

Assessment of Knowledge on Post-Exposure Prophylaxis (PEP) Among Nursing Students and its Association with Selected Demographic Variables

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Abstract: ***Problem statement:** Assessment of knowledge on Post-Exposure Prophylaxis (PEP) among nursing students and its association with selected demographic variables. **Methodology:** A quantitative research approach with a descriptive research design was employed. A sample of 830 nursing students was selected using Non-Probability Purposive Sampling method across various designated nursing institutions in Aizawl, Mizoram. Data was collected using a self-administered questionnaire specifically developed to assess demographic variables and knowledge regarding Post-exposure prophylaxis **Results:** The findings related to level of knowledge about PEP showed that 64.1% possessed an adequate level of knowledge, 23.2% demonstrated poor knowledge, and 12.7% exhibited excellent knowledge regarding PEP. Highly significant associations were observed between the level of knowledge and the type of nursing course ($p < 0.001$) as well as the academic year of study ($p < 0.001$). Furthermore, a significant association was found between academic year and the incidence of NSI ($p < 0.001$).*

Keywords: Post-exposure prophylaxis, nursing students, knowledge

1. Introduction

Post-exposure prophylaxis (PEP) serves as a critical emergency biomedical intervention designed to prevent viral acquisition- most notably Human Immunodeficiency Virus (HIV) and Hepatitis B- following accidental occupational exposures such as needle-stick injuries and mucosal splashes (Centers for Disease Control and Prevention [CDC], 2021; World Health Organization [WHO], 2020). Clinical nursing students represent a particularly vulnerable population within healthcare settings due to their limited practical experience, high frequency of invasive procedural contacts, and ongoing skill development during clinical rotations (Sultan et al., 2021). Despite established safety protocols, significant gaps persist regarding trainee awareness of immediate post-exposure protocols, time-sensitive drug initiation windows, and reporting mechanisms (Al-Dossary et al., 2022). Furthermore, variations in student comprehension are often moderated by specific background factors, including academic year of study, prior clinical exposure, and previous infection control training (Hambridge et al., 2023).

Healthcare settings expose nursing students to occupational hazards, particularly during their transition from classroom learning to clinical practice. As they perform procedures involving needles, sharp instruments, and body fluids, their limited experience and developing clinical skills may increase the risk of needle-stick injuries and mucosal exposure. Such incidents can lead to exposure to blood-borne infections, including HIV, HBV, and HCV. Timely Post-Exposure Prophylaxis (PEP), especially for HIV, is essential following potential exposure. However, gaps in students' knowledge regarding immediate first aid, reporting procedures, and

timely PEP initiation may contribute to delayed management or underreporting. Therefore, assessing PEP knowledge and its association with selected demographic variables is important for strengthening student safety and clinical preparedness.

2. Review of Related Literature

Sendo (2014) conducted an institution-based cross-sectional descriptive study among 185 nursing and midwifery students at Hawassa University, Ethiopia, to assess the level of knowledge and practice regarding HIV post-exposure prophylaxis. While 67.1% of participants had heard of PEP, the majority (63%) demonstrated inadequate knowledge of PEP protocols when assessed against a threshold of 75% correct responses. Among the 29.2% of respondents who reported exposure to HIV risk conditions during clinical practice, only 59.3% initiated PEP, and only 75% of those who initiated PEP completed the prescribed 28-day regimen. Lack of awareness about the existence of PEP services was the most frequently cited reason for non-initiation. Year of study emerged as a significant predictor of PEP practice, with final-year students significantly more likely to initiate PEP than junior students ($p = 0.01$). These findings are directly relevant to the present study as they demonstrate that inadequate PEP knowledge among nursing students in low-resource settings is a structural and educational problem requiring curriculum-level intervention.

Angadi et al. (2016) conducted a cross-sectional questionnaire-based study among 150 private allopathic general practitioners in Davangere city, Karnataka, India, to assess awareness and practice of HIV post-exposure

prophylaxis following needle-stick injury. All participants reported awareness of HIV PEP, and 83% affirmed its effectiveness in preventing HIV transmission. However, a critical knowledge-practice gap was observed: only 67% of those who experienced accidental exposure-initiated PEP, and only 38% completed the full 28-day course. The most commonly cited barrier to PEP initiation was unawareness of the protocol at the time of injury, and the most common reason for incomplete PEP was an assumption that partial treatment was sufficient. The study concluded that good awareness alone does not translate into adequate practice and emphasized the need for written workplace guidelines, continued education, and mandatory hepatitis B vaccination. These findings reinforce the knowledge-practice gap hypothesis that underpins the design of the present study.

Priya and Krishnamurthy (2018) investigated both the incidence of needle-stick injuries and the level of PEP knowledge among 150 nursing students at selected nursing colleges in South India. Regarding NSI incidence, 42% of students reported having sustained at least one injury during clinical training, primarily during injections, blood collection, and recapping of needles. With respect to knowledge, fewer than 30% of students demonstrated adequate understanding of PEP protocols, including the recommended time window for PEP initiation, the correct drug regimen, and the required duration of treatment. There was no statistically significant correlation between the year of clinical training and PEP knowledge, indicating that knowledge was not being effectively transferred through routine clinical exposure. The study recommended mandatory pre-clinical training on PEP, availability of PEP starter kits in all clinical settings, and regular educational workshops on universal precautions.

Tshering et al. (2020) assessed the knowledge, attitude, and practice of post-exposure prophylaxis for HIV among nurses at Jigme Dorji Wangchuck National Referral Hospital in Bhutan, published in *PLOS ONE*. The study found that while 96% of nurses were aware of the existence of PEP for HIV, only 64.7% could correctly identify the appropriate time window for PEP initiation, and 63.4% knew the required 28-day duration of treatment. A significant gap between awareness and actual practice was noted, with only a fraction of nurses who had experienced NSIs completing the recommended PEP protocol. The study highlighted inadequate institutional support, fear of drug side effects, and unfamiliarity with the reporting process as the primary barriers to PEP adherence. The authors recommended integration of PEP education into pre-service nursing training, regular refresher programs, and the establishment of accessible, nurse-friendly occupational health reporting systems. This study is particularly relevant to the present research as it focuses exclusively on nurses in a developing-country context and identifies practical barriers to PEP adherence that are likely to be mirrored among nursing students in Northeast India.

Rahaman et al. (2024) conducted a cross-sectional study evaluating the awareness of post-exposure prophylaxis (PEP) after needle-stick injuries (NSIs) among medical interns in Andhra Pradesh, they revealed a high vulnerability to occupational exposure alongside notable gaps in timing protocols. Among the 104 surveyed interns, a striking 89.01% reported a history of NSI exposure, primarily driven by unsafe

practices such as needle recapping (79.01%) and procedure execution (49.38%). While general awareness of blood-borne disease transmission and the identification of casualty as the initial PEP access point were universal (100%), practical knowledge regarding critical PEP windows was severely deficient. Only 58.6% of participants correctly identified the ideal initiation time frame of within two hours, while a minor fraction possessed accurate knowledge regarding the maximum initiation limit of 72 hours (17.3%) and the standard 28-day regimen duration (16.4%). Furthermore, immediate first-aid protocols were poorly understood, with only 26% knowing to wash the exposure site immediately with soap and water. The authors concluded that while overall PEP awareness among clinical trainees ranges from average to above average, targeted continuous educational campaigns emphasizing safe disposal and immediate post-exposure protocols are urgently required to bridge key knowledge gaps.

Sain et al. (2025) conducted a cross-sectional analytical study published in *Cureus* among 227 HH officers at a tertiary care hospital in Nagpur, India, to assess knowledge, attitudes, and practices regarding NSI, HIV, and Hepatitis B prevention. High overall knowledge levels were reported, with 89.4% demonstrating good understanding of NSI, 70% of HIV, and 93% of Hepatitis B. Despite this, significant practice gaps persisted: only 31% of nurses who sustained an NSI received post-exposure prophylaxis, and unsafe practices such as needle recapping were significantly associated with NSI incidence ($p = 0.045$). Among those offered PEP, only 39.3% completed the full regimen, often due to fear of adverse effects or assumption that partial treatment was adequate. The study concluded that while knowledge and attitudes were largely positive, translating these into consistent safe practice and PEP adherence remained a critical challenge.

3. Problem Statement

“Assessment of knowledge on post-exposure prophylaxis (PEP) among nursing students and its association with selected demographic variables”

4. Objectives of the Study

- 1) To assess the level of knowledge regarding PEP among nursing students of selected nursing institutions in Aizawl.
- 2) To determine the association between level of knowledge regarding PEP and selected demographic variables.

5. Methodology of the Study

5.1 Research Approach and Design

A quantitative research approach with a descriptive research design was employed.

5.2 Setting of the Study

The study was conducted in selected nursing institutions of Aizawl, Mizoram including Regional Institute of Paramedical & Nursing Sciences, College of Nursing Synod Hospital, BN College of Nursing, Aizawl College of Nursing, Health Worker Training Institute, ANM School Aizawl, Apollo

School of Nursing, Blessino Nursing School, and MFM School of Nursing.

Population, sample and sampling technique

The population comprised students of various nursing institutions within Aizawl district. A sample of 830 nursing students was selected using Non-Probability Sampling i.e., Purposive sampling method.

5.3 Inclusion and exclusion criteria

Inclusion criteria: Students currently studying in selected nursing institutions in Aizawl; students who can read and write English; students willing to participate.

Exclusion criteria: Students unwilling to participate; students absent at the time of data collection.

5.4 Description of the tool

Tool 1: Demographic Proforma (5 items) - assessed age, sex, course, academic year, and previous knowledge on needle stick injury and PEP.

Tool 2: Knowledge Assessment on PEP (15 items) - assessed knowledge regarding PEP. Each correct response scored as 1 and incorrect as 0. Knowledge levels categorized as:

- Poor Knowledge: 0-7 scores
- Adequate Knowledge: 8-11 scores
- Excellent Knowledge: 12-15 scores

5.5 Validity and Reliability

Content validity was established by 7 subject experts. Content Validity Index for Tool 1 was 88.60% and for Tool 2 was 94.00%. Reliability testing using Kuder-Richardson Formula 20 (KR-20) yielded a coefficient of 0.72 indicating acceptable reliability.

5.6 Method of Data Collection

Administrative approval was granted by the concerned authorities. Prior to data collection via a self-administered questionnaire, written informed consent was obtained from all participants after thoroughly explaining the study's purpose and scope. Strict participant confidentiality was maintained throughout the process, and verbal gratitude was expressed to all individuals for their contribution to the research.

6. Result and Discussion

6.1 Findings Related to Objective 1:

Assessing the level of knowledge regarding PEP among nursing students of selected nursing institutions in Aizawl.

Table 1: Frequency and percentage distribution of nursing students based on their level of knowledge regarding PEP (N=830).

Knowledge level	Score range	Frequency	Percentage
Poor knowledge	0-7	193	23.2%
Adequate knowledge	8-11	532	64.1%
Excellent knowledge	12-15	105	12.7%
Total		830	100%

The findings reveal that the majority of nursing students (64.1%) possessed an adequate level of knowledge regarding PEP, indicating a moderate understanding of post-exposure prophylaxis protocols. However, nearly one-quarter of the students (23.2%) demonstrated poor knowledge, which is concerning as these students may be ill-prepared to respond appropriately in the event of an occupational exposure. Only a small minority (12.7%) achieved an excellent level of knowledge, suggesting that while basic awareness exists, comprehensive understanding of PEP protocols including specific drug regimens, timing, and contraindications remains limited among most students.

Table 2: Mean, median, and standard deviation of nursing students knowledge scores regarding PEP (N=830)

Variable	Mean	Median	Standard deviation	Maximum possible score
Knowledge Score	8.98	9.00	2.35	15

The mean knowledge score of 8.98 (± 2.35) out of a maximum possible score of 15 indicates that nursing students, on average, correctly answered approximately 60% of the knowledge questions. The median score of 9.00 suggests that the distribution of scores is relatively symmetrical, with half of the students scoring above 9 and half scoring below. The standard deviation of 2.35 indicates moderate variability in knowledge scores among the students. Overall, the mean score falls within the "Adequate Knowledge" category (8-11), confirming that students possess a moderate level of understanding regarding PEP protocols, though there remains considerable room for improvement to achieve comprehensive knowledge.

6.2 Discussion

The study reveals that 64.1% of nursing students in Mizoram possess adequate knowledge of Post-Exposure Prophylaxis (PEP), indicating a positive trend in integrating occupational safety into nursing curricula. Despite this, only 12.7% achieved excellent knowledge, highlighting a significant gap in deeper understanding of PEP protocols, including essential drug regimens, contraindications, side effects, and follow-up requirements. The average knowledge score was 8.98 (± 2.35), consistent with findings from similar global studies, such as one by Sendo (2014) showing that 63% of nursing and midwifery students in Ethiopia had inadequate knowledge of PEP.

An item-wise analysis indicated specific strengths and weaknesses in knowledge. Notably, higher correct response rates were recorded for questions regarding the definition of PEP (64.1%) and recognizing NSI as a risk factor (72.4%), suggesting foundational knowledge exists. However, critical gaps were identified in several other areas, necessitating targeted educational interventions to enhance nursing students' comprehensive understanding of PEP and associated safety protocols.

Based on the findings, nursing students in Aizawl exhibit moderate knowledge of Post-Exposure Prophylaxis (PEP), with 64.1% demonstrating adequate understanding but only 12.7% achieving excellent knowledge. Their mean score of 8.98 out of 15 indicates that they answer about 60% of

questions correctly, falling short of the 75% benchmark. Critical gaps were identified, including low correct responses on PEP initiation timing (15.5%) and drug regimens (26.3%). The discrepancy between knowledge and practice suggests that improved PEP education is needed to enhance occupational safety, and the reliance on clinical training for knowledge acquisition points to inconsistencies in educational quality across settings.

6.3 Findings related to objective 2:

Determining the association between level of knowledge regarding PEP and selected demographic variables.

Understanding the factors that influence nursing students' knowledge regarding Post-Exposure Prophylaxis is essential for developing targeted educational interventions and institutional policies. Demographic variables such as the type of nursing program, academic year of study, and previous knowledge about NSI may significantly impact students' understanding of PEP protocols.

Table 3: Association between level of knowledge regarding PEP and type of nursing program (N=830)

Nursing program	Poor knowledge	Adequate knowledge	Excellent knowledge	Total	X ²	df	p-value
B.Sc. Nursing	60 (13.0%)	328 (71.1%)	73 (15.8%)	461	93.9	4	<.001*
GNM	73 (32.0%)	149 (65.4%)	6 (2.6%)	228			
ANM	60 (42.6%)	55 (39.0%)	26 (18.4%)	141			
Total	193	532	105	830			

*Significant at $p < 0.05$ level

B.Sc. Nursing students exhibited the strongest knowledge levels, with 71.1% demonstrating adequate knowledge and 15.8% achieving excellent knowledge, while only 13.0% had poor knowledge. In contrast, GNM students showed moderate levels of understanding, with 65.4% having adequate knowledge, but merely 2.6% classified as excellent and 32.0% categorized as having poor knowledge. ANM students presented a different distribution: 39.0% had adequate knowledge, while 42.6% fell into the poor knowledge

category; however, they recorded the highest proportion of excellent knowledge among the three groups at 18.4%. This data highlights significant variations in knowledge levels across the different nursing programs.

Since the p -value is less than 0.05, it indicates that the type of nursing program significantly influences the level of knowledge regarding PEP.

Table 4: Association between level of knowledge regarding PEP and academic year (N=830)

Academic year	Poor knowledge	Adequate Knowledge	Excellent knowledge	Total	X ²	df	p-value
1 st year/ I & II semester	115 (36.5%)	158 (50.2%)	42 (13.3%)	315	89.6	6	<.001*
2 nd year/ III & IV semester	57 (21.6%)	184 (69.7%)	23 (8.7%)	264			
3 rd year/ V & VI semester	16 (10.1%)	129 (81.1%)	14 (8.8%)	159			
4 th year/ VII & VIII semester	5 (5.4%)	61 (66.3%)	26 (28.3%)	92			
Total	193	532	105	830			

*Significant at $p < 0.05$ level

A clear progressive improvement in knowledge was observed over the four years of study, indicated by a notable decline in the proportion of students classified as having poor knowledge, which decreased from 36.5% in the 1st year to just 5.4% in the 4th year. The data also reveals that the proportion of students exhibiting adequate knowledge reached its highest point in the 3rd year at 81.1%, maintaining a substantial level of 66.3% in the 4th year. Furthermore, students demonstrating excellent knowledge peaked in the 4th

year at 28.3%, representing a significant increase from 8.8% in the 3rd year. This trend highlights a consistent enhancement in student knowledge throughout the course duration.

Since the p -value is less than 0.05, there is a highly significant association between the academic year and knowledge regarding PEP.

Table 5: Association between level of knowledge regarding PEP and previous knowledge regarding NSI (N=830)

Previous NSI knowledge	Poor knowledge	Adequate Knowledge	Excellent knowledge	Total	X ²	df	p-value
Yes	94 (16.3%)	400 (69.6%)	81 (14.1%)	575	50.2	2	<.001*
No	99 (38.8%)	132 (51.8%)	24 (9.4%)	255			
Total	193	532	105	830			

*Significant at $p < 0.05$ level

Students who possessed prior knowledge regarding NSI (Needle Stick Injury) exhibited significantly enhanced understanding of PEP (Post Exposure Prophylaxis). Specifically, 69.6% of these students demonstrated adequate knowledge, with 14.1% achieving an excellent level of understanding. In contrast, among students lacking previous knowledge, only 51.8% had adequate knowledge and a mere

9.4% showcased an excellent comprehension of PEP. Furthermore, a notable disparity was observed in poor knowledge levels; 38.8% of students without previous knowledge exhibited poor understanding of PEP, a stark comparison to only 16.3% of those with prior knowledge.

Since the p -value is less than 0.05, there is a highly significant association between the level of knowledge regarding PEP and previous knowledge regarding NSI. This highlights the importance of foundational knowledge in improving educational outcomes in health-related fields.

6.4 Discussion

The study highlights the significant relationship between nursing program type and knowledge of post-exposure prophylaxis (PEP), with statistical findings indicating $p < 0.001$. B.Sc. Nursing students exhibit the highest knowledge levels due to a comprehensive four-year curriculum that emphasizes both theoretical and clinical training on occupational safety, unlike the GNM and ANM programs. The GNM program, lasting three years, focuses more on practical aspects, which may lead to lesser theoretical insight into infection control. Conversely, the ANM program, with a duration of two years, often fails to provide adequate depth on complex topics like PEP, resulting in a high percentage of students (42.6%) possessing poor knowledge. Nevertheless, ANM students also display an unexpected 18.4% rate of excellent knowledge, prompting further investigation into potential factors such as motivated student selection or exceptional individual cases affecting overall outcomes.

Additionally, knowledge accumulates progressively with each academic year, aligning with previous research by Priya and Krishnamurthy (2018), which recognized improved understanding of needlestick injuries (NSI) and PEP through clinical exposure and academic growth. Notably, 4th-year students show a considerable increase in excellent knowledge (28.3%) compared to earlier years, suggesting that cumulative learning and repeated exposure play a critical role in shaping their understanding. However, the alarming statistic that 5.4% of 4th-year students still demonstrate poor PEP knowledge raises concerns, as these individuals are on the verge of entering professional practice. An intriguing U-shaped pattern was noted in the distribution of excellent knowledge among students of different academic years; 1st-year students (13.3%) displayed more excellent knowledge than their 2nd (8.7%) and 3rd (8.8%) year counterparts. This could be attributed to an "enthusiasm effect," with initial theoretical exposure promoting high recall, which may not yet be consolidated through practical experience. The increase in 4th-year performance indicates successful knowledge integration over time.

The significant link between prior knowledge of NSI and PEP knowledge ($p < 0.001$) emphasizes the need for early exposure to occupational safety topics. Those with prior NSI awareness arrive at clinical training better equipped to grasp PEP concepts, supporting the argument for early curriculum development to introduce these critical topics. Alarming, 30.7% of the students lacked prior NSI knowledge, signalling a critical educational gap necessitating review and enhancement. Moreover, while 69.3% of students had previous knowledge, largely acquired through clinical training (57.2%), reliance on varied clinical environments for safety education raises concerns regarding consistency and quality. Inconsistent adherence to safety protocols in clinical settings may lead to disparities in learning experiences, necessitating more structured and standardized education on

occupational safety that does not solely rely on the variances of clinical placements.

7. Conclusion

Based on the findings, several conclusions can be drawn regarding nursing students' knowledge of post-exposure prophylaxis (PEP). There is a significant association between the type of nursing program and PEP knowledge, with B.Sc. Nursing students showing the highest knowledge levels, while ANM students have a higher rate of poor knowledge. Academic year also significantly correlates with PEP knowledge, indicating progressive improvement from 1st to 4th year, although some final-year students still exhibit deficient knowledge. Prior knowledge of needlestick injuries (NSI) greatly enhances PEP understanding, suggesting the importance of integrating NSI and PEP education early in the curriculum. The study highlights the necessity for targeted educational interventions for diverse nursing student subgroups and emphasizes strengthening clinical education to improve safety awareness and knowledge retention.

References

- [1] Al Qadire, M., Ballad, C. A. C., Al Omari, O., Aldiabat, K. M., Shindi, Y. A., & Khalaf, A. (2021). Prevalence, student nurses' knowledge and practices of needle stick injuries during clinical training: A cross-sectional survey. *BMC Nursing*, 20, Article 188. <https://doi.org/10.1186/s12912-021-00711-2>
- [2] AL-Dossary, R. N. (2022). The effects of nursing work environment on patient safety in Saudi Arabian hospitals. *Frontiers in Medicine*, 9, Article 872091. <https://doi.org/10.3389/fmed.2022.872091>
- [3] Angadi, N., Davalgi, S., & Vanitha, S. S. (2016). Needle stick injuries and awareness towards post exposure prophylaxis for HIV among private general practitioners of Davangere city. *International Journal of Community Medicine and Public Health*, 3(1), 335–339. <https://doi.org/10.18203/2394-6040.ijcmph20151587>
- [4] Bouya, S., Balouchi, A., Rafiemanesh, H., Amirshahi, M., Dastres, M., Moghadam, M. P., Behnamfar, N., Shyebak, M., Badakhsh, M., Allahyari, J., Al Mawali, A., Ebadi, A., Dezhkam, A., & Daley, K. A. (2020). Global prevalence and device related causes of needle stick injuries among health care workers: A systematic review and meta-analysis. *Annals of Global Health*, 86(1), 35. <https://doi.org/10.5334/aogh.2698>
- [5] Centers for Disease Control and Prevention. (2021). Updated guidelines for antiretroviral postexposure prophylaxis after sexual, injection drug use, or other nonoccupational exposure to HIV—United States, 2016. U.S. Department of Health and Human Services. <https://www.cdc.gov/hiv/clinicians/pep/pep-guidelines.html>
- [6] Datar, U. V., Kamat, M., Khairnar, M., Wadgave, U., & Desai, K. M. (2022). Needlestick and sharps' injury in healthcare students: Prevalence, knowledge, attitude and practice. *Journal of Family Medicine and Primary Care*, 11(10), 6327–6333. https://doi.org/10.4103/jfmpc.jfmpc_155_22
- [7] Garg, R. K., Koundal, P., Sharma, P., Kumar, Y., Niwas, R., & Singh, J. (2025). The impact of organised

- educational campaigns on understanding of needle sticks injuries and related post-exposure HIV/AIDS prophylaxis. *Journal of Family Medicine and Primary Care*, 14(1), 395–400. https://doi.org/10.4103/jfmpe.jfmpe_1001_23
- [8] Hambridge, K. (2023). Sharps injuries within the healthcare student population: A narrative review. *British Journal of Nursing*, 32(22), 1098–1102. <https://doi.org/10.12968/bjon.2023.32.22.1098>
- [9] Mandal, R., Acharya, S., & Karki, A. (2025). Knowledge on post-exposure prophylaxis of Hepatitis B among undergraduate nursing students. *Journal of Manmohan Memorial Institute of Health Sciences*, 10(2), 12–16. <https://doi.org/10.3126/jmmihs.v10i2.86793>
- [10] Mondal, S., & Saha, I. (2013). NSI: A major occupational hazard among the healthcare workers in Nepal. *International Journal of Occupational Safety and Health*, 3(1), 22–25. <https://doi.org/10.3126/ijosh.v3i1.9092>
- [11] Pandey, P. K., Kunwar, R., Sengar, M., Gupta, G., & Saini, R. (2024). Needle stick injuries among healthcare workers in a tertiary care hospital of Lucknow. *Healthline Journal*, 15(3), 219–224. https://doi.org/10.51957/Healthline_633_2024
- [12] Pavithran, D. P., Rohini, A., & Muralidhar, C. A. (2015). Needle stick injuries in healthcare workers. *International Journal of Medicine and Public Health*, 5(2), 139–143.
- [13] Priya, N. H., & Krishnamurthy, A. (2018). Needle stick injuries among nursing students: Incidence, causes and preventive measures. *International Journal of Nursing Education*, 10(2), 47–51. <https://doi.org/10.5958/0974-9357.2018.00038.8>
- [14] Sain, [Add missing author initials]. (2025). Knowledge, attitudes, and practices of nurses regarding needle stick injuries, HIV, and Hepatitis B prevention in a tertiary care center in Nagpur, India: A cross-sectional study. *Cureus*, 17(7), e87160. <https://doi.org/10.7759/cureus.87160>
- [15] Sendo, E. G. (2014). Assessment of level of knowledge and practice of nursing and midwifery students on HIV post exposure prophylaxis in Hawassa University, Ethiopia. *Journal of HIV for Clinical and Scientific Research*, 1(1), 001–006.
- [16] Sunanda, K. (2024). Awareness about Post-Exposure Prophylaxis after Needle Stick Injury among Interns in a Tertiary Care Hospital in Andhra Pradesh. *International Journal of Pharmaceutical and Clinical Research*, 16(12); 2108-2110.
- [17] Tshering, K., Wangchuk, K., & Letho, Z. (2020). Assessment of knowledge, attitude and practice of post exposure prophylaxis for HIV among nurses at Jigme Dorji Wangchuk National Referral Hospital, Bhutan. *PLOS ONE*, 15(9), Article e0238069. <https://doi.org/10.1371/journal.pone.0238069>
- [18] World Health Organization. (2020). Post-exposure prophylaxis to prevent HIV infection: Joint WHO/ILO guidelines on post-exposure prophylaxis (PEP) to prevent HIV infection. World Health Organization. <https://www.who.int/publications/i/item/9789241508377>