Original Article

A SURVEY ON KNOWLEDGE, ATTITUDE, AND PRACTICE ON BLOOD-BORNE PATHOGENS AMONG DENTAL PROFESSIONALS

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ABSTRACT

Dentists and dental students are at a high risk of contracting HIV/HBV because dental treatment frequently involves direct contact with patients' blood and saliva. Dental clinics and other healthcare facilities lack efficient infection control procedures. Numerous studies examined dental professionals', lab technicians', and students' understanding of infection prevention principles. In this regard, the study was conducted to assess the knowledge, attitude, and practice among the dental professionals (Interns, post-graduates, and doctors) in a dental institute. The survey link was sent through a WhatsApp group targeted to dental students & dental professionals. A total of 115 respondents took part in this study. Participation was voluntary and anonymous without any incentive given for participation. There was good correlation among each domain, i.e, knowledge and attitude scores had p p-value of 0.001, knowledge and practice scores had p p-value of 0.005, and attitude and practice scores had p p-value of 0.009. All these domains were statistically significant. Our results show that in order to enhance the value of knowledge and occupational safety, an educational program and ongoing dental education are necessary.

Key words: Blood-borne, Dentistry, Dental professional, Infection.

Introduction

Blood-borne pathogens are microorganisms, such as viruses or bacteria, that are infectious microorganisms in human blood that can cause disease in humans. A blood-borne disease is a disease that can spread through contamination by blood and other body fluids. It is difficult to determine what pathogens are seen in any given sample of blood, and some blood-borne diseases are lethal, so standard medical practice regarding blood and any body fluid as potentially infectious should be made aware among the health professionals. Healthcare workers are at risk of infection when exposed to blood and body fluids due to occupational accidents [1-3]. Among the health professionals, dentists are placed in a high-risk group for occupational hazards, and thus awareness about blood-borne viral infections is of utmost importance. The most common viral infections are the hepatitis B virus (HBV) and the Human Immunodeficiency virus (HIV). These blood-borne infections have serious life-threatening illnesses, including long-term sickness, disability, and death. According to the WHO, each year, among 35 million healthcare professionals, two million injuries result in approximately 66,000 HBV and 1000 (200–5000) HIV infections [4-6].

It is estimated that around 12% of people are unaware of their HIV infection, which can potentially be the reason for its transmission in various ways. The hepatitis B virus causes liver failure and liver cancer if left untreated. These infections are often insidious and can have chronic asymptomatic carrier states. Therefore, the risk of transmission to other people can be both hidden and prolonged.

Dentists and dental students are at a high risk of contracting HIV/HBV because dental treatment frequently involves direct contact with patients' blood and saliva. This is because dentistry uses a lot of small, sharp instruments that are easily contaminated with infected blood during an invasive procedure, which is the main way that these infections are spread [7-10]. Epidemiological characteristics of HIV and viral hepatitis are different, but they can be transmitted to the dental team by professional exposure, most often by a needle stick injury.

The risk of accidental needle stick injuries is higher during invasive procedures such as giving an injection (nerve blocks) and recapping the needle after use. Needles that are not disposed of appropriately may end up hidden in trash or linen and cause harm to other employees who come into contact with them by accident. In the majority of healthcare settings, preventing needle stick injuries and other possible exposures is probably going to have a big influence on infection rates. In spite of awareness of the risk, these kinds of accidental exposures are common. Inadequate staff, lack of experience, insufficient training, and duty overloads and fatigue may lead to occupational sharp injuries [11-13].

In 2003, the Centers for Disease Control and Prevention in the United States of America updated their guidelines for infection control in dental settings. Dental clinics and other healthcare facilities lack efficient infection control procedures. Numerous studies examined dental professionals', lab technicians', and students' understanding

of infection prevention principles. These research findings demonstrated that dentists' understanding of infection management principles was lacking [4, 14-17].

The prevention of occupational exposures requires a systematic knowledge of the risks and practical measures to be taken. Health care workers should train themselves with universal precautions, which, as defined by the Centers for Disease Control, is a set of safety measures designed to prevent transmission of HIV and HBV when providing first aid [14, 18-20].

In this regard, the study was conducted to assess the knowledge, attitude, and practice among the dental professionals (Interns, post-graduates, and doctors) in a dental institute.

Materials and Methods

The participants were recruited by convenience sampling through the contacts of the authors. The survey link was sent through a WhatsApp group targeted to dental students & dental professionals. A total of 115 respondents took part in this study. Participation was voluntary and anonymous without any incentive given for participation. The survey consisted of 22 closed-ended questions; in addition to these, 4 questions were based on demographic data. Questions were prepared and validated to assess the knowledge, attitude, and practices about blood-borne pathogens (HIV and HBV) among the dental professionals. This study was approved by the Institutional Review Board (IRB), with the approval number 1263, granted on 10th October 2024.

All the data were entered into MS Excel, and SPSS 22.0 was used for statistical analysis. Measures of central tendency, i.e, mean and standard deviation, were applied for continuous variables. The association of demographic profile with the level of knowledge, attitude, and practice was assessed using the chi-square test. Comparison of demographic profiles of respondents with mean knowledge, attitude, and practice scores was done using an independent t-test. $P<0.05$ was considered significant.

Results and Discussion

The demographic profile of respondents shows that 72.92% were less than 25years & 27.08 % were above 25 years. When comparing the genders, female respondents were more, about 71.88 % compared to males, 28.13%. 62.50% respondents were the interns, and 37.50% were post-graduate/ faculty members. The respondents were both from clinical and non-clinical departments. Among which 64.58% were from the clinical department, whereas 35.42% from non non-clinical department. When asked about dental practice experience, 83.33% respondents had experience of less than 5 years, and only 16.67% had experience above 5 years.

Table 1. Levels of knowledge, attitude, and practice among respondents

Levels of	No of respondents	% of respondents
Levels of Knowledge		
Low Knowledge	16	16.67
Average Knowledge	68	70.83
High Knowledge	12	12.50
Levels of Attitude		
Poor attitude	21	21.88
Average attitude	64	66.67
Good attitude	11	11.46
Levels of Practice		
Poor practice	27	28.13
Average practice	52	54.17
Good practice	17	17.71
Total	96	100.00

The levels of knowledge were assessed among the respondents as low, average, and high knowledge, among which 70.83% had average knowledge. The levels of attitude & practice were assessed as poor, average, and good & the percentage of levels of attitude and practice is depicted in **Table 1**.

Association between demographic profiles of respondents with levels of knowledge towards blood-borne pathogens showed that respondents in the age group less than 25 years had 52.08% of average knowledge where whereas 18.75% of average knowledge was seen in the age group of above 25 years. 53.13 % females had average knowledge about blood-borne pathogens compared to 17.71% males. Association of the qualifications showed that interns had 5.21 % of good knowledge, whereas PG/ faculty had 7.29% of good knowledge. Respondents from the clinical & non-clinical departments had 42.17% & 28.13% of average knowledge, respectively. Respondents with experience of less than 5 years had 59.38% average knowledge, whereas respondents with more than 5 years of experience had 11.46% average knowledge. There was no statistical significance among the demographic profiles of respondents with levels of knowledge about the blood-borne pathogens.

Table 2. Comparison of demographic profiles of respondents with mean knowledge scores by independent t-test

Profiles	Mean	SD	t-value	p-value
Age groups				
<=25yrs	15.93	2.39	-1.8321	0.0701
>25yrs	16.88	1.90		
Gender				
Male	15.85	2.43	-0.8934	0.3739

Female	16.32	2.25		
Qualifications				
Interns	16.05	2.31	-0.7544	0.4525
PG/faculty	16.42	2.30		
Department				
Clinical	15.79	2.43	-2.3377	0.0215*
Non-Clinical	16.91	1.86		
Experience				
<=5yrs	16.10	2.35	-0.8321	0.4075
>5yrs	16.62	2.03		
Total	16.19	2.3		

*p<0.05

The mean knowledge score among the respondents more than 25 years old was 16.88, and female respondents was 16.32, which were statistically not significant. PG/ faculty members had a mean knowledge of 16.42 & respondents with the experience of more than 5 years had a mean knowledge of 16.62, which was not significant. Mean knowledge among non-clinical department respondents was 16.91 compared to clinical department respondents 15.79, which was statistically significant with p p-value of 0.0215 **Table 2**.

The responding dental professional's answers were first tabulated as the percentage of correct answers and were further analyzed by demographic parameters (Age, gender, qualification, department, and dental practice experience) by means of the chi-square test. When the levels of knowledge towards blood-borne pathogens were analyzed with respect to the demographic profile, both respondents < 25 years as well as > 25 years showed average knowledge, and the results were not significant. A larger percentage of younger individuals did exhibit lower knowledge. Both males and females demonstrated average knowledge as a whole; however, a higher percentage of females also demonstrated low knowledge as compared to males. However, the results were not significant. The majority of interns, as well as PG/Faculty members, showed average knowledge. Though statistically not significant, it was observed that a higher percentage of interns fell in the low knowledge category as compared to PG/Faculty. This suggests that the level of education does matter in gaining the apt knowledge. Clinical and non-clinical departments showed an average knowledge. The respondents with dental practice experience < 5 years and > 5 years showed average knowledge, but a high percentage of 15.6% of respondents < 5 years showed low knowledge. Our study showed similar findings with the study done by researchers in Georgia, where the knowledge about blood-borne infections among Dental Health Care Workers (DHCWs) was very low [21]. Knowledge regarding Dentists being anxious about increasing the transmission risk of the HBV and HIV infection while treating them was quite high (92.78%), which suggests that dentists are aware of the consequences if the blood-borne pathogens are transmitted. The majority of respondents responding to our survey had an adequate understanding of the possible routes of HIV and HBV transmission. The majority of the respondents, 87.63% believe that HIV and HBV can be transmitted by receiving contaminated blood transfusion, and about 71.13% agree that HIV and HBV are sexually transmitted. 94.85% of dental professionals were aware that needle stick injury carries risk for blood-borne infection, whereas a study done on HCWs showed only 70% of HCWs were aware of the percutaneous injury risk for blood-borne infection [22]. In our study, there was a lack of knowledge about the best method for the prevention of transmission of blood-borne infections. About 60.82% respondents didn't give the best method for prevention, while wearing masks, gloves, and eye protection was considered by 87.63% respondents. According to Puttaiah R *et al*. inadequate knowledge among DHCWs is a problem reported by most countries, suggesting that continuous education is needed for those working in dental care. In other words, universal precautions are not universally applied. All patients should be treated as potential blood-borne infection carriers irrespective of their awareness of their infection status. In general, age, levels of education, and experience are important parameters in increasing knowledge about the blood-borne pathogens/infections [23-26].

Table 3. Association between demographic profiles of respondents with levels of Attitude

Profile	Poor	%	Average	%	Good	%	Total	Chi-square	p-value
Age groups									
<=25yrs	16	16.67	46	47.92	8	8.33	70	0.1490	0.9280
>25yrs	5	5.21	18	18.75	3	3.13	26		
Gender									
Male	7	7.29	19	19.79	1	1.04	27	2.3310	0.3120
Female	14	14.58	45	46.88	10	10.42	69		
Qualifications									
Interns	13	13.54	39	40.63	8	8.33	60	0.5610	0.7560
PG/faculty	8	8.33	25	26.04	3	3.13	36		
Department									

Clinical	15	15.63	44	45.83	3	3.13	62	7.6110	0.0220*
Non-Clinical	6	6.25	20	20.83	8	8.33	34		
Experience									
<=5yrs	17	17.71	54	56.25	9	9.38	80	0.1540	0.9260
>5yrs	4	4.17	10	10.42	2	2.08	16		
Total	21	21.88	64	66.67	11	11.46	96		

*p<0.05

Association between demographic profiles of respondents with levels of attitude towards blood-borne pathogens showed that respondents less than 25 years had 47.92% of average attitude of 18.75% of average attitude was seen whereas the age group of above 25 years. 10.42 % females had a good attitude towards blood-borne pathogens when compared to males, who had a 1.04% good attitude. Association of the qualifications showed that interns had 40.63% of average attitude where whereas PG/ faculty had 26.04% of average attitude. Respondents from clinical & non-clinical departments had 3.13% & 8.33% of good attitudes towards blood-borne pathogens, respectively & were statistically significant with p p-value of 0.0220. Respondents with experience of less than 5 years had a 56.25% average attitude, whereas respondents with more than 5 years of experience had a 10.42% average attitude **Table 3**.

Table 4. Comparison of demographic profiles of respondents with mean attitude scores by independent t-test

Profiles	Mean	SD	t-value	p-value
Age groups				
<=25yrs	4.63	1.45	-0.7780	0.4385
>25yrs	4.88	1.40		
Gender				
Male	4.56	1.37	-0.6082	0.5445
Female	4.75	1.46		
Qualifications				
Interns	4.78	1.43	0.7539	0.4528
PG/faculty	4.56	1.44		
Department				
Clinical	4.58	1.39	-1.0861	0.2802
Non-Clinical	4.91	1.50		
Experience				
<=5yrs	4.70	1.43	0.0318	0.9747
>5yrs	4.69	1.49		
Total	4.698	1.43		

The mean attitude score among the respondents more than 25 years old was 4.88, and the female respondents were 4.75, which were statistically not significant. Interns had a mean attitude of 4.78 & respondents with the experience of less than 5 years had a mean attitude of 4.70, which was not significant. Mean attitude among the non-clinical department was 4.91, which was slightly more compared to the clinical department. All the parameters were statistically not significant for the comparison of demographic profiles of respondents with the mean attitude score.

The dental professionals' attitude towards HIV and HBV was assessed as poor, average, and good attitudes and compared according to age, gender, qualification, department, and dental practice experience. Overall, females had a good attitude compared to males towards HIV and HBV patients. 76.29% of the respondents, irrespective of gender, were willing to work with the centers that service the patients with blood-borne infections. Attitude was poor when asked about mouth-to-mouth resuscitation in case of emergency in a known HIV/HBV patient. Respondents from non-clinical departments had a good attitude towards blood-borne pathogens, and this was statistically significant. 89.69% of the respondents had a good attitude toward covering the broken skin before working on the patient. This suggests that the dental professionals are aware that either the dentist or the patients have a chance of contracting the disease if broken skin is not covered. The key elements of conventional precautions that can reduce mucocutaneous exposures are wearing gloves, gowns or aprons, and masks, as well as practicing excellent hand hygiene and having a positive attitude towards blood and bodily fluids. Another good tactic is to dispose of sharps in containers that can withstand punctures. Indirect transmission of blood-borne pathogens can also occur through the dental instruments, hence a proper method of sterilization needs to be taught among dental professionals [27, 28]. In our study majority of the dental surgeons had a good attitude towards HIV/HBV. In general, dentists' positive attitudes towards treating high-risk patients and their profound concerns for their well-being and the possibility that the virus could spread to others were in line with the findings of earlier research [4, 11, 29-31]. Increased awareness could lessen people's negative perceptions of HIV and HBV infections.

Table 5. Association between demographic profiles of respondents with levels of practice

Profile	Poor	%	Average	%	Good	%	Total	Chi-square	p-value
Age groups									
<=25yrs	22	22.92	41	42.71	7	7.29	70	10.6010	0.0050*
>25yrs	5	5.21	11	11.46	10	10.42	26		
Gender									
Male	8	8.33	9	9.38	10	10.42	27	10.9660	0.0040*
Female	19	19.79	43	44.79	7	7.29	69		
Qualifications									
Interns	15	15.63	39	40.63	6	6.25	60	9.3910	0.0090*
PG/faculty	12	12.50	13	13.54	11	11.46	36		
Department									
Clinical	22	22.92	29	30.21	11	11.46	62	5.1370	0.0770
Non-Clinical	5	5.21	23	23.96	6	6.25	34		
Experience									
<=5yrs	23	23.96	47	48.96	10	10.42	80	9.2810	0.0100*
>5yrs	4	4.17	5	5.21	7	7.29	16		
Total	27	28.13	52	54.17	17	17.71	96		

*p<0.05

Association between demographic profiles of respondents with levels of practice towards blood-borne pathogens showed statistical significance among all the demographic parameters except clinical and non-clinical departments. Respondents with an age group less than 25 years had 7.29% of good practice where whereas 10.42% of good practice was seen above 25 years, with a p value of 0.005. Males had good practice towards blood-borne pathogens compared to females, who had 7.29% of good practice with p p-value of 0.0040. Interns had 6.25 % of good practice, whereas PG/ faculty had 11.46% of good practice with p p-value of 0.0090. Respondents with experience of less than 5 years had 10.42% of good practice, whereas respondents with more than 5 years of experience had 7.29% of good practice towards the blood-borne pathogens, with p p-value of 0.01 **Table 5**.

The mean practice score among the respondents more than 25 years old was 8.15 points higher compared to respondents less than 25 years old and was statistically significant with a p-value of 0.0264. Female respondents had a mean practice of 7.29 compared to males, 7.89, which was statistically not significant. Interns had a mean practice of 7.48 & respondents with the experience of less than 5 years had a mean practice of 7.32, which was not significant. Mean practice among the non-clinical department was 7.85, which was slightly more compared to the clinical department.

The dental professionals' practice towards HIV and HBV was assessed as poor, average, and good practice, and compared according to age, gender, qualification, department, and dental practice experience. Based on the results of our study, dental professionals had good practice regarding HBV and HIV infections. 86.60% of interns and PG/faculty followed the seven steps of hand washing, and about 96.91% followed biomedical waste management rules. Studies have found that despite the participants' acceptable knowledge and attitude, individual behaviour was unsatisfactory with regard to the standard control precautions. This suggests that, according to exposure control principles, infection prevention cannot be achieved just by a positive attitude and awareness of infection control procedures [32-34]. On the contrary, our study showed that respondents less than 25 years, females, interns, and less than 5 years of experience had good practice. To lower or eliminate the risk of illness transmission to patients and dentists, a number of ongoing exposure management strategies must be put in place for health workers, particularly dentists.

Table 6. Correlation between knowledge, attitude, and practice scores by Karl Pearson's coefficient

Variables	Correlation between		
	r-value	t-value	p-value
Knowledge and attitude scores	0.4111	4.3718	0.0001*
Knowledge and practice scores	0.3499	3.6211	0.0005*
Attitude and practice scores	0.3339	3.4349	0.0009*

*p<0.05

There was good correlation among each domain, i.e, knowledge and attitude scores had p p-value of 0.0001, knowledge and practice scores had p p-value of 0.0005, and

attitude and practice scores had p p-value of 0.0009. All these domains were statistically significant. This suggests that knowledge can develop an attitude and can result in application in practice. Hence, providing knowledge is of paramount importance with regard to blood-borne pathogens, and this needs to be emphasized in both undergraduate and postgraduate curricula **Table 6**.

Conclusion

The risk for blood-borne infections is an unavoidable part of daily patient care. Occupationally acquired infections cause substantial illness among health care workers, including dental professionals. In the present study, the average knowledge level of dentists regarding HBV and HIV infections was influenced by age and work experience. Positive attitude towards infected patients was mainly influenced by females. These findings showed that dentists had a satisfactory level of knowledge and a positive attitude regarding HBV and HIV infections; however, some gaps were noted, indicating that dentists' higher levels of knowledge are crucial in forming their attitudes and practices regarding patients with HIV and HBV. Our results show that in order to enhance the value of knowledge and the occupational safety of DHCWs, an educational program and ongoing dental education are necessary. To safeguard DHCWs against the danger of occupational infection, commitment is required at the governmental, organisational, and personal levels. The continuous evaluation and supervision of the professional practice and learning package, which are actually put into practice, may provide fast knowledge and timely implementation of the management of occupational exposure to blood-borne infections.

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