Knowledge and attitude about infection control in dental practice among dental undergraduate students in Davangere city: A cross sectional survey

Veeresh DJ, Puja C Yavagal, Apoorva Shukla, Meera CV, Cibin Sabu, Madeeha Kousar and Megha Vasu Naik

DOI: https://doi.org/10.22271/oral.2021.v7.i1b.1126

Abstract

Background: Dental clinic is an environment which poses potential risk for disease transmission both for dentists and their patients. Hence a study was planned to assess knowledge and attitude of undergraduate dental students in Davangere city about infection control in dental practice.

Methods: A descriptive cross-sectional survey was conducted among 258 undergraduate dental students in Davangere city. A 21-item prevalidated structured close ended questionnaire was administered to the participants. Data was analyzed using chi-square test. Statistical significance was set at p ≤ 0.05.

Results: Out of 258 participants, 62% were females and belonged to third year (54%). Majority of them had good knowledge (>90%) about infection control in dental practice and more than 90% believed that dentists had a risk of acquiring HIV and Hepatitis infection and felt hepatitis vaccination was mandatory. More than 80% of them used gloves, face masks, head cap and gown, washed hands before and after examining patient and were willing to implement and follow the infection control procedures in clinical practice. However, majority did not wear eye protective glasses (>80%) and 90% had experienced non-sterile occupational percutaneous injury which was a cause of concern.

Conclusion: The knowledge of dental undergraduate students about infection control measures in dental practice was good. However, many reported non-sterile occupational injuries during clinical practice.

Keywords: Infection control, dental, knowledge, undergraduates, attitude

1. Introduction

The dental clinic is an environment where disease transmission occurs easily. Dentists are more prone to infection due to their direct contact with blood and saliva on a daily basis in their offices. Cross infection can be defined as the transmission of infectious agents between patients and staff in a clinical setting [1]. Infection can be established when subsequent factors are present like a patient having active viral or bacterial diseases, individuals without any prior vaccination or no immunity against pathogen and a path through which the causative microorganism can easily enter the host [1]. Transmission of pathogens can be of two types: Direct or Indirect. Direct transmission of pathogens to host can occur during examining of the oral cavity with bare hands and when contact is made with blood/serum of infected patients. Indirect transmission can occur through contact with contaminated needle, dental units, surfaces, or improperly sterilized instruments [1]. Dental health care professionals (DHCPs) are at risk of infections caused by various microorganisms Such as Mycobacterium tuberculosis, hepatitis B and hepatitis C viruses, staphylococci, streptococci, Herpes simplex virus types 1, human immunodeficiency virus (HIV), mumps, influenza, and rubella. Infection transmission can easily occur in routine dental practice. Therefore, protection from cross infection in the dental setup is a critical aspect of dental practice [2]. Infections can be prevented using safety precautions and implementing infection control guidelines in addition to vaccination and proper post-exposure management. Dental schools are responsible for providing appropriate infection control measures, proper training of dental students to protect patients, and for the establishment of safer work conditions. Dental education can play a significant role in the training of dentists by helping them to adopt adequate knowledge and attitudes related to
infection control procedures. Literature search revealed no study which has tried assess the knowledge and attitude towards infection control among undergraduate dental students in Davangere city. Hence an attempt was done to assess the knowledge and attitude towards infection control among undergraduate dental students in Davangere city.

2. Methodology
A Descriptive, Cross-sectional questionnaire survey was done involving 258, third and final year undergraduate students of dental colleges in Davangere city. The data was collected from the participants at their college premises. All third year and final year dental undergraduates of Davangere city who consented to participate were involved in the study. Ethical approval was obtained from the Institutional Review Board of college where the study was conducted. Voluntary written informed consent was obtained from the study participants after explaining them about the purpose of conducting the survey and procedure of collecting the data through participant information form.

2A. Details of questionnaire
A pre-validated questionnaire was selected from studies done previously. Questionnaire consisted of two sections. First section was designed for collecting demographic characters. Second section consisted 21 closed-ended items to assess the knowledge (8 items) and attitude (13 items). The responses were put on 3 point scale as yes, no and don’t know.

2B. Administration of questionnaire
The self-administered questionnaire was distributed to third year and final year undergraduate students by an investigator in their respective lecture classes. They were instructed not to discuss any answers with their friends or colleagues and were instructed to approach investigator if they had any doubts pertaining to questionnaire. They were given 30 minutes to answer the questionnaire after which, the questionnaire was collected back by checking for the complete response.

2C. Statistical analyses: The data obtained was compiled systematically in Microsoft Excel sheet and subjected to statistical analysis using Statistical Package for Social Sciences Software version 20. Descriptive statistics was used to summarize the demographic information in terms of frequencies or percentages. Chi-square test was used to compare categorical variables. Statistical significance was set at \( p < 0.05 \).

3. Results
Majority of them had good knowledge (>90%) about infection control in dental practice and majority (>90%) believed that dentists had a risk of acquiring HIV and Hepatitis infection. More than 90% of them responded that hepatitis vaccination was mandatory for all dental practitioners, disinfection of dental clinic was important to prevent cross-infection among patients and dental practitioners, were aware of the universal/standard precautions and use of personal protective barriers during clinical procedures and proper isolation during treatment was important for infection control during dental treatment procedures. Gender-wise and year-wise comparison revealed no significant differences (\( p > 0.05 \)) in the responses. (Table 1) (Table 2) More than 80% of them used gloves, face masks, head cap and gown, washed hands before and after examining patient and were willing to implement and follow the infection control procedures in private practice however, majority did not wear eye protective glasses (>80%) which was a cause of concern. More than 50% were not sure of treating patients with infectious diseases. Majority of females (>45%) had experienced more blood or saliva splashes to eyes compared to male students. Many students reported of being vaccinated for Hepatitis B (>60%) Many students responded that they were not tested for post-HBV immunization. Around 30% reported of not being vaccinated and they did not take a thorough history of the patient to rule out HIV/ HBV status (>40%). They had experienced non-sterile occupational percutaneous injury (around 90%) which was a cause of concern. (Table 3) (Table 4).

| Item no | Question                                                                 | Gender    | Percentage of response | Chi square value (\( ? \)) (p-value) |
|---------|--------------------------------------------------------------------------|-----------|------------------------|--------------------------------------|
| 1       | Do you think hepatitis vaccination is mandatory for all dental practitioners? | Male      | 100 0 0                | 0.85 (0.15)                          |
|         |                                                                         | Female    | 99 1 0                 |                                      |
| 2       | Do you think disinfection of dental clinic is important to prevent cross-infection among patients and dental practitioners? | Male      | 97 3 0                 | 0.12 (0.08)                          |
|         |                                                                         | Female    | 99 1 0                 |                                      |
| 3       | Dentists are at risk of acquiring which of the following diseases while treating patients? | Male      | HBV 70 HIV 105 TB 54   | 0.22 (0.2)                           |
|         |                                                                         | Female    | 90 70 59               |                                      |
| 4       | Which of the following diseases has the highest risk of transmission in the dental setting | Male      | 61 68 6                | 7.12 (0.7)                           |
|         |                                                                         | Female    | 72 67 4                |                                      |
| 5       | Are you aware of the universal/standard precautions and use of personal protective equipment’s? | Male      | 97 3 0                 | 1.7 (0.6)                            |
|         |                                                                         | Female    | 93 7 0                 |                                      |
| 6       | Do you agree that all patients to be treated as potentially infectious? | Male      | 91 9 0                 | 1.62 (0.12)                          |
|         |                                                                         | Female    | 97 3 0                 |                                      |
| 7       | Do you think proper isolation during treatment is important for infection control in dentistry? | Male      | 91 9 0                 | 8.7 (0.13)                           |
|         |                                                                         | Female    | 99 1 0                 |                                      |
| 8       | Are you aware of Post Exposure Prophylaxis (PEP)?                       | Male      | 95 5 0                 | 0.95 (0.3)                           |
|         |                                                                         | Female    | 98 2 0                 |                                      |

HBV-Hepatitis B Virus, HIV- Human Immuno deficiency virus, TB -Tuberculosis

Table 1: Gender-wise distribution of knowledge related responses

~ 113 ~
Dentists are at risk of acquiring which of the following diseases while treating patients?

- HBV
- HIV
- TB

Are you willing to implement and follow the same infection control procedures which are taught in your college in your private practice?

- Yes
- No
- Not sure

Are you aware of universal/standard precautions and use of personal protective equipment’s?

- Yes
- No
- Not sure

Do you use gloves, face masks, head cap, gown?

- Yes
- No
- Not sure

Table 2: Student-wise distribution of knowledge related responses

| Item No | Question                                                                 | Year of Under graduation | Number of Responses | Chi square value (p²) (p-value) |
|---------|--------------------------------------------------------------------------|--------------------------|---------------------|---------------------------------|
| 1       | Do you think hepatitis vaccination is mandatory for all dental practitioners? | 3rd Year                 | 97 1 2             | 2.57 (0.27)                     |
|         |                                                                           | 4th Year                 | 95 0 5             |                                 |
| 2       | Do you think disinfection of dental clinic is important to prevent cross-infection among patients and dental practitioners? | 3rd Year | 98 2 0 | 0.7 (0.4)                      |
|         |                                                                           | 4th Year                 | 98 2 0             |                                 |
| 3       | Dentists are at risk of acquiring which of the following diseases while treating patients? | 3rd Year | HBV 67 35 | 0.8 (0.6)                      |
|         |                                                                           | 4th Year                 | HBV 95 27          |                                 |
| 4       | Which of the following diseases has the highest risk of transmission in the dental setting | 3rd Year | 46 73 10 | 11.1 (0.12)                     |
|         |                                                                           | 4th Year                 | 88 73 10           |                                 |
| 5       | Are you aware of the universal/standard precautions and use of personal protective equipment’s? | 3rd Year | 91 9 0 | 16.6 (0.11)                     |
|         |                                                                           | 4th Year                 | 99 1 0             |                                 |
| 6       | Do you agree that all patients to be treated as potentially infectious? | 3rd Year | 94 6 0 | 3.1 (0.3)                       |
|         |                                                                           | 4th Year                 | 94 6 0             |                                 |
| 7       | Do you think proper isolation during treatment is important for infection control in dentistry? | 3rd Year | 97 2 0 | 3.27 (0.29)                     |
|         |                                                                           | 4th Year                 | 93 8 0             |                                 |
| 8       | Are you aware of Post Exposure Prophylaxis (PEP)? | 3rd Year | 97 3 0 | 0.9 (0.37)                      |
|         |                                                                           | 4th Year                 | 96 4 0             |                                 |

HBV-Hepatitis B Virus, HIV-Human Immuno deficiency virus, TB-Tuberculosis, *statistically significant

Table 3: Gender-wise distribution of attitude related responses

| Item No | Question                                                                 | Gender | Number of Responses | Chi square value (p²) (p-value) |
|---------|--------------------------------------------------------------------------|--------|---------------------|---------------------------------|
|         |                                                                          | Male   | 61 39 0             | 3.12 (0.2)                      |
| 9       | Have you been vaccinated for HBV                                          | Female | 92 8 0              |                                 |
| 10      | Have you been tested for post-HBV immunization?                           | Male   | 58 42 0             | 2.12 (0.3)                      |
|         |                                                                          | Female | 37 63 0             |                                 |
| 11      | Do you take a thorough history of the patient to rule out HIV/HBV status? | Male   | 21 79 0             | 1.5 (0.5)                       |
|         |                                                                          | Female | 50 50 0             |                                 |
| 12      | Do you use gloves, face masks, head cap, gown?                           | Male   | 83 17 0             | 5.49 (0.13)                     |
|         |                                                                          | Female | 94 6 0              |                                 |
| 13      | Do you use eye protection wears?                                          | Male   | 18 82 0             | 3.02 (0.08)                     |
|         |                                                                          | Female | 4 96 0              |                                 |
| 14      | Do you change your gloves between patients?                              | Male   | 89 11 0             | 6.05 (0.12)                     |
|         |                                                                          | Female | 80 20 0             |                                 |
| 15      | Do you wash your hands before and after examining patient?               | Male   | 100 0 0             | 5.1 (0.16)                      |
|         |                                                                          | Female | 100 0 0             |                                 |
| 16      | Did you have any non-sterile occupational percutaneous injury?            | Male   | 91 9 0              | 2.45 (0.28)                     |
|         |                                                                          | Female | 97 3 0              |                                 |
| 17      | Did you have any blood or saliva splashes to your eyes?                   | Male   | 10 90 0             | 9.31 (0.03) *                   |
|         |                                                                          | Female | 49 51 0             |                                 |
| 18      | Do you bend used needles before disposal?                                 | Male   | 76 24 0             | 2.77 (0.4)                      |
|         |                                                                          | Female | 87 13 0             |                                 |
| 19      | Do you follow proper biochemical waste disposal methods? (Colour coded bins) | Male   | 90 10 0             | 2.87 (0.57)                     |
|         |                                                                          | Female | 94 6 0              |                                 |
| 20      | Are you willing to treat patients with infectious diseases?               | Male   | 13 7 80             | 2.77 (0.4)                      |
|         |                                                                          | Female | 63 7 30             |                                 |
| 21      | Are you willing to implement and follow the same infection control procedures which are taught in your college in your private practice? | Male   | 91 9 0              | 2.77 (0.4)                      |
|         |                                                                          | Female | 95 5 0              |                                 |

HBV-Hepatitis B Virus, statistically significant

Table 4: Year-wise distribution of attitude related responses

| Item No | Question                                                                 | Year of Under graduation | Number of Responses | Chi square value (p²) (p-value) |
|---------|--------------------------------------------------------------------------|--------------------------|---------------------|---------------------------------|
|         |                                                                          | 3rd Year | 67 33 0             | 10.4 (0.11)                     |
| 1       | Have you been vaccinated for HBV                                          | 4th Year | 86 14 0             |                                 |
| 2       | Have you been tested for post-HBV immunization?                           | 3rd Year | 40 60 0             | 25.3 (0.00)                     |
|         |                                                                          | 4th Year | 55 45 0             |                                 |
| 3       | Do you take a thorough history of the patient to rule out HIV/HBV status? | 3rd Year | 43 57 0             | 5.9 (0.01) *                    |
|         |                                                                          | 4th Year | 28 72 0             |                                 |
| 4       | Do you use gloves, face masks, head cap, gown?                           | 3rd Year | 89 11 0             | 18.1                             |
4. Discussion
The results of the study indicated that majority of undergraduate third and final year students had good knowledge about infection control in dental practice and many believed that dentists had a risk of acquiring HIV and Hepatitis infection. Similar findings were seen in a study [3]. However contradictory findings were observed in some studies where knowledge of dental undergraduate students was poor [4, 5, 6, 7]. Many of them responded that hepatitis vaccination was mandatory for all dental practitioners, disinfection of dental clinic was important to prevent cross-infection among patients and dental practitioners, were aware of the universal/standard precautions and use of personal protective barriers during clinical procedures and proper isolation during treatment was important for infection control during dental treatment procedures. Gender-wise comparison revealed no significant differences in knowledge and attitude related responses.

Immunization: Around 30% reported of not being vaccinated which was a cause of concern. In a similar study, 61.2% of undergraduate students in a dental school in central India were not vaccinated for HBV even though it was mandatory [4]. Many were not tested for post immunization results through serology in the present study. Similar result was observed in a study [8]. A study done by McCarthy et al. and Britton’s study, highlighted a significant proportion of participants who failed to confirm the adequacy of post immunization anti-HB titer [9]. Since HBV immunization does not always lead to a sufficient response, students might have a false feeling of safety even if they did not have an adequate antibody titre in them.

Protective barriers: Majority wore protective barriers like mouth mask, head caps and gowns. However, the compliance in wearing protective eye wears was less. Similar result was observed in a study [8]. However use of PPE was high among all the students which was in accordance with study done by Freire et al. [10]. Students should be reminded that avoidance of protective eyewear puts them at risk of transmission of infectious diseases through exposed membranes. Studies have shown that aerosol and splatter containing pathogens can contaminate clinical wear, targeting the chest and forearms and remain alive for several days [11, 12]. It has been recommended that dental uniforms be worn only in dental clinics, changed daily and immediately after a blood splatter to prevent cross contamination and uniforms should be washed separately. If possible, disposable gowns should be preferred [13].

Exposure to infection: Many students had experienced blood or saliva splashes to eye and had experienced non-sterile occupational percutaneous injury in the present study. Similar results were observed in studies done by McCarthy and Britton who reported 82% accidental injuries [9]. Recapping the needles with both hands was found to be the most common cause of percutaneous injuries [14]. Non-sterile occupational injuries may pose a risk of transmission of bloodborne pathogens especially HBV, C and HIV [15]. Post exposure management program for non-sterile occupational injuries during the students’ clinical training may bring down the risk of infection among students.

The subjective assessment method of the survey limited us in not supervising the respondents’ practice hence, responses might have not accurately reflected the true knowledge, attitude, and compliance of students. There was absence of qualitative data that could have aided in understanding the thoughts and feelings of the research participants. The study at best provided the baseline data to help design educational programs for dental students to practice infection control measures and assess its effectiveness.

4. Conclusion
The knowledge of dental undergraduate students about infection control measures in dental practice was good. Many suffered Non-sterile injuries during clinical practice which was a cause of concern.

5. References
1. Kohn WG, Collins AS, Cleveland JL, Harte JA, Eklund KJ, Malvitz DM. Centers for Disease Control and Prevention (CDC). Guidelines for infection control in dental health-care settings. MMWR Recomm Rep. 2003;52(RR-17):1-61. PMID: 14685139.
2. Ciesielski C, Marianos D, Ou CY, Dumbaugh R, Witte J, Berkelman R, et al. Transmission of human immunodeficiency virus in a dental practice. Ann Intern Med 1992;116(10):798-805. Doi: 10.7326/0003-4819-116-10-798. PMID: 1567094.
3. Al-Maweri SA, Tarakji B, Shugaa-Addin B, Al-Shamiri
4. Singh A, Purohit BM, Bhambal A, Saxena S, Singh A, Gupta A. Knowledge, attitudes, and practice regarding infection control measures among dental students in Central India. J Dent Educ 2011;75(3):421-7. PMID: 21368266.

5. Qamar MK, Shaikh BT, Afzal A. What Do the Dental Students Know about Infection Control? A Cross-Sectional Study in a Teaching Hospital, Rawalpindi, Pakistan. Biomed Res Int 2020;2020:3413087. Doi: 10.1155/2020/3413087. PMID: 32596299; PMCID: PMC7285392.

6. Ghimire B, Chandra S. Awareness of Infection Control among Dental Students and Interns. JNMA J Nepal Med Assoc 2018;56(210):598-601. PMID: 30376004.

7. Alharbi G, Shono N, Alballaa L, Aloufi A. Knowledge, attitude and compliance of infection control guidelines among dental faculty members and students in KSU. BMC Oral Health 2019;19(1):7. Doi: 10.1186/s12903-018-0706-0. PMID: 30626370; PMCID: PMC6325736.

8. Rahman B, Abraham SB, Alsalami AM, Alkhaja FE, Najem SI. Attitudes and practices of infection control among senior dental students at college of dentistry, university of Sharjah in the United Arab Emirates. Eur J Dent 2013;7(1):S015-S019. Doi: 10.4103/1305-7456.119058. PMID: 24966723; PMCID: PMC4054074. However, use of PPE was high among all the students. Similar responses were observed in few studies.

9. McCarthy GM, Britton JE. A Survey of Final-Year Dental, Medical and Nursing Students: Occupational Injuries and Infection Control. J Can Dent Assoc 2000;66(10):561. PMID: 11091478.

10. Freire DN, Pordeus IA, Paixão HH. Observing the behavior of senior dental students in relation to infection control practices. J Dent Educ 2000;64(5):352-6. PMID: 10841110.

11. Bentley CD, Burkhart NW, Crawford JJ. Evaluating spatter and aerosol contamination during dental procedures. J Am Dent Assoc. 1994;125(5):579-84. Doi: 10.14219/jada.archive.1994.0093. PMID: 8195499.

12. Qureshi UM, Siddiqui S, Macfarlane TV. Cross-infection: How do dentists change into a clean set of clinical clothing? Health Educ J 2005;64:101-9.

13. Leivers M, Tangri E, Kanji NN, Hirji SK, Hernandez G, Kaminska BD, et al. Uniform contamination in the dental environment. Can J Dent Hyg. 2012;46:50-7.

14. Younai FS, Murphy DC, Kotelchuck D. Occupational exposures to blood in a dental teaching environment: results of a ten-year surveillance study. J Dent Educ. 2001;65(5):436-48. PMID: 11425248.

15. Hersey JC, Martin LS. Use of infection control guidelines by workers in healthcare facilities to prevent occupational transmission of HBV and HIV: results from a national survey. Infect Control Hosp Epidemiol 1994;15(4-1):243-52. PMID: 8207191.