaining to information level of dentists and incorporation of PEP-related information in course curriculum at present. An extensive item-by-item analysis reflects that the current knowledge held by the student population was only moderate and largely limited in nature. A whopping 48.8% disagreement level was obtained on the question "I am aware about post-exposure prophylaxis (PEP) for HIV/AIDS" (item 1). Since only the remaining 51.2% or approximately half times weightage score was obtained, it leaves tremendous scope for spreading knowledge in this urgent medical area, especially among 39.9% student population who were completely clueless about PEP for AIDS and answered to this item with a rating of 3, 4 and 5. To further assess the accuracy of the subjects' awareness levels, questions about HIV were asked. Since the second most agreed (9.2% disagreement) with item was the fact that "we can get HIV infection while working in dental clinics" (item 5), 96.6% agreed about the possible threats they faced in acquiring HIV. The disagreement score of 35.4% for the idea that "PEP can reduce chance of HIV infection among dentists" (item 9) again reflected that two-third weightage was given to PEP as a prospective technique by 86.5% of the sample (ratings of 1 & 2). While the terms like HIV and AIDS were commonly heard and clearly registered by these budding dentists, its conceptual knowledge and application for post-exposure prophylaxis needed much clarification. This fact may be brought to light by another significant revelation of a maximum disagreement score of 64.8% being obtained by item 10, i.e. "Post-exposure prophylaxis medication is available in dental clinics". Fig. 1 clearly depicts that unlike the frequency distribution on most items, as regards the availability of medicine for PEP is concerned, the percentage of responses kept increasing with the rating scale values. This led to a negative skewness, with most of the answers falling on the right side of the scale, on item 10, also making it an item with least awareness level (Table 1).

A mixed picture emerges about the current information base of dentistry students. While the awareness level is

Fig. 1 – Item-wise preferred percent ratings by a sample of 600 BDS students.

mediocre, a dismal scene faces us in the limited knowledge or infrastructural resources that are made accessible to the doctor population. This is further supported by the fact that 61.6% disagreed on item 2 "I was taught about PEP before entering clinic", with only a minority of 16.3% remembered being taught about PEP, indicating extremely low levels of awareness. This also reflects the poor conditions of the Indian dental schools, with students admitting to the lack of enough knowledge, yet wished to be more pro-active about PEP-related preventive measures. This observation also suggests that in the midst of tough competition for dental exams, high student-teacher ratio, inappropriate teaching delivery methods, most students either skip or fail to properly grasp the basic preventive techniques and often realize its importance only during their internship, when the knowledge is put into practice.

While the first half of the survey addressed the current knowledge base – as retained or spread among dental professionals, the second set of questions targeted the belief system and the possible management using PEP in the future. An attitude is "a relatively enduring organization of beliefs, feelings, and behavioral tendencies towards socially significant objects, groups, events or symbols".^{23,24} The leading social psychologist Gordon Allport²⁵ considers attitudes as "mental and neural state of readiness, organized through experience, exerting a directing and dynamic influence upon the individual's response to all objects and situations with which it is related". In this study, it was observed that a mandatory HIV test for both doctors and patients obtained only two-third preference with a mean disagreement percentage of 32.4 and 33.8 (items 4 and 6). With most of the sample, answering in the "strongly agree" and "moderately agree" categories, opting for an ELISA test seemed like a safer and more aware option to the students. Although this statistic suggests a moderate degree of awareness about being tested for HIV as a preventive measure, the student population, however, presented a rather confused picture when it came to the openness towards implementation of preventive measures as may be actively adopted by dental professionals. This is brought to light, by a weightage of only 57% that was given to separate treatment for HIV patients (item 7). About one-third students (31.5%) were either unsure or disagreed with the preventive measure or need of separate treatment. This was a surprising fact, reflecting serious concerns pertaining to the oral practices among the upcoming dental practitioners. Inconsistent answers about what preventions should be taken against a possible HIV infection emerged as a clearly confused concept, since it was based on poor teaching and information base among students. This misguided notion was further highlighted by a 45.8% disagreement to treat HIV patients in the first place (item 8). This lack of willingness was displayed by 40% students, who seemed to be guided by dearth of knowledge in lieu of the cultural stereotypes against an AIDS patient. This negative wish to treat an HIV patient clearly highlights the existence of a prejudiced attitude that draws from cognitive, affective, behavioural and motivational discrepancies towards the issue of acquisition of human immunodeficiency virus. It may be noted, at this point, that the term 'cognitive readiness' is defined as "the mental preparation (including skills, knowledge, abilities, motivations, and personal dispositions) an individual needs to establish and sustain competent performance".²⁶ This overarching term establishes a

Fig. 2 – Normal Probability Curve depicting combined frequency distribution for rating values on questionnaire.

psychological understanding of mental set in terms of both possession of certain abilities or preparedness of resources (external value) and a personal willingness (internal value). Thus, we observe that overall readiness, that incorporates cognitive, emotive as well as physical dimensions, to treat PEP against HIV has been found to be as rather limited in its range in the Indian dental scenario. In totality, it can be said that with maximum dentistry students (40.16%) expressing strong preference while the descendingly least frequency of 5.75% collegiates answering for strong disagreement, a moderately higher inclination for awareness and positive attitude towards PEP measures against HIV threat in the clinical setup was observed. This is clearly depicted through the bell-shaped curve, peaking towards the left end of the continuum in Fig. 2. These results can be taken with considerable reliability since the survey had convergent validity estimates of 0.81 and a majority of 89% population completed the survey.

Furthermore, most students agreed that more emphasis should be given on making topics of HIV/AIDS, possibility of transmission of the virus during dental treatment and the fact that PEP can effectively prevent the disease transfer, a part of their course curriculum, as suggested from least disagreement score of 25.8% on item 3 “Should more emphasis be given to teaching about PEP in curriculum”. 77% subjects strongly agreed and realized the need to be informed enough by their teachers. This puts significant question mark to the efficacy of the teaching fraternity, their knowledge base, upgradation of skills and their interest in the task at hand. A recent research on dentists from various universities has found that dental professionals have the least degree of purpose and meaningfulness about their profession in the Indian setup.²⁷

This study lays platform for dental experts, from both teaching and practicing professions, to consider the critical importance of training the budding doctors in the area of self-prevention as well as treatment measures for HIV patients. Being a largely ignored sphere, it becomes urgent for students to be cautious towards the threats they face in the clinic, yet at the

same time, not be misguided by looming social beliefs and labelizations. Other than being well informed, the younger medical fraternity needs to be more sensitive towards the patient population, particularly in a country like India where the population is huge, threats are manifold and the resources are little. Efforts should be made to ensure that students know exactly what the protocol entails at the faculty dental clinic with regard to such injuries. Needles stick injuries can also be quite alarming to the dental professionals creating extreme psychological stress. Therefore students need to be made aware of the channels for prompt management. Equally important for the health care personnel is to know how to minimize the injuries and about the round the clock availability of PEP, expected adverse events, and the strategies for managing them. It must be noted that PEP is not fully effective in preventing HIV seroconversions²⁸ (time during which HIV antibodies develop and become detectable). Therefore, PEP cannot be considered to replace the universal precautions and avoiding occupational injuries. Persons who take PEP and are under follow-up for 6 months should abstain from any high-risk behaviour activity and not donate blood.²⁹ Although preventing blood exposures (through needles, saliva, body fluids) is the primary means of preventing occupationally acquired blood-borne diseases, appropriate post exposure management is an important element of workplace safety. The study highlights the need of standardized protocols for management of exposure to blood-borne pathogens. It also reflects the need for safe working environment in all hospitals. There is a need to report, investigate and follow up needle stick injuries. Drugs for PEP should be readily available in dental hospitals for immediate use by OHCPs. Furthermore, this paper highlights, in particular, the precautionary measures that must be used and be brought to the awareness of dental practitioners. These include preventing transmission of blood-borne pathogens in dental practice by wearing gloves, surgical masks, using sterilized headpieces, thorough cleaning of intra-oral equipment after being exposed to contaminations of the mouth of patients and safe discarding of material that are difficult to disinfect.^{30,31} In the purview of these suggestions, a far more rigorous medical environment can be created by dentists that attempt to fulfil dual roles of catering to lack of resources as well as observing a well-informed position with respect to PEP exposure to HIV.

5. Conclusions

The study found moderate degree of awareness (57.94%) of PEP for HIV among dental students in Delhi NCR. The teaching of PEP against HIV prevention was rather erratic. Our observations revealed that dental students were only moderately cautious about disease-prone threats at the workplace and lacked optimal conceptual knowledge, thereby rendering them not very pro-active about learning on precautionary patient management issues. With regard to the technique implementation, the students appeared rather confused, possessing negative attitudes and being evasive and unwilling to deal patients with HIV. These findings leave much scope for training and educative measures for the undergraduate dentistry students. A modified education program pertaining

to imparting knowledge about PEP for HIV in the dental curriculum could help minimize inhibitions to render treatment to the HIV-infected patients. Not to forget the thumb rule, that prevention is always better than cure, it is mandatory for an OHCP to ensure that all prevention protocols are followed in a dental health care setting.

Conflicts of interest

All authors have none to declare.

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Appendix A

Questionnaire used for Post exposure prophylaxis survey

Name: _____ Age: _____ Gender: _____
College: _____ Year of study: _____

Instructions: To the following statements below, please circle the number that best suits your degree of agreement or preference, as per the rating scale where 1= Strongly agree; 2=Moderately agree; 3= Not sure; 4= Moderately disagree; 5= Strongly disagree. Give your first natural response to each statement. Remember there is no right or wrong answer. Your answers shall be kept confidential and are strictly for research purposes only

S.No.	Item	Rating Scale				
		1	2	3	4	5
		Strongly agree	Moderately agree	Not sure	Moderately disagree	Strongly disagree
1	I am aware about post exposure prophylaxis (PEP) for HIV/AIDS					
2	I was taught about PEP before entering clinic					
3	Should more emphasis be given to teaching about PEP in curriculum					
4	All students should undergo mandatory HIV test					
5	We can get HIV infection while working in dental clinic					
6	All patients undergoing surgical procedures should be asked for mandatory HIV test					
7	Patients with HIV infection should be treated separately					
8	I am willing to treat HIV infected patients					
9	PEP can reduce the chances of HIV infection among dentists					
10	Post exposure prophylaxis medication is available in dental clinics					

REFERENCES

- Annual Report 2013-2014. NACO, Department of AIDS Control, Ministry of Health & Family Welfare, Government of India. Published online on September 8, 2014. http://naco.gov.in/NACO/Quick_Links/Publication/Annual_Report/
- NACO Annual Report/Annual Report 2013-14, Retrieved on: April 30, 2015.
- Kohli A, Das UM, Arora V, Puttaiah R. Infectious disease in India – Epidemiology, Impact and Perceptions. In: Kohli A, Puttaiah R, eds. *Infection Control and Occupational Safety Recommendations for Oral Health Professionals* 1st ed. New Delhi: Dental Council of India; 2007:13–16.

3. Luber AD. Pharmacotherapy of HIV infection. In: Koda-Kimble MA, Young LL, Kradjan WA, Guglielmo J, eds. *Applied Therapeutics* 8th ed. Philadelphia, PA: Lippincott William & Wilkins; 2004:1–37.
4. Martin D. Current concepts in HIV/AIDS. *SADJ*. 1999;54:609–615.
5. McCarthy GM, Ssali CS, Bednarsh H, Jorge J, Wangrangsimakul K, Page-Shafer K. Transmission of HIV in the dental clinic and elsewhere. *Oral Dis*. 2002;8:126–135.
6. Serb P, Yeung S. HIV infection and the dentist, 1. The presence of HIV in saliva and its implications to dental practice. *Aus Dent J*. 1994;39:67–72.
7. Ogunbodede EO, Rudolph MJ. Policies and protocol for preventing transmission of HIV infection in oral health care in South Africa. *SADJ*. 2002;57:469–475.
8. Nasir EF, Astrøm AN, David J, Ali RW. HIV and AIDS related knowledge, sources of information, and reported need for further education among dental students in Sudan – a cross sectional study. *BMC Public Health*. 2002;8:286–294.
9. Kopacz DR, Grossman LS, Klamen DL. Medical students and AIDS: knowledge, attitudes and implication for education. *Health Educ Res*. 1999;14:1–6.
10. Askarian M, Mirzaei K, Assadian O. Iranians' attitudes about possible human immunodeficiency virus transmission in dental settings. *Infect Control Hosp Epidemiol*. 2007;28:234–237.
11. Darling M, Arendorf T, Samaranyake LP. Oral care of HIV-infected patients: the knowledge and attitudes of South African dentists. *J Dent Assoc S Afr*. 1992;47:399–402.
12. Gachigo JN, Naidoo S. HIV/AIDS: the knowledge, attitudes and behaviour of dentists in Nairobi, Kenya. *SADJ*. 2001;56:587–591.
13. Oliveira ER, Narendran S, Falcão A. Brazilian dental students' knowledge and attitudes towards HIV infection. *AIDS Care*. 2002;14:569–576.
14. Chan R, Khoo L, Goh CL, Lam MS. A knowledge, attitudes, beliefs and practices (KABP) survey on HIV infection and AIDS among doctors and dental surgeons in Singapore. *Ann Acad Med Singapore*. 1997;26:581–587.
15. Coogan MM, Greenspan J, Challacombe SJ. Oral lesions in infection with human immunodeficiency virus. *Bull World Health Organ*. 2005;83:700–706.
16. Cohen LA, Romberg E, Grace E. Revisiting the attitudes of dental faculty toward individuals with AIDS. *J Dent Educ*. 2001;65:249–252.
17. Lohrmann C, Välimäki M, Suominen T, Muinonen U, Dassen T, Peate I. German nursing students knowledge of and attitudes to HIV and aids: two decades after the first aids cases. *J Adv Nurs*. 2000;31:696–703.
18. Uti OG, Agbelusi GA, Jeboda SO, Ogunbodede E. Infection control knowledge and practices related to HIV among Nigerian dentists. *J Infect Dev Ctries*. 2009;3:604–610.
19. Kermod M, Holmes W, Langkham B, Thomas MS, Crofts N. Occupational exposure to blood and risk of blood borne infection among health care workers in rural north Indian health care settings. *Am J Infect Control*. 2005;33:34–41.
20. Kulkarni RR, Prithviraj DR, Basavarajaiah DM, Vidyashankar N. Assessment of knowledge on Post Exposure Prophylaxis in HIV among dental healthcare workers. *Int J Gen Med Pharmacy*. 2013;2(2):31–36.
21. Viswanathan S, Jain R, Adhikari MP, Jain A. Awareness of Post – Exposure Prophylaxis Guidelines against occupational exposure to HIV among post graduate residents at Mangalore, India. *Int J Med Public Health*. 2011;1(2):51–56.
22. Berry AJ. Needle stick and other safety issues. *Anesthesiol Clin North America*. 2004;22:493–508.
23. Hogg M, Vaughan G. *Social Psychology*. 4th ed. London: Prentice-Hall; 2005.
24. McLeod SA. *Attitudes and Behavior*. 2009. Available from: <http://www.simplypsychology.org/attitudes.html>, Retrieved on: May 2, 2015.
25. Allport GW. Attitudes. In: Murchison C, ed. *Handbook of Social Psychology*. Worcester, MA: Clark Univ. Press; 1935:798–844.
26. Morrison JE, Fletcher JD. *Cognitive Readiness*. Alexandria, Virginia: Institute for Defense Analyses; 2003.
27. Malhotra R, Bhola K, Khandelwal N, Bhola R. Meaningfulness at work: An Inter-Profession Analysis. *Psychological Studies*. 2015 (submitted).
28. Young TN, Arens FJ, Kennedy GE, Laurie JW, Rutherford GW. Antiretroviral post-exposure prophylaxis (PEP) for occupational HIV exposure. *Cochrane Database Syst Rev*. 2007;1: CD002835.
29. Merchant RC, Keshavarz R. Human immunodeficiency virus post-exposure prophylaxis for adolescents and children. *Pediatrics*. 2001;108:E38–E50.
30. Centers for Disease Control. Recommendations for prevention of HIV transmission in health-care settings. *MMWR*. 1987;36.
31. Kuhar DT, Struble KA, Henderson DK, et al. *Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HIV and Recommendations for Postexposure Prophylaxis*. 2005;1–48.