

IMPACT OF NEEDLE STICK INJURIES ON STUDENT NURSES AT KTH HOSPITAL, PESHAWAR, PAKISTAN

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Abstract. Needle stick injury (NSI) is a significant hazard in healthcare settings that poses a potential risk of transmission of blood-borne diseases. This cross-sectional study aims to determine the prevalence of NSI among student nurses in a tertiary care hospital in Peshawar and their knowledge about NSI prevention and control. The data collected through structured questionnaires, and the sample size was 147. The results showed 37% of students had experienced NSI during the last six months, while 70% were vaccinated and 75% were screened against HBS, HCV, and HIV. The study emphasizes the need for further training, workshops, and close supervision to prevent NSI complications and enhance safe practices during healthcare services. The positive effect of free vaccination and government attention to increasing the strength of nurses to control the increasing rate of NSI is also highlighted. Due to lack of proper supervision by trained staff, student nurses often suffer from needle stick injuries during their practical work. Patients may admitted to the hospital already contaminated with communicable diseases, and their beds are not labeled to indicate this. Exposure to NSIs can cause fear, insecurity, and low self-esteem in student nurses. There are many psychological consequences associated with NSIs, such as fear, anxiety, and depression. Student nurses are at substantial risk for NSIs because they often perform invasive procedures with minimal knowledge and experience. Education and awareness-raising about NSI prevention and reporting have been shown to positively impact previous studies. Observational studies conducted in Pakistan have recommended that nurse students receive further education to reduce the incidence of NSIs, as they are often deprived of advanced knowledge and experience. A lack of staff in hospitals can contribute to NSIs as nurses may ignore their safety while performing their duties. Two-handed recapping is responsible for approximately 80% of needle stick injuries.

Keywords: *needle sticks injury, student nurses, prevalence, knowledge, healthcare workers, screening*

Introduction

Needle stick injuries pose a serious threat in healthcare settings and occur when a needle containing another person's blood or bodily fluids accidentally penetrates the skin, potentially exposing the recipient to pathogens such as Hepatitis B virus, Hepatitis C virus, and Human Immunodeficiency Virus. The risk of post-exposure transmission of these diseases is approximately 30%. Clinical activities such as blood extraction, medication, intramuscular injection, or intra-venous catheter implantation can lead to needle stick injuries (Askarian and Ghavanini, 2002). Factors contributing to these injuries include lack of knowledge, experience, insufficient resources, and noncompliance with infection control standards. Two-handed recapping and unsafe collection and disposal of needles are the primary causes of needle stick injuries. Research has shown that students are particularly vulnerable to these injuries when performing clinical activities due to their lack of experience and knowledge. Due to a lack of proper supervision by trained staff, student nurses often suffer from needle stick

injuries during their practical work. Additionally, patients may be admitted to the hospital already contaminated with communicable diseases, and their beds are not labeled to indicate this. Exposure to NSIs can cause fear, insecurity, and low self-esteem in student nurses. There are many psychological consequences associated with NSIs, such as fear, anxiety, and depression. Student nurses are at substantial risk for NSIs because they often perform invasive procedures with minimal knowledge and experience.

Education and awareness-raising about NSI prevention and reporting have been shown to positively impact previous studies. Observational studies conducted in Pakistan have recommended that nurse students receive further education to reduce the incidence of NSIs, as they are often deprived of advanced knowledge and experience (Wilburn and Eijkemans, 2004). Additionally, a lack of staff in hospitals can contribute to NSIs as nurses may ignore their safety while performing their duties. Two-handed recapping is responsible for approximately 80% of needle stick injuries (Wilburn and Eijkemans, 2004). Prophylactic immunoglobulin was not given to any of the students as part of post-exposure prophylaxis against HBV and HIV. Only a small percentage (16.9%) of students washed the wound under running water, while the majority (36.3%) washed the wound with an antiseptic solution, and 35% allowed the wound to bleed and applied adhesive medicated plaster over the wound. Exposure to NSIs can lead to mental health problems such as depression, as reported by a case-control study conducted by Reitz et al. (2013). Regular education sessions that raise awareness about the risk of NSIs for student nurses are highly recommended, as they have been shown to reduce the incidence of NSIs, particularly during the education period. Two-handed recapping and unsafe collection and disposal of sharp waste are the primary causes of NSIs, as reported (Qaseem et al., 2011). Suture needles are the most common equipment responsible for injuries among surgical and perioperative nurses.

Every year, approximately 2 million needle stick injuries are reported by healthcare providers, but this is only the reported data. Developing countries, including Pakistan, have particularly high rates of NSIs, with nurses, especially student nurses, being more commonly affected. Lack of knowledge, experience and trained hand supervision during the initial phase of practical working make student nurses particularly vulnerable to NSIs. Understanding the risks associated with needle stick injuries is essential for avoiding these risks. The aim of the study was to determine the causes of needle stick injuries among student nurses at KTH Hospital in Peshawar, as well as to raise awareness among the student nurses regarding needle stick injuries.

Materials and Methods

A cross-sectional observational design was utilized in this study as it aimed to provide a descriptive analysis of the subject matter. The study was conducted at Khyber Teaching Hospital (KTH) in Peshawar, Pakistan. The target population consisted of student nurses enrolled at KTH Peshawar. A non-probability convenient sampling technique was employed to select participants based on their availability and accessibility. The sample size of 147 participants was determined using the Rao soft online calculator, considering the available resources and feasibility of data collection. All student nurses studying at KTH Peshawar were included in the study as they formed the specific population of interest. Nurse lecturers, senior nurses, head nurses, and other

health professionals were excluded from the study to maintain the focus on student nurses.

Structured questionnaires were utilized as the primary data collection tool in order to gather information from the participants in a systematic and organized manner. Ethical considerations were given due importance throughout the study. The study obtained the necessary ethical approval from the KTH principal. Informed consent was obtained from each participating student nurse in written form, clearly explaining the purpose and procedures of the study. Anonymity and confidentiality of the participants were strictly maintained to protect their privacy. The collected data were analyzed using the Statistical Package for Social Science (SPSS) version 16. Descriptive statistics, such as percentages and frequencies, were calculated for nominal and ordinal data to summarize the characteristics of the study population. Mean and standard deviation were calculated for scale data. Furthermore, the chi-square test was employed to identify any potential associations between knowledge levels and the prevalence of needlestick injuries.

Results and Discussion

Based on the results presented in *Table 1*, it can be inferred that the majority of the student nurses (86.4%) had an intermediate education level, followed by those with a bachelor's degree (11.6%), and a small percentage with a matric and master's degree (0.7% each). *Table 2* shows that most of the student nurses (59%) were between the ages of 15-20 years, while 38% were between 21-25 years old, and only 1% were between 26-30 years old. Additionally, age information was not provided for 2% of the participants. *Table 3* indicates that 78% of the participants had a good knowledge level (>8), while 21% had a knowledge level between the range of 5 to 8. Information on the knowledge level was not provided for 1. Overall, the study provides insights into the education level, age distribution, and knowledge level of student nurses. However, it is important to note that the sample size is small (n=147), and the results may not be generalized to a larger population.

Table 1. Education level of nurses student.

Education level	Frequency (N)	Percentage (%)	Valid %	Cumulative %
Matric	1	0.7	0.7	0.7
Intermediate	127	86.4	87	87.7
Bachelor	17	11.6	11.6	99.3
Master	1	0.7	0.7	100
Total	146	100	100	-

Table 2. Age distribution of participants.

Age range (in years)	Percentage (%)
15-20	59
21-25	38
26-30	1
Not mentioned	2

Table 3. Participant knowledge levels.

Knowledge level	Percentage (%)
5-8	21
Good (>8)	78

Analysis in python provided several plots using the matplotlib library. Here is an explanation of each plot and its details: (1) Bar plot for education level: This plot shows the frequency of student nurses for each education level using a bar plot. The x-axis represents the education level, while the y-axis represents the frequency of each level (*Figure 1*); (2) Pie chart for marital status: This plot shows the percentage of student nurses who are married or unmarried using a pie chart. The chart displays the percentage of married and unmarried nurses, with the values displayed as labels on the chart (*Figure 2*); (3) Pie chart for age distribution: This plot shows the percentage of student nurses in each age range using a pie chart. The chart displays the percentage of student nurses in each age range with different colors, and the values are displayed as labels on the chart (*Figure 3*); (4) Pie chart for knowledge level: This plot shows the percentage of student nurses with good knowledge level and those with knowledge level between the ranges of 5 to 8. The chart displays the percentage of student nurses with good knowledge level and those with knowledge level between the ranges of 5 to 8 (*Figure 4*); (5) Pie chart for awareness of needle-stick injuries: This plot shows the percentage of student nurses who are aware of needle-stick injuries using a pie chart. The chart displays the percentage of student nurses who are aware of needle-stick injuries and those who are not, with the values displayed as labels on the chart (*Figure 5*); (6) Bar chart for screening results: This plot shows the percentage of participants who tested positive for HBS, HCV, and HIV using a horizontal bar chart. The x-axis represents the percentage of participants who tested positive for each infection, while the y-axis represents the name of each infection (*Figure 6*); as well as (7) Two bar charts for injection administration status (*Figure 7*) and training received (*Figure 8*): This plot shows two bar charts for injection administration status and training received. The first bar chart shows the percentage of student nurses who have administered injections using different colors for each status. The second bar chart shows the percentage of student nurses who have received training for administering injections using different colors for each status. Both charts display the percentage of student nurses with their respective status, with values displayed as labels on each chart.

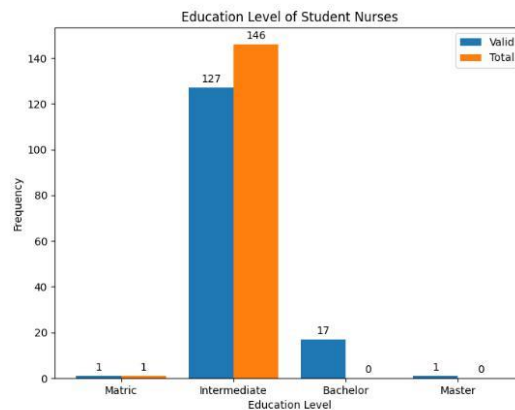


Figure 1. Knowledge level of participants in a study.

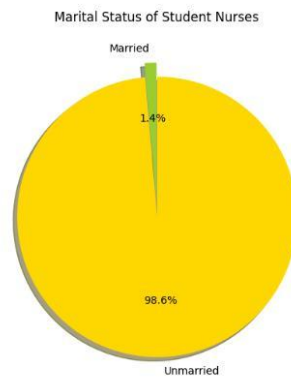


Figure 2. Marital status distribution of female participants in a study (N=147).

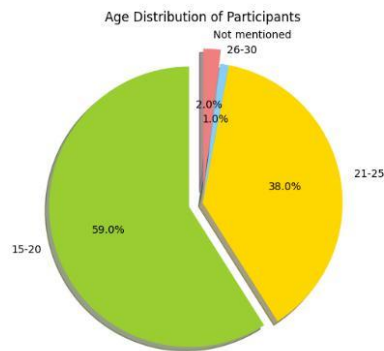


Figure 3. Age distribution of participants in a study.

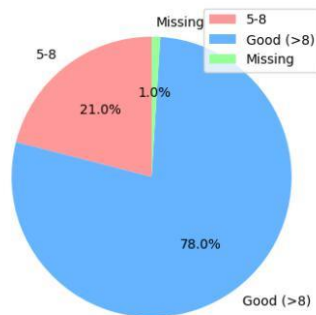


Figure 4. Knowledge level of participants in a study: Analysis and findings.

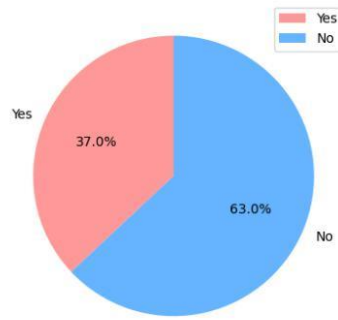


Figure 5. Prevalence of needle stick injury among study participants: A visual representation.

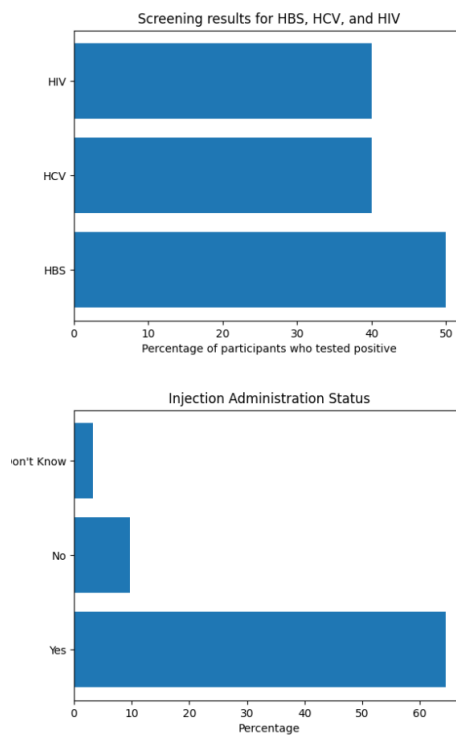


Figure 6. Screening results for HBS, HCV and HIV.

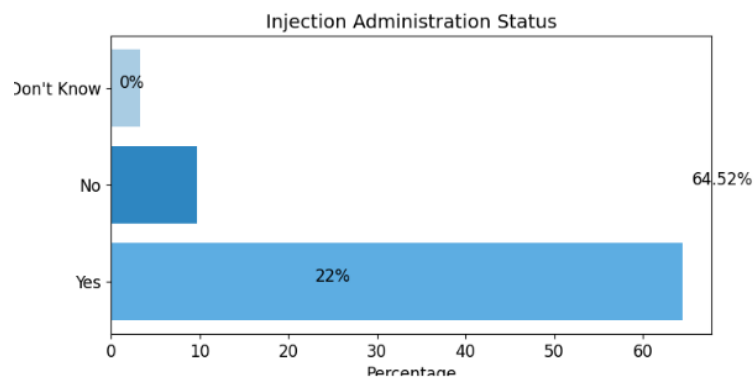


Figure 7. Training received on needle stick injury among study participants: A comprehensive overview.

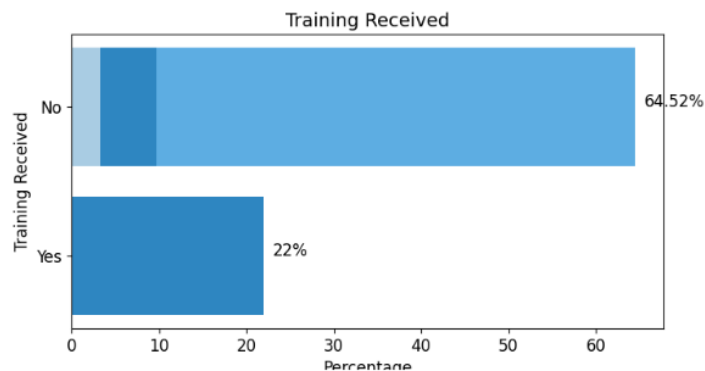


Figure 8. Injection administration status among study participants: A comprehensive overview.

Discussions

The results of the present study highlight the high prevalence of needlestick injuries (NSIs) among student nurses, with 37% reporting an NSI in the last 3 months. This is a concerning finding as NSIs can lead to the transmission of blood-borne infections such as hepatitis B, hepatitis C, and HIV (Gao, 2022). Furthermore, more than 50% of employees reported not receiving any training or infection control program about NSIs, indicating a lack of awareness and training in this area. These findings are consistent with previous studies that have reported a low level of awareness about preventive behaviors among healthcare workers (HCWs) (Lloyd, 2014). A study conducted in India also found a low level of awareness about NSIs among HCWs, with only 14% reporting adequate knowledge about preventive behaviors (Al-Khalidi and Nasir, 2022). In addition, the present study found that recapping of used syringes was a common cause of NSIs, with more than 70% of students agreeing with this finding. This is in line with a previous study conducted at a civil hospital in Karachi, which reported that 88% of NSIs were caused by the recapping of used syringes. This highlights the importance of avoiding the recapping of used syringes and using safe disposal methods to prevent NSIs. The present study also found that 70% of students were vaccinated against hepatitis B, tetanus, and typhoid, while 28% did not receive any preventive vaccine. Vaccination against these communicable diseases is important for HCWs, as they are at a higher risk of exposure than the general population. Interestingly, the present study found that free vaccination from the hospital had a positive effect, as the students who received vaccination were less likely to contract communicable diseases. This finding is in line with a previous study that reported a significant reduction in NSIs and hepatitis B virus infections following the implementation of a free vaccination program for HCWs (Askarian and Ghavanini, 2002).

Overall, the findings of the present study highlight the need for increased awareness, training, and vaccination among HCWs to prevent NSIs and transmission of blood-borne infections. Hospitals and healthcare organizations should implement comprehensive infection control programs and provide free vaccination to HCWs to ensure their safety and the safety of their patients. The present study found that 78% of students possess knowledge about NSIs, while 28% did not. Although this is a relatively high percentage of students who are aware of NSIs, there is still a need for continuous

education and training on this topic. A systematic review of 23 studies conducted in various countries reported that training and education programs for HCWs can significantly reduce the incidence of NSIs (Che Huei et al., 2020). Therefore, it is important for healthcare organizations to provide regular training and education to HCWs to increase their awareness and knowledge about NSIs. Moreover, the present study found that the use of structured questionnaires was the data collection tool. This is a valid and reliable tool for collecting data on NSIs, as it allows for standardized data collection and analysis. A systematic review of 11 studies conducted on NSIs reported that self-administered questionnaires are a valid and reliable tool for assessing the prevalence of NSIs among HCWs (Marschall et al., 2014). It is worth noting that the present study was conducted among student nurses, who are considered to be a high-risk group for NSIs. A study conducted in Ethiopia among student nurses reported that the incidence of NSIs was significantly higher among student nurses than among other HCWs (Rothe et al., 2013). Therefore, it is important for healthcare organizations to prioritize the training, education, and vaccination of student nurses to reduce the incidence of NSIs.

Conclusion

In conclusion, this study emphasizes the importance of awareness, education, and training programs for healthcare workers, particularly nursing students, to prevent NSIs and blood-borne infections. It is essential to create a safe working environment for healthcare workers by providing appropriate training and resources, including personal protective equipment and safe needle-handling techniques. These measures will not only protect healthcare workers from NSIs and blood-borne infections but also ensure the safety of patients and the community.

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Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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