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ORIGINAL ARTICLE

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Prevalence and Knowledge on Needle Stick Injury among Health care Workers of Tertiary Medical center in India.

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ABSTRACT

OBJECTIVES: To assess the prevalence and knowledge of needle stick injury among health care workers which includes surgeons, emergency room workers laboratory room professionals, nurses, class 4 workers (cleaners, sweepers, ward boys/helpers, laundry staff, ambulance staff) in a tertiary medical center in Chennai, Tamil Nadu, India.

METHODOLOGY: This cross-sectional, questionnaire - based study was conducted among 133 health care workers in ACS Medical College and Hospital over a period of January, 2025 to March, 2025. Our study includes students and staff of the institution, irrespect4e of their age and sex and we excluded HCWs administrat4e staff, Trainees or students with less than 6 months of clinical exposure, non-consenting ind4iduals. Data collection was carried out using a standardized questionnaire. Data analysis was carried by statistical package for scientific solutions (SPSS) version 22.0.

RESULTS: Our study showed that class IV workers including cleaners, sweepers, ward boys/helpers, laundry staff, ambulance staff (85.7%) had a history of needle stick injury, and the second significant incidence was amongst nurses (60.5%). 74.4% participants had positive attitude towards worrying about needle stick injury. 25.5% showed negative attitude towards worrying about needle stick injury.

CONCLUSIONS: There should be some preventive measures which includes training regarding the safety devices, post exposure prophylaxis, regular training for disposal of Bio medical waste by the management to elude the occurrence of needle stick injury. Pilot' between our & study has few limitations that our self-administered questions could over estimate or underestimate the result.

KEY WORDS: health care workers, needle stick injuries, blood borne infection, prophylaxis.

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INTRODUCTION

Needle stick injuries (NSI) have always been one of the occupational hazards for healthcare workers (HCWs) which includes surgeons, emergency room workers laboratory room professionals, nurses, class 4 workers (cleaners, sweepers, ward boys/helpers, laundry staff, ambulance staff).[1] NSI lead to the transmission of various infections such as hepatitis B, hepatitis C and human immunodeficiency virus (H4).[2] HCWs accidentally exposed with severe or even fatal blood borne infections due to NSI.[2,3] To prevent the HCWs from blood borne infections caused after occupational exposure, guidelines for post exposure prophylaxis must be followed. Professionals are at high risk during the usage of sharp instruments which have any contact with compromised skin, eyes, mucous membranes or parenteral contact with blood and potentially infectious materials. Health Protection Agency, UK reported that NSI accounted for 71% of occupational exposure to blood-borne infections. In Kerala, 31% of HCWs experienced at least one NSI within the past 12 months.[4] In contrast, a tertiary hospital in Delhi reported that 79.5% of healthcare workers had experienced one or more NSIs in their careers.[5] A systematic review of 87 studies across 31 countries, involving approximately 50,900 HCWs, found the global pooled one-year prevalence of NSI among healthcare workers to be around 44.5%.[6] Occupational exposure can be minimized by post

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exposure prophylaxis. Protocol comprises the following steps: immediate washing of injured site with soap and water without scrubbing, assessment of the risk of transmission of infection with the exposure, evaluating the source patient for blood borne infections, after evaluation if patient is infected then follow up with initiation of Post-Exposure Prophylaxis with appropriate anti-retroviral or immunoglobulin under the assessment of health care personnel. Needle stick injury should be treated within 2 hours. Various studies on NSI have been carried out. However, a comprehensible data from developing countries were rarely reported. Assessing the prevalence of needle stick injury is essential to estimate the occupational risk of blood-borne infections, identify high-risk practices, guide the development of training and policies, ensure workplace safety, and evaluate the effect4eness of prevent4e measures. This kind of evidence-based study helps health care organizations design safer protocols and prevention strategies.

METHODOLOGY

This is a cross-sectional study conducted among the 133 health care professionals includes senior residents, junior residents, interns, nurses, laboratory technicians, Class 4 workers. This study was carried out between January 20, 2025, and March 20, 2025 at ACS Medical College and Hospital, Chennai, India.

Inclusion Criteria

- HCWs act4ely employed in a hospital or clinic for at least 6 months.
- Professions: Doctors, nurses, technicians, and support staff (e.g., phlebotomists, cleaning staff handling sharps).
- Age: 18 years or older.
- Willing to provide informed consent (implied by completing the anonymous questionnaire).

Exclusion Criteria

- Administrat4e staff
- Trainees or students (e.g., medical/nursing students) with less than 6 months of clinical exposure.
- HCWs who have not worked in the past 12 months (e.g., on extended leave).
- Non-consenting ind4iduals (i.e., those who choose not to complete the questionnaire).

Data collection was carried out by standardized questionnaire Via hospital departments during staff meetings. The questionnaire, pre-tested on randomly selected 30 samples to ensure its practicability, validity, interpretation of responses, and reliability. The questionnaire was modified and developed based on previously published studies and review of the literature. The structured questionnaire consists of the following information: demographic details, practice, knowledge, attitude towards NSIs. Front page of the questionnaire was incorporated with informed consent and structured online questionnaire was distributed to HCWs. Data analysis was carried out with statistical package for scientific solutions (SPSS) version 22.0. This study was conducted after procuring the ACS Medical College and Hospital, Chennai, India Institutional Ethics committee approval.

RESULTS

133 health care workers comprised predominantly young ind4iduals (mean age ~25 years), with a majority being female interns and nurses. The high proportion (85%) of healthcare workers in high-risk areas underscores significant occupational vulnerability to needle stick injuries (NSIs) and other exposures. Additionally, Class 4 workers, although fewer in number, constitute an important risk group due to potential improper handling of biomedical waste. This is depicted in table 1.

More than a third of healthcare workers reported needle stick injuries, with nursing staff (60.5%) and Class 4 workers (85.7%) being the most vulnerable. Interns and residents also reported a significant incidence, highlighting procedural risks. . The differences in incidence across groups were statistically significant ($p < 0.001$), as calculated using the Chi-square test. The difference in the proportion of needle stick injuries was statistically significant [Table 2] (Chi-square test, $p < 0.001$).

Among 133 respondents, 91% people had vaccinated against Hepatitis B and 28.1% had checked anti HBs antibody after HBV vaccination. This is depicted in table 3.

Further the questions were concerned with the risk and safety measure of the NSI. 37.6% respondents experienced with NSI, 52% respondents had not worn gloves at the time of NSI. Among overall respondents 42.9% used needle cutter or syringe destroyer. This is depicted in table 4.

Although nearly half of healthcare workers performed immediate first aid (soap and antiseptic) after NSIs, a significant majority failed to formally report incidents. Reasons cited suggest gaps in awareness, systemic deficiencies, and cultural barriers in the workplace. Underreporting (58%) poses a substantial challenge to occupational safety, potentially depr4ing unreported cases of timely post-exposure prophylaxis (PEP) and follow-up care. These data are depicted in table 5.

General awareness questions were also asked from respondents. 65.4% had reported that needle stick injuries is often neglected. 74.4% had considered NSI as harmful. To know the awareness of HCWs regarding reporting department after exposure to NSI. 25.6% respondents stated causality, 8.3 % lab

Table 1. Demographic characteristics of informant

	N	%
Age Mean (SD) Min – Max	24.96 (5.25) 19 – 52	19%
Gender Male Female	32 101	24.1 75.9
Occupation Residents/Physician Interns Nursing staff Lab technician Class 4 workers	33 38 38 17 7	24.8 28.6 28.6 12.8 5.3
Working status High risk area Low risk area	114 19	85.7 14.2

Table no 2. Incidence of needle stick injury

Designation	Incidence of needle stick injury		P value
	Yes, n(%)	No, n(%)	
Residents	10 (30.3)	23 (69.7)	<0.001C
Interns	10 (26.3)	28 (73.7)	
Nursing staff	23 (60.5)	15 (39.5)	
Lab technician	1 (5.9)	16 (94.1)	
Class 4 workers	6 (85.7)	1 (14.3)	
Total	50	83	

Table no 3. Vaccination

Have you checked Anti HBs antibody after HBV vaccination Yes No	34 (28.1) 87 (71.9)
Are you vaccinated against Hepatitis B Yes No	121 (91.0) 12 (9.0)

incharge,12% ICN nurse or supervisor, 12.8% medicine, 5.3% microbiology, 5.3% health care authority, 3.8% surgery, 3.8% others, 23.3% don't know. 72.2% respondents had knowledge on un4ersal precaution guideline. 53.4% respondents stated that gloves provide protection against NSI. 87.2% respondents were aware that NSI lead to blood borne diseases. 88% Respondents were aware that HCV are transmitted by NSI. 83% respondents responded that transmission of HBV has been more likely possible than H4 by needle stick injury. 59.4% respondents had knowledge that after exposure with NSI both (health care and patient) samples to be evaluated. 89.5% respondents stated that post exposure prophylaxis is necessary. 95.5% respondents responded that needle should be discarded immediately after usage whereas 76.7% people stated that

Table no 4. Risk and safety measures of needle stick injury

	n (%)
Did you experience any needle stick injury? Yes No	50 (37.6) 83 (62.4)
How many times did you get needle stick injury? Median Interquartile range	2 1 – 6
Were you wearing gloves during needle stick injury Yes No	24 (48.0) 26 (52.0)
Do you use needle cutter or syringe destroyer? Yes Rarely No	57 (42.9) 26 (19.6) 50 (37.6)

Table no 5. After incidence of needle stick injury

What you have done after needle stick injury? Applied antiseptic solution Washed the area with soap Others	24 (48.0) 24 (48.0) 2 (4.0)
Did you report your needle stick injury? Yes No	21 (42.0) 29 (58.0)
If no, then what was the reason for non-reporting? Was a minor injury Too busy in work Not aware of reporting No reporting system Stigma	10 (34.5) 6 (20.7) 5 (17.2) 5 (17.2) 3 (10.3)

needle should be recapped after usage. Among 133 respondents 48.1% uses PPE while handling blood and body secretions. This is depicted in table 6.

The Un4ariate regression analysis showed that older age (β=-0.066), nursing staff (β=-1.986) and those who experienced needle injury (β=-0.752) were likely to have low awareness about the needle stick injury. When all the factors adjusted in the mult4ariate model, only the nursing staffs were more likely to have low awareness score. All other factors like age, gender were not statistically significant (table 7).

DISCUSSION

The study shows that the incidence of NSI among HCWs were 37.6% which was low compared to Ghufran et al[7] who had a rate of 53.8%. In various studies, results showed that nurses were highly exposed and other studies showed the incidence of NSI was significantly higher among those physician, young HCWs

Table No 6. Reporting after needle stick injury

	n (%)
Do you consider needle stick injury are often neglected and un reported	
Yes	87 (65.4)
No	46 (34.6)
Do you consider needle stick injury as harmful	
Yes	99 (74.4)
Maybe	21 (15.8)
No	13 (9.8)
To which department do you report needle stick injury	
Causality	34 (25.6)
Lab incharge	11 (8.3)
ICN nurse or supervisor	16 (12.0)
Medicine	17 (12.8)
Microbiology	7 (5.3)
Health care authority	7 (5.3)
Surgery	5 (3.8)
Others	5 (3.8)
Don't know	31 (23.3)
Do you know about un4ersal precaution guidelines?	
Yes	96 (72.2)
No	37 (27.8)
Do Gloves provide protection against needle stick injury?	
Yes	71 (53.4)
No	62 (46.6)
Do you know needle stick injury results in transmission of blood borne diseases?	
Yes	116 (87.2)
No	17 (12.8)
Can HCV can be transmitted by needle stick injury?	
Yes	117 (88.0)
No	16 (12.0)
Is there more possibility of transmitting of HBV than H4 by needle stick injury?	
Yes	111 (83.5)
No	22 (16.5)
Whose blood sample has to be tested in case of sharp injury?	
Both	79 (59.4)
Health care staff	23 (17.3)
Patient only	18 (13.5)
Not required	13 (9.8)
Post exposure prophylaxis is really necessary	
Yes	119 (89.5)
No	14 (10.5)
Needles should be discarded immediately after use	
Yes	127 (95.5)
No	6 (4.5)
Needles should be recapped/bent after use	
Yes	102 (76.7)
No	31 (23.3)
Do you use PPE during every task while handling blood and body secretions?	
Yes	64 (48.1)
Rarely	27 (20.3)
No	42 (31.6)

Table no 7. Regression analysis showing factors showing the awareness about needle stick injury among health care works

Factors	Un4ariate analysis		Mult4ariable analysis	
	β Coefficient (SE)	P value	β Coefficient (SE)	P value
Age	-0.066 (0.031)	0.035	-0.022 (0.034)	0.516
Gender	-0.068 (0.387)	0.860	-0.304 (0.372)	0.416
Male*				
Female				
Occupation	-0.322 (0.412)	0.434	-0.313 (0.431)	0.470
Residents*	-1.986 (0.412)	<0.001	-1.852 (0.441)	<0.001
Interns	0.160 (0.516)	0.975	0.143 (0.552)	0.795
Nursing staff	-1.311 (0.720)	0.071	-1.231 (0.761)	0.108
Lab technician				
Class 4 workers				
Incidence of needle injury	-0.752 (0.335)	0.027	-0.112 (0.353)	0.739
No*				
Yes				

practicing surgery.[8,9,10] The highest incidence of needle stick injury was among class 4 workers 85.7%; however, only 42% has reported which is consistent with the findings of Sardesai, R. V et al.[1] A significant concern is the underreporting of sharp injuries, with 58% of NSIs going unreported, often due to being perce4ed as minor injuries. This trend may be attributed to inadequate awareness and inexperience among healthcare workers, potentially increasing their vulnerability to bloodborne diseases. The second highest incidence of needle stick injuries was among nurses [65%], which is consistent with the findings of Sreeja et al.[11] and higher compared to Ghufran et al.[7], who reported a rate of 36.5%. This disparity is likely due to inadequate staffing, frequent shifts, and responsibility for administering medications. We found that a significant majority 91% of our participants were vaccinated, which is high compared to other studies like Sreeja et al.[11,12,13,14]

Alarmingly, 71.9% of vaccinated ind4iduals hadn't checked their anti-HBs titres. We strongly recommend making anti-HBs titre

testing a standard practice, done one month after the third vaccine dose and properly documented. Our study aims to prompt management to adopt this policy for all healthcare professionals. Routine titre checks and boosters aren't advised, as titre levels naturally decline over time. Unlike other studies, recapping accounted for only 48% of needle stick injuries in our research. However, concerningly, only 42% wore gloves, 48.1% used needle cutters, and a similar percentage used PPE when handling blood and bodily fluids which is lower when compared to previous studies.[7,15] According to Post exposure actions, 37.6% of HCWs who sustained NSI washed the injury site with soap and applied antiseptic solutions 48% which is similar when compared with P. S. Aswin et al and Ullah H et al.[14,16] Reports from various study shows that NSI were reported to appropriate authorities by HCWs at rate of Poland 55%17, UK 51% [18] but it is lower than that 80% reported from UAE1[9,20] and India.[9] 87.2% of participants had a high awareness that NSIs can transmit bloodborne diseases like HBV, HCV, and H4 when compared with Aswin, P. S et al.[14] Our study shows 74.4% participants had posit4e attitude towards worrying about NSI. 25.5% showed negat4e attitude towards worrying about NSI.

CONCLUSION

This study found that Class 4 workers were the most affected by needle-stick injuries, followed by nurses, underscoring occupational vulnerability among these groups. The findings highlight the urgent need for better reporting mechanisms and prevent4e training to reduce workplace risks. As this was a single-center, cross-sectional study based on self-reported data, the results should be interpreted with caution, but they provide valuable insights for strengthening safety protocols in similar healthcare settings.

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CONFLICT OF INTEREST

Author declared no conflict of interest

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AUTHORS CONTRIBUTIONS

KDV: Conception, Design of the work, Data collection, and Drafting, Reviewed, Final approval, Agreement to be accountable.

JN: Conception, Design of the work, Acquisition, Data Analysis, and Drafting, Reviewed, Final approval, Agreement to be accountable.

IKS: Conception, Design of the work, Interpretation of data for the work, and Drafting, Final approval, Agreement to be accountable.

DATA SHARING POLICY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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