



# Occupational Exposure and Needlestick Injuries among Employees of a Tertiary Care Institute in Kashmir

Anjum B. Fazili<sup>1</sup>, Rohul J. Shah<sup>1</sup>, Qazi M. Iqbal<sup>2</sup>, Feroz A. Wani<sup>2</sup>, Beenish M.<sup>2</sup>

<sup>1</sup>Additional Professor, Department of Community Medicine, SKIMS Srinagar; <sup>2</sup>Senior Resident, Department of Community Medicine, SKIMS Srinagar.

## ABSTRACT

**Background:** Needlestick injuries are one of the important occupational hazards of health care workers which pose serious health consequences. The present study examines the prevalence of NSIs among the employees of a tertiary care institute.

**Methods:** This cross-sectional study was carried out for a period of six months at Sher-i-Kashmir Institute of Medical Sciences, Soura. All categories of the workforce participated in the study.

**Results:** Out of a total of 2763 employees studied the prevalence of NSIs was 39.19%. NSIs were more common in males, doctors, nursing staff and employees belonging to high risk group and the differences were statistically significant.

**Conclusion:** NSIs are a common public health problem in this tertiary care institute. Proper awareness with regard to adoption of standard precautions coupled with proper working conditions will help in ensuring control of potential blood borne infections due to occupational exposure in this tertiary care institute.

**Key Words:** Needlestick injury, Occupational exposure, High risk, Blood and body fluid

## INTRODUCTION

Health care workers have increased risk of occupational exposure to blood and other body fluids. Needle stick injuries (NSIs) are major cause of blood borne infections transmitted among health care personnel. These preventable injuries expose workers to over different blood borne pathogens[1] and the most common being Hepatitis B, Hepatitis C and HIV.[2] Most exposures among HCWs are caused by percutaneous injuries with sharp objects contaminated with blood or body fluids which include needles, scalpels, lancets and broken glass. NSIs are therefore one of the potential occupational hazards for HCWs. Transmission of at least twenty different pathogens by injuries due to sharps instruments and needlesticks has been reported in the literature.[3,4]

Globally, more than 35 million HCWs face the risk of sustaining a percutaneous injury with a contaminated object every year.[5] American health workers suffer 800,000 to 1 million NSIs annually excluding those that go unreported.[4,6,7] More than 100,000 NSIs occur in UK hospitals each

year.[7,8] In India, it is not known exactly how many occupation related injuries occur each year, and as data are scarce, it is not possible to estimate an annual incidence[9,10].

An HCWs chance of contracting HIV after an HIV infected accidental NSI is 1 in 250, while the chance of contracting HBV after an accidental NSI is 1 in 20 while the chances of contracting HCV after exposure to an HCV contaminated needle stick is 3.5 in 100[11] Although lower transmission rate is found for HIV <0.3%, [5] about 1000 HIV infections mostly in developing countries could occur every year worldwide among HCWs due to exposure to percutaneous injuries. This occupational acquisition of HIV represents a serious consequence of NSIs[5]. HCWs are at risk of the deadly Ebola virus disease which is an emerging infectious disease contracted through exposure to blood and body fluid of infected patients which may be through NSIs[12]. The same is true of Lassa fever[13].

With this background, the present study was undertaken up to know the extent of occupational exposure to needle stick

### Corresponding Author:

Dr. Feroz Ahmad Wani, Senior Resident, Department of Community Medicine, SKIMS Srinagar.

Email: drferoz47@gmail.com

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injuries among health care personnel of tertiary care hospitals. The present study also aims to study the actions taken by the HCWs following an accidental NSI exposure.

## MATERIAL AND METHODS

This cross-sectional study was carried out from April 2014 to October 2014 for a period of six months at Sher-i-Kashmir Institute of Medical Sciences, Soura. All categories of the workforce, which included doctors, nursing-staff, lab-staff, sanitation-staff, administration, laundry and linen, participated in the study. The participants were further broadly classified into high risk and low risk groups depending on the risk of exposure to infectious material. High-risk group include doctors, nursing staff, paramedic/ lab-staff, sanitation, laundry and linen. Low risk group included staff of the hospital administration who was not directly involved with the infectious agent. Needlestick injuries in this study included injuries caused by sharps used during medical intervention such as needles, cannulas and intravenous sets. All the participants were explained the objective of the study and written informed consent was taken from each of them. The data was collected using a pretested, semi structured questionnaire. The questionnaire consisted of information related to socio demographic details, history related to their occupational exposure to needlestick injury in their work tenure.

## DATA ANALYSIS

Data was analyzed by using SPSS software version 20. Results are represented in the form of tables and figures. Chi square test was used for univariate analysis and p value of less than 0.05 was considered as statistically significant.

## RESULTS

Among 2763 employees who participated in the study, 71.4% were males and 28.6% were females. Mean age of employees was  $40.46 \pm 10.1$  years. 57.9% of employees were between 31-50 years of age while only 17.1% were above 50 years of age (Table 1).

**Table 1: Distribution of employees by age and gender**

Socio-demographic characteristics	Number	Percentage
Age ( Mean: 40.46 , SD:10.1)		
≤ 30 Years	691	25%
31-50 Years	1600	57.9%
> 50 Years	472	17.1%
Gender		
Male	1973	71.4%
Female	790	28.6%

**Table 2** depicts that out of total 2763 employees, 27.90% belonged to nursing staff, 24.50% were doctors, and 27.36% belonged to administration and rest of employees 11.11%, 7.35%, 1.77% belonged to lab staff, sanitation, laundry and linen respectively. 72.64% of employees belonged to high risk group and 27.36% to low risk group. High- risk groups included doctors, nursing staff, para- medic/ lab-staff, sanitation, laundry and linen. Low risk group included staff of the hospital administration who were not directly involved with the infectious agents.

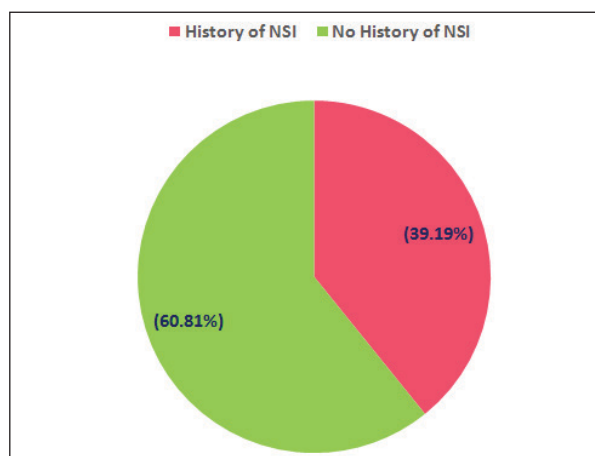
**Table 2: Distribution of employees by category**

Category	N	%
High Risk		
Nursing staff	771	27.90
Doctors	677	24.50
Lab Staff	307	11.11
Sanitation	203	7.35
Laundry and linen	49	1.78
Low Risk		
Administration	756	27.36

Table 3 depicts that 64.16% of employees gave history of some kind of occupational exposure. Among those employees who gave history of occupational exposure 43.20% gave history of needle stick injury, 38.91% had blood and body splash and 17.87% gave history of both kinds of exposure (Table 3 ). Among the total employees who participated in the study, 1083 (39.19%) had history of needle stick injury (Fig. 1).

**Table 3: Distribution of employees by occupational exposure**

	N (%)
Occupational exposure	
Exposed	1773 (64.16)
Not exposed	990 (35.84)
Total	2763 (100.00)
Type of exposure	
Needle stick injury	766 (43.20)
Blood and body splash	690 (38.91)
Both	317 (17.87)
Total	1773 (100.00)



**Figure 1:** Distribution of employees (n=2763) with respect to exposure to NSI

Among the HCWs with NSIs, doctors had the highest percentage (38.6%) followed by nurses (37.9%). laboratory staff (12.3%) and sanitation staff (7.1%). These differences with respect to designation and occurrence of NSIs were found statistically significant. Almost all NSI's (96.7%) were found in the high risk group employees.(Table 4)

**Table 4: Needlestick exposure with respect to gender, designation and risk group of employees.**

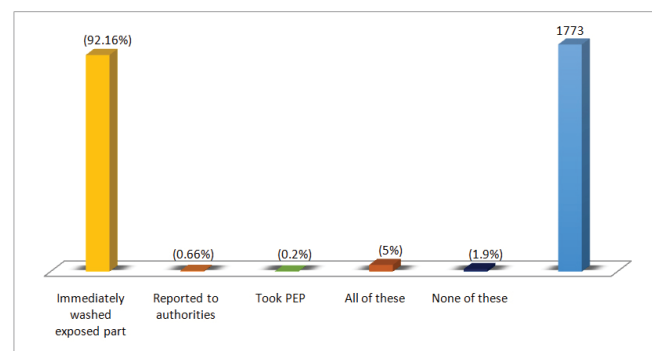
Variable	Needle stick exposure			Test of Significance
	Yes (%)	No (%)	Total No.	
Gender				
Male	688(63.5)	1286(76.5)	1974	$\chi^2=54.719$ $df=1$ $p=0.000$
Female	395(36.5)	394(23.5)	789	
Total (%)	1083(100)	1680(100)	2763	
Designation				
Doctors	418(38.6)	260(15.5)	678	$\chi^2=595.426$ $df=5$ $p=0.000$
Nursing Staff	410(37.9)	358(21.3)	768	
Lab Staff	133(12.3)	176(10.5)	309	
Laundry & linen Staff	9(0.8)	40(2.4)	49	
Sanitation Staff	77(7.1)	126(7.5)	203	
Administrative staff	36(3.3)	720(42.9)	756	
Total (%)	1083(100)	1680(100)	2763	
Risk Group				
High risk	1047(96.7)	960(57.1)	2007	$\chi^2=517.809$ $df=1$ $p=0.000$
Low risk	36(3.3)	720(42.9)	756	
Total (%)	1083(100)	1680(100)	2763	

**Table 5: Characteristic of Reported NSIs**

Characteristics	Frequency
<b>Procedures leading to NSI</b>	
Giving injections	478 (44.1%)
Drawing blood	255 (23.5%)
Stitching / Suturing	215 (19.8%)
Recapping	83 (7.6%)
Others	52 (4.8%)
<b>Type of Needle</b>	
Hollow bore needle	862 (79.60%)
Solid needle	221 (20.40%)
<b>Wearing gloves</b>	
Yes	295 (27.23%)
No	788 (72.76%)

**Table 5** depicts that 44.1% of the needlestick injuries was as a consequence of giving injections, 23.5% while drawing blood, 19.8% during suturing and 7.6% as a consequence of recapping of needles. In 79.605 cases a hollow bore needle was responsible for the injury. Only 27.23% of the employees who sustained needlestick injuries were wearing gloves.

With regards to the action taken following accidental exposure only 5% among high risk group took post-exposure prophylaxis (PEP), reported to authorities and washed the exposed part while other 0.5% of employees among this group took only PEP. Majority of employees (92.6%) immediately washed the exposed part following an accidental NSI (Fig.2).



**Figure 2:** Action taken following accidental exposure among high risk groups

## DISCUSSION

The mean age of our study participants was 40.46±10.01 years which was almost in accordance with that observed by Maryam Amini et al[14] (37±9years). Holla et al[15] in their study also reported majority of study participants belong-

ing to age group between 25 and 45 years with mean age as  $35.53 \pm 9.45$  years. Majority of our study participants were males (71.4%). This was contrary to that reported by Maryam Amini et al [14] in their study where 58.8% were females. Holla et al [15] also reported almost equal distribution of males and females. The most common occupational category in our study were nurses (27.90%) followed by doctors (24.50%) and administrative staff (27.36%). Maryam Amini et al [14] also reported nurses as the predominant category among their study participants. Contrary to this Devendra Jaybhaye et al [16] and Holla et al [15] reported that doctors were the most common among their study participants. In our study out of a total of 2763 study participants 1083 gave history of needlestick injury thus giving an overall prevalence of NSI as 39.19%. This is much lower than that reported by Chen et al [17] (71.3%), Holla R et al [15] (71.9%) and Maryam Amini et al [14] (67.8%). Different prevalence rates have been reported from other countries including 55.5% from Thailand [17], 57 % in England [18] and 72.4% from Canada [19]. The present study revealed that doctors suffered the highest number of NSIs followed by nurses. Similar observations were reported by Salelkar et al [20] and Rahul Sharma et al. However, Muralidhar et al [22] and Devendra Jaybhaye et al [16] reported that NSIs were more common in nurses followed by doctors. Evans et al [23] in their study in UK also reported that nurses were the commonest victims of NSIs. Needle stick injuries were more common among male employees of our study population. Salelkar et al [20] in their study reported almost equal prevalence of NSIs in males and females. Contrarily, Maryam Amini et al [14] reported that female employees had NSIs more than males. The most common procedure responsible for NSI in our study was injection administration (44.1%) followed by blood drawing in 23.5% cases, suturing in 19.8% cases and recapping of needle in just 7.6% of incidents. Salelkar S et al [20] reported maximum NSIs following sharps disposal (31.7%), 21.6% during operative procedures, 13.8% during withdrawal of samples, 13.2% during injections and 6.3% while recapping of needles. However Rahul Sharma et al [21] and Muralidhar et al [22] reported recapping as the most common procedure responsible for NSIs with 34% and 39% NSIs respectively associated with recapping. Devendra Jaybhaye et al [16] reported that in 52% of NSIs recapping of needle was responsible. Muralidhar et al [22] in their study however, reported withdrawal of blood as the commonest clinical activity to cause NSI. In 79.6% of our NSI incidents hollow bore needles were involved. Similar observations were reported by Salelkar et al [20] who reported that in 77.5% incidents of NSIs hollow bore needles were responsible. Rahul Sharma et al [21], Devendra Jaybhaye et al [16] and Muralidhar et al [22] also reported hollow bore needles being responsible for majority of the NSIs. As far as personal protection is concerned, only 27.3% of our employees were wearing gloves at the time of NSI. Contrary to this Maryam Amini et al [14]

reported that only 1.8% used protective barriers. Muralidhar et al [22] in their study reported that majority of health care workers (74%) were wearing gloves at the time of NSI. In another study by Salelkar et al [20] 58% of the health care workers were wearing gloves at the time of injury. Following the NSI, majority (92.6%) of employees immediately washed the exposed part, 5% of the employees washed exposed part, reported to the authorities and took PEP while as a small percentage 0.5% took only PEP. Muralidhar et al [22] in their study reported that 74% of those suffering a NSI took action in the form of washing the site, applying antiseptic, reporting to seniors and seeking advice on PEP. Salelkar S et al [20] in their study reported that 3% of HCWs with NSI had taken PEP for HIV and 32% of HCWs reported the injury to concerned superiors. In a study by Rahul Sharma et al [21] it was reported that 27.5% HCWs reported a NSI to their senior and 20.7% got their blood tested immediately after injury.

## CONCLUSION

NSIs are a common public health problem in this tertiary care institute hence guidelines regarding disposal of biomedical waste must be strictly followed. Proper and continuous awareness among staff with regard to adoption of standard precautions coupled with immunization against hepatitis B, proper working conditions and cooperative atmosphere in the hospital will help in ensuring control of potential blood borne infections due to occupational exposure in this tertiary care institute.

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**Ethical Clearance:** Not required

**Informed Consent:** Taken individually

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**Conflict of interest:** Nil

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