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## RESEARCH ARTICLE

### PREVALENCE AND RESPONSE TO NEEDLE STICK INJURIES AMONG HEALTH CARE WORKERS

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#### ABSTRACT

**Introduction:** A needle stick injury is a serious occupational health hazard in health care settings. Health care workers are at risk of blood borne diseases and the psychological consequences of these injuries. These injuries are a major source of infections with blood-borne diseases like Hepatitis B Virus, Hepatitis C Virus and Human Immunodeficiency Virus. The risk of transmission of this infection after exposure to percutaneous injuries with infected blood is 2–40% for HBV, 2.7–10% for HCV, and 0.3% for HIV. Additionally, studies show an influence on the mental health of the injured HCWs. Anxiety, depression, and worry about being infected or transmitting the infection to their family affected their quality of life. **Materials and Methods:** Study Design: Cross-sectional study. **Setting:** A tertiary care hospital in Panipat. **Participants:** 105 resident doctors, and consultants. **Results:** A large percentage (32.4%) of HCWs reported having had one or more NSIs in their career. 43.8% of males and 56.2 females were affected. More than half (29.8%) ascribed fatigue, work load as a cause in their injury. Most of the injuries (35.2%) occurred during recapping. In addition, heavy work load (44%), caused the highest rate of injuries, followed by inattention and hasty work (25.8%). Regarding post-exposure actions of the 39% respondents first washed the injury site with soap and water while 8.6% just squeezed the blood. Only 15% of the HCWs took post-exposure prophylaxis (PEP) against HIV/AIDS after their injury. **Conclusions:** Avoidable practices like recapping of needles were contributing to the injuries. Prevention of NSI is an integral part of prevention programs in the work place, and training of HCWs regarding safety practices indispensably needs to be an ongoing activity at a hospital.

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## INTRODUCTION

A Needlestick injury (NSI), a grave occupational hazard amongst healthcare professionals (HCPs) is a penetrating or cut wound in the skin caused by a needle or sharp instrument in the health care setting.<sup>(1)</sup> More than 20 different types of blood borne pathogens can be transmitted as a result of NSIs. The risk of transmission of HBV is highest (6%–30%), followed by HCV (1.8%) and HIV (0%–10%).and only HBV infection is preventable through vaccination.<sup>(2,3,4,5)</sup> Even though preventive measures, including enhanced equipment design and personnel training were applied, sharps injuries continued to occur at every stage of sharps device utilization, disassembly or discarding. The factors contributing to NSIs include recapping needles, unnecessary use of sharp devices, lack of device with safety measures, absent of personal protective equipment and containers for sharp disposal, lack of engineering control (e.g. needles with safety features), shortage of staff, lack of training, inappropriate disposal of sharp device, and patient reactions<sup>(6)</sup>, in addition to inadequacy of protective and safety measures in medical devices at work<sup>(7)</sup>. A study done among HCW's showed that there Needle stick injuries were significantly associated with working hours, particularly if employee work at least once per week for 13 hours or more<sup>(8)</sup>. Also Students are more vulnerable to NSI during training periods due to their lack of practical experience and skill. It is critically important to assess determinants of sharp injuries to guide implementing effective prevention standards and programs as NSIs are preventable by proper knowledge of handling of the instrument by following precautions, and sound knowledge of post-exposure prophylaxis (PEP). Few studies also suggest that most health sciences curriculum lack precise infection control and preventive procedures for NSI.<sup>(9, 10)</sup> Most of the infections by NSI are preventable, and obtaining the information regarding the circumstances of the injury is of utmost importance to ply suitable preventive measures.

Because they are often under reported, health care institutions should not interpret low reporting rate as low injury rate. Injuries recorded through standard occupational reporting systems may underestimate the true injury rate, as much as 10-fold.<sup>(11)</sup> Despite the existence of efficient therapies, the likelihood of contracting human immunodeficiency virus(HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) can cause HCWs to experience psychological distress such as anxiety, depression, and post-traumatic stress disorder, as well as a reduction in quality of life, Needle stick injuries have significant indirect consequences in health care delivery especially so in the developing countries, where already the qualified work force is limited with respect to the disease burden in the population. These injuries not only potentiate health consequences but also cause emotional distress in health care workers which results in missed workdays and directly affects the health care services and resources. Hence, in the present study, the authors aimed at comparing the knowledge, attitude, practice, and prevalence of NSI amongst medical, dental, and nursing students at an academic healthcare institute. The authors also assessed whether gender, clinical exposure, and stream of medicine to which the students belong had any bearing on NSI prevalence and awareness.

## MATERIALS AND METHODS

**Study Design and Setting:** This is a cross-sectional study among health care workers on details of needle stick injury. The sample included senior residents, junior residents, and consultants. However, interns and medical students were excluded in the study. Institutional ethical clearance was obtained before commencing the study. The self-administered questionnaire included twenty questions to test the knowledge about NSIs, blood-borne virus (BBV) transmission, and appropriate exposure management. A purposive sampling was done aimed at covering 105 respondents of health care workers, working in departments where exposure to needle stick injury may occur. The health care workers were contacted in person and to tell about purpose of the study and that their responses were kept anonymous. Informed consent was taken from each respondent.

### Questionnaire Included

**1. Email**

**2. Name**

**3. Gender**

- A. Male
- B. Female

**4. Position**

- A. Specialists
- B. PG / Resident
- C. Undergraduate

**5. Healthcare institution**

- A. Primary health care center
- B. Secondary health care center
- C. Tertiary health care center

**6. Age**

- A. 18-25
- B. 25-35
- C. 35-50
- D. Above 50

**7. Have you had a needle stick injury**

- A. Yes
- B. No

**8. Number of NSI Incidence**

- A. Once
- B. Twice
- C. More than twice
- D. Never

**9. Injury type**

- A. Superficial (little or no bleeding)
- B. Moderate (skin punctured, some bleeding)
- C. Severe ( deep stick/cut, or profuse bleeding)
- D. Not applicable

**10. Received medical attention within 2hours after injury**

- A. Yes
- B. No
- C. Not applicable

**11. Time of NSI reporting**

- A. Immediately after incident
- B. Late before going off workplace (same day)
- C. After two days or more of incident
- D. Not applicable

**12. When you had a needle stick injury (procedure)**

- A. Recapping a needle
- B. During injection, puncture
- C. During intravenous line insertion
- D. During blood collection
- E. During the intervention by instrument
- F. Surgical
- G. By disposing to the sharp container
- H. Not applicable

**13. Factors influenced for needle stick injury**

- A. Heavy work load
- B. Lack of protection measures
- C. Inattention, hasty work
- D. Uncooperative patient
- E. Not applicable

**14. After needle stick injury did you get tested for**

- A. HIV
- B. HBV
- C. HCV
- D. Not applicable

**16. NSI Incidence report**

- A. Informed clinical instructors
- B. Wrote a report
- C. Did not write a report
- D. Not applicable

**17. Reasons for not reporting**

- A. Did not know the standard
- B. Neglected
- C. Worried and afraid
- D. Not applicable

**18. What type of measures were taken after NSI**

- A. Squeeze the blood
- B. Washing the site with water
- C. Washing the site with soap and water
- D. Screened for HIV, HBV, HCV titres (source and self)
- E. Got post exposure prophylaxis (PEP)
- F. Not applicable

**19. Source of information regarding prevention of NSI**

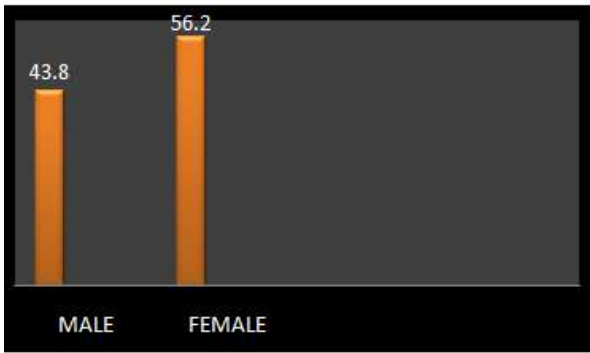
- A. Training programs
- B. Journal updates
- C. CME
- D. Senior colleagues
- E. NACO guidelines
- F. Not applicable

**20. Practices related to NSI**

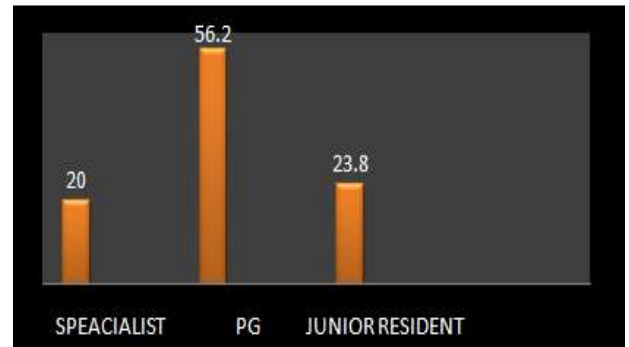
- A. Not wearing gloves before venipuncture/injections
- B. Recap needles before discarding
- C. One hand recapping not done
- D. Avoid PPE during emergency procedures
- E. Not applicable

## RESULTS

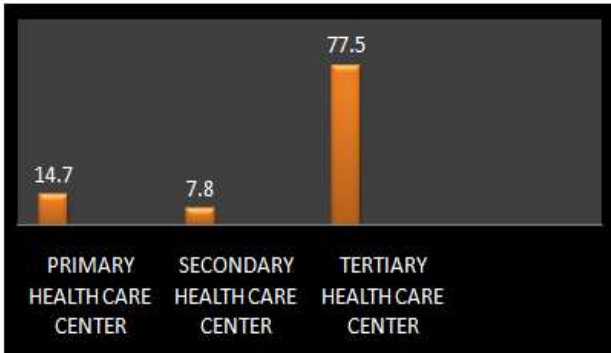
In our study, a significant proportion (32.4%) of healthcare workers (HCWs) reported experiencing one or more needle stick injuries (NSIs) during their careers. Among those affected, 43.8% were male and 56.2% were female. Fatigue and workload were cited as causes for the injury by 29.8% of participants (Graph 1). The age range of participants was between 25 and 35 years (Graph 4). Additionally, 54.3% of HCWs had experienced an NSI at least once in their lifetime (Graphs 5 and 6), and only 60.5% sought medical attention within two hours of the incident (Graph 7). Most of the injuries (35.2%) occurred during recapping (graph 9). The most of the injuries were noted during morning shift (58%), followed by evening shift (26%), and night shifts (16%) having the lowest number of NSIs. The knowledge about NSIs and the preparedness and prophylactic measures for NSIs were studied using several criteria. Around 60% of them got immune status checked after the injury, and most of the healthcare providers were aware of the steps to be followed after injury (Graph 11).



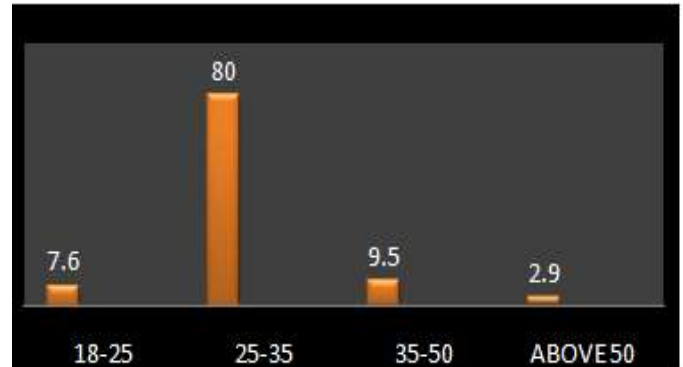
GRAPH 1: NSI incidence according to gender (%age)



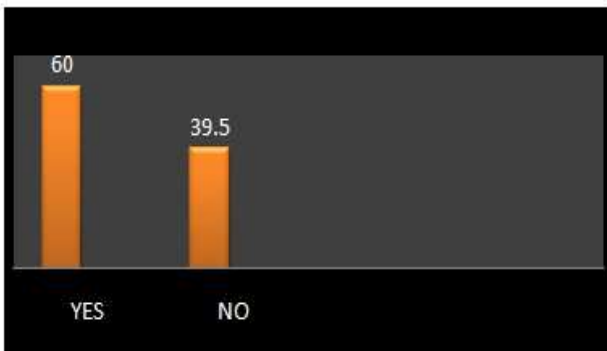
Graph 2 : NSI incidence acccd. to Designation (%age)



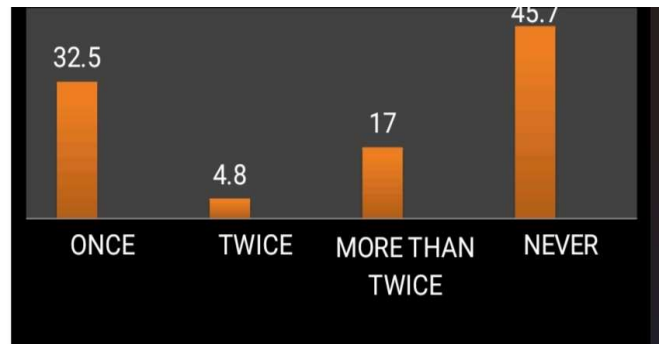
Graph 3: Working institution of the study participant (%age)



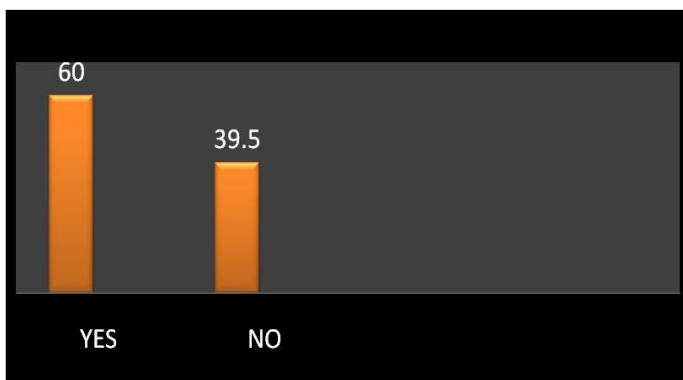
Graph 4: Age group of the participants (%age)



Graph 5 : Percentage of participants who had a needle stick injury (%age)



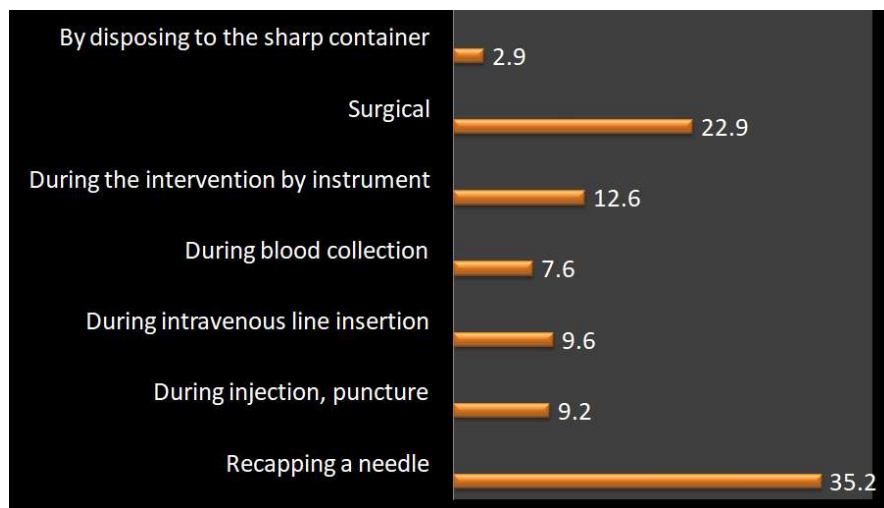
Graph 6 : Time of reporting NSI (%age)



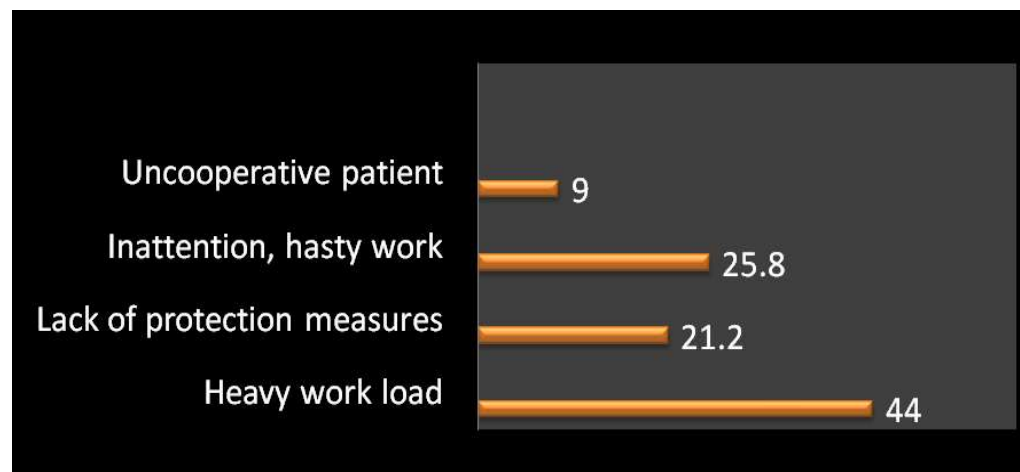
GRAPH 7: Percentage of participants who received medical attention within 2 hours after injury (%age)



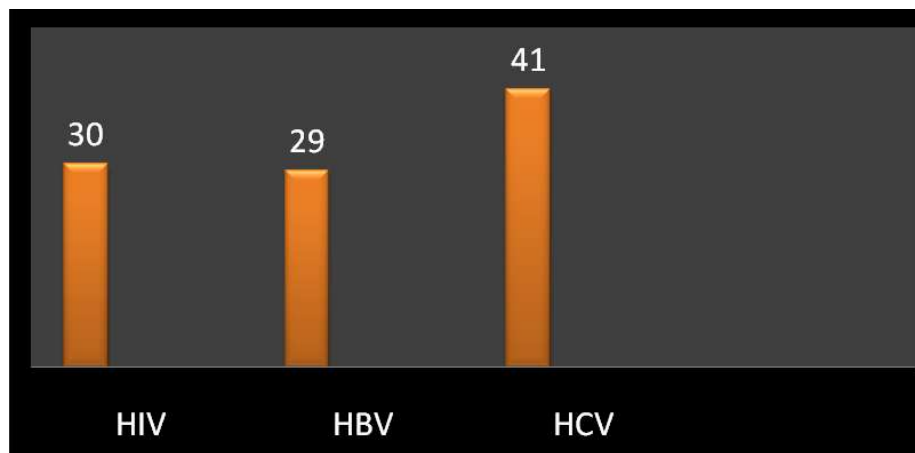
GRAPH 8: Time of NSI reporting (%age)



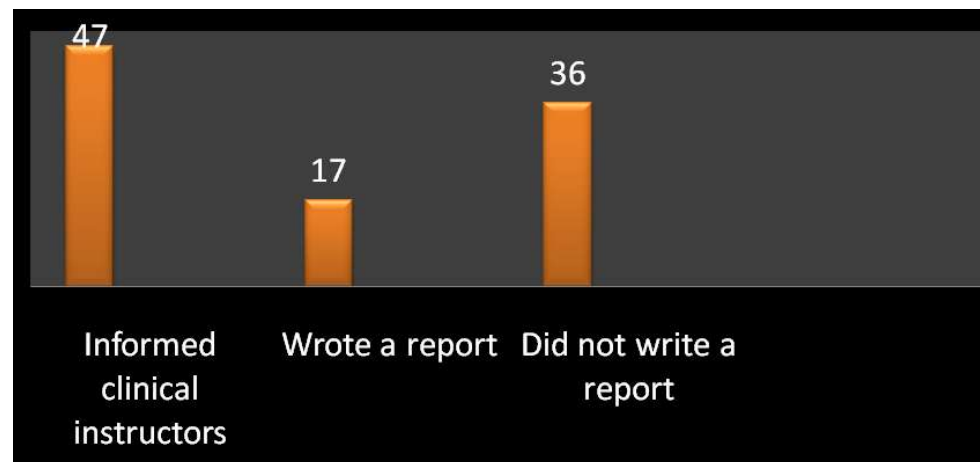
GRAPH 9: Procedure during which the participant had NSI (%age)



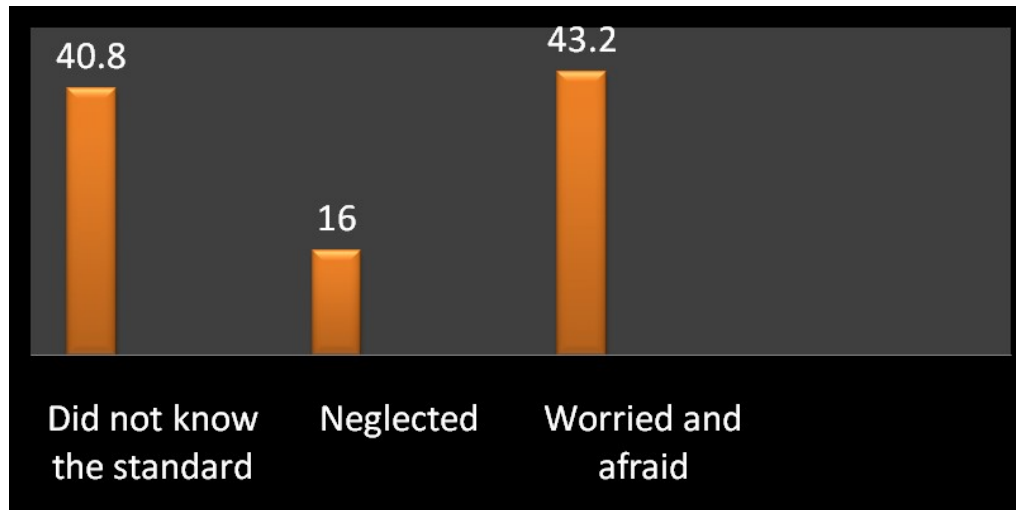
GRAPH 10: Factors influenced for needle stick injury (%age)



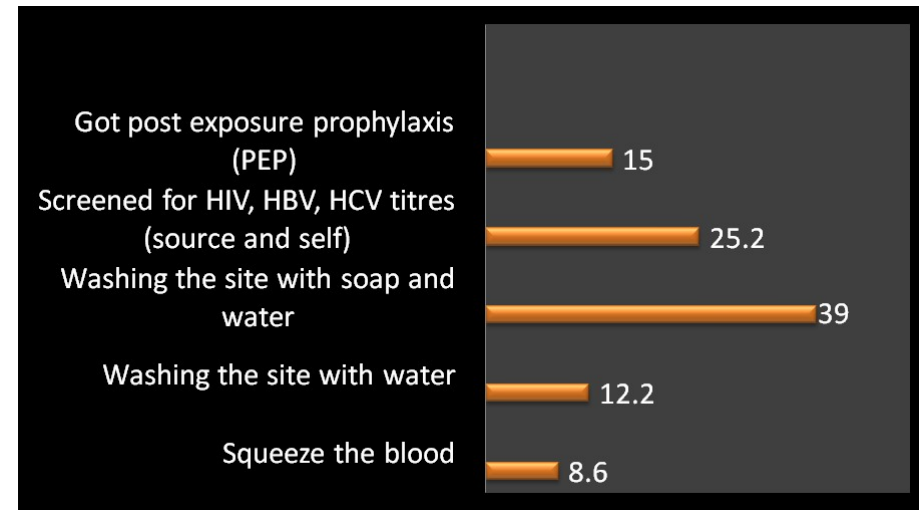
GRAPH 11: The viral marker, study participant got tested for after needle stick injury (%age)



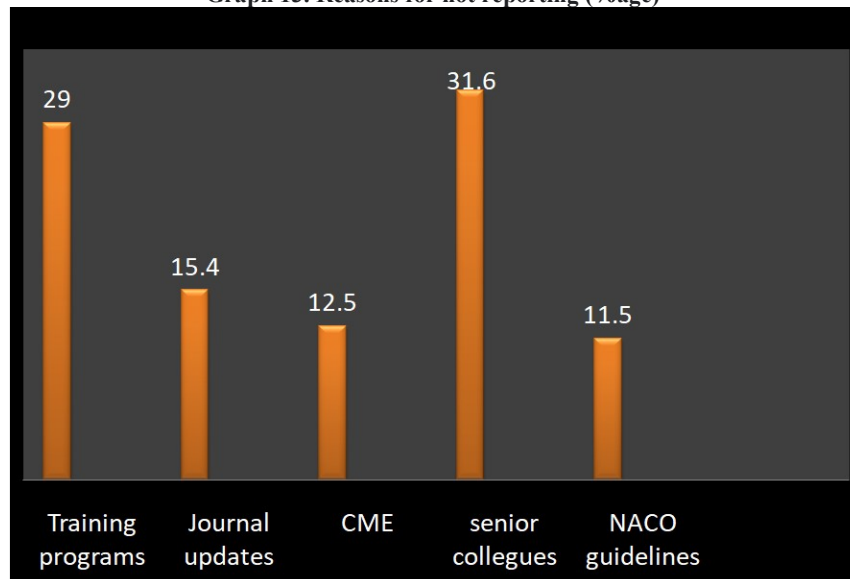
GRAPH 12: NSI Incidence report (%age)



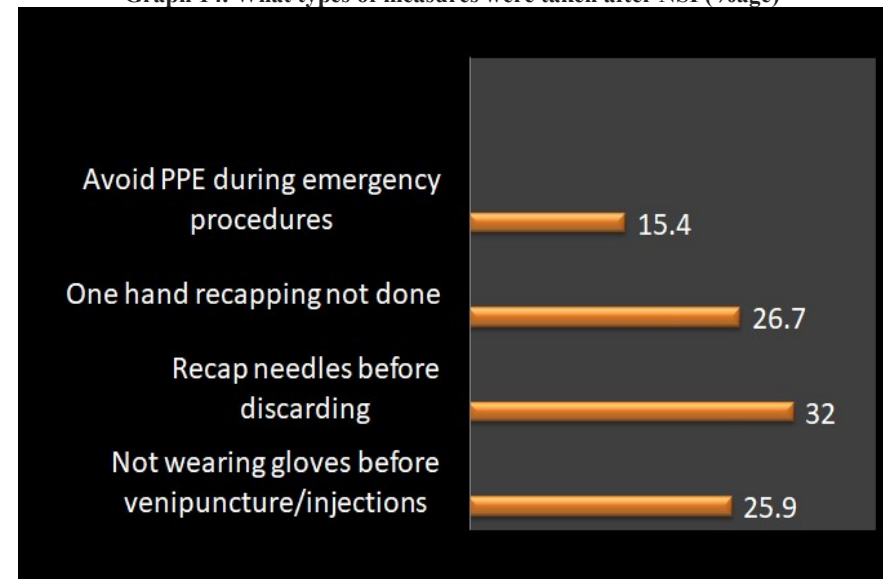
Graph 13. Reasons for not reporting (%age)



Graph 14. What types of measures were taken after NSI (%age)



GRAPH 15: Source of information regarding prevention of NSI (%age)



GRAPH 16: Practices related to NSI (%age)

Around 41.3% of the health workers were not wearing gloves at the time of injury, and only 18% of the health workers stopped procedure immediately to take care of the injury, and only 47% of them informed superiors regarding the incident, and 15% took precautions and treatment after NSIs. (Graph12, 14) In addition, heavy work load (44%), caused the highest rate of injuries, followed by inattention and hasty work (25.8%). Regarding post-exposure actions of the 39% respondents first washed the injury site with soap and water while 8.6% just squeezed the blood. (graph14). Of our study population, 40.8% were unaware of needle stick and sharp injury safety policies. (Graph 13). Only 15% of the HCWs took post-exposure prophylaxis (PEP) against HIV after the injury. (graph14)

## DISCUSSION

Needle stick and sharp injuries (NSSIs) are increasingly prevalent among healthcare professionals, including physicians, nurses, and other personnel in the healthcare sector. According to the World Health Organization (WHO), NSSIs stand as one of the foremost occupational risks encountered by healthcare workers globally, with more than 2 million occurrences annually among a total of 35 million healthcare workers.<sup>(12)</sup> In our investigation, we noted that students exhibited satisfactory awareness regarding NSSIs and their prevention; however, their understanding of post-exposure prophylaxis (PEP) was notably deficient. A majority of the students lacked familiarity with the various components of the PEP guidelines recommended by the WHO. These findings align with studies conducted by Madhavan et al.,<sup>(13)</sup> and Ayub et al.<sup>(14)</sup> Even though Hepatitis B Virus (HBV) poses the highest risk of transmission among all Blood-Borne Viruses (BBVs), it is fortunate that there exists an effective vaccine and post-exposure prophylaxis (PEP)<sup>(15)</sup>. It is imperative for health institute authorities to prioritize student safety by initiating an HBV vaccination campaign and mandating its administration.

In the current study, although the proportion of female participants (56.2%) exceeded that of male participants (43.8%), male participants reported a higher incidence of needle stick injuries (NSIs) (61.2%) compared to female participants (38.8%). This observation aligns with our findings indicating that female participants exhibited superior knowledge and a more positive attitude toward NSI prevention. Conversely, some studies have indicated that female healthcare professionals (HCPs) are at a higher risk of NSIs, attributing this to potential underreporting of NSIs by male staff<sup>(16)</sup>. In our study, a significant high-risk behavior identified was needle recapping, reported by 35.2% of participants. Needle recapping is recognized as a high risk practice, with healthcare professionals (HCPs) who engage in this practice facing three times higher risk of needle stick injuries (NSIs) compared to those who do not recap needles<sup>(17,18)</sup>. Consequently, many hospitals have implemented prohibitions against needle recapping. If needle recapping is unavoidable, the single-hand scoop method is recommended as the safest approach<sup>(17)</sup>. The importance of reporting injuries cannot be overstated, especially concerning needle stick injuries (NSIs) to ensure prompt management and timely administration of post-exposure prophylaxis (PEP) when necessary. One concerning finding from the study was the alarmingly low rate of NSI incident reporting; 90.3% of participants failed to report an injury, consistent with the findings of Hussain et al.<sup>(19)</sup> and Madhavan et al.<sup>(13)</sup>, where 77.4% and 68% of students, respectively, did not report NSIs. Literature review reveals similarly low reporting rates, with half of NSIs in the USA going unreported, and rates in developing countries plummeting to as low as 25%. (20,21) Possible reasons for these low reporting rates include the stigma attached to NSIs, the misconception that the risk of transmission is minimal, absence of standardized procedures post-incident, and insufficient awareness regarding the importance of reporting such incident. In the present study, participants demonstrated a positive attitude toward preventing needle stick injuries (NSIs). However, it's essential to note that a positive attitude alone does not ensure adherence to universal precaution guidelines. Regular educational classes and induction sessions for recruits have proven effective in promoting positive changes in knowledge, practice, and attitude toward safety protocols, as evidenced by previous research<sup>(22, 23)</sup>

## CONCLUSION

The prevalence of needle stick injuries (NSIs) among healthcare professionals remains significant, with an incidence rate of 11.57% and over half of these incidents go unreported. The relative lack of awareness towards preventive measures and the inexperience among healthcare workers (HCWs) may contribute to the high occurrence of NSI events. This study emphasizes the importance of raising awareness among HCWs and providing consistent training in the proper handling of sharp instruments. Additionally, there is an urgent need to improve current reporting systems for NSIs to ensure the prompt administration of post-exposure prophylaxis. Implementing safety protocols, promoting safe injection practices, and providing engineered safety devices can further contribute to minimizing the occurrence of NSIs.

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