

## “The prevalence of needle- stick (NSI) and sharp injuries and the factors associated with it among dental students in Moradabad”

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### ABSTRACT

**AIM:** To evaluate the prevalence and associated risk factors of needle stick and sharp injury sustained by dental students. **OBJECTIVE:** To determine the prevalence of needle-stick and sharp injuries. To determine the factors associated with needle-stick and sharp injuries among dental students. To assess the knowledge, attitude and practice among dental students regarding needle-stick and sharp injuries. **METHODOLOGY:** A convenient sample of 269 dental students present at the time of study will be recruited. A set pre- validated 17 item questionnaire related to needle-stick and sharp injuries and the factors associated with it will be used to collect the data. students will be interviewed for demographic data, knowledge, attitude, practice and history related to needle-stick and sharp injuries. The data collected hereby will be subjected to statistical analysis. **RESULT:** About 18% of the total participants had an NSI and about 34% had sharp injuries over the last 6 months and this result was seen significant. Prominent risk factors for sharp injuries are injuries during the clearing of instruments (43.1%) followed by injection during LA (20.8%). Only 68% participants are vaccinated against hepatitis B. **CONCLUSION :** The knowledge of dental professionals on NSIs and their preventive measures are insufficient; however, training on Universal Precaution Guidelines, protocols regarding post exposure prophylaxis, and safety devices has to be provided to prevent such injuries in future among the dental students.

**Key Words:** Dental college, dental professionals, needle stick injury, sharps injury

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### I. Introduction

Needle stick and sharps injuries (NSIs) present the greatest occupational risk for transmission of blood-borne pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV)<sup>1</sup>. There are no reliable surveillance data regarding occupational exposure in our country<sup>2</sup>. Given the high rate of transmission of potentially fatal blood-borne pathogens, NSI and sharp injury incidents are priority occupational risk factors. The routine use of sharp instruments in dental treatment, the presence of blood and saliva, and the diverse bacterial flora in the oral cavity all contribute to the hazardous nature of the dental workplace for blood borne infections<sup>3</sup>. Dental students who works in various clinical departments are generally at a higher risk of occupational hazard due to lack of experience and skill in performing dental procedures during clinical training period<sup>4</sup>. According to the World Health Report 2002, out of 35 million healthcare workers (HCWs), 2 million experience percutaneous exposure to infectious diseases each year. It further notes that 37.6% of hepatitis B, 39% of hepatitis C, and 4.4% of Human Immunodeficiency Virus (HIV)/AIDS among HCWs around the world are due to NSIs<sup>5</sup>. It is, therefore, important to understand the conditions that increase their prevalence and to assess available control and prevention strategies.

Knowledge of correct procedures, which reduce the risk of sharps injuries thus decreasing the likelihood of contracting blood-borne viruses, must be evaluated regularly in order to identify any need for further education. This is especially important as there is currently no post-exposure prophylaxis for hepatitis C, and hepatitis B immunization may not completely protective in certain individuals<sup>6</sup>. Since the establishment of an effective infection control program requires information on occupational exposure and prevalence of the factors related to it therefore the present study was planned to assess the prevalence of NSIs and sharp injuries among dental students in a dental college at Moradabad.

## II. Methodology

A cross-sectional survey was conducted in October 2019 among the dental students in Moradabad city. The study sample include all the Post graduates and undergraduates who had been through their clinical postings. These groups were the most susceptible to NSIs and SIs.

Convenience sampling technique was used in which total of 269 dental students who gave consent to be a part of the study after briefing about the design and purpose of this study. The participants were assured of the anonymity throughout the study. Ethical clearance was taken from the Institutional ethics and review board of the college. A pilot study was conducted with few randomly selected dental students from the same area to assess the feasibility and applicability of the questionnaire. The pilot study confirmed the feasibility of the main study.

Data was collected using a structured, pre-tested guided interview-based questionnaire consisting of closed-ended questions. The questionnaire consisted about demographic data, knowledge, attitude, practice and history related to needle-stick and sharp injuries. The questionnaire included a range of response options designed to identify the student’s knowledge, attitude and practice of the universal precautions in the medical field and about their awareness toward NSI and SI.

### Statistical Analysis

The data was entered into data sheet and analyzed using the statistical package, SPSS version 21. The comparison between NSI, SI and dental students was made using Pearson’s Chi-square test and the P value for the same was calculated. Statistical significance was set at  $P < 0.05$  for this study.

## III. Results

Out of 269 participants in the study, 36% were males and 64% were females participants, aged between 20 to 30 years (mean age 25 years). Among them, 67% were undergraduates and 33% were postgraduates students. About 18% of the dental professionals had a needle stick injuries and about 34% had sharp injuries in the past 6 months. The prevalence of these injuries in the past 6 months was 1-2 times in the majority of the participants (30%) followed by 3-4 times in last 6 months i.e. 8%. About 72% of the participants reported that injury caused while using all the instruments (hand, rotary, surgical, hypodermic needle, suture needle and lancets). [Table 1]

<b>TABLE 1 : PREVALENCE OF NEEDLE STICK AND SHARP INJURIES IN PAST 6 MONTHS</b>						
<b>QUESTIONS</b>	<b>STUDENTS(%)</b>					<b>p-value</b>
	<b>3<sup>rd</sup> YEAR</b>	<b>FINAL YEAR</b>	<b>INTERNS</b>	<b>PG</b>	<b>TOTAL</b>	
<b>Do you ever have needle stick injury(hollow bore)</b>						
Yes	10(17.5%)	6(14.2%)	21(26.5%)	13(14.2%)	50(18.5%)	<b>.00001*</b>
No	46(80.7%)	33(78.5%)	32(40.5%)	75(82.4%)	186(69.1%)	
Don't know	1(1.57%)	3(7.1%)	26(32.9%)	3(3.7%)	33(36.2%)	
<b>Do you ever have sharp injury</b>						
Yes	22(38.5%)	21(50%)	21(26.5%)	27(29.6%)	91(33.8%)	<b>.00001*</b>
No	35(61.4%)	17(40.4%)	30(37.9%)	62(68.1%)	144(53.5%)	
Don't know	0(0%)	4(9.5%)	28(35.4)	2(2.1%)	34(12.6%)	
<b>Number of needle stick/ sharp injuries in last 6 months</b>						
1-2 times	18(31.5%)	14(33.3%)	21(26.5%)	29(31.8%)	82(30.4%)	<b>.0001*</b>
3-4 times	4(7%)	1(2.3%)	15(18.9%)	0(0%)	20(7.4%)	
More than 4 times	1(1.7%)	1(2.3%)	5(6.3%)	0(0%)	7(2.6%)	
Zero	34(59.6%)	26(61.9%)	38(48.1%)	62(68.1%)	160(59.4%)	
<b>Do you consider the following to the sharp injuries</b>						
Injury while using hand instrument(explorer, scalers and endodontic instruments)	5(8.7%)	6(14.2%)	16(20.2%)	13(14.2%)	40(14.8%)	<b>.02*</b>
Injury while using rotary instrument(air rotor, endodontic instruments)	1(1.7%)	1(2.3%)	9(11.3%)	2(2.1%)	13(4.8%)	
Injuries while using surgical instrument(scalpel, scissors, and elevators)	3(5.2%)	5(11.9%)	8(10.1%)	5(5.4%)	21(7.8%)	
All of the above	48(84.2%)	30(71.4%)	46(58.2%)	71(78%)	195(72.4%)	

\*Chi-square test,  $p < 0.05$

About the dental students who had an NSI & SI in the last 6 month, 46% had it during the clearance of the instruments, 20% had it during injection of LA, 16% had it during endodontic treatment and lastly, 18% had it during needle recapping. The clinical hours in the department were up to 3 hours (34%) followed by 3-6 hours (35%) and 6-9 hours (25%). A very few of the students reported their working time to be more than 9 hours. As reported by most of the dental students, they use one handed recapping technique (45%) followed by two handed technique (35%). [Table 2]

<b>TABLE 2 : RISK PRACTISES ASSOCIATED WITH NSI &amp; SI AMONG DENTAL STUDENTS</b>						
QUESTION	STUDENTS(%)					p-value
	3 <sup>rd</sup> year	Final year	interns	pg	Total	
<b>Risk factors</b>						
During needle recapping	5(8.7%)	4(9.5%)	22(27.8%)	12(13.1%)	43(15.9%)	<b>.00008*</b>
Endodontic files	9(15.7%)	5(11.9%)	21(26.5%)	19(20.8%)	54(20%)	
During injection of LA	6(10.5%)	14(33.3%)	14(17.7%)	22(24.1%)	56(20.8%)	
During clearance of instruments	37(64.9%)	19(45.2%)	22(27.8%)	38(41.7%)	116(43.1%)	
<b>Number of hours worked per day</b>						
Up to 3 hours	49(85.9%)	12(28.5)	17(21.5%)	14(15.3%)	92(34.2%)	<b>.00001*</b>
3-6 hours	7(12.2%)	30(71.5%)	29(36.7%)	30(32.9%)	96(35.6%)	
6-9 hours	1(1.7%)	0(0%)	22(27.8%)	46(50.5%)	69(25.6%)	
More than 9 hours	0(0%)	0(0%)	11(13.9%)	1(1%)	12(4.4%)	
<b>Needle recaps after use</b>						
One hand needle recapping	17(29.8%)	12(28.5%)	36(45.5%)	56(61.5%)	121(44.9%)	<b>.001*</b>
Two handed needle recapping	24(42.1%)	18(42.8%)	27(34.1%)	26(28.5%)	95(35.3%)	
I don't recap a used needle	16(28%)	12(28.5%)	16(20.2%)	9(11.3%)	53(19.7%)	

\*Chi-square test, p < 0.05

Majority of the dental students were vaccinated against Hepatitis B (68%) while the remaining was not vaccinated for the same. About 55% of the dental students used antiseptic solution after they had an injury. only 27% were aware about the PEP in the management of NSI and SI. [TABLE 3]

<b>TABLE 3: Knowledge on needle stick and sharp injuries among dental students</b>						
QUESTION	STUDENTS(%)					p-value
	3 <sup>rd</sup> year	Final year	interns	Pg	total	
<b>Are you vaccinated against hepatitis B</b>						
Yes	33(57.8%)	29(69%)	51(64.5%)	69(75.8%)	183(68%)	<b>.13</b>
No	24(42.2%)	13(31%)	28(35.5%)	22(24.2)	86(32%)	
<b>What you have done after needle stick/ sharp injuries</b>						
Washed the area with water	15(26.3%)	2(4.7%)	9(11.3%)	6(6.5%)	32(11.8%)	<b>.018</b>
Washed the area with water and soap	10(17.5%)	8(19%)	10(12.6%)	11(12%)	39(14.4%)	
Apply antiseptic solution	22(38.5%)	26(61.9%)	45(56.9%)	55(60.4%)	148(55%)	
Any other	10(17.5%)	6(14.2%)	15(18.9%)	19(20.8%)	50(18.5%)	
<b>What should be the post exposure prophylaxis with an already infected instrument</b>						
PEP for HBV	12(21%)	21(50%)	14(17.7%)	25(27.4%)	72(26.7%)	<b>.002*</b>
PEP for HIV	5(8.7%)	2(4.7%)	11(13.9%)	11(12%)	29(10.7%)	
PEP for HCV	0(0%)	2(4.7%)	10(12.6%)	4(4.3%)	16(5.9%)	
None of the above	40(14.8%)	17(40.4%)	44(55.6%)	51(56%)	152(56.5%)	

\*Chi-square test, p < 0.05

#### IV. Discussion

NSI or Needle stick injuries are accidental skin-penetrating stab wound from a hollow bore needle (or any sharp) containing another person's blood or body fluid. SI or Sharp Injuries are a skin penetrating stab wound caused by sharp instruments<sup>7</sup>. Majority of the dental students had experienced these injuries in their career either once and few of them had experienced it many times. In this study, the occurrence of NSIs is about 19% and SI about 34%, when compared with other studies in term of incidence of injuries. The high prevalence of sharp injuries among dental students should be of concern because such injuries can lead to serious consequences. Other studies of medical students around the world also seem to support the high prevalence of sharp injuries among medical and dental students. In Other studies similar finding has been reported

internationally at the following rates: 24% in France<sup>8</sup>, 30–33% in the United States of America (USA)<sup>9, 10</sup>, 12–33% in England<sup>11</sup> and 35% in Singapore<sup>12</sup>.

In the present study, 41% students had an NSI and SI in the past 6 months. This prevalence rate was similar to the studies conducted by Prabhu *et al*<sup>13</sup>. (33%), and Salekaret *al*<sup>14</sup>.(34.8%) MP, India<sup>2</sup> (41%), the prevalence of injuries in the present study was lower when compared to other studies conducted nationally and internationally: Hyderabad and Karachi<sup>15</sup> (54.2%), Iran<sup>16</sup> (63.3%), Pakistan<sup>17</sup> (70.6%), and Saudi Arabia<sup>18</sup> (74%).

In the present study, 72% students considered the injury caused while using hand instrument, rotary, surgical, hypodermic needles, suture needles, and lancets constituted NSIs and SIs and 7% considered hypodermic needles, suture needles, and lancets to constitute NSIs and SIs. In a study conducted by Saini *et. Al*<sup>19</sup>.28% of the dental students reported that hypodermic needles had the highest risk for NSIs.

The possible threat for injuries as seen in the present study was during clearing of the instruments (43%) followed by injection during LA (21%) and endodontic files (20%). Thus, it can infer that injuries occur mostly during clearing of instruments rather during treatment on patients.

The increased workload may also be associated with loss of concentration, subsequently leading to more injuries involving sharp instruments. In our study, the highest incidence of injuries in students was seen among those who work for 3-6 hours at stretch. Cheng *et al.*<sup>20</sup> (2012) reported similar findings in those dentists who spent more time in clinics were at increased risk of NSI.

In the present study, 44% practiced and followed one-handed needle recapping technique (scoop technique) and 35 % practiced two-handed needle recapping. Muralidhare *al.*<sup>3</sup> and Raiset *al.*<sup>21</sup> stated about the recapping techniques (two-handed while recapping the needle) which is a wrong technique (59% and 42%, respectively) which is more prone to injuries and increase the chance of spreading of disease or infection.

Vaccination rates for HBV in our study (68%) compared favorably with those seen in other studies (percent of vaccination). Previous investigation of NSIs among Australian medical and dental students showed their hepatitis B vaccination rates to be 98% and 95%, respectively,<sup>22</sup> such a high rate of vaccination is desirable, as hepatitis B is one of the major infectious disease threats for health care workers. Unvaccinated individuals may have a 6–30% risk of becoming infected with the virus following an injury<sup>23</sup>.

In the present study, 55% students washed the injured area with antiseptic solution as it can be helpful and best suited for disintegrating and destroying the germs and in turn, reducing the chances of infection as the antiseptic is a substance that stops or slows down the growth of micro organisms. Similar study carried out by Sharma *et al.* reported that 60.9% respondents washed the injured area with soap and water<sup>24</sup>. The first steps after needle stick injury are: letting the wound bleed without sucking or squeezing, cleansing the injured site with soap and running water and administering first aid. If the mucous membrane splash (to eye, nose or mouth) occurred, the site should be thoroughly rinsed several times with water or saline solution. The next step is to sample the blood for HBV, HCV and HIV testing from the source patient<sup>25 26 27</sup>. It was also reported that participants (37.5%) washed the wound as it was bleeding and later on also applied an antiseptic<sup>28</sup>. yet another study, similar findings were observed, showed that 5.6% of nurses washed the wound with water and soap only, 5.7% squeezed the wound place while 70% of the participants disinfected the wound with antiseptics<sup>29</sup>. 44% of the students were aware about the PEP (for HBV, HIV and HCV) in the management of NSIs. It was less on compared to the studies by Jaber<sup>30</sup> (54.34%) and Salekaret *al.*<sup>14</sup> (55.5%).

## V. Conclusion

NSIs and SIs persists to be a significant occupational hazard in the field of Dentistry. The knowledge of dental professionals on NSIs and SI and their preventive measures are scarce. The attitude of the dental professionals toward the non-reporting of NSIs and SI was poor and therefore the prevalence of NSIs and SI remains to be a serious concern among the professional group.

## VI. Recommendations

The reporting facility for NSIs and SIs must be made mandatory and therefore the dental professionals must be encouraged to report any incidence of NSIs and SI within the dental college. The PEP must be immediately provided to the victims of NSIs and SIs. Before beginning any procedure using needles, plan for safe handling and proper disposal. The dental professionals must not ever recap a syringe with a needle in it – AVOID RECAPPING!

## References

- [1]. Panlilio AL, Orelie JG, Srivastava PU, Jagger J, Cohn RD, et al. (2004) Estimate of the annual number of percutaneous injuries among hospital-based healthcare workers in the United States, 1997–1998. *Infect Control Hosp Epidemiol* 25: 556–562.
- [2]. Sahasrabudde AG, Suryawanshi SR, Khare R. Determinants of occupational exposure to blood borne pathogens among resident doctors in a tertiary care hospital in the city of Mumbai. *Int J Med Sci Public Health* 2014;3:1014- 7.

- [3]. Muralidhar S, Singh PK, Jain RK, Malhotra M, Bala M. Needle stick injuries among health care workers in a tertiary care hospital in India. *Indian J Med Res* 2010;131:405- 10
- [4]. Maurya R P et al. Knowledge, Awareness and Practices regarding Sharp Injuries amongst the Dental students. *International Journal of Oral Health Dentistry*; July-September 2017;3(3):181-187
- [5]. World Health Organization. Occupational Health- Needle stick Injuries 2002. Available from: <https://www.who.int/occupational-health/topics/needle-stick-injuries/en/>. [Last accessed on 2015 Feb 22].
- [6]. Höhler T, Reuss E, Evers N. Differential genetic determination of immune responsiveness to hepatitis B surface antigen and to hepatitis A virus: A vaccination study in twins. *Lancet* 2002; **360**: 991-995. [http://dx.doi.org/10.1016/S0140-6736\(02\)11083-X](http://dx.doi.org/10.1016/S0140-6736(02)11083-X)
- [7]. Centre for Disease Control and Prevention. 2008. Available from: <https://www.cdc.gov/niosh/topics/bbp/emergnedl.html> [Last accessed on 2015 Feb 22].
- [8]. Rosenthal E, Pradier C, Keita-Perse O, Altare J, Dellamonica P, Cassuto JP. Needlestick injuries among French medical students. *J Am Med Assoc* 1999; **281**: 1660. <http://dx.doi.org/10.1001/jama.281.17.1660>
- [9]. Shen C, Jagger J, Pearson RD. Risk of needle stick and sharp object injuries among medical students. *Am J Infect Control* 1999; **27**: 35–37.
- [10]. Patterson JMM, Novak CB, Mackinnon SE, Ellis RA. Needlestick injuries among medical students. *Am J Infect Control* 2003; **31**: 226–230. <http://dx.doi.org/10.1067/mic.2003.44>
- [11]. Waterman J, Jankowski R, Madan I. Under-reporting of needlestick injuries by medical students. *J Hosp Infect* 1994; **26**:149–150. [http://dx.doi.org/10.1016/0195-6701\(94\)90058-2](http://dx.doi.org/10.1016/0195-6701(94)90058-2)
- [12]. Chia HP, Koh D, Jeyaratnam J. A study of needle stick injuries among medical undergraduates. *Ann Acad Med (Singapore)* 1993; **22**: 338–341.
- [13]. Prabhu A, Rao AP, Reddy R, Sugumaran K, Mohan G, Ahamed S. Needle safety awareness among dental nurses. *Workplace Health Saf* 2014;62:243- 8.
- [14]. Salekar S, Motghare DD, Kulkarni MS, Vaz FS. Study of needle stick among health care workers at a tertiary care hospital. *Indian J Public Health* 2010;54:18- 20.
- [15]. Jan S, Akhund T, Akhtar MJ, Shaik JM. Needle stick injuries among dental health care providers: A survey done at Hyderabad and Karachi. *Pakistan Oral Dent J* 2014;34:339- 43.
- [16]. Ebrahimi H, Khosravi A. Needlestick injuries among nurses. *J Res Health Sci* 2007;7:56- 62.
- [17]. Sultana A, Kulsoom A, Iqbal R. Needle stick/sharps injuries in Health care workers. *J Rawalpindi Med Coll* 2014;18:133- 5.
- [18]. Alam M. Knowledge, attitude and practices among health care workers on needle- stick injuries. *Ann Saudi Med* 2002;22:396- 9.
- [19]. Saini R. Knowledge and awareness of needlestick injury among students of Rural Dental College, Maharashtra, India. *Ann Nigerian Med* 2011;5:12- 4.
- [20]. Cheng, Hsin-Chung & Su, Chen-Yi & Yen, Amy & Huang, Chiung-Fang. (2012). Factors Affecting Occupational Exposure to Needlestick and Sharps Injuries among Dentists in Taiwan: A Nationwide Survey. *PLoS one*. 7. e34911. [10.1371/journal.pone.0034911](https://doi.org/10.1371/journal.pone.0034911).
- [21]. Rais N, Jamil HM. Prevalence of needle stick injuries among health care providers. *Int J Endorsing Health Sci Res* 2013;1:73- 9.
- [22]. de Vries B, Cossart YE. Needlestick injury in medical students. *Med J Aust* 1994; **160**: 398–400.
- [23]. Hanrahan A, Reutter L. A critical review of the literature on sharps injuries: epidemiology, management of exposures and prevention. *J Advanc Nursing* 1997; **5**: 144–54. <http://dx.doi.org/10.1046/j.1365-2648.1997.1997025144.x>
- [24]. Sharma R, Rasania S, Verma A, Singh S. Study of prevalence and response to needlestick injuries among health care workers in a tertiary care hospital in Delhi, India. *Indian J Community Med* 2010;35:74-7.
- [25]. Samaranayake L, Scully C. Needlestick and occupational exposure to infections: a compendium of current guidelines. *Br Dent J* 2013;215:163–166.
- [26]. Cleveland JL, Barker L, Gooch BF, Beltrami EM, Cardo D. Use of HIV postexposure prophylaxis by dental health care personnel: An overview and updated recommendations. *J Am Dent Assoc*. 2002;133:1619–1626.
- [27]. Rymer W, Beniowski M, Mularska E. Postexposure prophylaxis for HIV, HBV, HCV. *Recomm Polish AIDS Soc*. 2015:31–39 (in Polish).
- [28]. Sharma A, Gur R, Bhalla P. Study on prevalence of needlestick injury among health care workers in a tertiary care hospital in New Delhi: A two-year review. *Indian J Public Health* 2012;56:101-3.
- [29]. Galougahi MH. Evaluation of needlestick injuries among nurses of Khanevadeh Hospital in Tehran. *Iran J Nurs Midwifery Res* 2010;15:172-7.
- [30]. Jaber MA. A survey of needle sticks and other sharp injuries among dental undergraduate students. *Int J Infect Control* 2011;7:1- 10.

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