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# Knowledge regarding Needle Stick Injury among Nursing Students of Selected Nursing Colleges in Pokhara

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## ABSTRACT

**Introduction:** Medical, paramedical and all health workers including nursing students are at high risk to exposed blood borne infection through sharp injuries. Worldwide prevalences of NSI in health workers ranges from (13 to 62) % and among nursing students was (12-85) %. Most incidents occurred during drug administration, drug preparation, recapping and carrying syringes. (Write or scenario or consequences of needle stick injury than definition in this portion) in the objectives of this study we to assess knowledge regarding needle stick injury among nursing students**.**

**Methods:** A cross-sectional study design was used among 141 nursing students of School of Health and Allied Sciences, Pokhara University and Gandaki Medical College. Non-probability purposive sampling technique was used for the data collection. Data was collected by using a semi-structured self- administered questionnaire after getting ethical approval from institutional review committee (IRC) of Pokhara University. The written informed consent was obtained from all the participants. Data was coded and entered in Epi Data 3.1. and analyzed with statistical package for statistical software (SPSS) (use full form at first) version 23. Data was analyzed by using mean, frequency, standard deviation and chi-square test.

**Results:** The study found that nearly half of the respondents had history of needle stick injury. The mean score of respondent was 1.1064 ± 0.33171**.** Almost all of the respondents (90.10%) had adequate knowledge and 9.20 percent had moderately adequate knowledge regarding needle stick injury. There was a significant association of level of knowledge on NSI with father's occupation (*p=0.050)* and mother's occupation (*p=0.018*).

**Conclusions:** The study concluded that almost all respondents had adequate level of knowledge regarding needle stick injuries (NSI) among nursing students. There was a significant association of level of knowledge on NSI with respondent's father's and mother's employment. Efforts should be made to reduce the incidence of needlestick injuries (NSIs) by providing healthcare workers with periodic training, addressing emotional well-being in the workplace, and ensuring the availability of appropriate personal protective equipment (PPE).

**Keywords:** *Knowledge, Needle stick injury, Nursing Student*

## INTRODUCTION

Nursing students are at high risk of needle stick injury due to their limited clinical experience. Knowledge among nursing student is important because they are the future nurses who will provide the care to patients so they need to learn how to protect themselves from occupational exposure especially needle stick injury which is common among health care workers.[1] Per-cutaneous injury caused by suturing needle and hollow bore needles during injection ,drawing of blood or performing invasive procedure in the patient is considered as needle stick injuries in this study. Likewise, needle stick injuries include injury from all types of sharp instruments, for eg; needles, scissors, broken glass, lancet and so on. Student nurses are at significant risk from occupationally acquired infections.[2] The objectives of this study was to assess the knowledge regarding needle stick injury among nursing students of selected nursing colleges in Pokhara and to find out the association between level

of knowledge on needle stick injury and the selected variables of respondents.

Nurses are the important bridge between doctors and patients as they have the greatest degree of contact with patients.[3,4] Due to limited clinical experience and insufficient attention to personal safety, nursing students are particularly susceptible to occupational needle stick injuries.[5] Nursing education includes both classroom and clinical education. During practical session, students are required to perform various types of skills and procedures involving sharps and subcutaneous, intramuscular, and intravenous needles.[6]

The study conducted in college of nursing sciences, Karnataka, India among nursing students, the showed that none of them were having adequate knowledge level regarding needle stick injury.[7] As per the study done in a tertiary care hospital in Northeast India, The nurses who experienced needle stick injuries in the past one year were 67.3% mostly by giving intravenous injections , Disposing syringe needle.[8] A study done in Nepal in Kathmandu University on 2015 revealed that Nurses had (47.87%) nurses had multiple episodes of needle stick injury and nearly one third nurses had poor knowledge on needle stick injury and as well as poor knowledge on recapping of needles using a single handed technique (80%).[9] Various study done in Nepal among nurse shows that most of them have poor knowledge regarding needle stick injury.[1,10–12]

## METHODS

A descriptive cross-sectional study design was used to assess the knowledge regarding needle stick injury among 141 nursing students of School of Health and Allied Sciences and Gandaki Medical College Teaching Hospital and Research Centre (GMCTHRC). Pre-testing of the instrument was done in 10% (14) of the total sample size (BSc. Nursing students of Pokhara Nursing Campus . Non-probability purposive sampling technique was used. Complete enumeration was used to collect sample for this study. B.Sc. Nursing students of 1$^{st}$, 2$^{nd}$, and 3$^{rd}$year who were present during the time of data collection were included in the study. The students who were not willing to participate in the study were excluded from the study. Principal investigator developed the research instruments on the basis of research objectives, extensive literatures review and opinion of subject export and research advisor. The content validity was established by providing research instrument to the 5 experts and incorporating their suggestion. Pre-testing of the instrument was done in 10% of the total sample size Reliability of the instrument was calculated by using Karl Pearson's correlation coefficient test by adopting Split Half technique which was found to be 0.81.

Data was collected after getting ethical approval from institutional review committee (IRC) of Pokhara University. Written permission was taken from the concerned authorities (Director, Coordinators of selected nursing colleges and supervisor) of Pokhara University and Gandaki medical college to collect data. The purpose of the study was explained to the respondents and written informed consent was obtained from all the respondents. Data was collected using self-administered questionnaire. Participants were assured that all the information given during the data collection will be used only for the academic purpose of researcher. Data was collected by the researcher over 3 days from 14$^{th}$ August to August 29$^{th}$ August. Anonymity was maintained throughout the study.

After collection of the data, checking, entry, compiling was done manually on the same day of the data collection. The collected data was coded and entered in Epi Data 3.1. Entered data was exported and analyzed with Statistical package for social sciences version 23. Descriptive data was analyzed by using mean, frequency, standard deviation and percentage and are represented in the form of the table and figures. Inferential statistics such as chi square test was used to find out the association between dependent and independent variables.

## RESULTS

The findings of the study were presented in tabular and narrative forms under the following headings. Statistical significance was considered at 5% with p value at $<0.05$.

**Table 1:** Socio-demographic characteristics of the respondents **n=141**

| Variables | Frequency | Percentage (%) |
|---|---|---|
| **Age in completed years** | | |
| 21≥ | 33 | 23.40 |
| 21≤ | 108 | 76.60 |
| **Mean ± S.D. = 21.24 ± 1.006** | | |
| **Ethnicity** | | |
| Brahmin | 55 | 39.00 |
| Chhetri | 33 | 23.40 |
| Janajati | 45 | 31.90 |
| Dalit | 7 | 5.00 |
| Muslim | 1 | 0.70 |
| **Religion** | | |
| Hinduism | 121 | 85.80 |
| Buddhism | 19 | 13.50 |
| Muslim | 1 | 0.70 |
| **Academic year** | | |
| 1st Year | 21 | 14.90 |
| 2nd Year | 50 | 35.50 |
| 3rd Year | 70 | 49.60 |
| **Father's education status** | | |
| Illiterate | 1 | 0.70 |
| No formal education | 3 | 2.10 |
| Basic Level (1-8) | 14 | 9.90 |
| Secondary Level (9-12) | 84 | 59.60 |
| Bachelor's degree & above | 39 | 27.70 |
| **Mother's education status** | | |
| Illiterate | 6 | 4.30 |
| No formal education | 4 | 2.80 |
| Basic Level (1-8) | 39 | 27.70 |
| Secondary Level (9-12) | 76 | 53.90 |
| Bachelor's degree & above | 16 | 11.30 |
| **Occupation of father** | | |
| Business | 60 | 42.60 |
| Foreign employed | 41 | 29.00 |
| Service | 33 | 23.40 |
| Agriculture | 7 | 5.00 |
| **Occupation of mother** | | |
| Homemaker | 97 | 68.80 |
| Business | 23 | 16.30 |
| Agriculture | 13 | 9.20 |
| Service | 8 | 5.70 |
| **Total duration of clinical exposure** | | |
| Up to 18 weeks | 24 | 17.00 |
| 19 weeks-39 weeks | 73 | 51.80 |
| 40 weeks-60 weeks | 44 | 31.20 |
| **Previous experience of NSI** | | |
| Yes | 54 | 34.00 |
| **If yes, how many times (n=54)** | | |
| One | 34 | 63.00 |
| Twice | 15 | 27.70 |
| Thrice | 4 | 7.40 |
| Sixth | 1 | 1.90 |
| **Family members in health-related field** | | |
| Yes | 23 | 16.30 |
| No | 118 | 83.70 |

Table 1 illustrates that mean age of respondents was 21.24 ± 1. 006. Most of the respondents nearly 60% percent were from bsc 3rd year. Similarly, 80% respondents have clinical exposure more than 18 weeks. More than one third (38.30%) of respondents had experience of needle stick injury. Among them, 63 percent had experience for only one time, 27.80 percent had twice, 7.40 percent had thrice and 1.90 percent had sixth times during their clinical practice. Few of respondents (16.30%) had their family members working in health related field.

**Table 2:** Knowledge regarding meaning and risk factors of NSI among respondents. **n=141**

| Items | Frequency(f) | Percentage (%) |
|---|---|---|
| **Meaning #** | | |
| Accidental injury by used needle to the skin | 127 | 90.10 |
| **Greater chance to get needle stick injury *** | | |
| Nursing students | 138 | 97.90 |
| Doctors | 100 | 70.90 |
| Pharmacist | 47 | 33.30 |
| Dental students | 35 | 24.80 |
| **Highest risk for needle stick injury #** | | |
| Blood filled hollow bore needles | 58 | 41.10 |
| **Route of injection having high risk of needle stick injury #** | | |
| Intravenous | 78 | 55.30 |
| **Stage of use leading to needle stick injury *** | | |
| During recapping | 124 | 87.90 |
| During injection/procedure | 97 | 68.80 |
| During disposal | 60 | 42.60 |
| Every stage of use | 2 | 1.40 |
| **After performing every procedure needles should #** | | |
| Not be recapped | 28 | 19.9 |
| **Blood borne pathogens that are most commonly exposed after NSI #** | | |
| Hepatitis B | 20 | 14.20 |
| Hepatitis C | 3 | 2.10 |
| HIV | 12 | 8.5 |
| All of the above | 106 | 75.2 |

Table 2 exhibits that Almost all (90.10%) of respondents gave right answer about the meaning of needle stick injury. Almost all stated that, nursing students has greater chance to get needle stick injury. More than one third (41.10%) of respondent's marked blood filled hollow bore needle has a highest risk for needle stick

injury. More than half (55.30%) of respondents told that intravenous route of injection have high risk of needle stick injury Only 19.9 percent of respondents mentioned correct answer that is needles should not be recapped after performing every procedure. Likewise, Majority (75.2%) of respondents were aware about the blood borne pathogens exposed after needle stick injury.

**Table 3:** Knowledge regarding immediate action and preventive measure of NSI among respondents **n=141**

| Items | Frequency(f) | Percentage (%) |
|---|---|---|
| **Is it necessary to report needle stick injury?** | | |
| Yes | 141 | 100.00 |
| No | 0 | 0.00 |
| **If yes, what type of needle stick injury should be reported by student nurses #** | | |
| All needle stick injuries | 53 | 37.60 |
| **Needle stick injury should be reported to #** | | |
| Supervisor | 96 | 68.10 |
| **Action taken immediately after NSI #** | | |
| Thoroughly rinsing the injury site with running water | 114 | 80.90 |
| **Best time to get tested after a NSI with serology positive patient #** | | |
| As soon as possible | 68 | 48.20 |
| **Sharp disposal container should be located at #** | | |
| Close to patient care area | 67 | 47.50 |
| **Can needle stick injury be prevented** | | |
| Yes | 139 | 98.60 |
| No | 2 | 1.40 |
| **If yes, how NSI can be prevented? *** | | |
| Safe handling of needles | 123 | 87.20 |
| Safer devices and techniques | 75 | 53.20 |
| Avoiding leaving open syringes | 67 | 47.50 |
| Use of PPE's | 46 | 32.60 |
| **Responsible persons for preventing NSI in a hospital #** | | |
| Employers and employees | 121 | 85.80 |
| **Percentage of NSI that can be prevented by safe handling of needle #** | | |
| 80% | 45 | 31.90 |
| **Best management of NSI with serology positive patient #** | | |
| Post-exposure prophylaxis (PEP) | 86 | 61.00 |
| **The risk of NSI during clinical exposure can be reduce by #** | | |
| Education and safe practice | 129 | 91.50 |
| **Main reason behind blood borne transmission is #** | | |
| Needle stick injury | 111 | 78.70 |

* = *Multiple responses ,# = Correct responses*

Table 3 reveals that, (37.60%) respondents stated all needle stick injury should be reported. Majority (80.90%) of respondents were aware about thoroughly rinsing injury site immediately after needle stick injury. Nearly half (48.20%) of respondents marked as soon as possible as best time to get tested after needle stick injury with serology positive patient and. Safe handling of needle (87.20%), safer devices and techniques (53.20%), avoiding leaving open syringes (47.50%) and use of PPEs (32.60%) were viewed as a preventive measure for NSI. Nearly one third (31.90%) were aware that 80 percent of NSI can be prevented by safe handling of needle. More than half (61%) respondents stated post-exposure prophylaxis is the best management in such cases. Almost all (91.50%) mentioned correct answer that education and safe practice can reduce the risk of NSI during clinical exposure.

**Table 4:** Level of knowledge regarding NSI among respondents n= 141

| Level | Frequency (f) | Percentage (%) |
|---|---|---|
| Adequate (>75%) | 127 | 90.10 |
| Moderately adequate (50%-75%) | 13 | 9.20 |
| Inadequate (<50%) | 1 | 0.70 |
| Mean +S.D=1.106 + 0.331, Max = 28 Min =9 | | |

Table 4 reveals that almost all (90.10%) of the respondents had adequate knowledge, 9.20 percent had moderately adequate knowledge and only 0.70 percent had inadequate knowledge on needle stick injury. The mean score of respondents was 1.1064 ± 0.33171 and maximum score was 28 where minimum score was 9.

**Table 5:** Association between level of knowledge and selected variables **n=141**

| Variables | Level of Knowledge | | χ2 value | df | *P* value |
|---|---|---|---|---|---|
| | Adequate | Moderately Adequate | | | |
| **Age in completed year** | | | | | |
| 21≥ | 30(23.6%) | 3(21.4%) | 0.034 | 1 | 0.854 |
| 21≤ | 97(76.4%) | 11(78.6%) | | | |
| **Ethnicity** | | | | | |
| Brahmin/Chhetri | 79(62.2%) | 9(64.3%) | 0.023 | 1 | 0.879 |
| Others | 48(37.8%) | 5(35.7%) | | | |
| **Religion** | | | | | |
| Hinduism | 109(85.8%) | 12(85.7%) | 0.01 | 1 | 0.991 |
| Others | 18(14.2%) | 2(14.3%) | | | |
| **Academic year** | | | | | |
| 1st Year | 21(16.5%) | 1(7.1%) | | | |
| 2nd Year | 45(35.4%) | 4(35%) | 2.986 | 2 | 0.225 |
| 3rdYear | 61(48.1%) | 9(57.9%) | | | |
| **Father's education** | | | | | |
| Illiterate | 3(2.4%) | 1(7.1%) | 1.046 | 1 | 0.307 |
| Literate | 124(97.6%) | 13(92.9%) | | | |
| **Mother's education** | | | | | |
| Illiterate | 9(7.1%) | 1(7.1%) | 0 | 1 | 0.994 |
| Literate | 118(92.9%) | 13(92.9%) | | | |
| **Father's occupation** | | | | | |
| Employed | 70(55.1%) | 4(23.1%) | 5.767 | 2 | 0.050* |
| Unemployed | 57(44.9%) | 10(76.9%) | | | |
| **Mother's occupation** | | | | | |
| Employed | 118(92.9%) | 9(69.2%) | 8.005 | 2 | 0.018* |
| Unemployed | 9(7.1%) | 5(30.8%) | | | |
| **Total duration of clinical exposure** | 23(18.1%) | 1(7.1%) | 1.074 | | |
| 18 Weeks | 104(81.9%) | 13(92.9%) | | | 1 |
| 19-39 Weeks | | | | | |
| **Previous experience of NSI(n=54)** | | | | | |
| 1-3 Times | 48(98%) | 4(98.1%) | 0.104 | | |
| 4-6 Times | | | | | 1 |

**P value significant at < 0.05*

Table 5 reveals that the significant association was found between level of knowledge and socio-demographic variable i.e father's occupation (*p=0.050*) and mother's occupation (*p=0.018*).The significant association was not found between level of knowledge and other variables.

## DISCUSSION

The result of this institutional based study found that although almost all of the participant has adequate knowledge on needle stick injury but nearly half of the participants had experienced needle stick injury.

In the present study, majority of the participants had adequate knowledge on NSI. The result is similar with the study conducted among nurses in Pakistan demonstrated that majority of the participant had good knowledge.[20] Similarly, the finding is consistent with the study conducted among nursing students in West Bengal, India where majority had adequate level of knowledge on needle stick injury.[17] In contrast, the opposite finding was reported by the study conducted in different settings. The study finding conducted in college of nursing sciences, Karnataka, India among nursing students, revealed that out of 30 students, none

of them were having adequate knowledge on needle stick injury.[7] In the same way the study conducted in northern India among nurses illustrated that only one fifth of nurses had adequate knowledge on needle stick injury.[8] The contradictory findings may be due to difference in setting, study participant were nursing students from first year who might not much more exposed to the hospital duty, the provided training to the participant might more focus on theorical rather than practical. Lastly, the less sample size in some study might not sufficient enough to generalize the results.

The finding from the present study on the participant response on the correct meaning of NSI was consistent with the study conducted in university of Oman, In West Bengal, India where majority of nursing student nurses were aware about the meaning of NSI and had correct response on the meaning of needle stick injury.[16,17] The knowledge on NSI further categories into different section.

In the present study more than half of the participant aware on intravenous route of injection have high risk of NSI which is in line with the study conducted in Jaipur, India.[18] In the present study, two third of the participant were aware that, NSI commonly occurs during injection or procedure. Finding of this study is quite different in the study conducted in a tertiary care hospital in Northeast India where only one third nurses stated that NSI mostly occurred during injection while using needles.[8] But whatever the awareness level this is probably the difference in the job description of nurses and other procedure which might require different skill to handle needles and other sharp objects .

Regarding awareness on transmission of blood borne pathogen exposed to NSI , the present study revealed that, the three fourth of the participant were aware which was quite high in the study conducted the University of Lahore in Pakistan.[19,20]

Regarding awareness on the necessity of reporting NSI, our finding and other findings in the nursing students of Pakistan, Oman reported that they reported NSI to the immediate supervisor.[13,16] With regard to immediate action after NSI, the present study found that majority of respondents were aware that injury site should be rinse thoroughly immediately after NSI. It is higher as compared to the study conducted among nurses in a tertiary care hospital in India where two third participant had knowledge to wash the injury site with running water immediately after NSI.[8] However, the contradictory finding was reported from the study conducted in a tertiary care centre of Nepal in Kathmandu among health workers where only one fifth of the participant mentioned that only cleaning injury site with running water.[9] This might be due to inappropriate needle handling practice, due to priority procedures done for the patients requirement that put nursing students under risk of NSI.

In the result of present study, half of the respondent mentioned use of personnel protective device and techniques as a preventive measure for NSI. This results is higher in the study conducted in Oman where three fourth of the participant stated that safer devices and techniques are responsible for preventing NSI.[16]This difference may be the different place and time of study.

The study further assessed the association of level of knowledge with socio demographic variable of the respondents and found a statistically significant association of level of knowledge on needle stick injury with father's employment *(p=0.050)* and mother's employment (*p =0.018)*. The finding is consistent with the study conducted in Karachi and the university school in Turkey where prevalence of NSI was 30-40.[13–15] The finding is supported by the study conducted in colleges of nursing sciences, Karnataka, India where the statistically significant association was found between level of knowledge and age (*p=0.046*) and mother's occupation (*p =0.045*).[7] The result of study illustrated that there is no significant association of level of knowledge on NSI with age (*p=0.854*) and academic year ( *p=0.225*).The finding is consistent with the study conducted in India where the significant association was not found between the level of knowledge and age (*p=0.62*) academic year (*p=0.55).*[16] The reason behind this may be occupation (being nursing students), handling methods of sharp materials, needle recapping practice.

## CONCLUSIONS

The findings of the study concluded majority of the nursing student have adequate knowledge on needle stick injury however nearly half of the participants had experienced needle stick injury. Thus, every nursing student should have adequate knowledge on NSI in order to prevent injuries from needles. Awareness raising programmed such as training on needle handling practice, needle recapping after use, use of personnel protective device can be conducted to raise the adequate knowledge on needle stick injury among nursing students.

## CONFLICT OF INTEREST

None

## REFERENCES


1. Hu ATT. Knowledge, Attitude and Practice Regarding Needle Stick Injuries (NSI) Among Nursing Students in Faculty of Medicine and Health Sciences, UNIMAS [PhD Thesis]. Universiti Malaysia Sarawak; 2009.
2. Rapiti E, Prüss-Üstün A, Hutin YJ. Sharps injuries: assessing the burden of disease from sharps injuries to health-care workers at national and local levels. 2005.
3. Ibrahim S, Salem N, Soliman S. Assessment Of Safe Injection Practices And Needlestick Injury Among Nursing Students At Mansoura University. Mansoura Nursing Journal. 2021;8(1):59–76.
4. Wiechula R, Conroy T, Kitson AL, Marshall RJ, Whitaker N, Rasmussen P. Umbrella review of the evidence: what factors influence the caring relationship between a nurse and patient? Journal of advanced nursing. 2016;72(4):723–34.
5. Yao WX, Yang B, Yao C, Bai PS, Qian YR, Huang CH, et al. Needlestick injuries among nursing students in China. Nurse education today. 2010;30(5):435–7.
6. Ahmed AS. Needle stick and sharp injuries among nurses at Zagazig University Hospitals, Sharkia Governorate, Egypt. Middle East J Appl Sci. 2014;4(4):1205–11.
7. Shil R, Upashe SP. Nursing students knowledge regarding needle stick injury: Effectiveness of structured teaching plan. Hindu. 2020;21(12):70.
8. Saravanan K, Lyngdoh M, Shanthibala K, Brogen A. Knowledge and practices of needle stick injuries among nurses in a tertiary care hospital in northeast India–A cross-sectional study. IOSR Journal of Dental and Medical Sciences. 2018;17(3):72–7.
9. Singh B, Paudel B, Kc S. Knowledge and practice of health care workers regarding needle stick injuries in a tertiary care center of Nepal. Kathmandu University Medical Journal. 2015;13(3):230–3.
10. Kaphle HP, Poudel S, Subedi S, Neena Gupta NG, Varidmala Jain VJ, Paudel P. Awareness and practices on injection safety among nurses working in hospitals of Pokhara, Nepal. 2014 [cited 2024 Sep 25]; Available from: https://www.cabidigitallibrary.org/doi/full/10.5555/20153401433
11. Devi WA, Panta S. Knowledge and Practices Regarding Needle Stick Injury among Nurses of Manipal Teaching Hospital, Pokhara, Nepal. [cited 2024 Sep 25]; Available from: https://www.indianjournals.com/ijor.aspx?target=ijor:ijcm2&volume=1&issue=1&article=027&type=pdf
12. Bhattarai S, Kc S, Pradhan PM, Lama S, Rijal S. Hepatitis B vaccination status and Needle-stick and Sharps-related Injuries among medical school students in Nepal: a cross-sectional study. BMC Res Notes. 2014 Dec;7(1):774.
13. Malik A, Shaukat MS, Qureshi A. Needle-stick injury: a rising bio-hazard. Journal of Ayub Medical College Abbottabad. 2012;24(3–4):144–6.
14. Ozer ZC, Bektas HA. Needlestick injuries during education period in nursing students in Turkey. Procedia-Social and Behavioral Sciences. 2012;46:3798–801.
15. Ojo LI. Knowledge, Attitude and Practice of Handling Medical Sharps Among Health Care Workers in Intermediate Hospital Oshakati in Namibia [Internet]. University of Johannesburg (South Africa); 2021 [cited 2024 Sep 27]. Available from: https://search.proquest.com/openview/a4843c13d1cd233ba057645c64822aeb/1?pq-origsite=gscholar&cbl=2026366&diss=y
16. Al Qadire M, Ballad CAC, Al Omari O, Aldiabat KM, Shindi YA, Khalaf A. Prevalence, student nurses' knowledge and practices of needle stick injuries during clinical training: a cross-sectional survey. BMC Nurs. 2021 Dec;20(1):187.
17. Bhattacharya A, Basu M, Das P. The pattern of needle stick injury among health care workers at West Bengal. Muller Journal of Medical Sciences and Research. 2014;5(1):29–33.
18. Vinod Kapoor VK, Gambhir RS, Simarpreet Singh SS, Sanjeet Gill SG, Agiapal Singh AS. Knowledge, awareness and practice regarding needle stick injuries in dental profession in India: a systematic review. 2013 [cited 2024 Sep 24]; Available from: https://www.cabidigitallibrary.org/doi/full/10.5555/20143168148
19. Wang D, Anuwatnonthakate A, Nilvarangkul K. Knowledge attitude and practice regarding prevention of needle stick injuries among nursing students in Henan province, China. J Pak Med Assoc. 2021;71(10):2–2420.
20. Zia M, Afzal M, Sarwar H, Waqua A, Gilani SA. Knowledge and practice of nurses about needle stick injury at Lahore General Hospital. Saudi J Med Pharma Sci. 2017;3(6B):571–81.