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Original Article

Student Nurses Knowledge of Needle Stick Injuries at a Private Institute, Karachi

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ABSTRACT

Needle Stick Injuries (NSI) are wounds penetrated to the skin by needles which can lead to infectious diseases such as Hepatitis B, C, and Human Immunodeficiency virus. **Objectives:** To determine the student nurses' knowledge of NSI at a private nursing institute in Karachi. **Methods:** Descriptive cross-sectional study design was used. A total of 67 participants were recruited through the purposive sampling technique. Data were collected through a valid and reliable questionnaire from September to November 2022. **Results:** Study results showed that 41.8% of participants were males and 58.2% were females. The majority of the participants, 62.7%, were between 20-30 years of age and had an experience of 5-10 years. 62.7% of participants have taken the vaccine against the Hepatitis B virus. Around half (53.7%) of the participants were exposed to needle stick injuries (NSI) during clinical rotations. Knowledge results showed that 22.4% of nursing students had a good level of knowledge, 17.9% moderate, and 59.7% had a low level of knowledge regarding NSI. The association was found only between clinical experience and student nurses' knowledge. **Conclusions:** Based on the findings, high prevalence of NSI, a low level of knowledge of NSI among students, and a low immunization rate of the Hepatitis B vaccine. Therefore, the institute and hospitals should conduct educational training programs and workshops to increase the knowledge level of nursing students regarding NSI and an immunization drive against Hepatitis B to protect them from the deadly virus.

INTRODUCTION

Needle stick injuries (NSI) are common occupational hazards among healthcare workers, including nursing students. These injuries occur when a sharp object, such as a needle, accidentally punctures the skin. NSIs can be dangerous as they can transmit blood-borne pathogens, such as Hepatitis B, Hepatitis C, and HIV. Nursing students are at an increased risk of NSI due to their limited clinical experience, lack of training, and inadequate knowledge of infection control practice [1]. Multiple studies showed that 3 million HCWs experience NSI each year. Similarly, it has also been linked to an increase in the prevalence of 37% Hepatitis B, 39% Hepatitis C, and 4.4% HIV globally, and numbers of NSI cases are reported in the USA and Europe, 385,000 and 100,000, respectively. Aside from this, according to WHO data, NSI causes 16000 HCV, 66,000 HBV, and 1000 HIV cases each year [2]. According to a Pakistani report, 49.7% of HCWs suffer from NSI each year; that high rate of injuries among HCWs is thought to contribute to the spread of blood-borne pathogens [3]. In addition, the factors involved include improper handling of needles, work overload, recapping of needles, lack of safer needle devices, sharp disposals, low resources, lack of proper training, immunization rate, and compliance with infection control measures can cause NSI among HCWs [4]. Various studies conducted in different countries showed different results regarding exposure to NSI among HCWs and nursing students. A study conducted in Lahore, Pakistan, in 2019 showed that 71.6% HCWs suffered from NSI, [5] in Karachi 66% were exposed to NSI, [6] in Ethiopia 43%, [7] in India, in Haryana, 30% of nursing students had NSI, [8]

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while in Maharashtra it was 25.2%, in Bangalore 74%, and in Iran, Sheraz, 76% sustained NSI [9]. The prevalence of NSI in developing countries is higher than the developed countries like Italy; the prevalence of NSI was 14.8, and in Saudi Arabia, 14.7% [10, 11]. Multiple kinds of literature are present on knowledge of NSIs. To review internationally, a cross-sectional study was conducted in Iraq's Baghdad Teaching Hospital in 2020. The study aimed to assess the knowledge, attitude, and practice of HCWs toward NSI. Study results showed that 91.5% of participants knew safety boxes, 71.2% of using double gloves in phlebotomy procedures, 96% of discarding needles after use, and 96.5% knew that Hepatitis B, C, and HIV could transmit via NSI [12]. Studies in developing countries like India, 2021, showed that 62.1% of participants knew the latest universal precautions guidelines, 70.9% always used gloves when dealing with needles, 14.3% had injuries, and 40.9% strongly believed that NSI could be prevented [13]. Likewise, in Karachi in 2016, study results showed that 51% of HCWs were aware of standard methods of discarding needles, and 80.3% were recapping needles. Only 18.6% had knowledge of post-exposure management, e.g., allowing some blood to ooze after NSI, washing the site of the prick with an antiseptic solution, and reporting to the infection control center for further management. But in developed countries like Saudi Arabia knowledge level of HCWs was very high (94.7%); 81% were aware of the procedure and what to do after having NSI, and 47.1% agreed that NSIs are preventable [14]. Therefore, this study's objectives were to determine the student nurses' knowledge of NSI and an association between knowledge level with demographic characteristics of nursing students at a private nursing institute in Karachi, Pakistan

METHODS

A cross-sectional descriptive study was conducted at Horizon Institute of Health Sciences, Karachi, Pakistan, in 2022 from September to November. The sample size was calculated through open EPI version 3.9, with a 95% confidence interval and a target population of 80 students; the obtained sample size was 67. A purposive sampling technique was used in the study; all 1st year Post RN, semester II nursing students who were willing to participate in the study and had a clinical experience of more than 6 months were included and those who were unwilling to participate and had a clinical experience of less than 6 months were excluded from the study. The adopted tool was used, and permission was taken via email[2]. A demographic tool was developed, which had 6 questions of sociodemographic data, i.e., gender, age, work experience, workplace, vaccination status, and 15 questions about NSI knowledge. It was reviewed and validated by three experts of infection control personnel, and their suggestions were incorporated into the questionnaire. Furthermore, a pilot study was also conducted for the tool's reliability on 10% of the total sample size. The questionnaire was tested for internal consistency, for which Cronbach's alpha test was performed using the reliability option in SPSS software. The alpha coefficient for 15 items was computed (0.820), suggesting that the items have relatively high internal consistency. The questionnaires and consent forms were distributed in the class in hard copy, and the study's objectives and benefits were told to the participants. A scoring system assessed nursing students; one point was given to the participant for each correct answer, while incorrect answers were assigned zero. The students' total scores ranged from 0 to 15, and total scores were classified into three categories: low level of knowledge, moderate and good knowledge. Students who scored above 80% considered a high level of knowledge regarding NSI scored between 60-80% moderate, and those below 60% had a low level of knowledge. Permission was taken from the management of Horizon Institute of Health Sciences (Ref # HSNHS 2022/276) for data collection. Every participant signed a consent form after being told about the aim and purpose of the data collection and their right to leave any time they wanted. Nursing students were also assured of their confidentiality and anonymity. Data were entered and analyzed in the SPSS software, version-26. Frequency/percentage was computed for demographic characteristics, and the Chi-square test of association was applied to check the relationship of demographic characteristics with students' knowledge.

RESULTS

According to table 1, Study results showed that 41.8% of participants were males and 58.2% were females. The majority of the participants, 62.7%, were between 20-30 years of age and had an experience of 5-10 years. 62.7% of participants have taken the vaccine against the Hepatitis B virus. Around half (53.7%) of the participants were exposed to needle stick injuries (NSI) during clinical rotations.

Table 1: Demographic Features of Studied Group

Demographic Features	Frequency (%)
Gender	
Male	28(41.8)
Female	39(58.2)
Age	
20-30 years	42(62.7)
31-40 years	23(34.3)
Above 40 years	2(3)
Work Experience	
0.6 yr-2 years	19(28.4)
2-5 years	13(19.3)
5-10 years	32(47.8)
Above10 years	3(4.5)

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Workplace	
ER	11(16.4)
ICU	12(17.9)
CCU	3(4.5)
General ward	28(41.8)
OT	1(1.5)
Other departments	12(17.9)
Vaccination status	
Vaccinated against Hepatitis B	42(62.7)
Not Vaccinated	25(37.3)
Incidence of NSI	
Yes	36(53.7)
No	31(46.3)

Table 2 results revealed that (59.7%) of students had a low score of knowledge, (17.9%) had moderate, and (22.4%) had a high score of knowledge regarding NSI. Overall, the nursing students had a low level of knowledge of NSI.

Table 2: Nursing student's knowledge of NSI

Nursing student's knowledge level of NSI		
Low level of knowledge	**Moderate level of knowledge**	**High level of knowledge**
59.7%	17.9%	22.4%

Table 3 results showed an association of the knowledge level of nursing students with their work experience*, but there was no association of knowledge level with other demographic characteristics of the students like gender, age, vaccination status, workplace, and incidence of NSI.

Table 3: Association between Demographic Features and knowledge score of Nursing students

Association between Demographic Features and knowledge score of Nursing Students n = 67				
Demographic Characteristics	**Knowledge Level of NSI**			**p-value**
	Low level n (%)	**Moderate n (%)**	**High Level n (%)**	
Gender				
Male	16 (57.1)	5 (17.9)	7 (25)	0.94
Female	24 (61.5)	7 (17.9)	8 (20.6)	
Age				
20-30 years	24 (57.10)	8 (19.1)	10 (23.8%)	0.831
31-40 years	14 (60.9)	4 (17.4)	5 (21.7)	
41-50 years	2 (100)	0	0	
Work Experience				
6 months to 2 year	15 (78.9)	4 (21.1)	0	0.006 *
2-5 years	6 (46.2)	2 (15.3)	5 (38.5)	
6-10 years	19 (59.4)	6 (18.7)	7 (21.9)	
>10 years	0	0	3 (100)	
Workplace				
ER	6 (54.5)	2 (18.2)	3 (27.3)	0.472
ICU	6 (50)	3 (25)	3 (25)	
CCU	1 (33.3)	2 (66.7)	0	
General ward	18 (64.2)	5 (17.9)	5 (17.9)	
OT	1 (100)	0	0	
Other departments	8 (6 6.7)	0	4 (33.3)	
Vaccination Status				
Vaccinated against HBV	28 (66.6)	7 (16.7)	7 (16.7)	0.301s
Not Vaccinated	12 (48)	5 (20)	8 (32)	
Incidence of NSI				
Yes	19 (52.8)	8 (22.2)	9 (25)	0.462
No	21 (67.7)	4 (12.9)	6 (19.4)	

DISCUSSION

NSIs are occupational health hazards for all professionals, including nursing students, who are at higher risk due to their lack of knowledge and experience. These injuries can lead to diseases such as Hepatitis B, Hepatitis C, and Human Immunodeficiency Virus if the needles are previously used on infected patients. Therefore, this descriptive cross-sectional study aimed to identify nursing students' knowledge and exposure to NSI. The result showed that 57.3% of nursing students who were in the second semester of Post RN BSN had experienced NSI, which is higher than the result of an analytical study conducted by Mengistu *et al.*, which showed 45.3% incidence of NSI and the result of another meta-analysis, in China, which showed 33% exposure to NSI among nursing students [15]. The prevalence rate of NSI in developing countries, like Pakistan, is higher than the developed countries, like Saudi Arabia, which showed a result of 14.7% exposure to NSI among nursing students [16]. The current study showed a 53.7% incidence of NSI which contrasts with a survey conducted in 2022 in India titled, "Needle stick and sharps' injury in health care students: Prevalence knowledge, attitude, and practice" which showed 25.2% incidence of NSI among health care students [17]. The current study was similar to a " Needle Stick and Sharp Injuries Among Nursing Students in Nanjing China" conducted in China by Zhang *et al.*,, which showed 60.3% reporting of NSI among nursing students [18]. The occurrence of NSI among nursing students was 14.7% in another study which contrasts with the current study, which showed a 53.7% incidence of NSI [19]. The present study was different from a study conducted in Italy by Papadopoli *et al.*, titled "Sharps and Needle Stick Injuries among Medical Residents and Health Care, Professional Students: Pattern and Reporting in Italy - a cross-sectional analytical study," which showed that 14.8% health care professional students sustained NSI [20]. The present study results were similar to a study conducted in Ethiopia in 2018, which showed that 65% of participants were male, 48.1% had 4-10 years of experience the overall prevalence of NSI was 43% [21]. In the present study, results showed that female participants (53.3%) were more knowledgeable than males (46.7%), the incidence of NSI was 53.7%, participants working inwards were 41.8%, in ICU 17.9% and E/R 16.5%, the results showed resemblance to a study by Sonkar *et al.*, in which female participants were more knowledgeable (59.6%) than males (40.4%), the incidence of NSI was 53.8%. Participants working inwards were 58%, E/R 38%, and ICU 7.7% [22]. The present study's results revealed that 22.4% had a high level of knowledge regarding NSIs, 17.9% moderate, and 59.7% had a low level of knowledge. The findings are different from a study by Sudha and Selvanayaki titled, " A Study to assess the

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knowledge of first-year nursing students on needle stick injury at selected colleges of Puducherry," which showed 82.2% of nursing students had decreased knowledge of 16.82% average, and 0.3% of students had a high level of knowledge regarding NSI [23]. The present study showed an association between the knowledge level of nursing students with their clinical experience (p-value 0.006), but no association was found with other demographic characteristics. The results differed from a study conducted in Iran, titled " Evaluation of needle stick injuries among nurses of Khanevadeh Hospital in Tehran" in which there was no association of knowledge level found with clinical experience. Still, knowledge level was associated with other demographic characteristics like gender and working hours [24]. The present study showed that 62.7% were vaccinated against the Hepatitis B virus, which is near to the study's results of India which showed a vaccination status of 55.6% [25]. The literature review revealed that most studies were conducted on exposure to NSI among healthcare workers (HCWs) and nursing students who remained ignored and who were more vulnerable to NSI than other HCWs due to inadequate knowledge and experience; therefore, this study was specially designed for nursing students. Overall, the study guided us that the number of NSI can be reduced by educational training programs, workshops, and adding some chapters in the curriculum to increase the knowledge level of student nurses regarding NSI.

CONCLUSIONS

The results showed a high prevalence of NSI, a low level of knowledge of NSI among student nurses, and a low immunization rate of the Hepatitis B vaccine. So, it is suggested that an educational training program should be conducted at institutes and hospitals to improve knowledge of student nurses regarding NSIs and an immunization drive to prevent them from the deadly virus.

Authors Contribution

Conceptualization: MA, AB
Methodology: SA, MD
Formal analysis: MA, JK
Writing-review and editing: SA, MD, YM

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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