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Awareness and risk factors of needle stick injuries among dental undergraduate and postgraduate: a cross sectional study

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Introduction

Occupation related unintentional injuries that break the integrity of the skin are defined as “percutaneous injuries” and these include needle stick injuries (NSI), incision object injuries including scalpel or any other sharp object injuries such as glass and empty ampules [1]. It has been reported that the risk of getting contaminated with hepatitis B infection due to NSI is 100 times higher than HIV infection. The prevalence of occupational HIV is 0.3% after parenteral exposure compared to 0.09% after mucosal exposure [2]. Since the 1980s, there has been an increase in the reported incidences of various blood borne infections (BBIs) among health care workers (HCWs) and increased awareness of the occupational risks of BBI transmission [3].

Overall occurrence rates for NSIs in various dental schools have ranged from 1.97/10,000 visits [4] to 12.5/10,000 visits [5]. Many of these studies include only

faculty and staff members of the dental hospital whereas others include resident dental surgeons and dental students. Although the possibility of getting infected by a blood borne viruses (BBVs) is minimal after a single exposure, sometimes NSIs have adverse effect on the personal as well as professional lives of health care workers [6].

Also, the risks of NSI in dental healthcare environment were investigated less frequently [7]. The routine use of various 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. Moreover, at a dental college and hospital, dental procedures are frequently executed by undergraduate students during their clinical training with lower occupational skills, making NSIs an even more important issue for hospital dental teams. Many confusions are there regarding correct responses to NSIs both at the administrative levels where policy decisions for institutions are to be made as well as amongst the dental students and staffs themselves who are not aware the preventive aspects and of the immediate prophylactic steps to be taken in case of NSIs [8]. There should be a well-formulated approach for the provision of information support, and referral from dental healthcare workers who sustain occupationally related management of occupational exposures varies between institutions and often reflects the level of staff education and previous experience in areas of infection control and transmission of blood-borne diseases. Despite published guidelines and training programs, NSIs remain an ongoing problem.

In the present scenario, there is no growing consensus among undergraduate as well as postgraduate students regarding NSIs. Hence, the aim of the present study was to determine the prevalence of NSIs among the dental students and helping to identify the associated risk factors which will provide a background for the development of a strategy to minimise and hopefully prevent NSIs.

Methods

A cross-sectional, questionnaire survey was conducted among undergraduate students including interns and post graduate students at Haldia Institute of Dental Sciences, Haldia, West-Bengal over a time period of 1 month. Ethical clearance was obtained from the institutional ethical committee of Haldia Institute of Dental Sciences and Research under West Bengal University of Health Sciences, Kolkata, India. A closed-ended, structured 10-item multiple-choice questionnaire was formulated in English for evaluating the knowledge and incidences of NSIs. Then the questionnaires were mailed to undergraduate and postgraduate students attending the clinical specialities. The identity of the participating students was kept strictly confidential, and participation was voluntary. The responses were collected and computed on Microsoft Excel (Microsoft, Redmond, WA, USA). Descriptive statistics were performed among the questionnaire items.

Results

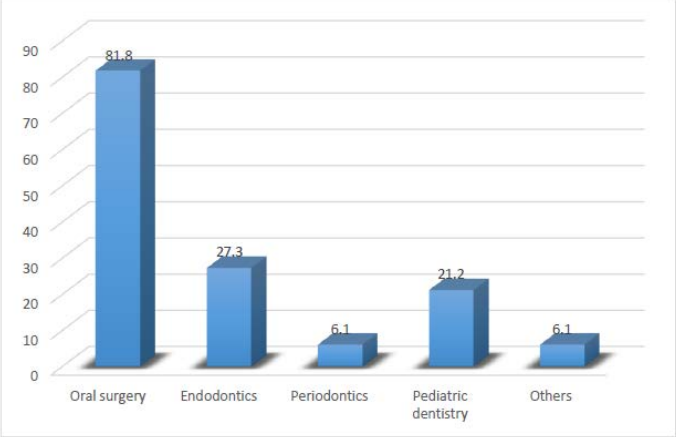
A total of 260 survey questionnaires were distributed. Among them 226 questionnaires were filled and returned with the response rate of 86.92%. There were 103 (45%) males and 123 (55%) females. Most of the students (total 179, 79%) were undergraduates while 47 (21%) were postgraduate students (Table 1). Students experienced most occurrence of NSIs in the department of Oral surgery (81.8%) followed by Endodontics (27.3%) and Pediatric dentistry (21.2%) (Graph 1). The most frequent injuries among students were during administering local anesthesia injection (59.4%), 50% during recapping of needles, 6.3% during clearance of needle, 6.3% during disposal of instruments at the end, 3.1% during suturing (Graph 2). 98 students (44%) who injured by NSIs only 32

students (33%) of them reported about the incidences. The reasons for not reporting were fear of stigmatisation (28%) and the fear of consequences (43%) of cross infection (Graph 3).

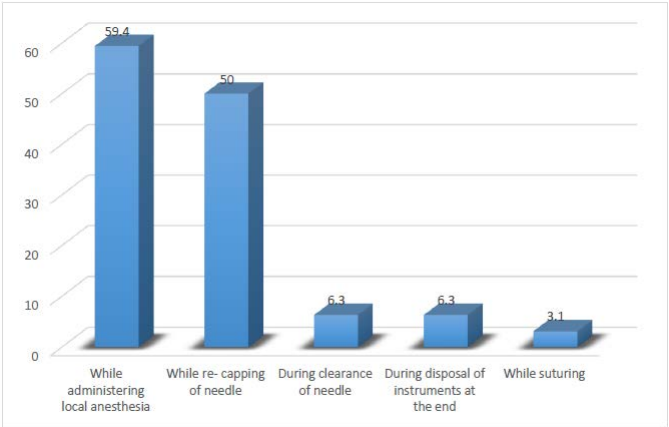
Table 1: Distribution of participants according to gender and level of education of study

FACTORS	RESPONDENTS NUMBER	%
ACADEMIC YEAR		
3rd year undergraduate	63	28
4th year undergraduate	68	30
Interns	48	21
Postgraduates	47	21
GENDER		
Male	103	45
Female	123	55

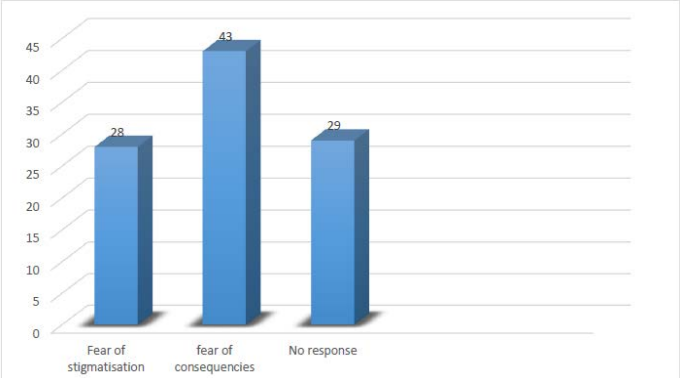
Graph 1: Department in which most injury occurred



Graph 2: Procedure during which injury was sustained



Graph 3: Distribution of the respondents who experienced NSI according to the reason for failure to report



Discussion

Dental students like other health care workers face intense risk of occupational exposure to blood borne infections such as hepatitis B virus (HBV), hepatitis C virus (HCV) and Human Immunodeficiency Virus (HIV) [8]. The outstanding response rate (86.92%) achieved exemplifies the value of mass administration of short questionnaire surveys following a brief verbal introduction. One possible limitation of questionnaire based studies is that what people report in the survey may vary from what they actually experience and the findings may be underestimated since it depend on the respondent memory which might give a chance for the incidence of recall bias. Even though blood contacts with skin and mucous membranes may be reduced through use of traditional rubber or latex gloves, still these barriers are not effective when the needle pass through the gloves accidentally. Thus the chances of getting infected by various blood borne pathogens from an infected patient when a student is exposed to NSIs.

Current investigation showed that NSIs are more frequent in Oral Surgery clinics as compared to other clinics. A similar study done by Cleveland et al. [5] who found that more than one third of percutaneous injuries are reported by Oral Surgery clinics. Another study done by Wicker and Rabenau [9] investigated that NSIs among German

dental professionals and students and showed that the most frequent procedures involved with NSIs were the operative dentistry & endodontics (36.2%) followed by Oral Surgery (20%). Also they concluded that students in oral surgery clinics are tend to hide the NSIs [9].

This investigation shows that two types of injury were equally reported as the most frequent reason for NSIs experienced by dental students. Nearly 59.4% of injuries took place either during administration of the anaesthetic or during disposal of the used needles while 50% of injuries were sustained during recapping of the syringe needles. A 10-year surveillance study by Younai et al. [4] of NSIs in the US dental institutes showed that more than 65% of local anaesthetic-related NSIs occur during needle insertion and/or needle withdrawal. Also this report have shown that the NSIs usually take place during recapping of the used dental needles. The reported incidence of NSIs caused by this mechanism is around 50% of NSIs. A similar study done by Panlilio AL et. al. [10] showed that 22- 52% incidences of NSIs occur during recapping of used needles. A simple solution of this problem might be the use of a portable recapping device that has been shown to decrease NSIs, from 1 in 4,000 to 1 in 16,000 injuries per blood drawing event [11]. One other method is change in the recapping method described by Anderson et al (1991) [12]. The author described the gravity-resheathing method where the sheath is placed over the tip of needle and dropped into place immediately. Another suggestion described by the same authors is the scooping-resheathing or the single-hand resheathing method. The introduction of such techniques has shown a significant reduction in the occurance of NSIs among the dental students [10].

The field of dentistry has responded to the challenge of the frequent NSIs with more revolutionary syringe designing solutions, thus eliminating injuries taking place either during resheathing or during disposal of the used needle with the introduction of safety dental syringes. Unlike the non-disposable metallic syringes where needles must be re-sheathed in order for the syringes to be dismantled and the appropriate parts to be autoclaved, the safety syringe totally eliminates the need for needle resheathing and both self-recapped needle and attached local anaesthetic cartridge barrel are disposed together without the needle to dismantle the latter from the syringe.

From this study we can also see that the fear as a major factor for failure to report. Similar study done by Du Toit M et al [13] concluded that fear may be a reason for non-reporting as well as other factors like age, the specific department in which the student was posted, and the particular individual, would have to be taken into account. Fear of testing may also play an important role in the underreporting of occupational exposure [14]. These two factors for non- reporting and others may have probably contributed to the reduced levels of knowledge on NSIs preventive measures among dental students as well.

This report highlights that the highest risk of NSIs to dental students occurs within surgical departments, mostly with the conventional syringe system, when administering local anesthesia. The possible solution is introduction of safety syringe has resulted in elimination of injuries caused by resheathing of needles and significantly reduced the injuries reported during disposal of used needles. Taking our results of this investigation into consideration, we suggested to minimise the incidence of NSIs both providing adequate training to the students and introduction of effective engineering tools have be to implemented.

Conclusion

The best way of preventing infection by HIV and other blood-borne pathogens is through safer practices, the prevention of blood exposure when using needle devices and through barrier precautions [15].

Despite the precautionary measures and reporting guidelines that are in place with regard to percutaneous injuries and NSIs, these incidents still occur [16]. The problem of greatest concern, however, is that these injuries are often underestimated, resulting in non-reporting. It is every dental student's responsibility to be informed about the reporting procedures, and to report these incidents.

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