Evaluating Dental Students' Knowledge, Attitude and Practice of Needle Stick Injuries

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Abstract

Background: Needle stick injuries (NSIs) constitute a significant occupational hazard for dental professionals, potentially transmitting blood-borne pathogens (like HCV, HBV and HIV) and resulting in considerable physical and psychological morbidity.

Objectives: This study aimed to evaluate the knowledge, attitudes, and practices (KAP) regarding NSIs among dental students at KMU Institute of Dental Sciences, Kohat.

Materials and Methods: A descriptive cross-sectional study was conducted among 130 participants, including undergraduate dental students, house officers and postgraduate residents. Data was collected using a structured and pre-validated questionnaire assessing participants' knowledge, attitude and practice of NSIs. Statistical analyses were performed using SPSS version 25, with Chi-square tests employed to determine associations between variables.

Result: The study revealed a high level of awareness about NSIs related infections, including HIV, Hepatitis B and Hepatitis C. A good proportion of participants reported familiarity with universal precautions (69.2%) and post-exposure prophylaxis protocols (82.3%). Preventive practices, such as single-handed needle recapping and appropriate sharps disposal, were widely practiced. However, 20% of respondents reported experiencing NSIs within the preceding year.

Conclusions: While dental students demonstrate satisfactory knowledge and positive attitudes towards NSIs prevention, critical gaps remain in reporting practices and consistent adherence to safety protocols. These findings underscore the need for targeted educational interventions, reinforcement of institutional policies and the establishment of streamlined reporting mechanisms to enhance occupational safety in dental training environments.

Keywords: *Needle Stick Injury (NSIs), Dental Students, Knowledge, Attitude and Practice (KAP)*

Introduction

A Needle stick injury occurs when a sharp medical device, including hollow-bore needle accidentally punctures or lacerates the skin, potentially exposing the individuals to blood borne pathogens and other infectious agent. [1] NSIs pose major occupational risk to health care professionals, ranking among the most significant hazards they confront daily, with about 3 million workplace exposures occurring yearly among 35 million healthcare professionals [2]. NSIs pose risks of transmitting blood- borne pathogens including HIV, HBV, HCV, other viruses and bacteria. According to the report of WHO (2002), transmission of HCV and HBV is about 40% and HIV is 2.5%. [2, 3]

NSIs are a major concern for all the areas of health care sector, affecting every class of health care professionals. Dental professionals, being a class of health care professionals, are also at a significant risk of NSIs due to frequent utilization of sharp instrument during local anesthesia, extractions, suturing and most importantly while performing oral and maxillofacial surgeries.[4] Furthermore, the existence of saliva, blood and abundance of oral microbiota contributes to the **risk-prone environment** of dental clinics and hospitals, particularly in terms of blood borne infections. [5]

Evidence shows that a large proportion of incidents are never reported, as shown **by a survey done in Hyderabad and Karachi by T.** Akhund. [6] A similar study was conducted in Quetta.[7] Furthermore, while students often demonstrate good theoretical knowledge of blood-borne infection risks, their actual practices frequently fall short as shown by a study in Punjab.[8] Despite these findings, there is still a

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scarcity of **region-specific data from Khyber Pakhtunkhwa (KpK)** in particular regarding knowledge, attitudes and practices in dentistry which is required for informing targeted interventions to improve occupational safety and reduce the risk of NSIs. Therefore, the objective of this study was to assess knowledge, attitude and practice of NSIs among the dental students at KMU Institute of Dental Sciences, Kohat.

Material and Methods

A cross-sectional study was conducted at the Khyber Medical University (KMU) Institute of Dental Sciences, Kohat. The study continued until the completion of the survey. The sample size of 150 dental students was selected based on feasibility and was consistent with similar studies such as Rana Pratap [9] who assessed 150 dental students for their knowledge, awareness and practices regarding sharp injuries. Purposive sampling technique was used to recruit participants. Total 130 students consented to participate.

The study included dental students who had clinical exposure, specifically those in the 3rd year, final year, house officers and postgraduate residents at KMU Institute of Dental Sciences, Kohat. Students in the 1st and 2nd years of the BDS program were excluded due to their lack of clinical experience which was essential for meaningful participation in this study.

Following permission from the institutional review board of bioethics (IRBB) with ethical number **KIDS-IRBB/ECC/24-9/32**, a cross-sectional study was conducted on the dental students.

Informed consent was obtained from all the participants prior to data collection. Data for the study was gathered using a pre-tested and pre-validated questionnaire [10]. The hard copies of the questionnaire were distributed among the participants. The questionnaire consisted of an informed consent section, followed by demographic data (name, age, gender, and educational qualification). Next section consisted of closed-ended questions designed to measure participants' knowledge, attitude and practices about NSIs. The questionnaire included five questions to assess knowledge, two questions regarding attitude and four questions addressing the occurrence and practice of NSIs. **Knowledge** refers to the level of awareness, understanding and factual knowledge about NSIs such as the correct procedure for handling instruments and the guidelines regarding post exposure prophylaxis (PEP) and prevention of such injuries. **Attitude** relates to their beliefs, perceptions, their sense of responsibility in preventing NSIs, their willingness to comply with safety measures and how seriously they regard the risks posed by such injuries. **Practice** refers to the actual behaviors and actions of dental students when dealing with NSIs. It includes their observance of safety practices, such as correct use of sharp instruments, proper disposal of sharps, and adherence to post-exposure protocols. Practice reflects how effectively they implement their knowledge and attitudes to prevent NSIs in clinical settings.

Results

Out of 130 participants, 52.3% were male and 47.7% were female as shown in figure 1, with a mean age of 24.07 ± 1.9 years.

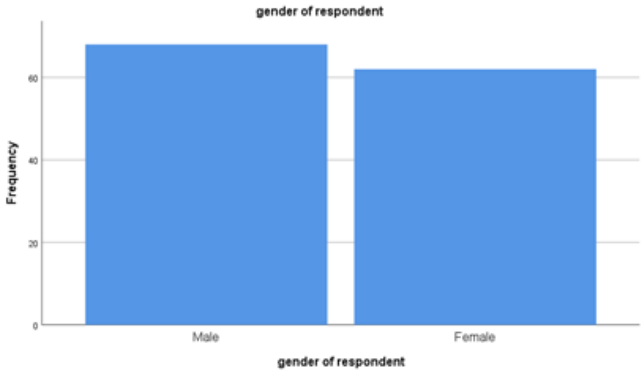

Figure 1. This figure is showing gender frequency

Among them, 32.3% were third year BDS students, 18.5% were final year students, 32.3% were house officers and 16.9% were postgraduate residents (figure 2).

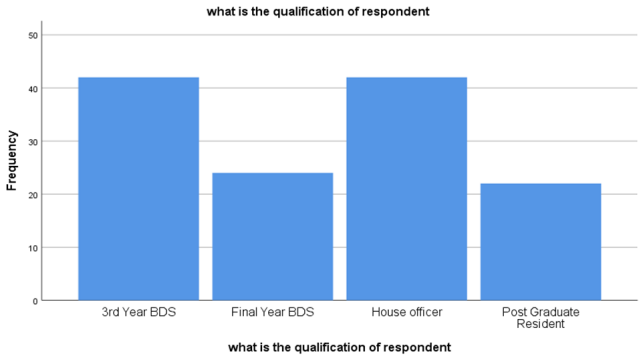

Figure 2. This is a figure showing qualification frequency

The majority of dental students and professionals (90.8%) identified hepatitis B, hepatitis C and HIV/AIDS as diseases transmissible through NSIs (p = 0.148). Additionally, 60.8% considered injuries caused by all instruments, including hand, rotary, surgical instruments, hypodermic needles, suture needles and lancets as NSIs (p = 0.074) [table 1].Most participants (70%) were aware of the Universal Precaution Guidelines (p = 0.266). A similar proportion (76.2%) reported knowledge of safety devices to prevent NSIs (p = 0.010). Furthermore, 82.3% were aware of post-exposure prophylaxis (PEP) for managing NSIs (p = 0.465) [table 1].

In the event of a NSIs, 56.9% indicated they would report to the emergency room (p = 0.047). Among those who did not report an NSIs in the past 12 months, the most common reason was that the injury was caused by a sterile needle 46.9% (p = 0.196) [table 1].

Among participants who experienced a NSIs in the past 12 months, 52.1% reported that the injury oc-

curred during device use (p = 0.012). When asked about the recapping techniques, majority (80.8%) reported using the single-handed needle recapping technique (p = 0.012). For the needle disposal, 69.2% used puncture-resistant containers, while 10.8% used a needle burner or destroyer, 10% used a needle incinerator and another 10% used a needle cutter (p = 0.000) [table 1].

Approximately 20% of dental students and professionals experienced NSIs within the past 12 months, which represents the annual incidence rate of NSIs in this population (p = 0.015) [table 1].

Discussion

In the current study, 90.8% of dental students and professionals identified hepatitis B, hepatitis C and HIV as diseases transmissible through needle stick injuries (NSIs). Although this level of awareness is high, it slightly remains below the 96.5% reported by Baig FJ [3] and above 88% observed in the study by Pavithran et al. [10] This indicates a good level of awareness, though there remains room for improvement toward near universal recognition of NSI related risks.

When asked about instruments associated with NSIs, 60.8% of participants in the current study recognized a comprehensive range of instruments, including hand, rotary, surgical, hypodermic, suture needles, and lancets as potential sources of injury. In contrast, only 28% of dental students in the study by Saini et al [11] identified hypodermic needles as the highest risk. This suggests that our respondents had a more comprehensive understanding of NSIs risks across various instrument types, reflecting adequate training or clinical exposure.

With regard to Universal Precaution Guidelines, 70% of respondents were aware of these protocols. This is less than the 74% reported by Azhar R. [12] Since these guidelines are essential for clinical infection control, institutional efforts must aim to raise awareness above 90% through targeted education and ongoing reinforcement.

In the current study, 76.2% of participants reported knowledge of safety devices to prevent NSIs, which

Table 1. Cross-tabulated responses on NSI Knowledge, Attitude and Practice by Qualification (Pearson's Chi-Square Test Results)

Question	3rd Year BDS (n=42)	Final Year BDS (n=24)	House Officer (n=42)	Postgraduate Resident (n=22)	Total (n=130)	p-value*
1. KNOWLEDGE OF NSI						
Which diseases can be transmitted through NSIs?						0.1481
Hepatitis B	4 (9.5%)	3 (12.5%)	0 (0%)	0 (0%)	7 (5.4%)	
Hepatitis C	0 (0%)	1 (4.2%)	0 (0%)	0 (0%)	1 (0.8%)	
HIV/AIDS	2 (4.8%)	0 (0%)	1 (2.4%)	1 (4.5%)	4 (3.1%)	
All of the Above	36 (85.7%)	20 (83.3%)	41 (97.6%)	21 (95.5%)	118 (90.8%)	
What types of injuries are considered NSIs?						0.074
Injury while using hand instruments	0 (0%)	0 (0%)	1 (2.4%)	2 (9.1%)	3 (2.3%)	
Injury while using rotary instruments	0 (0%)	0 (0%)	0 (0%)	1 (4.5%)	1 (0.8%)	
Injury while using surgical instruments	6 (14.3%)	1 (4.2%)	2 (4.8%)	4 (18.2%)	13 (10.0%)	
Injury while using hypodermic/suture needles	14 (33.3%)	4 (16.7%)	12 (28.6%)	4 (18.2%)	34 (26.2%)	
All of the above	22 (52.4%)	19 (79.2%)	27 (64.3%)	11 (50.0%)	79 (60.8%)	
Knowledge of Universal Precaution Guidelines						0.4331
Yes	25 (59.5%)	19 (79.2%)	31 (73.8%)	15 (68.2%)	90 (69.2%)	
No	17 (40.5%)	5 (20.8%)	11 (26.2%)	7 (31.8%)	40 (30.8%)	
Knowledge of safety devices to prevent NSIs						0.0101
Yes	27 (64.3%)	20 (83.3%)	30 (71.4%)	22 (100%)	99 (76.2%)	
No	15 (35.7%)	4 (16.7%)	12 (28.6%)	0 (0%)	31 (23.8%)	

Knowledge of post-exposure prophylaxis (PEP)						0.465
Yes	35 (83.3%)	22 (91.7%)	32 (76.2%)	18 (81.8%)	107 (82.3%)	
No	7 (16.7%)	2 (8.3%)	10 (23.8%)	4 (18.2%)	23 (17.7%)	
2. ATTITUDE TOWARDS NSIs						
Who would you contact after an NSI?						0.0471
Medical emergency room	32 (76.2%)	13 (54.2%)	16 (38.1%)	13 (59.1%)	74 (56.9%)	
Oral surgery department	4 (9.5%)	6 (25.0%)	14 (33.3%)	7 (31.8%)	31 (23.8%)	
Principal	1 (2.4%)	1 (4.2%)	0 (0%)	0 (0%)	2 (1.5%)	
Would not contact anyone	2 (4.8%)	3 (12.5%)	10 (23.8%)	2 (9.1%)	17 (13.1%)	
Others	3 (7.1%)	1 (4.2%)	2 (4.8%)	0 (0%)	6 (4.6%)	
Why did you not report NSIs?						0.0196
Injury due to sterile needle	25 (59.5%)	9 (37.5%)	15 (35.7%)	12 (54.5%)	61 (46.9%)	
Didn't know the reporting procedure	6 (14.3%)	5 (20.8%)	6 (14.3%)	8 (36.4%)	25 (19.2%)	
Afraid of blame/trouble	2 (4.8%)	2 (8.3%)	4 (9.5%)	0 (0%)	8 (6.2%)	
Thought it was unimportant	3 (7.1%)	3 (12.5%)	6 (14.3%)	0 (0%)	12 (9.2%)	
No time to report	2 (4.8%)	1 (4.2%)	5 (11.9%)	2 (9.1%)	10 (7.7%)	
Concerned about confidentiality	4 (9.5%)	4 (16.7%)	6 (14.3%)	0 (0%)	14 (10.8%)	
3. NSI EXPERIENCED IN PAST 12 MONTHS						0.0151
Yes	6 (14.3%)	8 (33.3%)	12 (28.6%)	0 (0%)	26 (20.0%)	
No	36 (85.7%)	16 (66.7%)	30 (71.4%)	22 (100%)	104 (80.0%)	
4. OCCURRENCE AND PRACTICE OF NEEDLE RECAPPING AND DISPOSAL						
When did NSI occur?						0.076
During device use	6 (14.3%)	4 (16.7%)	5 (11.9%)	10 (45.5%)	25 (19.2%)	
After use, before disposal	3 (7.1%)	4 (16.7%)	4 (9.5%)	0 (0%)	11 (8.5%)	
During recapping	3 (7.1%)	2 (8.3%)	4 (9.5%)	0 (0%)	9 (6.9%)	
During disposal	1 (2.4%)	2 (8.3%)	0 (0%)	0 (0%)	3 (2.3%)	
How do you recap used needles?						0.0121
One-handed technique	37 (88.1%)	21 (87.5%)	28 (66.7%)	19 (86.4%)	105 (80.8%)	
Two-handed technique	1 (2.4%)	1 (4.2%)	10 (23.8%)	0 (0%)	12 (9.2%)	
Do not recap	4 (9.5%)	2 (8.3%)	4 (9.5%)	3 (13.6%)	13 (10.0%)	
How do you dispose of needles after use?						0.0001
Puncture-resistant container	18 (42.9%)	19 (79.2%)	36 (85.7%)	17 (77.3%)	90 (69.2%)	
Needle burner/syringe destroyer	6 (14.3%)	1 (4.2%)	3 (7.1%)	4 (18.2%)	14 (10.8%)	
Needle incinerator	6 (14.3%)	4 (16.7%)	3 (7.1%)	0 (0%)	13 (10.0%)	
Needle cutter	12 (28.6%)	0 (0%)	0 (0%)	1 (4.5%)	13 (10.0%)	

Note: NSIs: Needle Stick Injury; PEP: Post Exposure Prophylaxis. [1] Statistically Significant $p<0.05$.

is notably higher than 47.5% found in the study by Jayachandra MY.[13] This represents a significant improvement and underscores the success of recent educational efforts and clinical training programs. However, continuous reinforcement is recommended to ensure sustained awareness and practice.

Knowledge of post-exposure prophylaxis (PEP) was reported by 82.3% of respondents, which is satisfactory but still slightly lower than the 89.1% observed in Fatima's study. [14]Other studies, including those by Datar [15], Madhavan et al [16] and Ayub et al [17] reported much lower awareness levels. To close the gap with the best performing studies, workshops and refresher courses on PEP protocols should be prioritized.

In terms of NSI reporting behavior, 56.9% of respondents indicated they would report an incident to the emergency room. This is lower than the 81% reported in the study by Pavithran et al [10] and slightly less than the 60% who would consult a general physician, as per Jayachandra MY. [13] These findings point to underreporting and inadequate diligence, underscoring the need for institutional policy reform, education on the importance of reporting and easy reporting pathways.

When exploring the reasons for not reporting NSIs, 46.9% reported that the injury involved a sterile needle, which is significantly higher proportion than the 10% reported in Eltahir MA's study. [18]This highlights a critical misconception—that sterile needles pose no risk which can lead to missed opportunities for early intervention and infection surveillance. This is a key area for educational improvement, particularly concerning the importance of reporting all NSIs, regardless of perceived risk.

The 12 month incidence of NSIs in this study was 20%.This is substantially lower than the 72% reported by Baig FJ [3]and 54.2% by T. Akhund. [6] This could reflect improved safety practices, heightened awareness or alternatively, underreporting bias. Further investigation is needed to clarify whether the lower incidence is genuine or due to non-disclosure.

Despite OSHA guidelines prohibiting needle recapping [19], 80.8% of participants reported using the single-handed recapping technique. This is consistent with findings by Eltahir MA [18](81%) and Santhosh Kumar [20] (82%). While the use of a safer recapping technique is commendable, efforts should continue to discourage recapping unless absolutely necessary (when multiple injections are required for instance in case of local anesthesia) and use of advance safer devices for example syringe with retractable needles, scalpel with retractable blade and syringe with hinged cap should be used.

Regarding needle disposal practices, 69.2% used puncture-resistant containers, while 10.8% used needle burners or destroyers, 10% used incinerators, and 10% used cutters. These practices demonstrate better awareness compared to Rana Pratap [9] where only 43% recognized proper disposal methods. Baig FJ [3] reported lower use of puncture-proof containers (17%) and higher reliance on needle cutters (65%). While the results indicate progress, reliance on outdated or hazardous methods like incinerators suggests the need to standardize and modernize disposal protocols across institutions.

The limitations of this study included a relatively small sample size, which may limit the generalizability of the findings. Additionally, recall bias and social desirability bias may have influenced participants' responses, potentially affecting the accuracy of the reported practices and experiences.

Conclusion

This study found a generally high level of awareness among dental students and professionals regarding the risks and prevention of NSIs. While participants showed good knowledge of infection transmission, safety practices, and post-exposure protocols, gaps remained in reporting NSIs and consistent use of proper disposal methods. Low reporting rates, especially with sterile needles, indicated a need for improved education and supportive institutional policies.

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Author Contributions

1. **Fatima Arif:** Data collection, data analysis and interpretation, writing original draft preparation, final approval, agreement on accountability.
2. **Sanna Safi:** Conceptualization and design, critical revision, final approval, agreement on accountability.
3. **Hafeez Ullah:** Data collection, data analysis and interpretation, critical revision, final approval, agreement on accountability.
4. **Hanzala Waqar:** Data collection, data analysis and interpretation, critical revision, final approval, agreement on accountability.
5. **Maryam Qanita:** Data collection, data analysis and interpretation, critical revision, final approval, agreement on accountability.