Assessment on knowledge and practice of postexposure prophylaxis of human immuno-deficiency virus among staff nurses and paramedical workers at a tertiary care hospital in South India

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Abstract:

INTRODUCTION: Adequate knowledge about the presence of postexposure prophylaxis (PEP) against human immuno-deficiency virus (HIV) is imperative for health-care workers. This study focuses on the evaluation of the present knowledge and practice of nurses and paramedical workers on the post exposure prophylaxis against HIV.

AIM: The aim of this study is to assess and compare the knowledge and practice of PEP against HIV among Staff Nurses and Paramedical workers.

SUBJECTS AND METHODS: A descriptive cross-sectional questionnaire study about the knowledge and practice of PEP against HIV among Staff nurses and Paramedical workers done at a tertiary care hospital in South India. The analysis of the data was performed using SPSS software version 24. The statistical tests used to compare the knowledge between nurses and paramedical workers was Chi-square test. \( P < 0.05 \) was considered statistically significant.

RESULTS: About 339 nurses and 66 paramedical workers participated in the study. An overall of 65.4% of the study participants had a good level of knowledge, higher (\( P = 0.000 \)) among nurses (71.1%) compared to paramedical workers (36.3%). However, only 23% of nurses and 14.3% of paramedical workers received PEP after a needle prick injury.

CONCLUSION: This study revealed a low-level practice of HIV PEP among staff nurses and paramedical workers despite their good knowledge. This can be improved by providing formal training sessions to the health care workers.

Keywords: Human immuno-deficiency virus, nurses, paramedical workers, postexposure prophylaxis

Introduction

Human immunodeficiency virus (HIV)/acquired immuno-deficiency syndrome (AIDS) is one of the most serious public health challenge, and also a leading cause of mortality prevailing across the globe.[1] At the end of 2016, the WHO statistics highlighted that 36.7 million people are living with HIV.[2] Moreover, in the same year (2016), India was declared to be the third-most HIV epidemic country having 2.1 million sufferers.[3] Of which 0.27% are residing in Tamil Nadu seen during 2014.[4] The Indian Centre for Disease Control has charted out the guidance to prevent the occurrence of new infection by providing technical assistance, as well as increasing the access to service for people who are living with HIV by strategies like strengthening laboratory systems and district-level capacity to address HIV.[5]
World Health Report emphasizes that among the HIV patients, 2.5% have acquired owing to occupational exposure. Over 90% of such occupationally acquired diseases occur in countries with low economic status.

The incidence is mainly attributed to the higher prevalence and increased exposure to occupational hazards due to the lack of stringent safety procedures and standards at workplace. Health-care workers, especially in the cadre of nurses and paramedical workers are potentially at a higher risk of exposure to needle stick injuries and percutaneous exposure to HIV transmission. The average risk of acquiring HIV after a percutaneous exposure to blood is about 0.3% and 0.09% to mucous membranes.

To prevent the transmission of the virus after exposure and to minimize the development of the disease subsequent to the exposure, postexposure prophylaxis (PEP) must be followed. The PEP process includes first aid, counseling, risk management, relevant laboratory investigations, followed by a short course of antiretroviral therapy for 28 days along with follow-up evaluation. PEP is said to prevent 81% of the seroconversion, and currently is the only resource available to reduce the risk of acquiring HIV. However, the euro surveillance reports that between 1999 and 2002, there were 24 cases of more than or equal to 12 correct responses (≥75%) – Good knowledge
• Less than or equal to 7 correct responses (<50%) – Poor knowledge.

Recognizing this threat, adequate knowledge about the presence of PEP against HIV is imperative for Healthcare workers due to a higher risk of acquiring blood-borne infections. Thus, this study focuses on to estimate and compare the difference in knowledge and practice of PEP against HIV among nurses and paramedical workers in a tertiary care hospital in South India.

**Subjects and Methods**

**Methodology**

A cross-sectional study was conducted between April 2018 and June 2019 among the staff nurses and Paramedical workers at a Tertiary Health Care Hospital in South India after obtaining prior Institutional Human Ethics committee clearance and as per GCP guidelines.

**Data collection and procedure**

About 339 staff nurses and 66 paramedical workers employed at the tertiary care hospital were included in the study after obtaining consent from the participants. The confidentiality of the study participants was maintained. A pretested semi-structured questionnaire obtained from work done by Aminde et al. along with some questions designed in alignment with NABH guidelines on PEP against HIV was prepared by the research team for data collection. Initially, a pretest was done among ten percent of the total sample size, which is not included in the present study. Following the test, the feedback was obtained from the participants about any problem in clarity or interpretation of questions and was revised. The validity of the contents of the questionnaire was evaluated and rectified further based on the feedback from a panel of experts.

The questionnaire included 16 questions on knowledge of the participants about the prevalence of PEP (questions like if they have ever heard of PEP; source of knowledge; if they ever had training on PEP; if they were aware of the hospital policy for HIV; what to do in case of exposure, indication, drugs and drug regimen for PEP for HIV) and 12 questions addressing their practice (whether they consider themselves to be at a risk of HIV acquisition at their workplace; if they ever had occupational exposure to HIV in the past; what type of exposure; how many exposures they had in 12 months; circumstances of the exposure; did screening/test for HIV; if no, why not; have they received PEP after exposure; was the time-lapse from exposure to which PEP was received after exposure; reasons for not receiving PEP; postexposure screening of the source exposure; what was the HIV status of the exposure). The questionnaire does not include the name of the staff nurse or other personal identifiers.

**Scoring and knowledge of the participants**

Each question contains equal marks, and the knowledge is judged on the following basis:

- More than or equal to 12 correct responses (≥75%) – Good knowledge
- 8–11 correct responses (50%–69%) – Average knowledge
- Less than or equal to 7 correct responses (<50%) – Poor knowledge.

**Analysis**

The data were analyzed using SPSS software version 24. The descriptive analysis was summarized as frequencies, percentages, mean, and standard deviation. The statistical tests used to compare the knowledge between nurses and paramedical workers was Chi-square test. P < 0.05 was considered statistically significant.

**Results**

Out of 405 participants, 339 (83.7%) were nurses and 66 (16.3%) were paramedical workers. The mean age was 34.2 ± 8.6 years, with a range of 21 and 44 years. Most of the participants (65% nurses and 72.3% paramedical workers) were in the age group between 20 and 30 years. About 3/4th of the staff nurses (74.9%) and paramedical workers (75.8%) belonged to 1–5 years of the service period [Table 1].
Awareness of PEP was higher among the nurses (325 [95.9%]) than paramedical workers (56 [84.8%]). Majority of the study participants stated their source of knowledge to be PEP training and had a good knowledge about how soon PEP must be followed after a needle stick injury. All the nurses (100%) who participated in this study were aware about ‘washing thoroughly with soap and water’ as a first-aid measure after needle stick injury, while only 2 of the 66 paramedical workers answered otherwise. A large number of study participants had poor knowledge about the duration and the ideal drug regimen of PEP to be followed and about if antiseptics have to be used after exposure to needle stick injury. Among those who had answered correctly, the nurses were in majority compared to the paramedical workers [Table 2].

About 65.4% of the study participants had a good level of knowledge, higher among nurses (71.1%) compared to paramedical workers (36.3%). An overall significant difference ($P < 0.001$) in Knowledge between the nurses and paramedical workers was present [Table 3].

Our study shows a higher incidence of nurses being susceptible for occupational exposure to HIV (52 [15.3%]) compared to the paramedical workers [7 [10.6%]]. Approximately 85.3% of the nurses had encountered exposure through needle prick while giving injections. On the other hand, majority of the paramedical workers (57.1%) were exposed during the collection of blood samples. Out of which 12 (23.1%) of the nurses and 2 (28.6%) of the 7 paramedical workers had screened for HIV. On questioning their reason for not screening for HIV, majority of these participants (26 [65%]) nurses and (4 [71.4%]) paramedical workers assumed the patient to be HIV negative [Table 4].

**Discussion**

Abiding to universal health precautions and safe injection practices are pertinent in primary prevention against HIV among healthcare workers. However, the appropriate knowledge about the PEP regimen against HIV is crucial following occupational exposure. Periodic assessment about the knowledge about PEP among healthcare workers enables us to recognize the problems and efficient ways to improve.

Almost 3/4th of our participants had good knowledge about PEP against HIV, which was much higher compared to the study conducted among Rural Cameroonian Nurses, wherein only 1/4th of the participants had good knowledge about the same. The majority of our study participants had known about PEP for HIV (95.9% nurses). PEP training (65.8%) was the main source of knowledge for participants in our study. This is at the variance of findings from a study conducted by Aminde et al., whose participants learnt about PEP from ward rounds. All but two nurses (99.4%) knew how soon PEP was to be initiated following needle stick injury. Our findings are higher than those obtained in a study carried out in Mumbai, wherein 64% of the participants correctly stated the time for initiation. All the nurses who were part of our study identified the correct first aid method to institute following a needle prick injury, that is, to wash thoroughly with soap and water. This is much higher compared to findings of a study conducted amid interns of a medical college in West Bengal, wherein 84.6% of the study participants answered correctly. The knowledge observed in our study is most likely due to regular NABH training sessions and lectures on occupational exposures held by the hospital management, their work experience gained through ward rounds and also to their self-awareness.

Despite regular training sessions, a large number of the nurses who participated in the study (64.9%) did not know antiseptics could cause more damage to the skin and, on the contrary, the interns who participated in the study in West Bengal had better knowledge of this regard. This poor knowledge might be due to the informal source of information gained among the study participants.

Although three-fourth of the participants were able to correctly identify breast milk as a high-risk fluid, they were not able to identify other nonblood high-risk fluids. Unlike results obtained in the study conducted...
Table 2: Knowledge about postexposure prophylaxis against human immuno-deficiency virus among nurses and paramedical workers

| Variables* | Responses | Nurses (n=339), n (%) | Paramedical workers (n=66), n (%) |
|------------|-----------|-----------------------|----------------------------------|
| Have you ever heard about PEP? | Yes | 325 (95.9) | 56 (84.5) |
| | No | 14 (4.2) | 10 (15.2) |
| Source of knowledge (multiple responses) | Newspapers/journals | 0 (0) | 0 (0) |
| | Radio | 0 (0) | 0 (0) |
| | Television | 0 (0) | 0 (0) |
| | Seminar/workshop | 22 (6.5) | 4 (6.1) |
| | Ward rounds | 260 (23.3) | 14 (21.2) |
| | PEP training | 223 (65.8) | 38 (57.6) |
| | Can’t remember | 1 (0.3) | 5 (7.6) |
| Aware of hospital’s PEP policy? | Yes | 328 (96.8) | 61 (92.4) |
| | No | 11 (3.2) | 5 (7.6) |
| Have you had ever had training on PEP? | Yes | 223 (65.8) | 38 (57.6) |
| | No | 116 (34.2) | 32 (42.4) |
| How soon after a needle prick injury should PEP be followed | Within 1 h | 337 (99.4) | 64 (97) |
| | After 72 h | 1 (0.3) | 1 (1.5) |
| | Don’t know | 1 (0.3) | 1 (1.5) |
| Which of the following fluids are at a higher risk of transmission of HIV? (multiple answers acceptable) | Breast milk | 212 (62.5) | 40 (60) |
| | Urine | 21 (6.2) | 5 (7.6) |
| | Peritoneal fluid | 11 (3.2) | 2 (30) |
| | Saliva | 94 (27.7) | 19 (28.8) |
| | Pleural fluid | 07 (2.06) | 1 (1.5) |
| | Cerebrospinal fluid | 9 (2.6) | 3 (4.5) |
| | Faces | 3 (0.8) | 1 (1.5) |
| | Synovial fluid | 4 (1.1) | 0 (0) |
| Indication for initiation of PEP (multiple answers acceptable) | Needle prick injury | 308 (90.9) | 60 (90.9) |
| | Splashing of blood/body fluid on Mucosa | 33 (9.7) | 5 (7.6) |
| | Rape | 4 (1.2) | 0 (0) |
| | Infants born with HIV | 13 (3.8) | 1 (1.5) |
| First aid measure to institute following needle stick injury | Promotive active bleeding of the wound | 0 (0) | 2 (1.5) |
| | Wash thoroughly with soap and water | 339 (100) | 64 (98.5) |
| | Don’t know | 0 (0) | 0 (0) |
| Are you supposed to apply antiseptics/skin washes after an exposure to clean the surrounding area? | Yes | 220 (64.9) | 42 (63.6) |
| | No | 119 (35.1) | 24 (36.4) |
| Are you supposed to squeeze the wound to let it bleed? | Yes | 125 (36.8) | 25 (37.9) |
| | No | 214 (63.2) | 42 (62.1) |
| What is the ideal HIV-PEP regimen following needle stick injury? | One drug regimen | 51 (15) | 10 (15.2) |
| | Two Drug regimen | 57 (16.8) | 9 (13.3) |
| | Expanded three drug regimen | 173 (51) | 33 (50) |
| | Don’t know | 58 (17.1) | 13 (19.7) |
| Which of the following drugs are used in PEP? (multiple answers acceptable) | Zidovudine | 261 (77) | 50 (75.8) |
| | Glimepiride | 0 (0) | 0 (0) |
| | Nevirapine | 31 (9.1) | 6 (9.1) |
| | Lamivudine | 64 (18.9) | 10 (15.2) |
| | Levimisole | 1 (0.3) | 0 (0) |
| | Stavudine | 0 (0) | 0 (0) |
| | Faminotidine | 7 (2.1) | 1 (1.5) |
| | Nevirapine | 0 (0) | 0 (0) |
| Duration of PEP | For life | 11 (3.2) | 2 (3) |
| | 28 days | 114 (36.6) | 24 (36.4) |
| | 8 weeks | 0 (0) | 5 (7.5) |
| | 6 months | 212 (62.5) | 39 (59.1) |
Public health officials have observed that occupational exposure to HIV, mostly through needle sticks and other injuries, is low among nurses, which is evident from the findings of our study. However, the rate of occupational exposure to HIV among nurses may be underestimated due to the high patient load at the study sites and lower reporting rates.

Table 3: Level of knowledge and comparison about postexposure prophylaxis against human immuno-deficiency virus between nurses and paramedical staffs

| Variables* | Responses  | Nurses (n=339), n (%) | Paramedical workers (n=66), n (%) | Total (%) | χ² | P* |
|------------|------------|----------------------|----------------------------------|-----------|----|----|
| When is the expanded three drug regimen used? | When the status of the source is clinically symptomatic and it is a moderate to severe exposure | 180 (53.1) | 34 (51) | 214 | 0.00 | 0.0
| | When the status of the exposure is clinically asymptomatic and its a mild exposure | 51 (15) | 12 (18.2) | 63 | | |
| | Expanded 3 drug regimen is an ideal HIV-PEP regimen and should be given to anyone who is exposed to HIV | 108 (31.9) | 19 (28.5) | 127 | | |
| | When the source is unknown | 0 (0) | 0 (0) | 0 | | |
| What is the proportion of needle prick injury results in HIV? | 1/100 | 33 (9.7) | 7 (10.6) | 40 | | |
| | 1/500 | 15 (51) | 10 (15.2) | 25 | | |
| | 3/1000 | 124 (38.6) | 25 (37.9) | 149 | | |
| | Don't know | 105 (31) | 21 (21) | 126 | | |
| Should the source be screened for HIV? | Yes | 295 (87) | 57 (86.4) | 352 | | |
| | No | 44 (13) | 9 (13.6) | 53 | | |

*Values are expressed as frequency and percentages. PEP: Postexposure prophylaxis, HIV: Human Immuno-Deficiency virus

Table 3: Level of knowledge and comparison about postexposure prophylaxis against human immuno-deficiency virus between nurses and paramedical staffs

As per our findings, more than half of the nurses and paramedical staffs had a good level of knowledge about PEP for HIV. However, almost half of the respondents among nurses and paramedical staffs had a poor level of knowledge, which was similar to the study conducted in Lagos University.[6] Two-thirds of the participants received PEP within 24 h, wherein in a study conducted by Aminde et al. only half of the participants received PEP within 24 h.[10] Among those exposed, 3/4th of the participants took PEP screening of the exposure which and in comparison, only 1/4th of participants took PEP screening for HIV in a study overseen by Prasuna et al.[13] The reason behind the majority of our study participants not screened for HIV following exposure are the sources of exposure were HIV negative and also negligence about the hospital protocol concerning PEP at that time.

Comparing previous studies wherein the knowledge regarding PEP for HIV was found poor, this study proposes novel inferences such as, despite the good knowledge, a low-level practice of HIV PEP among staff nurses and paramedical workers was observed. However, the limitations of the study may be attributed to the cross-sectional study design and the response bias involved due to the nature of self-report data. Further, larger sample size, including health-care workers from diverse centers would provide a refined analysis for a more precise conclusion.

**Conclusion**

The study revealed a huge gap between the knowledge and practice of PEP among nurses and paramedical workers. The practice of PEP against HIV can be improved by establishing strategies such as periodic training sessions on universal precautions and hanging posters in every ward regarding standard guidelines and policies toward urgent utilization of PEP in case of exposure and also to set up a round the clock PEP center to impart elaborate counseling and follow-ups.

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Nil.
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Table 4: Practice of postexposure prophylaxis against human immuno-deficiency virus among nurses and paramedical workers

| Variables* | Responses | Nurses, n (%) | Paramedical workers, n (%) |
|------------|-----------|---------------|---------------------------|
| Do you consider yourself to be at a risk of HIV acquisition at your workplace? (n=339, 66) | Yes | 339 (100) | 65 (98.5) |
| Have you ever had occupational exposure to HIV in the past? (n=52, 7) | No | 0 (0) | 1 (1.5) |
| What type was it? (n=52, 7) | Needle prick | 49 (95.1) | 6 (85.7) |
| | Splashing of blood/body fluid on mucosal surfaces | 2 (2.8) | 1 (14.2) |
| | Both needle prick and splashing of blood on mucosal surface | 1 (2.1) | 0 (0) |
| How many exposures have you had in 12 months? (n=52, 7) | 1 | 38 (73.1) | 6 (85.7) |
| | 2-3 | 14 (26.9) | 1 (14.3) |
| | >5 | 0 (0) | 0 (0) |
| What were the circumstances of exposure? (multiple answers accepted) (n=52, 7) | Setting up IV line | 20 (38.5) | 0 (0) |
| | During surgery | 8 (15.7) | 0 (0) |
| | Giving injections | 43 (84.3) | 4 (57.1) |
| | Collecting blood samples | 28 (53.8) | 6 (85.7) |
| | Recapping needles | 28 (54.9) | 3 (42.7) |
| | During delivery | 2 (2.8) | 0 (0) |
| | Other | 0 (0) | 0 (0) |
| If you ever had occupational exposure to HIV, did you screen or test for HIV? (n=52, 7) | Yes | 12 (23.1) | 2 (28.6) |
| | No | 40 (76.9) | 5 (71.4) |
| If no, why did you not test for HIV? (n=40, 5) | Not aware | 11 (27.5) | 1 (20) |
| | Assumed patient was HIV negative | 26 (65) | 4 (71.4) |
| | Other reasons | 3 (18.5) | 0 (0) |
| Did you receive PEP after exposure? (n=52, 7) | Yes | 12 (23.1) | 1 (14.3) |
| | No | 40 (76.9) | 6 (85.7) |
| What was the time lapse from exposure to which PEP was received after exposure? (n=12, 1) | <24 h | 8 (66.6) | 1 (100) |
| | >24 h | 4 (33.3) | 0 (0) |
| Reasons for not receiving PEP? (n=40, 6) | Not necessary | 6 (15) | 1 (26) |
| | ARVs not available | 0 (0) | 0 (0) |
| | Source of HIV was negative | 22 (55) | 2 (33.3) |
| | Not aware of the need to take PEP after exposure | 0 (0) | 2 (33.3) |
| | Not aware of the hospital protocol concerning PEP at the time | 12 (30) | 1 (16) |
| Postexposure screening of source exposure? (n=52, 7) | Screened | 34 (65.4) | 3 (42.9) |
| | Not screened | 18 (34.6) | 4 (57.1) |
| What was the HIV status of the exposure? (n=34, 3) | Positive | 12 (35.5) | 1 (33.3) |
| | Negative | 22 (64.7) | 2 (66.6) |

*Values are expressed as frequency and percentages. PEP: Postexposure prophylaxis, HIV: Human immunodeficiency virus

Conflicts of interest
There are no conflicts of interest.

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