# Proportion of needle stick injury and its characteristics among nursing staffs in a tertiary care teaching hospital in Trivandrum, South India

**Amritesh Kumar[1], Srinivas KSN[2*], Sruthy Sathyan[3], Blessed Singh.S[4], Vannya.M.S[5]**

[1,2]Assistant Professor, [3]Cheif Statistician, [4]Professor and HOD, [5]Post Graduate, [1-5]Dept. of Community Medicine, Thiruvananthapuram, Kerala, India

***Corresponding Author: Srinivas KSN**
Email: amritesh2003@gmail.com

## Abstract
**Introduction:** A cross-sectional study was conducted among health care workers (Nurses) at a tertiary care hospital in Trivandrum, Kerala to study the proportion of needle stick injury and associated factors. A semi structured questionnaire was used to collect data from the study participants at their work place. Participants were asked to recall needle stick injuries (NSIs) in the preceding 6 months and definition of needle stick injury was formulated. Factors such as work experience, type of procedure, action taken following injury etc were also studied.
**Results:** The prevalence of NSIs was 94(47%). Mean age of 200 participants was 32.8 years (± 6.8), all were female.
Emergency department accounted for highest (62.8%) of NSIs. & it was maximum (42.6%) during injection procedure. Heavy work load (37.2%) followed by inattention (32%) were prime causes. Following injury 34% of nurses washed injury site with soap & water and applied antiseptics as well. usage of personal protective equipment(PPE) was 84%. Prime causes for not using PPEs were lack of supply and inappropriate size of gloves respectively.
Usage of PPEs were found to be significant in preventing NSIs.
**Conclusion:** Prevalence of NSI is high and measure for safety concern. There is urgent need of close monitoring and implementation of uniform NSIs programme like safe practices, safe disposal of sharps, mandatory reporting of needle stick injury at work station.
Provision of post exposure prophylaxis following NSIs.
**Limitation:** Small sample size, purposive-sampling and impact of information broacher regarding NSIs could not be accessed.

**Keywords:** Nurses, Cross-sectional study, Needle prick injury, Proportion.

## Introduction
Nurses are identified as a key provider in the management of patients at all levels of health care services round the globe. They play a pivot role in patient care by enhancing patient safety, quality care & effectiveness of care delivery, thus essential & irreplaceable.[1,2]

All health care professional deal with a wide range of hazards on duty, including blood & body fluid exposure, musculoskeletal injuries, ergonomic hazards &repetitive tasks; nursing personnel often experience these hazards & risks most / more frequently than others.[3] Nurses have highest level of NSIs compared to all other health care personals.[3] Around 3-6 billion injections are given per year, of which 2/3rd injections are safe. There is huge number of under reporting as well.[5]

Needle stick injuries (NSIs) are wounds caused by needles used in health-care set-up that may accidentally puncture the skin resulting in exposure to blood or other body fluids. NSI is a major occupational health & safety issue faced by health-care professionals globally. These events are of concern because of the risk of blood-borne diseases such as HBV, HCV & HIV. Despite their seriousness as a medical event, NSIs have been neglected, most go unreported & ICD-10 coding is not available.[6]

WHO reports in the World Health Report 2002, that of the 35 million health- care workers, 2 million experience percutaneous exposure to infectious diseases each year. It further noted that 37.6% of Hepatitis B, 39% of Hepatitis C & 4.4% of HIV/AIDS in Health-Care Workers around the world are due to NSIs.[7]

NSIs are a common event in the health-care set ups & these injuries may occur not only with freshly contaminated sharps, but also with needles with dry blood In it.[8,9]

### Rationale
An assessment done by the WHO, Eastern Mediterranean Regional Office shows an average of four NSIs per year per health-care worker. It is much higher in developing countries. Thus this study was undertaken to address important issue of NSI among heath care nursing staffs and explore the circumstances under which they occur with following.

## Objectives
### Primary Objective
To determine the proportion of NSIs among the nurses in a tertiary care hospital in Trivandrum district of Kerala, South India.

### Secondary Objective
To find out associated factors.

## Materials and Methods
A cross sectional study was conducted among nurses working in various clinical departments of Dr.Somervell Memorial C.S.I, a tertiary care a large, 800 bedded, teaching hospital in Kerala, India. The study was carried out over four months from September to March of 2019.

A non probability purposive sampling was done. Attempt was made to cover at least 185 nurses, working in clinical departments where exposure to needle stick injury

may occur. The calculated sample size was 185 (using formula $4PQ/d^2$, p=35%)[10] however final sample size was 200. Respondents, willing to participate and gave written informed consent were included. Whereas those who were absent & could not be contacted after 2 attempts were excluded from the study.

Subjects were fully informed about the design and purpose of study. A written informed consent was obtained prior study. Data were collected using a pretested, semi-structured questionnaire consisted of socio demographic details, history related to occupational exposure to NSIs and knowledge regarding the same.

Self administered questionnaire were distributed and retried in front of researchers. Collected data were entered into MS Excel and analyzed using SPSS (version 20.0).Mean & Standard deviation were calculated for quantitative variables& frequency and percentage for qualitative variable. Comparison between NSI & associated factors were analysed using chi-square test & fisher exact test at P value <0.05.

Case definition of NSIs in this study used as any injuries caused by sharps such as hypodermic needles, blood collection needles, IV set, suture needles, winged needles, etc used in hospital. Responded who gave history of NSIs were directed to nursing superintendent to seek advise on PEP and infection control measures from hospital.

## Results

The prevalence of Needle Stick Injuries was 94 (47%) among 200 respondents. The mean age of respondents was 32.8 years (± 6.8) and all were females.

**Table 1:** Distribution of characteristic of the respondents (n=200)

| Variables | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age (Years)** | | |
| 21-30 | 80 | 40.0 |
| 31-40 | 95 | 47.5 |
| 41-50 | 24 | 12.0 |
| 51-60 | 1 | 0.5 |
| **Marital status** | | |
| Single | 29 | 14.5 |
| Married | 169 | 84.5 |
| Widow | 1 | 0.5 |
| Divorced | 1 | 0.5 |
| **Educational Status** | | |
| GNM | 130 | 65.0 |
| BSC | 62 | 31.0 |
| MSC | 8 | 4.0 |
| **Years in Service** | | |
| <1 year | 12 | 6.0 |
| 1-5 | 62 | 31.0 |
| 6-10 | 84 | 42.0 |
| ≥ 10 | 42 | 21.0 |

**Table 2:** Characteristic of NSIs among respondents (n=94)

| Variables | Frequency (n) | Percentage (%) |
|---|---|---|
| **Activity leading to NSIs** | 59 | 62.8 |
| During injection | 12 | 12.8 |
| Intervention by instruments | 7 | 7.4 |
| Recapping needle | 7 | 7.4 |
| During cleaning | 8 | 8.6 |
| Disposal of sharps | 1 | 1.0 |
| **Location of injury** | | |
| Emergency department | 40 | 42.6 |
| Medicine department | 30 | 31.9 |
| OT | 12 | 12.8 |
| Surgery department | 10 | 10.6 |
| Others | 2 | 2.1 |
| **Duty shift** | | |
| Morning shift | 60 | 63.8 |
| Night shift | 19 | 20.2 |
| Evening shift | 15 | 16.0 |

| | | |
|---|---|---|
| **Cause of NSI** | | |
| Heavy work load | 35 | 37.2 |
| Inattention | 30 | 32.0 |
| Lack of protective measures | 20 | 21.3 |
| Tiredness | 2 | 2.1 |
| Others | 7 | 7.4 |

**Table 3:** Characteristic of NSIs among respondents

| Variable | Frequency(n) | Percentage (%) |
|---|---|---|
| **Usage of PPEs(n=200)** | | |
| Used always | 168 | 84.0 |
| Occasionally used | 28 | 14.0 |
| Not used | 4 | 2.0 |
| **Reasons for not/occasionally using PPEs (n=32)** | | |
| Inadequate supply | 13 | 40.6 |
| Laziness | 9 | 28.1 |
| High patient load | 3 | 9.4 |
| Others | 7 | 21.9 |
| **Usage of gloves at the time of NSI (n=94)** | | |
| Yes | 32 | 34.0 |
| No | 62 | 66.0 |
| **Appropriate disposal of waste(n=200)** | | |
| Always | 185 | 92.5 |
| Sometimes | 15 | 7.5 |
| **NSIs reporting to higher authority(n=94)** | | |
| Reported | 41 | 43.6 |
| Not reported | 53 | 56.4 |
| **Reasons for not reporting (n=53)** | | |
| Fear of losing job | 29 | 54.7 |
| Stigma | 10 | 18.9 |
| Hectic schedule | 7 | 13.2 |
| Unaware of reporting system | 3 | 5.7 |
| Others | 4 | 7.5 |

**Table 4:** Measures Undertaken by the respondents after NSIs (n=94)

| Immediate Measures following NSIs | Frequency | Percentage |
|---|---|---|
| Wash with water only | 27 | 28.7 |
| Wash with water and soap | 32 | 34.0 |
| Applied antiseptic only | 1 | 1.0 |
| Wash with water and applied antiseptic | 13 | 13.8 |
| Wash with water + soap & applied antiseptic | 21 | 22.5 |
| **Blood test done after NSI** | | |
| Done HIV testing | 9 | 9.6 |
| Done HBV testing | 1 | 1 |
| Not done | 84 | 89.4 |
| **Vaccination taken after NSI** | | |
| Hep B vaccine | 1 | 1 |
| Tetanus | 12 | 12.8 |
| Toxoid | 7 | 7.4 |
| BothNone | 74 | 78.8 |
| **Post Exposure Prophylaxis** | | |
| Taken | 13 | 13.8 |
| Not ken | 81 | 86.2 |

Almost all 99.5% (N=199) nurses had knowledge about spread through NSI. Almost 92.5% (185) participated in awareness class on NSI organized by college and only 75% (N=15) were not immunized against Hep B and 2% (N=4) against TT. Majority of respondents had knowledge about post exposure prophylaxis against Hep B 99% (198), Tetanus (100%(200), HIV (60%(N=120)

**Table 5:** Comparison between Needle Stick Injuries (NSIs) and Associated Factors.

| Parameter | Needle stick injury | | $X^2$ | df | p-Value |
|---|---|---|---|---|---|
| | Injured (n=9 4) N (%) | Not injured (n=106) n(%) | | | |
| **Total years of experience** | | | | | |
| < 1 years | 4(4.3%) | 8 (7.5%) | 5.284 | 3 | 0.155 |
| (1- 5 years | 35(37.2%) | 27(25.5%) | | | |
| (6 -10 years) | 40(42.6%) | 44(41.5%) | | | |
| >10 years | 15(16.0%) | 27(25.5%) | | | |
| **Usage of Adequate Personal Protective Equipment** | | | | | |
| Use always | 72(76.6%) | 96(90.1%) | 9.027 | 2 | 0.007 |
| Occasionally | 18(19.1%) | 10(9.4%) | | | |
| Never | 4(4.3%) | 0(0.00%) | | | |
| **Participation in seminars on NSI** | | | | | |
| Attended | 88(93.6%) | 97(91.5%) | 0.319 | 1 | 0.604 |
| Not attended | 6(6.4%) | 9(8.5%) | | | |

## Discussion

HCWs are exposed to occupational hazards of injury with contaminated needles and sharps which could lead to blood-borne infections.

In this study prevalence of NSIs was found to be 47%,which is higher compared to similar studies done by ChinthaSujatha et al[10] (35%), Ananthachari K R et al[11] in Malabar medical college Calicut, Kerala (21.1%) and Ruta Lukians kyte et al[12] in Lithuania (38.5%).

Maximum respondents belong to age group of 31-40 years (53%), which is higher than a study done by RutaLukianskyte et al among nursing staff & nursing students[12] (27%) in the same age group.

In a study by Awoke Kebede et al[13] among nurses in Northeast Ethiopia, majority (66.7%) of respondents had less than or equal to 5 years of work experience. Whereas in the present study 42% of them had 6-10 years of experience. In this study 63.82% of NSIs occurred during day time which is lower than a study conducted by Arati Sharma et al[14] (83.7%). This increased incidence of NSIs in the day time may be due to increase in patient influx during morning hours, it further increases the overall work load of HCWs.

A study by Ananthachari K. R et al[11] among health care workers of Malabar Medical College, only 46.2% of respondents reported about NSIs to health authority, which is similar to our study (43.6%). This reduced reporting may be due to system of scrutiny by higher authority& apprehension to lose job.

In this study, most of the NSIs occurred in emergency department (42.5%) followed by medical ward (31.9%). Similar pattern was found in another study conducted by Yeshitila M et al,[15] which was 39% in emergency department & 27.1%in medical ward. This higher percentage of NSIs may be due to high patient load and urgency of cases.

In a study by Ruta Lukianskyte et al among staff nurses & nursing students in Lithuania[12], most common activity leading to NSI was recapping of needles (51%), followed by injection procedure (11%).Whereas in this study, it was highest during injection procedure (62.7%) followed by intervention by instruments (12.7%) like scalpels, lancets, scissors etc. Eventhough the nurses had training regarding preventive measures of NSIs, 7.4% got NSI while recapping. This reflects safety protocols were not followed religiously by nursing staffs.

A study conducted by N.Gita&N.P.Rao,[16] the most common cause for NSIs was due to negligence by health-care workers & failure to follow the safety instructionsat work station (36.4%).Whereas heavy work load (37.2%), followed by inattention (31.9%) were the cardinal reasons in this study. The health care system in a tertiary care centre is a stressful and hectic one, and prolong duty hours are inevitable. It must be ensured that nurses putting in long hours mustbe provided compulsory short breaks in between, so that they will have a positive impact.

In a study conducted by Sumathi Muralidhar et al among health-care workers in a tertiary care hospital of India[17], 74% of them sustained NSIseventhough they used PPE such as gloves. Whereas in this study, only 34% of them reported NSIs despite usage of gloves. This may be due to non availability and/ inappropriate gloves size during procedure.

In a study conducted by Chinta Sujatha et al among health care workers in Trivandrum Medical College[10], only 55% of them followed proper sharp disposal instruction. It was 92.5% in this study. This higher percentage of proper sharp disposal may be due to compulsory display of biomedical waste segregation flow chart in each ward.

In the knowledge domain, majority (99.5%) of nurses had adequate knowledge about spread of diseases (HIV, Hepatitis B, Hepatitis C) through NSI. It is similar to a study by Ananthachari K. R et al[11] regarding their knowledge on spread of HIV, Hepatitis B & Hepatitis C following NSIs as (100%), (99.1%),(81.4%) respectively.

92.5% of respondents in this study were immunized against Hepatitis B. This is because it is mandatory to take vaccination prior joining work as per institution rule. Similar findings (94.4%) were reported in a study done by Ananthachari K. R et al.[11] Such measures helps in curbing preventable infections among vulnerable section of health care workers.

In a study conducted by S. Tetali et al in three tertiary care hospitals in South India,[18] only 39% had knowledge

about post exposure prophylaxis(PEP) following NSIs. Whereas it was 98% in current study. This increased knowledge among nursing staffs in our study may be due to quaternary sessions on NSI and preventive measures by infection control department.

There is a difference in the proportion of not injured (90.1%) who always use PPEs and was found to be statistically significant (p=0.007).

## Conclusion and Recommendation

In our study the proportion of NSI was high. One third of NSI was due to heavy work load followed by inattention. Almost all respondents had sufficient knowledge regarding spread of HIV, Hep B, Hep C through NSIs. Usage of personal protective measures were found to be statistically significant in preventing them.

All nurses should be encouraged for safe practices during health care services. All NSIs must be self-reported without delay as an emergency in fear free atmosphere. Appropriate post prophylactics must be availed. Compulsory periodic training programs can conducted for recent updates and a robust induction and in-service programme will protect such preventable calamity.

### Limitation

This study was conducted in a single hospital. So, obtained results can not be generalized. Many respondents might fail to reveal exposure to NSIs and infection status in fear of losing Job. Post study a browser containing information on NSI was provided to reinforce safely net. Although its impact could not be assessed.

### Acknowledgement

This study was supported by Dr.Somervell Memorail C.S.I Medical college and Hospital, Trivandrum Kerala, India. The authors are grateful to the respondents who participated in this study. Special thanks to all undergraduate students Suddhhanyaa S,Sujhitha S.A, Sulthana Sajad, Sweethy G Merlin, Tony Santosh, Varsha AS, Vijil B P, Vikas Vikram V.K and Mr. Michael Hoover for their time and efforts in guiding us through the data collection and compilation, and realization of this research article.

**Source of Funding**: None.

**Conflict of Interest**: None.

**Ethical Approval:** EIC Obtained.

## References

1. American Academy of Ambulatory Care Nursing. American Academy of Ambulatory Care Nursing position statement: the role of the registered nurse in ambulatory care. *Nurs Econ* 2011;29(2):96, 66.
2. Grumbach K, Bodenheimer T. Can health care teams improve primary care practice? *JAMA* 2004;291(10):1246-51.
3. Centers for Disease control & prevention worker health chartbook, 2000. Cincinnati (OH): US department of health & human services, public health service; www.cdc.gov. Sep 2000.
4. Muralidhar S, Singh PK, Jain RK, Malhotra M, Bala M. Needle stick injuries among health care workers in a tertiary care hospital of India. *Indian J Med Res* 2010r;131:405-10.
5. Ustun A P, Rapiti E, Hutin Y. Sharps injuries: global burden of disease from sharps injuries to health-care workers.Geneva, World Health Organization, 2003 (WHO Environmental Burden of Disease Series, No. 3).
6. Jalinalaishram, AvinashKeisam et al; prevalence of needle stick injuries among nurses in a tertiary care hospital & their immediate response, international journal of medicine & public health oct-dec 2013;3(4).
7. Protecting health-care workers – preventing needlestick injuries. Available at https://www.who.int/occupational_health/topics/needinjuries/en/sh arps. cited on 30.10.2018
8. Cardo DM, Culver DH, Ciesielski CA, Srivastava PU, Marcus R, Abiteboul D, et al. Acase-control study of HIV seroconversion in health care workers after percutaneous exposure. Centers for disease control and prevention needlestick surveillance group. *N Engl J Med* 1997;337:1485-90
9. Ippolito G, Puro V,Heptonstall J, Jagger J, De Carli G, Petrosillo N et al. Occupational human immunodeficiency virus infection in health care workers: Worldwide cases through September 1997. *Clin Infect Dis* 1999;28:365-83.
10. Sujatha C. Needle stick injury among healthcare workers in a tertiary care hospital, kerala. October 2017. Published online doi:10.18410/JEBMH/2017/996
11. Ananthachari KR, Divya CV. A cross sectional study to evaluate needle stick injuries among health care workers in Malabar medical college, Calicut, Kerala, India. *Int J Community Med Public Health* 2016;3:3340-4.
12. Lukianskyte et al. Needle sticks and sharps injuries experienced by staff nurses and nursing students and their prevention.2012:8(1).Published online doi:https://doi.org/10.3396/ijic.v8i1.8961.
13. Kebede A, Gerensea H. Prevalence of needle stick injury and its associated factors among nurses working in public hospitals of Dessie town, Northeast Ethiopia, 2016. *BMC Res Notes* 2018;11:413. Published online doi: 10.1186/s13104-018-3529-9
14. Sharma A,Tripura K, Acharjee A. A Cross Sectional Study on Prevalence of Needle Stick Injury And Management Practices Among Health Workers Working In A Teaching Hospital, Tripura." *IOSR J Dent Med Sci* (IOSR- JDMS), 2018;17(1); 05-07. www.iosrjournals.org
15. Yeshitila M, Mengistie B, Demessie A, Godana W (2015) Prevalence and Associated Factors of Needle Stick Injury among Nursing andMidwifery Students an Haramaya and Jigjiga University, Eastern Ethiopia. Primary Health Care 5: 186. Published online doi:10.4172/2167-1079.1000186
16. Gita N, Rao N P. Needle stick injuries in a tertiary care hospital in India: Observations from a clinical audit;july 2017:5(7).
17. Muralidhar S et al. Needle stick injuries among health care workers in a tertiary care hospital of India; *Indian J Med Res* 2010;131:405-10.
18. Tetali S, Choudhury P L. Occupational exposure to sharps and splash: Risk among health care providers in three tertiary care hospitals in south India. *Indian J Occup Environ Med* 2006;10:35- 40.

**How to cite this article:** Kumar A, Srinivas KSN, Sathyan S, Singh SB, Vannya MS. Proportion of needle stick injury and its characteristics among nursing staffs in a tertiary care teaching hospital in Trivandrum, South India. *Indian J Forensic Community Med* 2019;6(2):61-5.