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Research Paper

# Knowledge, Attitudes, and Practice Regarding Infection Control Measures Among Dental Students in Central India

Medical science

**KEYWORDS :** Infection, dental.

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| **Nilesh Agrawal** | Assistant professor, Dept. of Community Medicine,Travancore medical college, Kollam |
| *** Dr. Pranay Gandhi** | Assistant professor, Dept. of Community Medicine,IGGMC, Nagpur. * corresponding Author |
| **Sunita Sharma** | Junior resident-3, Dept. of ENT, SRTR medical college, Ambajogai |

## ABSTRACT

*A questionnaire study was conducted among 245 dental students from Nagpur city, Central India, to determine their level of knowledge, attitudes, and practice regarding infection control measures and if any correlation exists among the knowledge, attitudes, and practice scores. We found that 61.2 percent of the dental students had not been vaccinated with hepatitis B. Use of face mask, gloves, eyewear, and protective clothing as standard infection control measures was practiced only by two students. Mean knowledge, attitude, and practice scores were 3.75 (1.01), 3.40 (0.75), and 3.35 (1.04), respectively. Significant linear correlation was seen between attitude and practice scores (r=0.20, p≤0.01). The level of knowledge and practice of infection control measures was poor among dental students. We recommend rigorous training on infection control measures prior to graduation and mandatory hepatitis B immunization of students before exposure to clinical practice.*

**Introduction**

The dental clinic is an environment where disease transmission occurs easily.1 Prevention of cross infection in the dental clinic is therefore a crucial aspect of dental practice, and dental clinic workers must adopt certain basic routines while practicing. 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. Infections may be transmitted in the dental operatory through several routes, including direct contact with blood, oral fluids, or other secretions; indirect contact with contaminated instruments, operatory equipment, or environmental surfaces; or contact with airborne contaminants present in either droplet splatter or aerosols of oral and respiratory fluids.2,3

With this in mind, the aim of this work was to analyze the knowledge, attitudes, and practice regarding infection control measures among dental students in Nagpur city, Central India. The study also explored if any correlation exists among the knowledge, attitudes, and practice scores.

**Methodology:**

A questionnaire study was conducted among dental students (third year, final year, interns) of a Dental college in Nagpur city, Central India. The sample was comprised of eighty-six third-year dental students, eighty-two final-year students, and seventy-seven interns. Interns are graduates from the same school, with postings equally distributed in various departments during the stipulated one year. Training in infection control is mainly provided in the first, second, and third years of dental school. The study population of 245 dental students voluntarily completed a questionnaire consisting of fifteen questions. The percentages of students in third year, fourth year, and internships who responded were 91.5 percent, 91.1 percent, and 89.5 percent, respectively.

The questionnaire was framed with the help of experts in the field. The questionnaire kept the study group in mind, and questions were linked to curriculum content of infection control. A self-administrated questionnaire consisting of fifteen close-ended items was used for data collection. The dental students were given the questionnaire in the classrooms and asked to fill it out without discussing it in fifteen minutes. The interns were given the same questionnaire in various departments. There were six questions to assess knowledge, four questions to assess attitude, and five questions to judge infection control practices of the respondents.

Informed consent and university clearance were granted for the study. The questionnaire was pretested on a random sample of dental students to ensure practicability, validity, and interpretation of responses. The validity of the questionnaire was assessed using Cronbach's alpha internal consistency coefficient. Chi-square test was used to compare categorical variables. Analysis of variance (ANOVA) was used to compare mean of knowledge, attitudes, and practice scores. Kendall's test was used to compute the correlation among knowledge, attitudes, and practice scores. A p value of ≤0.05 was considered significant for all statistical analyses. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) software for Windows version 13.

**Results:**

Of the 245 dental students, sixty-three were males and 182 females. No significant differences were noted between males and females

**1. Distribution of dental students in study according to gender and class, by number and percentage of respondents in each group.**

| Gender | 3rd year | 4th year | Interns | total | P value |
|---|---|---|---|---|---|
| Male | 26 (22.4%) | 21 (17.2%) | 16 (12.3%) | 63 (25.7%) | |
| Female | 60 (77.6%) | 61 (82.8%) | 61 (87.7%) | 182 (74.3%) | |
| Total | 86 (35.1%) | 82 (33.5%) | 77 (31.4%) | 245 (100%) | 0.38 |

Only 39.2 percent of the undergraduates used antiseptic solution to wash their hands before and after patient examination. The majority (92.2 percent) of the students considered isolation to be an important infection control measure. Surprisingly, 61.2 percent of the undergraduate dental students had not been vaccinated with hepatitis B vaccine. Use of face mask and gloves as an infection control measure was practiced by 69.8 percent (Table 2⇓). The majority (92.2 percent) of the students considered the importance of isolation in infection control, and 96.7 percent confirmed that ineffective sterilization during clinical practice can transmit infection from one patient to another.

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**2. Students' knowledge, attitudes, and practice regarding infection control measures, by number and percentage of total respondents to each item**

| Question | Response | Number | Percentage |
|---|---|---|---|
| Q1. Do you wash your hands before and after patient examination? | Yes | 234 | 95.5% |
| | No | 11 | 4.5% |
| Q2. With what do you wash your hands? | Plain soap | 139 | 56.7% |
| | Detergent | 10 | 4.1% |
| | Antiseptic solution | 97 | 39.2% |
| Q3. Do you prefer oral mouth rinse before commencement of any treatment procedure? | Yes | 138 | 55.4% |
| | No | 107 | 43.6% |
| Q4. Do you think isolation is important in infection control? | Yes | 226 | 92.2% |
| | No | 19 | 7.8% |
| Q5. With which of the following vaccines have you been vaccinated ? | Hepatitis B | 94 | 38.4% |
| | Tetanus | 29 | 11.8% |
| | Tuberculosis | 1 | 0.4% |
| | None | 121 | 49.4% |
| Q6. Which of the following do you use to sterilize instruments in dental clinic? | Autoclave | 231 | 94.3% |
| | Boiling | 3 | 1.2% |
| | Washing | 11 | 4.5% |
| Q7. Minimum time required for sterilization in autoclave? | 5 min | 3 | 1.2% |
| | 10 min | 28 | 11.4% |
| | 15 min | 214 | 87.4% |
| Q8. Temperature for sterilization in autoclave? | 100° C | 3 | 1.2% |
| | 120° C | 236 | 96.4% |
| | 150° C | 6 | 2.4% |
| Q9. Which of the following has the highest rate of transmission via saliva? | Hepatitis B | 79 | 32.2% |
| | AIDS | 26 | 10.6% |
| | Tuberculosis | 123 | 50.2% |
| | Don't know | 17 | 6.9% |
| Q10. What immediate action should be taken in case of direct blood contact with an HIV patient? | Anti-HIV immunoglobulins | 86 | 35.1% |
| | Anti-HIV drugs | 73 | 29.8% |
| | Blood tests to be carried out | 74 | 30.2% |
| | Don't know | 12 | 4.9% |
| Q11. Odds of HIV transmission after a single contaminated needlestick injury? | 0.1%–0.4% | 91 | 37.1% |
| | 1%–4% | 94 | 38.4% |
| | 10%–40% | 28 | 11.4% |
| | 70%–90% | 32 | 13.1% |
| Q12. As a clinician, what protective measures do you take to prevent yourself from injury? | Face mask and gloves | 172 | 69.8% |
| | Eyewear | 4 | 1.6% |
| | Protective clothing | 68 | 27.8% |
| | All the above | 2 | 0.8% |
| Q13. After use of gloves for a patient, what do you do with them? | Dispose of them | 171 | 69.8% |
| | Reuse them after wash | 4 | 1.6% |
| | Reuse them after sterilization | 70 | 28.6% |
| Q14. Ineffective sterilization during clinical practice can transmit infection from one patient to another? | Yes | 237 | 96.7% |
| | No | 5 | 2.0% |
| | Don't know | 3 | 1.3% |
| Q15. Apart from instrument sterilization, disinfection of dental chair, clinic, dental office is required? | Yes | 224 | 91.4% |
| | No | 13 | 5.3% |
| | Don't know | 8 | 3.3% |

Knowledge, attitudes, and practice scores were calculated separately. Each correct response added a score of 1. Mean knowledge, attitudes, and practice scores were 3.75 (1.01), 3.40 (0.75), and 3.35 (1.04) respectively. Significant differences between the groups were noted for means of knowledge (≤0.05) and practice scores (≤0.01)

**3. Mean (SD) of knowledge, attitudes, and practice scores regarding infection control**

| Group | Knowledge Mean (SD) | Attitude Mean (SD) | Practice Mean (SD) |
|---|---|---|---|
| Maximum score: Knowledge: 6, Attitudes: 4, Practice: 5. | | | |
| *≤0.05, **≤0.01 | | | |
| Interns | 3.48 (0.91) | 3.42 (0.67) | 3.18 (1.03) |
| Final-year students | 3.70 (0.98) | 3.47 (0.83) | 3.25 (1.10) |
| Third-year students | 4.03 (1.06) | 3.30 (0.75) | 3.18 (0.92) |
| Total | 3.75 (1.01) | 3.40 (0.75) | 3.35 ( 1.04) |
| p value | ≤0.05* | 0.31 | ≤0.01** |

Significant linear correlation was seen between attitude and practice scores (r=0.20, p≤0.01). No differences were noted for knowledge-attitude and knowledge-practice scores

**4. Correlation among knowledge, attitudes, and practice scores**

| Variables | Correlation Coefficient | p value |
|---|---|---|
| Knowledge-Attitude | 0.047 | 0.46 |
| Attitude-Practice | 0.204 | ≤0.01 |
| Knowledge-Practice | –0.024 | 0.71 |

**Discussion:**

The most surprising result of the study was that 61.2 percent of the undergraduate dental students had not been vaccinated with hepatitis B vaccine. The Dental Council of India has made hepatitis B vaccination mandatory for dental students prior to admission, although the school has not listed it as a requirement.

The level of knowledge about and compliance with infection control measures was poor among the students. Attributable reasons could be inadequate training for infection control measures, inadequate supply of personal protective equipment, and carelessness. Similar results were found in studies by Askarian and Assadian,28 Henrique et al.,29Taiwo and Aderinokun,1 and Ogden et al.30 regarding dental students in Iran, Brazil, Nigeria, and UK.

Most students (94.3 percent) in our study used an autoclave to sterilize instruments. Henrique et al.29 conducted a ten-year study to assess attitudes and behavior of dental students concerning infection control rules. In 1995, most students used an autoclave to sterilize instruments (83.8 percent), and this percentage increased in 2005 (95.9 percent). No student could describe the correct pressure, temperature, and sterilization time in either 1995 or 2005. However, in our study, 87.4 percent and 96.4 percent of the students answered correctly about temperature and sterilization time, respectively. The high percentage of correct answers to questions about sterilization procedure revealed a good knowledge.

The majority (92.2 percent) believed in the importance of isolation in infection control. Also, 91.4 percent of the students thought that disinfection of the dental chair, clinic, and dental office is required apart from instrument sterilization. With respect to attitudes towards adherence to infection control measures, the majority of the respondents believed infection control measures to be necessary. Viewing the responses indicates that dental students in the study have a positive attitude towards infection control measures. Ramesh and Anuradha.31 in a study done with Bangalore and Chennai dentists found that although attitudes towards treating patients with infectious disease were positive, more knowledge about infection control was needed.

Means of knowledge, attitudes, and practice scores were 3.75 (1.01), 3.40 (0.75) and 3.35 (1.04), respectively. Significant differences between the groups (third year, fourth year, and interns) were noted for knowledge and practice scores ($p \leq 0.05$; $p \leq 0.01$). This was a reflection of students' forgetting material over time. The finding suggests the importance and need of rigorous infection control training prior to graduation. The topic of infection control requires a proactive approach throughout the course.

Personnel are more likely to comply with an infection control program and exposure control plan if they understand its rationale. Clearly written policies, procedures, and guidelines can help ensure consistency, efficiency, and effective coordination of activities.

**Conclusion:**

Our findings indicate a lack of understanding of the basics of infection control and the prevention of transmission of communicable infectious diseases not only in a large percentage of our medical students, but also in graduate students who took part in this study.

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