

Human Immunodeficiency Virus-related Understanding among Dental Students and Faculty of an Urban Indian Dental School

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ABSTRACT

Introduction: Human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) has become one of the most serious health issues in the world. However, there exists a mixed attitude among dental professionals and students while treating HIV-infected patients.

Aim: To assess HIV/AIDS-related understanding amongst dental students and dental faculty in a dental school located in urban India.

Materials and methods: Five-hundred respondents were divided into three groups: Group I – Undergraduate Dental Students, Group II – Postgraduate Dental Students, and Group III – Dental Faculty. A questionnaire survey with multiple choice questions was conducted to explore the understanding of dental students and dental faculty in a dental school in urban India, i.e., representative of the Indian dental academia. Pearson chi-square test was used to analyze the responses for different domains (knowledge and awareness, attitude and practice and, adequacy of training) among the different subgroups of respondents.

Results: All 500 questionnaires were evaluated after excluding questions with invalid answers. Responses to 12 out of 15 questions showed significant differences ($p < 0.001$) using Pearson chi-square test.

Conclusion: It was found that higher level of training correlated with better knowledge of HIV infection. Considering how early dental students start treating patients clinically, this study points out the need for early incorporation of training in undergraduate dental curricula with emphasis on problem-based learning, especially in the areas of pathogenesis and dental management of HIV-infected/AIDS patients. Dental professionals need to

augment their diagnostic skills in this area, by means of continuing dental education.

Keywords: Advanced dental education, Curriculum, Dental faculty, Dental students, Human immunodeficiency virus, Training.

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INTRODUCTION

Human immunodeficiency virus (HIV) causes acquired immunodeficiency syndrome (AIDS) that till now has claimed more than 39 million lives.¹ Since its discovery, AIDS has become one of the most serious health issues in the world.² Till 2013, around 1.5 million people had died due to HIV-related causes worldwide.^{3,1} India is the second most populated country in the world with approximately 1.22 billion people and has the third largest number of people living with HIV.⁴ According to the HIV Sentinel Surveillance 2008–2009, it is estimated that 2.39 million people are infected with HIV in India.⁴ Dental health care workers and allied health professionals play an important role in providing diagnostic treatment and referral services for patients with AIDS and, consequently, also are at risk for contracting HIV infection.⁵ The reason being, the health professionals come in direct contact with blood either through needle prick injuries or by blood splashes. There exists, however, a negative attitude among the dental professionals when it comes to managing HIV-infected patients.^{6–8} A dentist–patient relation free of discrimination along with the use of universal precautions in the dental office is necessary to ensure that the AIDS patients are not reluctant to disclose their health status and feel confident that such disclosure will lead to care best adapted to their condition.⁹ The unfounded anxiety and misconceptions associated with the treatment of HIV-infected patients among dental students and professional stems from lack of HIV-related knowledge and can be mitigated with sound understanding of HIV infection.^{5,10}

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This study was a survey planned to investigate whether HIV-related instruction given to the dental graduates and dental professionals in their dental curriculum at Indian dental schools is sufficient to develop the correct approach toward HIV-infected patients. However, basic virology and brief knowledge about immunodeficient disorders are taught in subjects like microbiology, general pathology. This study aimed at comparing the preparedness of dental students and dental faculty in a representative urban Indian dental academic setting. The following were the specific objectives of the study:

- To evaluate if greater academic level in dentistry correlates with better understanding of HIV infection.
- To identify the specific lacunae in the knowledge base with regard to HIV infection and its management among dental professionals.

MATERIALS AND METHODS

This cross-sectional study was designed as a survey based on a self-administered questionnaire. The questionnaire was developed in line with World Health Organization – Knowledge, Attitude, Beliefs and Practices on AIDS (WHO KABP) Modified Questionnaire.¹¹ The original questionnaire was a part of Behavioral Risk Factor Surveillance System Questionnaire, released in October 2008 and was used without any significant modification. The questionnaire was designed to assess the knowledge and awareness, diagnosis, attitude, and practice and perceived adequacy of training being provided by the institution. The questionnaire had 15 questions with multiple choice answers. Questions testing each of these areas were mixed together and appeared randomly.

This study was conducted from August 2014 to October 2014 in a representative scenario in dental academia. India has a large number of dental schools that are distributed across the country, many of which are located in urban settings, where HIV prevalence is high.¹² The study was reviewed and approved by the Ethics Committee of the Institute (Ref. No.: 25/2014). The study subjects were first-, second-, third-, and fourth-year undergraduate dental students, the interns (group I – 1, 2, 3, 4, 5), the postgraduate dental students (group II), and

the dental faculty (group III). The total number of eligible participants were 750, out of which a convenience sample of 500 subjects was chosen based on their availability. The subjects were explained about the study and participated after giving their informed consent. Subjects were divided into groups based on their level of training. The profile of the responders is presented in Table 1.

The questions and the method of marking the responses were explained to the respondents. Returned questionnaires were screened for questions with missing, multiple, or ambiguously marked answers and such questions were excluded from analysis. The responses were then compiled in a Microsoft Excel 2013 (Microsoft, Redmond, United States) spreadsheet and checked for data entry errors. All analysis was done using personal computer (PC)-based software (IBM Statistical Package for the Social Sciences 17 for Windows, IBM, Chicago, United States). Pearson chi-square test was used to analyse the responses for different domains (knowledge and awareness, attitude and practice and, adequacy of training) among the different subgroups of respondents. Percentage of correct answers from each category was calculated and plotted on graphs.

RESULTS

The age of the participants ranged from 18 to 45 years. The questionnaire along with the correct answers and responses received from the three groups of respondents is presented in Table 2.

Knowledge and Awareness

A total of 81.18% undergraduate dental students (group I), 66.66% postgraduate dental students (group II), and 87.32% dental faculty (group III) members believed that HIV and AIDS are different (Graph 1A). Thus, the responses obtained were similar for the three groups ($p = 0.118$). When asked about the host defence cell primarily affected in HIV, 67.70% from group I and 96.66% from group II and 95.77% from group III chose the appropriate option as T-lymphocytes (Graph 1B). Thus, fewer undergraduate students chose the correct answer to this question ($p < 0.001$). All subjects from all three groups responded that HIV spreads through body fluids (Graph 1C). A total

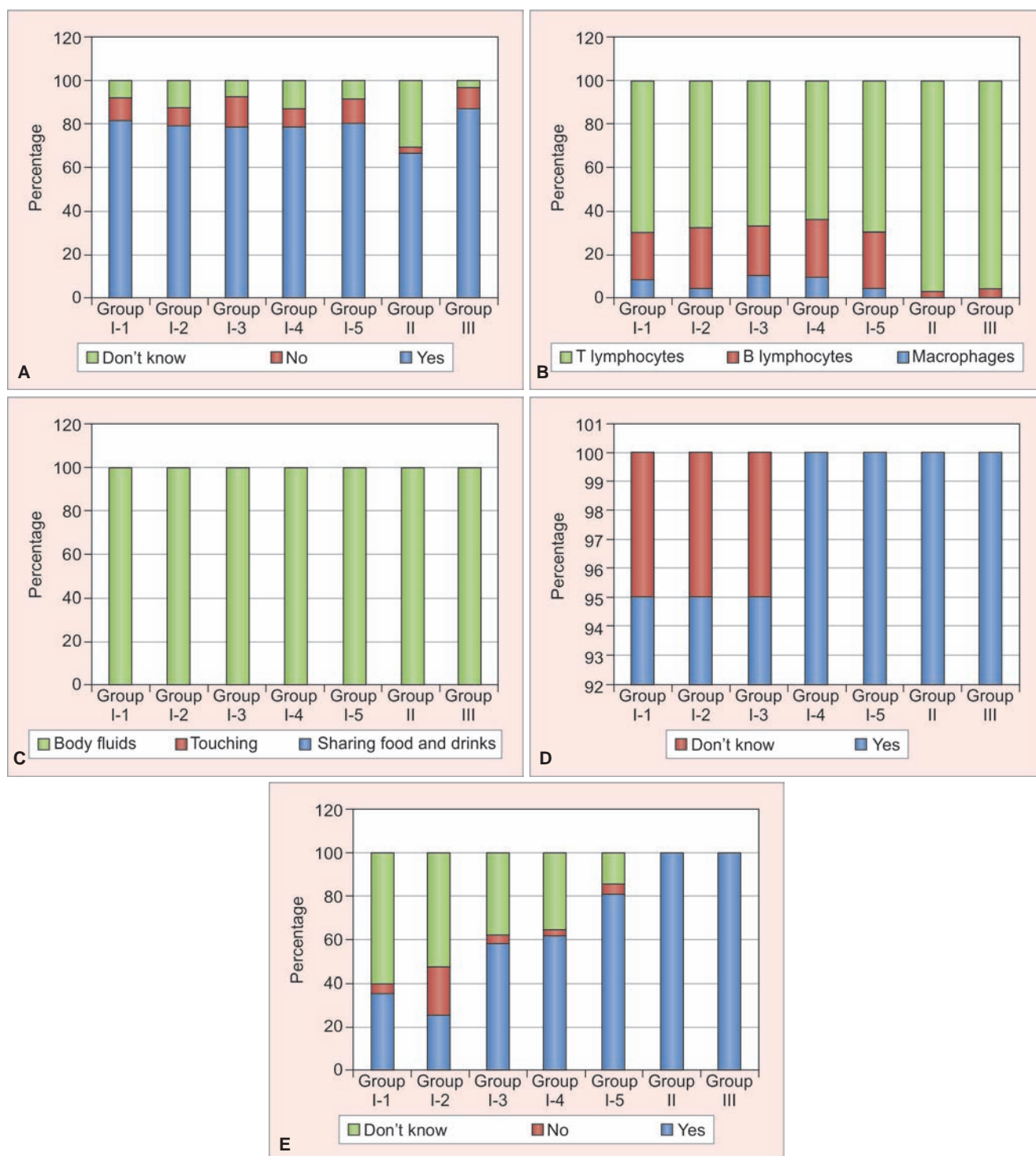
Table 1: Profile of responders

Groups	Description (number of subjects)		Male/female
I	Undergraduate dental students – 399 subjects	First-year dental students – 80 subjects	37/43
		Second-year dental students – 80 subjects	47/33
		Third-year dental students – 80 subjects	41/39
		Fourth-year dental students – 79 subjects	45/34
		Interns – 80 subjects	39/41
II	Postgraduate dental students – 30 subjects		15/15
III	Dental faculty – 71 subjects		40/31

Table 2: Data collected from answers to all questions

Questions arranged in the sequence that they appeared in the questionnaire	Question Type*	Correct response	Percentage of subjects with correct response, number of respondents with correct answer, incorrect answers, invalid				Overall correct response		Total (n = 500)	
			Group I	Group II	Group III		Correct response	Not responded	Responded	Not responded
Are HIV and AIDS different?	K	Yes	81.18%, 315,73,11	66.66%, 20,9,1	87.32%, 62,9,0		81.35%, 397	488	12	
How does HIV spread?	K	Body fluids	100%, 399,0,0	100%, 30,0,0	100%, 71,0,0		100%, 500	500	0	
Which host defense cells are primarily affected?*	K	T-Lymphocytes	67.70%, 262,125,12	96.66%, 29,1,0	95.77%, 68,3,0		73.56%, 359	488	12	
Does cross transmission infection arise when cut finger contacts HIV positive blood?	K	Yes	96.99%, 387,12,0	100%, 30,0,0	100%, 71,0,0		97.60%, 488	500	0	
What is the critical value of CD4 cell count in AIDS?*	D	Below 200 cells/mm ³	47.23%, 171,191,37	58.62%, 17,12,1	87.14%, 61,9,1		54.01%, 249	461	39	
Which is the most common oral manifestation seen in AIDS?*	D	Candidiasis	81.77%, 314,70,15	93.33%, 28,2,0	100%, 71,0,0		85.15%, 413	485	15	
Which is the confirmatory test for HIV/AIDS?*	D	Western blot	6.07%, 24,371,4	23.33%, 7,23,0	39.43%, 28,43,0		11.89%, 59	496	4	
Does HAART (Highly Active Anti-retroviral Therapy) improve the quality of life in HIV/AIDS?*	K	Yes	52.41%, 206,187,6	100%, 30,0,0	100%, 71,0,0		62.14%, 307	494	6	
Do dentists belong to high risk group for HIV infections?*	A & P	Yes	54.77%, 218,180,1	93.33%, 28,2,0	81.69%, 58,13,0		60.92%, 304	499	1	
Should people infected with HIV be isolated in special centers?*	A & P	No	81.70%, 326,73,0	100%, 30,0,0	100%, 71,0,0		85.40%, 427	500	0	
Are you willing to participate in rendering dental care to HIV-infected patients?*	A & P	Yes	61.65%, 246,153,0	100%, 30,0,0	95.77%, 68,3,0		68.80%, 344	500	0	
Where do you think HIV/AIDS patients should be treated?*	A & P	At any dental facility	83.03%, 328,67,4	100%, 30,0,0	100%, 71,0,0		86.49%, 429	496	4	
Will you use ultrasonic scaler for scaling in HIV/AIDS patients?*	A & P	Yes	30.02%, 119,275,5	100%, 30,0,0	77.14%, 54,16,1		41.09%, 203	494	6	
What will you do if you get a needle stick injury?*	A & P	PEP within 72 h	39.37%, 150,231,18	76.66%, 23,7,0	100%, 71,0,0		50.62%, 244	482	18	
Do you think your professional education has provided you with enough information to work safely with AIDS patients?*	Adq	Yes	41.85%, 167,232,0	30%, 9,21,0	88.73%, 63,8,0		47.80%, 239	500	0	

*Indicates questions where p value is < 0.001; K: Knowledge; A & P: Attitude and practice; D: Diagnosis; Adq: Adequacy of Training



Graphs 1A to E: Responses of all the responders related to knowledge and awareness: (A) Are HIV and AIDS different? (B) Which host defense cells are primarily affected in AIDS? (C) How does HIV spread? (D) Will HIV spread if cut finger contacts HIV-positive blood? (E) Will HAART improve quality of life?

of 100% subjects from Groups II and III and 96.99% subjects from Group I agreed that when a cut finger comes in contact with HIV-positive blood, the risk of transmission increases (Graph 1D), with non-significant differences ($p = 0.038$). When questioned about the antiretroviral therapy, i.e., HAART (highly active antiretroviral therapy), 100% subjects from Groups II and III and 52.41% of Group I answered that HAART can improve the quality

of life of HIV-infected and AIDS patients (Graph 1E). There was a large variation between the responses received from different groups, with fewer undergraduate students choosing the correct response ($p < 0.001$).

Attitude and Practice

All questions in this category had significant differences in the responses received from different groups, with

fewer undergraduate students choosing correct answers ($p < 0.001$). A total of 54.77% subjects of Group I, 93.33% subjects of Group II, and 81.69% of Group III agreed that dentists belong to high risk towards HIV infection, with 60.92% of all subjects across all three groups being in agreement (Graph 2A). A total of 81.70% subjects from Group I and 100% from Groups II and III rightly identified that HIV-positive patients need not be isolated and hence, can be treated in any clinical setting after taking universal precautions (Graph 2B). The study also displayed that 61.65% subjects from Group I were willing to treat HIV-infected or AIDS patients, whereas 35.83% subjects from Group I were either not ready or were unsure. A total of 100% subjects from Group II and 95.77% Group III expressed their willingness to treat HIV-positive patients (Graph 2C). Majority of the undergraduate dental students, irrespective of their year of study, showed negative attitude towards treating these patients. A total of 39.37% subjects from Group I, 76.66% from Group II, and 100% from Group III correctly answered that postexposure prophylaxis (PEP) should be started within 72 hours after needle stick injury. A total of 26.78% subjects from Group I responded saying that needle stick injury can be ignored (Graph 2D). A total of 100% subjects from Group II, 77.14% subjects from Group III, and only 30.20% subjects from Group I held an opinion that ultrasonic scalers can be used in HIV-infected patients after undertaking preventive measures (Graph 2E).

Diagnosis

A total of 47.23% subjects from Group I, 58.62% from Group II, and 87.14% from Group III correctly answered that the critical cluster of differentiation 4 (CD4) cell count seen in HIV-positive patients to be <200 cells/mm³ (Graph 3A). A remarkable finding regarding confirmatory test was found wherein, maximum number of respondents across all groups marked enzyme-linked immunosorbent assay and polymerase chain reaction as the correct answer instead of Western Blot. Only 6.07% of Group I, 23.33% of Group II, and 39.43% of Group III appropriately marked Western blot as the confirmatory test for HIV. This shows lack of knowledge and awareness in all the groups when it relates to investigations related to HIV (Graph 3B). A total of 81.77% subjects from Group I, 93.33% from Group II, and 100% from Group III correctly considered oral candidiasis as one of the most common oral manifestations seen in HIV-infected patients (Graph 3C). Again, fewer undergraduate students chose correct answers to all questions in this category ($p < 0.001$).

Adequacy of Training

A total of 47.80% of all the respondents across all three groups said that they had received adequate training

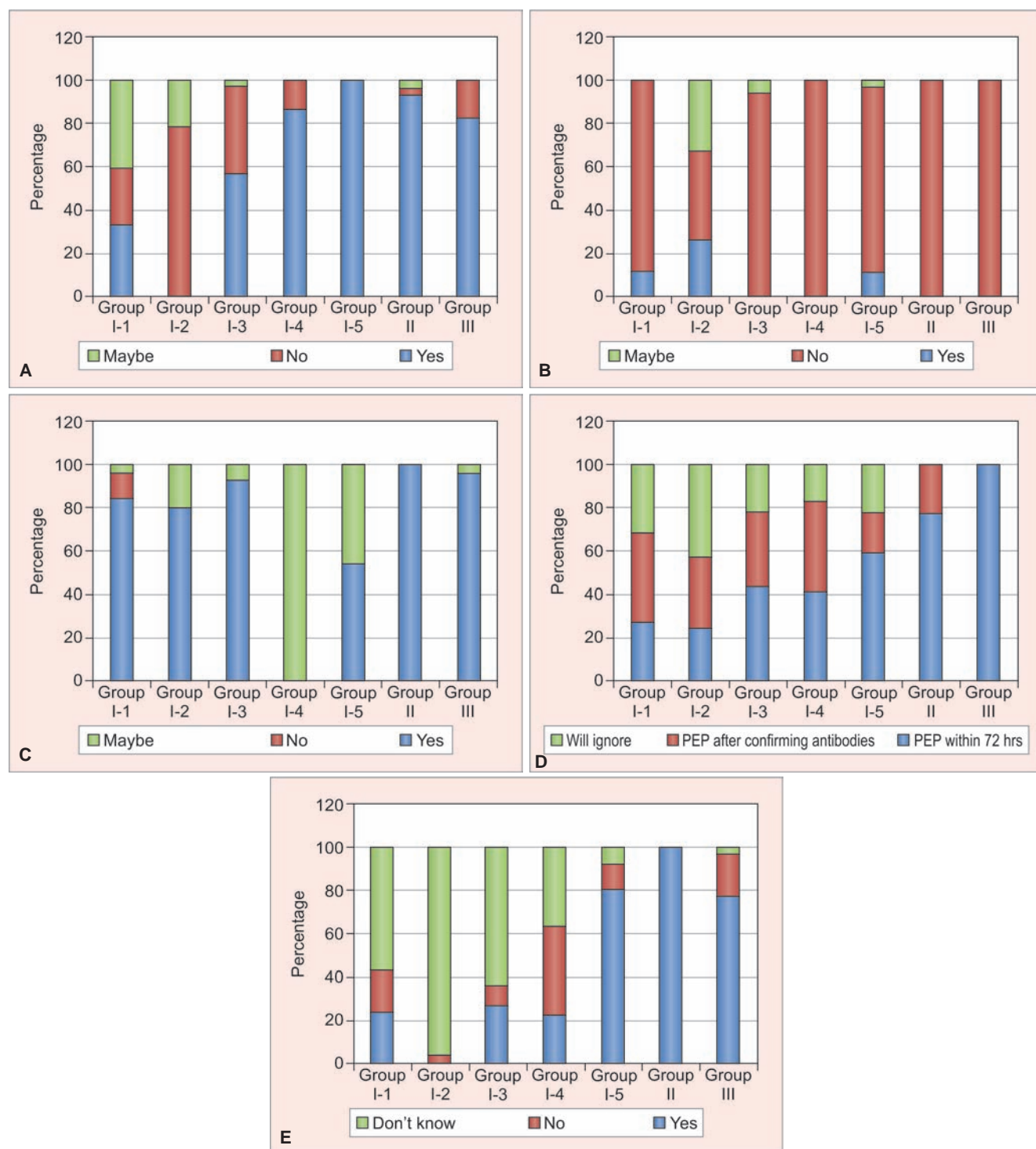
during their professional education, whereas 37% subjects responded that while information about HIV was provided to them, it was insufficient and more information needs to be incorporated in the academic schedule. A total of 15.20% of all subjects said that there was no training provided to them (Graph 4). There was a significant difference between responses from the three groups, with fewer undergraduate and postgraduate students saying that they had received adequate training as compared with the dental faculty ($p < 0.001$).

DISCUSSION

In our study, majority of the respondents across all groups demonstrated reasonably sound knowledge about HIV, with the undergraduate dental students falling short in their know-how about the pathogenesis and treatment of HIV infection. All subjects correctly answered the question pertaining to the spread of HIV, a finding that corroborates with those from studies done by Anjum et al and Aggarwal and Panat.^{13,14}

Oral findings can lead to early detection and management of HIV infection.¹⁵ Majority of the respondents marked candidiasis as the most common opportunistic infection seen in HIV patients. A similar finding was reported by Ragavendra et al, where he reported that 72% of the subjects reported that candidiasis is the most commonly seen oral manifestation in HIV infection.¹⁶ In our study, we found, however, that undergraduate dental students chose to keep many questions that test the respondents' skills in diagnosis unanswered, possibly due to their lack of knowledge. While the critical CD4 cell count was reported incorrectly by numerous subjects across the groups, even more concerning was the error in identifying the confirmatory test for HIV/AIDS. The error was reported across all three groups in alarmingly substantial numbers, decreasing in magnitude from the undergraduate students to the faculty.

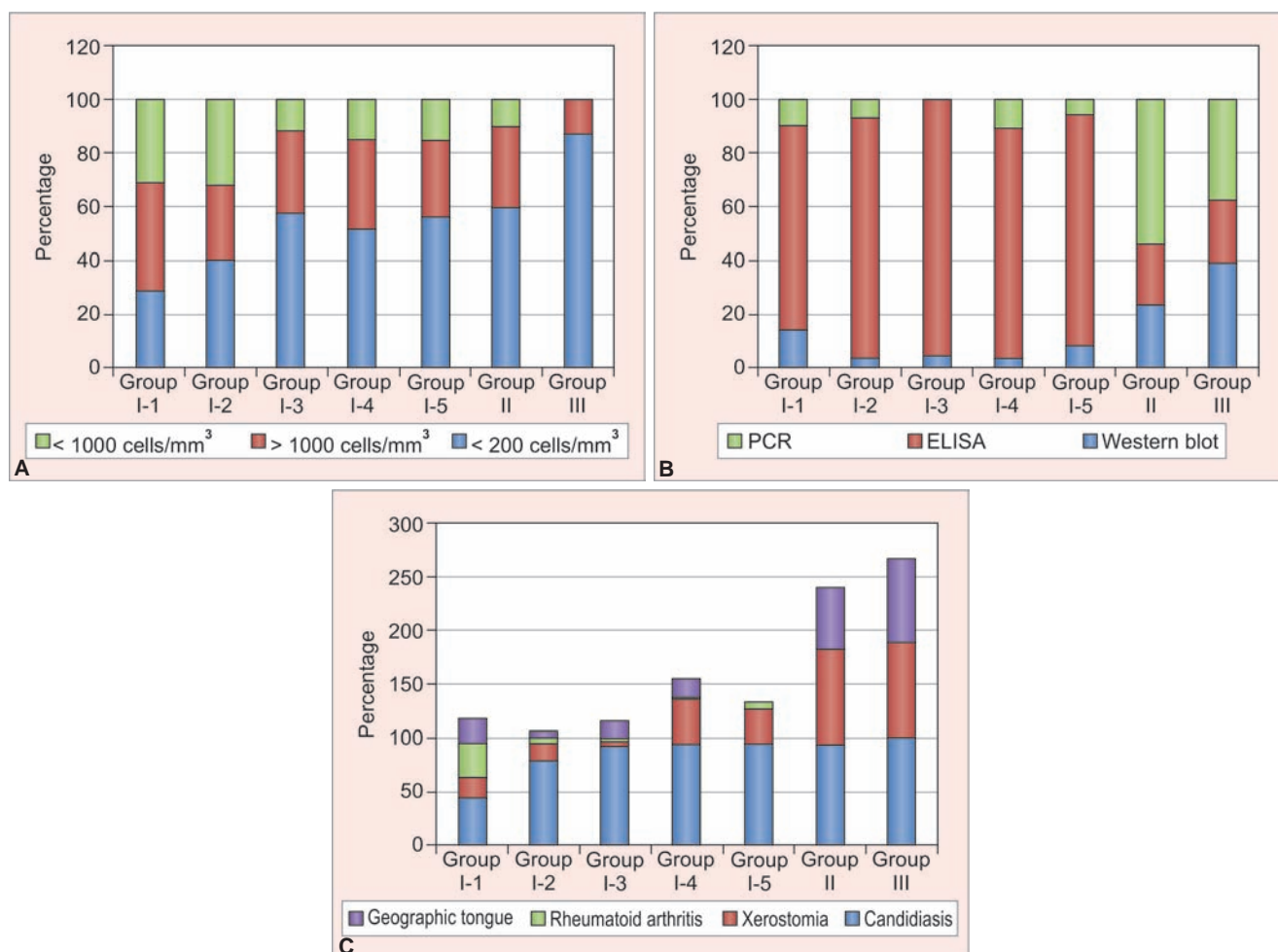
In spite of a wealth of well-documented information related to managing HIV-infected/AIDS patients, we found wide variations in the responses to questions testing the attitude and practice of respondents from different groups. The undergraduate dental students were clearly found to lack accurate information about a number of key issues. On one hand, they failed to identify dentists as a population at greater risk for contracting HIV, while on the contrary, a staggeringly high number of them were unaware of the correct PEP protocol. Similar findings were obtained in a 2012 study done by Myers et al in which 66.7% of participants correctly answered questions about transmission of blood-borne pathogens, but only 25% demonstrated reasonable awareness about



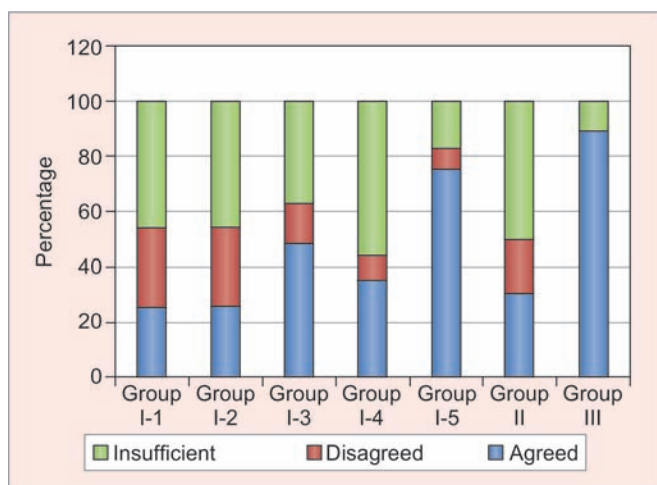
Graphs 2A to E: Responses of all the responders related to attitude and practice: (A) Do dentists belong to high-risk group for HIV infections? (B) Should people infected with HIV be isolated in special centers? (C) Are you willing to participate in rendering dental care to HIV-infected patients? (D) What will you do if you get a needle stick injury? (E) Will you use ultrasonic scalers for scaling in HIV-positive patients?

postexposure management.¹⁷ Whereas majority of the undergraduate dental students in our study were willing to treat HIV-infected/AIDS patients at any dental facility, a finding contradictory to the one from a 2011 study by Patil et al, a very large proportion of them were unwilling to use ultrasonic scalers.⁸ All in all, this pattern possibly reflected the undergraduate dental students' lack of confidence in their own ability to manage HIV/AIDS

patients that may have amplified their perceived risk of being infected with HIV, a concern expressed by Scully and Greenspan.¹⁸ With almost two fifths of undergraduate dental students expressing their unwillingness to treat HIV-infected/AIDS patients, our study clearly demonstrated their negative attitude in this regard. Results from studies conducted by Shan et al¹⁹ and Azodo et al²⁰ also highlighted the negative attitude of the dental students



Graphs 3A to C: Responses of all the responders related to diagnosis: (A) What is the critical value of CD4 cell count in AIDS? (B) Which is the confirmatory test for HIV/AIDS? (C) Which is the most common oral manifestation seen in HIV-positive patients?



Graph 4: Responses of all the responders related to adequacy of training. Do you think your professional education has provided you with enough information to work safely with AIDS patients?

toward HIV-infected/AIDS patients. In a study done by Kopacz et al²¹ in medical students and by Arjuna et al²² among clinical dental students in Kuwait University, reported that there is prevalence of negative attitude on the same issue.

Only 47.80% of all the respondents accepted the fact that adequate training is being provided by the institution, a finding in agreement with a study done by Seacat and Rohr.²³ Our study found that undergraduate as well as postgraduate students recognized the need for better training, as evidenced by the significant differences between the respondents' views toward the adequacy of information provided to them during their curricula. A similar finding was reported in a study done by Oliveira et al²⁴ where they found inadequacies in knowledge and infection control practices among Brazilian dental students and recommended a curriculum with special focus on the management of HIV/AIDS patients.

More multicenter trials involving dental schools from various countries are necessary to further validate our findings.

CONCLUSION

Knowledge about HIV/AIDS is crucial for health care professionals because of increasing prevalence of this infection. Our study demonstrated a clear improvement in the HIV/AIDS-related know-how as the level

of training improved, indicating that more training indeed helps. What must be recognized however is that dentistry, unlike many other medical faculties, requires its students to treat patients quite early in their curricula. Hence, it is of paramount importance that dental students should be exceedingly well versed in management of HIV-infected/AIDS patients in the initial years of their professional education.

Our study concludes that Indian undergraduate dental students need to augment their knowledge about the pathogenesis and general treatment of HIV infection. Another critically crucial enhancement to their repertoire would be learning the correct principles of practice when managing HIV-infected/AIDS patients in dentistry. Finally, our study also revealed gaps in the knowledge related to diagnosis of HIV and related conditions across all three categories of respondents.

There is a strong need for greater emphasis problem-based HIV/AIDS-related education from the very beginning of professional dental curricula, with reinforcements after completion of formal education in the form of continuing education programs. The misconceptions and fears need to be overcome, so that dental professionals can confidently handle HIV patients without any prejudice or bias. While our study was done in the geographic confines of India, the extent to which our study was in agreement with a large number of global studies that were carried out in developed as well as developing nations is indicative of a need for more studies of this sort.

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