

Awareness and Prevalence of Accidental Blood-borne Exposures Among Students of Sri Sai College of Dental Surgery Vikarabad

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ABSTRACT

Background: Studies have demonstrated that dental students / dentists are among the most vulnerable to blood-borne exposures.

Objectives: The objective of this study was to assess the awareness and prevalence of accidental blood-borne exposures among undergraduate and postgraduate dental students.

Materials and Methods: A cross-sectional survey was conducted among 281 students at Sri Sai College of Dental Surgery- Vikarabad, in which a structured pre-tested self-administered questionnaire was given to all clinical dental students and the responses were subjected to statistical analysis.

Results: The response rate in present study was 87%. The mean age of the subjects was 22.9 years and awareness on blood borne exposures was found to be 88.9%. 76% of the students reported having undergone accidental exposures with 24% of them being Per-cutaneous injuries. In 49% of respondents syringe needle was the most common instrument causing accidental injury.

Conclusion: Accidental exposures and non-reporting of accidental exposures were prevalent in these students.

Keywords: Dental students, Accidental blood-borne exposures.

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INTRODUCTION

Studies have demonstrated that dental students / dentists are among the most vulnerable to blood-borne exposures. These preventable injuries expose workers to over 20 different blood-borne pathogens and result in an estimated 1000 infections per year, the most common being Hepatitis B, Hepatitis C and HIV (1). The risk of occupational exposure to blood borne viruses depends on the prevalence of the infection/disease in the patient population and the nature and frequency of contact with blood and body fluid through per-cutaneous or per-mucosal routes (2), as well as the susceptibility of the exposed worker(3).

Worldwide, the prevalence of HBV varies greatly. In India, prevalence of HBV among general population ranges from 2 to 7% (4). Hepatitis B is the most common disease transmitted via accidental exposures among the dentists. For a susceptible person, risk from a single needle stick injury or cut to HBV-infected blood ranges from 6-30% and depends on the hepatitis B e antigen (HBe-Ag) status of the source individual (2). Next, important virus to be transmitted through blood is hepatitis-C. Antibodies against hepatitis-C are present in approximately 15 million Indian people with prevalence rate of 2% (4) and the average risk for infection after a needle-stick or cut exposure to HCV infected blood is approximately 1.8% (2).

HIV which is on a rising trend and estimated to be present among 2.27 million people according to the recent reports released by NACO in 2008 (5). In prospective studies of Health Care Professionals, the average risk for HIV transmission after a per-cutaneous exposure to HIV infected blood has been estimated to be approximately 0.3% and after a mucous membrane exposure, approximately 0.09% (2). There are no studies done in India pertaining to prevalence of these diseases among dentists. When compared to the developed countries, which have far reached the heights in achieving Infection Control, in developing countries such as India it takes many a steps to reach the level indicating need for steps towards implementation of the same.

A study was conducted in 2009 to compare the level of awareness on Hepatitis-B infection among dental and medical interns in Pondicherry, India. It showed that dental interns had better awareness than medical interns (6). And a study conducted in 2010 among dentists to assess the status of Dental Infection Control and Occupational Safety in India showed that even though dentists had adequate knowledge in the subject of infectious diseases, attitude (Stigma) towards treating infected patients was a negative factor (7). However, as they are few studies done exclusively among dental students the present study was done to

explore their awareness on blood-borne exposures and prevalence as well from start of their clinical training. The present study is done with the following objectives- To assess the awareness and protective measures taken following accidental blood-borne exposures among undergraduate and postgraduate dental students and to assess the prevalence of accidental blood-borne exposures among undergraduate and postgraduate dental students.

MATERIALS AND METHODS

Ethical clearance was obtained from the Institutional Review Board of Sri Sai College of Dental Surgery, Vikarabad.

Study design

This cross-sectional study was conducted among dental students enrolled in clinical component of the curriculum at Sri Sai College of Dental Surgery- Vikarabad. The data were collected between September 2010 and October 2010.

Data collection

A self-administered questionnaire consisting of twenty-one closed-ended questions and multiple choice items printed in English was used as the data collection instrument. Once the purpose of the study and its conceptual basis were defined, the generation of items was accomplished by means of a broad-based review of the literature, including questions used in pre-existing instruments.

The questionnaire comprised 21 questions divided into five areas of enquiry on personal details, awareness on blood-borne exposures, prevalence of blood-borne exposures, reporting rate of exposures and suggestions to improve the student's ability to handle such exposures patient

A pilot study was conducted prior to data collection with a sample of twenty students who were not part of the main sample. A final modification of the questionnaire was carried out based on the questions and suggestions that arose during the pilot study.

The questionnaires were distributed at the

end of lecture periods to all third and fourth years who attended the lectures and for the interns and postgraduate students in their respective departments and collected by the investigator after an hour.

To test reliability of the questionnaire cronbach's alpha was done and the value obtained was 0.75 for the given sample thus showing a high degree of reliability

Statistical analysis

The chi-square test was used to test associations between the students enrolled in and the independent variables. Criteria for the selection of variables in the multivariate analysis (unconditional logistic regression) were obtained from the results of the Univariate analysis (chi-square test). Variables remained in the model if they continued to be significant ($p < 0.05$) and/or adjusted to the model. Exponential transformations were then performed to obtain the odds ratio (OR). The chances of awareness and prevalence on accidental exposure to biological material were determined in the presence of the independent variables. Data were tabulated and analyzed using the Statistical Package for the Social Sciences (SPSS) 17.0.

RESULTS

Two hundred and eighty-one dental students responded to the questionnaire. This represented an overall response rate of 87.8%. The mean age of the subjects was 22.9 years (range-19-31; SD, 8.5) with majority of them being females (69%). Table 1 displays demographic variables, distribution of frequencies related to awareness and prevalence of occupational exposure to biological material and level of statistical significance between different groups of students enrolled in clinical part of the curriculum.

88% reported that they were aware of occupational blood-borne diseases. When asked about the use of PPM, the most frequently used protective measures included gloves and masks reported by 93% and protective eye wear by 51%.

33% of respondents reported their aware-

Table 1 Distribution of demographic variables and frequencies related to the sample of 281 dental students and statistical significance in comparison to the students enrolled in different years of study (third, fourth years, interns and post graduate students)

Independent variables	n	%	p-value
Gender			
Female	196	69.75	
Male	85	30.2	
Year of study			
Third year students	65	23.13	
Fourth year students	80	28.47	
Interns	68	24.20	
PG students	68	24.20	
1. Are you aware of blood-borne exposures which are common in dental profession?			
Yes	250	88.97	0.00002
No	31	11.03	
2. What personal protective measures are you taking to avoid such exposures?			
Gloves and mask	123	43.77	0.00000
Protective eye wear	4	1.72	
Both	141	50.18	
Others	13	4.63	
3. Universal Precaution Guidelines-Awareness			
Awareness	95	33.81	0.00000
Universal Precaution guidelines are applied for all the three blood-borne pathogens-hepatitis-A, hepatitis-C and HIV	194	69.04	0.00681
All patients to be treated as potentially infectious	160	56.94	0.31948
Isolation is necessary for patients with blood-borne infections	204	72.60	0.76522
Dentists with non intact skin should not be involved in direct patient care until the condition resolves	191	67.97	0.21395
Universal Precaution apply for treatment procedures needing contact with saliva	104	37.01	0.00000
4. Have you taken vaccination (Hepatitis B) to avoid such blood-borne infections?			
Yes, completed 3-dose vaccination schedule	179	63.70	0.00014
Missed the vaccination schedule	37	13.17	
Not taken	65	23.13	
5. Which is the common accidental exposure you had come across till now?			
Cutaneous exposure	110	39.15	0.00000
Mucous membrane exposure (splash into eyes)	48	17.08	
Per-cutaneous exposure	15	5.34	
All of the above	42	14.95	
None	66	23.49	
6. How many times has the exposure occurred till today?			
One	98	34.88	
Two	43	15.30	0.00018
Three/more	70	24.91	
None	70	24.91	
7. What is the common instrument that causes an exposure frequently?			
Syringe needle	140	49.82	0.00820
Dental bur	22	7.83	
Hand instruments	67	23.84	
BP blade	43	15.30	
Endo instrument (files)	9	3.20	
8. Which is the treatment that causes the exposure frequently?			
Scaling	95	33.81	
Restoration	27	9.61	0.02277
Extraction	159	56.58	
9. Reporting of exposures			
Staff member's	41	14.59	
Friends/Colleagues	70	24.91	
Family doctors	15	5.34	
Parents	8	2.85	0.00039
Never reported	77	27.40	
10. Are you aware of prophylactic measures which should be taken following such exposures?			
Yes	149	53.02	0.00004
No	132	46.98	
11. What are your suggestions to improve the student's ability to handle such exposures?			
Regular training / educational sessions	110	39.15	0.00137
Improvement in rapport between staff and students specific guidelines should be available	39	13.88	
Availability of treatment at the dental college itself	58	20.64	
Any other suggestions please specify	26	9.25	

ness on Universal Precaution Guidelines which was found to be statistically significant among postgraduate students (p-value=0.00). However, in terms of awareness, responses were moderate, with the correct response rate under 50% for 2 out of 5 questions.

Exposures were reported by 75% majority of who were among postgraduate students (88% p-value=0.00). Exposure was classified as cutaneous (39%), per-cutaneous (5%), and mucous membrane (17%). 14% of the respondents reported of being exposed to all three types of accidents. Of these 25% reported three/more exposures each.

63% of respondents completed the vaccination schedule against Hepatitis-B.

Majority of them found to be at risk were third year students who either missed or had not received the vaccination (52%, p-value=0.000).

A significant proportion of accidents occurred with Syringe needle (49%) and most of them affected were found to be postgraduate students (67%, p-value=0.000). 56% of accidents were reported while performing extractions and found to be more among third year students (66%, p-value=0.020). 39% reported accidents to the concerned staff, 20% reported to their family doctors, 13% to their friends, 9% to their parents while 17% had never reported. 53% of the respondents were aware of PEP.

Postgraduate students had more awareness compared to other undergraduate students (67%, p-value=0.000).

In the multiple logistic regression analysis, the variables that remained independently associated with awareness on blood-borne exposures were use of PPM (OR=1.6; 95 percent CI 1.0–2.7), type of accident (OR=1.4; 95 percent CI 1.0-2.1), and instrument frequently involved in exposure most specifically during use of syringe needles (OR=0.6; 95 percent CI 0.4–0.9) (Table 2) and variables independently associated with exposure to blood were students year of study (OR=2.2; 95 percent CI 1.3-3.9), treatment during which exposure occurred most specifically during extractions (OR=0.3; 95 percent CI 0.2-0.5) and reporting of exposures (OR=0.4; 95 percent CI 0.3-0.7) (Table 3)

DISCUSSION

This study has looked at the dental students risk for accidental exposure to blood borne infections and has compared the exposure across different groups of dental students. Dental students were certainly at risk for injury. In comparison between different groups, we found that postgraduate students had good awareness but alarmingly they also reported higher number of injuries.

93% of the students in the present study wear gloves and mask and 50% protective eye shields while working on their patients which were in contrast to the findings of

Rai *et al* (8). Students’ use of PPM in this study, which is a critical component of standard precautions, was found to be inadequate particularly in regards to the eyewear and other PPM. This finding, however, is not peculiar to India, as the study in the UK also noted that 60 percent of the students were not wearing protective eyewear when they experienced an exposure incident (3).

56% of respondents stated that all patients should be treated as potentially infectious (while a 100% of patients should have been viewed as potentially infectious) which is in contrast to study done by Puttaiah *et al* (7) where 66% felt the same indicating the need for continuous dental education programmes stressing the importance of infection control and safety guidelines.

HBV is 50 -100 times more infectious than HIV. In India about 4% of population were estimated to be HBV carriers giving a total pool of approximately 36 million carriers and is one among vaccine preventable diseases (6). In present study 63% of respondents were completely immunized against Hepatitis- B vaccine. These results are in contrast to those reported by Tirounilacandin *et al* (6). This is of great concern as a considerable number were not immunized and are at risk for the blood-borne diseases since prevalence of exposures was found to be high among these students.

20% of respondents experienced Per-cuta-

Table 2. Multiple logistic regression analysis: awareness on blood-borne exposures

Independent variables	Odds Ratio	Std. Err.	Z-value	P-value	95% confidence interval	
Year of study	2.0964	0.6103	2.5400	0.0110*	1.1849	3.7093
Personal Protective Measures	1.6692	0.4134	2.0700	0.0390*	1.0273	2.7122
Type of accident	1.4809	0.2900	2.0000	0.0450*	1.0088	2.1739
Instrument frequently involved in exposure	0.6350	0.1167	-2.4700	0.0130*	0.4430	0.9103

*p<0.05

Table 3. Adjusted multiple logistic regression: occupational exposure to blood

Independent variables	Odds Ratio	Std. Err.	Z-value	P-value	95% confidence interval	
Year of study	2.2979	0.6269	3.0500	0.0020*	1.3462	3.9225
Treatment during which exposure occurred	0.3404	0.0857	-4.2800	0.0000*	0.2078	0.5577
Reporting of exposures	0.4913	0.1012	-3.4500	0.0010*	0.3281	0.7356

*p<0.05

neous exposures which were found to be more prevalent among postgraduate students. These findings are in contrast to those reported by Machado-Carvalho *et al* (9) where final year students reported more exposures. This finding might have obtained due to the fact that postgraduate students are involved in a wide variety of clinical work when compared to other students which might have led to the exposure. However, the aspects of accidental exposure reported among students in different phases in the dental clinical context need to be explored in further research.

Students exhibited a greater chance of exposure to blood in the dental operatory while performing extractions and majority of them belong to third years. This result is in contrast with the findings of Al-Hussyeen *et al* (10). This may be due to the lack of experience in handling of instruments and the lower knowledge about the precautions that can be taken to minimize the risks of exposure among third years, although previous studies involving practicing dentists and dental students reported that age, experience and skill were not related to injury rate.

Post-exposure prophylaxis is available in the event of exposure to HBV and HIV. In this study 53% were aware of PEP which is almost in agreement with the findings of Muralidhar *et al* in HCP (11).

In this study we found that only 14% officially reported the accidents. Under-reporting is a universal problem. It is well-described by other researchers, who found actual reporting rates ranging from only 3%-30%. In separate studies, Askarian documented under-reporting of 85% of

incidences, Mangione 80%, and Tarantola 69% (12). They suggest that the method of reporting should be well-publicized, not time-consuming, nonjudgmental, and confidential and should lead to appropriate outcomes.

It should be pointed out that memory bias is a potential limitation associated with retrospective data collection in questionnaire based cross-sectional surveys by subjects, without other means of verification of their description of exposure incidents which highlight the need for further research using different study designs (9). Nevertheless, our data provides a baseline from which to work at reducing accidental exposures in the future. Majority of the students in the present study were of the opinion that education/ training and availability of proper guidelines would help them in handling the exposures. It demonstrates the need to improve awareness on engineering and work practice controls and helps guide prevention at the unit or institutional level.

CONCLUSION

Accidental exposures and under reporting were prevalent in these students. A combination of standard precautions, engineering, work practice, and administrative controls are the best means to minimize accidental exposures amongst all oral health care workers including students. It is important to inculcate this behaviour in students at an early stage such that they carry the same in their future. As there is a famous saying-

“IT IS EASIER TO BEND A SAPLING THAN A TREE”

REFERENCES

1. Singru AA, *et al*. Occupational Exposure to Blood and Body Fluids among Health Care Workers in a Teaching Hospital in Mumbai, India. *Indian Journal of Community Medicine* 2008;**33**(1):29-30
2. Centres for Disease Control. Recommendations and reports. *MMWR* 2003;**52**(RR-17):10.
3. Sofola OO, *et al*. Occupational Exposure to blood-borne Pathogens and Management of Exposure Incidents in Nigerian Dental Schools. *J Dent Educ* 2007;**71**(6):832-837
4. Sood S, Malvankar S. Seroprevalence of hepatitis-b surface antigen, antibodies to Hepatitis-C virus, and Human Immunodeficiency Virus in a hospital based population in Jaipur, Rajasthan. *Indian J Community Med* 2010;**35**(1):165-169
5. Overview of HIV and AIDS in India. Available from: <http://www.avert.org/aidsindia.htm>. Accessed on 3 November 2010.
6. Tirounilacandin P, *et al*. Hepatitis-B infection: Awareness among medical and dental interns in India. *Ann Trop Med Public Health* 2009;**2**(2):33-36
7. Puttaiah R, *et al*. Dental Infection Control in India at the Turn of the Century. *World J Dentistry* 2010;**1**(1):1-6.
8. Rai SB, *et al*. Infection Control Procedures Employed During Dental Practice In Haryana (India). *The Intern J Epidemiol* 2006;**3**(2).
9. Machado-Carvalho HP, *et al*. Occupational Exposure to Potentially Infectious Biological Material in a Dental Teaching Environment. *J Dent Educ* Volume 2008;**72**(10):1201-1208.
10. Al-Hussyeen. Accidental occupational exposures occurring among dental healthcare workers in dental clinics in Riyadh, Saudi Arabia. *Saudi Dental Journal* 2007;**19**(3).
11. Muralidhar S, *et al*. Needle stick injuries among health care workers in a tertiary care hospital of India. *Indian J Med Res* 2010;**131**:405-410.
12. Siddiqi A. Occupational Blood Exposures at a Dental Faculty: A Three Year Review. *International Dentistry SA* 2007;**9**(5):28-36.