Original Article

Evaluation of HIV Non-occupational Post-exposure Prophylaxis Utilisation in a Tertiary Health Facility in Nigeria

Olanrewaju Fatai Olatunde[1*], Oripelaye Muphy Mufutau[1], Ajani Atinuke Arinola[1], Enitan Ademola Olusegun[2]

[1]*Department of Dermatology/ Venereology, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria.*
[2]*Department of Dermatology, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun State, Nigeria.*

***Corresponding author:** Qlanrewaju Fatai Olatunde. Department of Dermatology/Venereology, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. Email: docjufat@yahoo.com

Abstract

Background
The Sub-Saharan Africa accounts for more than 70% of the global burden of HIV infections. Non-occupational post-exposure prophylaxis, when initiated within 72 hours of HIV exposure for 28 days, can prevent seroconversion in 80% of HIV exposures.
Objectives
To evaluate the characteristics, prevalence and outcome of non-occupational HIV post-exposure prophylaxis utilization in a tertiary hospital.
Method
This was a retrospective study that involved the medical records of 143 patients who sought HIV non-occupational post-exposure prophylaxis between 1st June 2011 and 31st May 2021. A questionnaire was used to collect information about the socio-demographic data, profiles of both the source and exposed persons, antiretroviral completion rate and outcome at follow-up.
Results
Females accounted for 125 (87.4%). Sexual assaults were the main reasons for seeking non-occupational post-exposure prophylaxis in 119 (83.2%). High-risk exposures were observed in 134 (93.7%). HIV status of the sources was unknown in 126 (88.1%). 123 (86.0%) initiated antiretroviral within 72 hours of exposure and antiretroviral completion rate was 70.6%. Only 28 (19.6%) reported for follow-up scheduled HIV screening and were all negative.
Conclusion
Early initiation of postexposure prophylaxis, improvement in baseline HIV testing of the source, and follow-up HIV screening, will significantly improve services and outcomes.
Rwanda J Med Health Sci 2022;5(3):264-275

Keywords: Evaluation, non-occupational, postexposure prophylaxis, HIV, utilisation

Introduction

Non-occupational HIV post-exposure prophylaxis (nPEP) is the initiation of antiretroviral therapy (ART) in HIV-negative individuals within 72 hours or as early as possible for 28 days after the person is exposed to potentially HIV-infected blood or body fluids outside the occupational or healthcare setting.[1,2] Ideally, nPEP is most effective when the first dose of the antiretroviral (ARV) regimen is given within 2 hours of HIV exposure because the efficacy of nPEP reduces with prolongation in initiating ART.[2] Non-occupational post-exposure prophylaxis became necessary as part of the numerous approaches to reduce HIV/AIDS-related deaths, high lifetime medical costs and the economic burden of treating HIV patients when exposed individual seroconverts.[3]

This preventive measure started in the mid-1990s when the Centre for Disease Control and Prevention (CDC) released the first guideline on the ability of Zidovudine to prevent seroconversion in more than 80% of HIV occupational exposures among healthcare workers.[4] Since this discovery, other forms of exposure like sexual exposure and injection sharing have also received attention and are included in the nPEP programme. In addition to the observation by CDC, proven efficacy of ART has also been established in the prevention of maternal-to-child transmission during pregnancy and animal studies by World Health Organisation (WHO).[2,4]

The WHO, in an attempt to simplify nPEP services, has developed guidelines and harmonised previous ones to ease the assessment of eligibility for nPEP, and standardised antiretroviral prescription with a view to improving uptake, and ARV completion rate.[2] Several countries have now adopted and domesticated the WHO recommendation on post-exposure prophylaxis without differentiating the type of exposure. These national guidelines have been improved upon with many now prescribing the 3-drug regimen to prevent all forms of HIV exposure from unprotected receptive vaginal intercourse (HIV transmission per sex act: 0.002%) to high-risk exposures like unprotected receptive anal intercourse (HIV transmission per sex act: 1.4%) and injection sharing among intravenous drug users.[2,4,5] This global strategic public health approach has significantly contributed to alleviating the initial high prevalence of HIV, and its high morbidity and mortality rate by reducing the rate of seroconversion after exposure to potentially infectious materials.[2,6]

Globally, the human immunodeficiency virus is affecting about 38 million of the world's population of which the majority are in developing countries.[6] Sub-Sahara Africa (SSA) despite making up only 12% of the world's population, is the worst hit by the scourge carrying 70% of the global burden of the disease, estimated to be 25.7 million people living with HIV (PLHIV).[4] Regrettably, more than two-thirds of HIV/AIDS-related deaths occur in Sub-Sahara Africa.[7] Nigeria shares a high proportion of this scourge with a prevalence of 1.4% estimated to be about 1.7 million people living with the virus as of 2020.[6] Among the propagators of HIV transmission in Nigeria and many parts of SSA are unprotected multiple sexual partners, low or improper use of condom, money for sex due to poverty, inconsistent use of universal precaution, lack of personal protective equipment, poor waste or sharps disposal, stigmatisation, and sexual assaults.[6,8]

To control the spread of HIV, prevention must play a pivotal role in the HIV response. These preventive strategies among other measures must strengthen HIV education, awareness campaign, intensive case findings, early diagnosis, administration of highly active antiretroviral therapy, pre-exposure prophylaxis and post-exposure prophylaxis.[9] Besides, there must be a well-coordinated pragmatic approach that focuses on reducing all forms of exposure to potentially infectious body fluid. Unprotected sexual exposures, which constitute the major means of HIV transmission, must be discouraged by promoting the consistent and correct use of condoms.[9]

For nPEP services to be effective they must encompass first aid following HIV exposure, pre-test and post-test counselling, risk assessment and eligibility of both the exposed and source person for ART, necessary laboratory investigation, provision of antiretroviral therapy (ART) and adherence counselling, follow-up HIV screening and emphasis on avoidance of risky sexual behaviours.[10] Unfortunately, despite the potential benefits of non-occupational post-exposure prophylaxis and these proactive measures to reduce the epidemic through the provision of nPEP, awareness is either poor or underutilised which may drive HIV transmission and worsen the epidemic. [4,11]

Also, attention shifts and declining global funding of HIV reduction strategies as a result of the recent Covid-19 pandemic may negatively impact previous gains made before the pandemic.[12,13] Scaling up of nPEP services is highly advocated because many countries in SSA including Nigeria may witness an increase in the incidence of non-occupation HIV exposure, due to the high prevalence of HIV infection in developing countries, declining economic fortunes, the inadequacy of healthcare facilities, internal conflicts, and a surge in violent crimes such as terrorism, banditry, kidnapping, and gender-based violence including sexual assaults.[12,13]

To efficiently reduce seroconversion and transmission following HIV exposures, nPEP should be encouraged for all high-risk exposures. High-risk exposure is defined as exposures in which post-exposure prophylaxis is indicated. The timely and proper use of nPEP is very effective at inhibiting the replication of the initial inoculum of the virus and thereby preventing the establishment of chronic HIV infection in more than 80% of exposures.[14] Examples of high-risk exposure include HIV-positive sources, sources with unknown HIV status, large-bore needles, large-volume body fluid exposure, and risky sexual behaviour. In contrast, low-risk exposure occurs when post-exposure prophylaxis is not necessary. This category of exposure is observed in solid needle stick injury, superficial exposure on intact skin, a small volume (drops of blood) on mucous membranes or non-intact skin exposures, and a negative source. Even though low-risk exposures may not need nPEP, physicians may still prescribe ART in some cases of low-risk due to the high prevalence of HIV in that environment, multiple exposure sources and consideration of a window period in the source. Patients on nPEP should be offered continuous counselling and support to reduce the anxiety and psychological effects of HIV exposure.The present study aimed at documenting the characteristics, prevalence and outcome, of both the exposed and source persons, delays in their time of presentations for nPEP, ART completion rate for 28 days and HIV status at follow-up to measure outcome and identify deviation from the guidelines, with a view to improving nPEP service delivery. This can assist to improve the quality of health care offered to HIV-exposed individuals and emphasize the need for nPEP providers to be proactive in the services rendered by creating awareness on timely presentation after exposure since timely presentation influences the outcome.

Materials and Methods

Study design

The study was a retrospective cross-sectional descriptive survey involving the medical records of all the patients who sought HIV non-occupational post-exposure prophylaxis (nPEP) following exposures to potentially infected body fluids between 1st June 2011 and 31st May 2021, a period of 10 years.

Study location

The study was conducted at the Virology Research Clinic (VRC) of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Osun State, Nigeria. OAUTHC is a government-run specialist centre that provides services to an ethnically diverse population of about 8 million from different states and geo-political zones of the country. VRC is a clinic in OAUTHC run by the Federal Government of Nigeria with support from non-governmental organizations. The clinic specializes in providing current and multidisciplinary HIV care including prevention, diagnosis and treatment. All HIV services are domiciled in this clinic for easy access to comprehensive care.

Study population

The study population included all 143 clinic records of patients who self-reported HIV exposure outside the occupational or healthcare setting within the 10 years review period from 1st June 2011 to 31st May 2021. In the context of this review, HIV exposure is defined as direct mucosal,

percutaneous or intravenous contact with potentially HIV-infected body fluids. The inclusion criteria for this study include non-occupational HIV exposure within the review period, HIV negative individuals. The exclusion criteria were clinic records of patients with occupational exposures, patients who were HIV positive, and clinic records with inadequate documentation.

Data collection method and instrument

We collected data from the clinic records of all 143 HIV-exposed persons using a questionnaire that was specifically designed by the investigators for the purpose of the study. The questionnaire contained the following information: (i) sociodemographic data such as age, sex, occupation, marital status, and education level, (ii) exposure characteristics of both the patients and the source - date and time of exposure, types of exposure, risk of exposure, the delay between exposure and initiation of ARVs, HIV status of the source and patients, identity and availability of the source (iii) antiretroviral therapy regimen, number of days ARV was used, (iv) follow-up HIV screening at 12 and 24 weeks.

Data analysis

Data were analysed using IBM Statistical Package for Social Science (version 25). The results were presented using descriptive statistics such as frequency, percentage, and mean. The association between two categorical variables of interest was determined using chi-square and the level of significance was set at $p< 0.05$.

Ethical approval

Ethical clearance for the study was granted by the Ethics and Research Committee of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife. (Registration numbers: International - IRB/IEC/0004553, National - NHREC/27/02/2009a). The questionnaires and data entry were anonymous to ensure confidentiality. The data was protected from unauthorized individuals using a password-protected computer.

Result

A total of 143 individuals who had non-occupational HIV exposure sought HIV nPEP within the review period of 10 years. Most of the patients were females 125 (87.4%) with a male-to-female ratio of 1: 6.9. The age range of the patients was between 3 years and 70 years (mean age 21.40 ± 9.59 SD). More than 75% of the patients were in the age group 10-19 years and 20-29 years. One hundred and twenty-five (87.5%) of the recruited patients were single, 17 (11.9%) were married and 1 (0.7%) was divorced. More than half (52.4%) of the patients had tertiary education and 2.1% had no formal education. The only significant association was found between the sex of the patients and the time interval between exposure and initiation of nPEP. Other sociodemographic data were not associated with nPEP completion rate, follow-up HIV screening, and delay time in initiating nPEP. (Table 1).

Table1. Sociodemographic characteristics of the patients who accessed nPEP and association with some variables

Sociodemographic profile	Frequency n (%)	Time of Initiation of ART (hours) N = 143		nPEP rate of Completion N = 143		Follow-up HIV screening N =143	
		≤ 72 n (%)	>72 n (%)	Yes n (%)	No n (%)	Yes n (%)	No n (%)
Age (years)							
0-9	14 (9.8)	10 (7.0)	4 (2.8)	8 (5.6)	6 (4.2)	3 (2.1)	11 (7.7)
10-19	48 (33.6)	40 (28.0)	8 (5.6)	31 (21.7)	17 (11.9)	8 (5.6)	40 (28.0)
20-29	60 (42.0)	53 (37.1)	7 (4.9)	45 (31.5)	15 (10.5)	14 (9.8)	46 (32.2)
30-39	17(11.9)	14 (9.8)	3 (2.1)	15 (10.5)	2 (1.4)	1 (0.7)	16 (11.2)
40-49	1 (0.7)	1 (0.7)	0	1 (0.7)	0	1 (0.7)	0
50-59	2 (1.4)	2 (1.4)	0	1 (0.7)	1 (0.7)	1 (0.7)	1 (0.7)
60-69	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	0
70-79	1 (0.7)	1 (0.7)	0	0	1 (0.7)	0	1 (0.7)
Mean ± SD	21.4 ± 9.59						
Statistics		LR=1.130, p= 0.76		LR=8.821, p=0.18		LR=8.062, p=0.21	
Sex							
Male	18 (12.6)	18 (12.6)	0	2 (1.4)	16 (11.2)	5 (3.5)	13 (9.1)
Female	125 (87.5)	101 (70.6)	24 (16.8)	40 (28.0)	85 (59.4)	23 (16.1)	102 (71.3)
Statistics		LR= 6.749, p= 0.04		LR=4.629, p= 0.32		LR=0.814, p= 0.34	
Level of education							
Primary	23 (16.1)	20 (14.0)	3 (2.1)	16 (11.2)	7 (4.9)	6 (4.2)	17 (11.9)
Secondary	41 (28.7)	34 (23.8)	7 (4.9)	29 (20.3)	12 (8.4)	6 (4.2)	35 (24.5)
Tertiary	75 (52.4)	64 (48.6)	11 (7.7)	55 (38.5)	20 (14.0)	16 (11.2)	59 (41.3)
No education	3 (2.1)	3 (2.1)	0	1 (0.7)	2 (1.4)	0	3 (2.1)
Missing	1 (0.7)	1 (0.7)	0	0 (0)	1 (0.7)	0	1 (0.7)
Statistics		LR=7.400, p= 0.83		LR=7.548, p= 0.18		LR=1.370, p= 0.83	
Marital status							
Single	125 (87.5)	105 (73.4)	20 (14.0)	88 (61.5)	37 (25.9)	24 (16.8)	101 (70.6)
Married	17 (11.9)	16 (11.2)	1 (0.7)	12 (8.4)	5 (3.5)	4 (2.8)	13 (9.1)
Divorced	1 (0.7)	1 (0.7)	0	1 (0.7)	0	0	1 (0.7)
Statistic		LR=10.526, p=0.17		LR=1.077, p=0.99		LR=.608, p= 0.80	

LR = Likelihood Ratio, SD= Standard Deviation, p= level of significance (< 0.05), Freq=Frequency

The predominant type of exposure was sexual assault (rape), observed in 119 (83.2%). Three (2.1%) patients, while caring for HIV-infected relatives, were exposed to blood/blood products and body fluids. The majority, 134 (93.7%) of the patients were high-risk exposures while the remaining 9 (6.3%) were low-risk exposures. The identity of the source was known in 117 (81.8%) cases. Sexual exposures (rape) observed from strangers, friends, family members, and commercial drivers were 37 (25.9%), 8 (5.6%), 1 (0.7%) and 1 (0.7%) respectively.

The HIV serostatus of the source persons at baseline was known only in 17 (11.9%) while the HIV statuses of the majority, 126 (88.1%) were unknown as they were not available for screening. Eight (5.6%) of the source persons screened at baseline were found to be seropositive. One hundred and forty (97.9%) of the exposed patients who presented for nPEP had their baseline HIV screening done. None of them was HIV positive at baseline. HIV status of the source, risk of exposure and identity of the source were significantly associated with types of exposure, (Table 2).

Table 2. Clinical profile of the source and patients at baseline

Variables	Types of exposures N = 143 (100%)					Statistics
	Rapes 119 (83.2%)	Sharp 6 (4.2%)	Body fluid 4(2.8%)	Other 14 (9.8%)	Total 143 (100%)	ρ-values
HIV status of the patients						
Positive	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
negative	117(81.8)	6 (4.2)	4 (2.8)	13 (9.1)	140 (97.9)	
Unknown	2 (1.4)	0 (0)	0 (0)	1 (0.7)	3 (2.1)	0.89
HIV status of the source*						
Positive	0 (0)	1 (0.7)	1 (0.7)	6 (4.2)	8 (5.6)	
Negative	6 (4.2)	1 (0.7)	1 (0.7)	1 (0.7)	9 (6.3)	
Unknown	113 (79.0)	4 (2.8)	2 (1.4)	7 (4.9)	126 (88.1)	< 0.001*
Identity of the Source						
Strangers	37 (25.9)	1 (0.7)	1 (0.7)	4 (2.8)	43 (30.1)	
Neighbours	21 (14.7)	0 (0)	0 (0)	0 (0)	21 (14.7)	
Robbers	19 (13.3)	0 (0)	0 (0)	0 (0)	19 (13.3)	
Friends	8 (5.6)	1 (0.7)	1 (0.7)	8 (5.6)	18 (12.6)	
Acquittances	8 (5.6)	0 (0)	1 (0.7)	1 (0.7)	10 (6.9)	
Patients	0	2 (1.4)	1 (0.7)	0 (0)	3 (2.1)	
Family member	1 (0.7)	0 (0)	0 (0)	1 (0.7)	2 (1.4)	< 0.001*
Drivers/Bike rider	1 (0.7)	0 (0)	0 (0)	0 (0)	1 (0.7)	
Missing	24 (16.8)	2 (1.4)	0 (0)	0 (0)	26 (18.2)	
Risk of exposure						
High risk	114(79.7)	6 (4.2)	2 (1.4)	12(8.3)	134 (93.7)	
Low risk	5 (3.5)	0 (0)	2 (1.4)	2 (1.4)	9 (6.3)	0.004*

*significant level at <0.05

The median time (hours) of all patients before seeking nPEP was 34 hours. The median time (hours) for males and females were 24 and 38 hours respectively. Only seven (4.9%) individuals presented within the first two hours of exposure. The majority of the patients, 116 (81.1%), sought nPEP within the recommended 72 hours while 21 (14.7%) patients presented beyond 72 hours.

One hundred and thirty-four (93.7%) and three (2.1%) patients used three ARV drugs of different combinations and two ARV regimens for their nPEP respectively. Six (4.2%) of the patients did not use antiretroviral (ARV) even though they were classified as high risk based on the fact that the HIV status of the sources was unknown.

The ARVs completion rate was 101 (70.6%) among the exposed patients. Only 36 (25.2%) did not complete the 28-day nPEP. The follow-up characteristics of the exposed persons revealed that a larger proportion, 115 (80.4%), did not present for the post-nPEP HIV screening schedule even though 132 (92.3%) were counselled for post-nPEP HIV screening. The remaining 28 (19.6%) exposed persons were screened for HIV and all were negative. The time of initiation of ART is significantly associated with the sex of the exposed persons.

Table 3. Characteristics of exposed patients who received HIV nPEP

Patients Variable	Sex n = 143			Statistics
	Male	Female	Total	
	N=18(12.6%)	N=125 (87.4%)	143 (100%)	ρ value
Interval from HIV exposure to ARVs initiation				
MEDIAN (hours)(Range)	24.0 (2.0-72)	38.0 (0.0-720.0)	34.0 (0.0-720)	
No ARVs	0 (0)	6 (4.2)	6 (4.2)	
2 hours or less	1 (0.7)	6 (4.2)	7 (4.9)	
3-24 hours	9 (6.3)	50 (35.0)	59 (41.3)	
25–72 hours	8 (5.6)	42 (29.4)	50 (35.0)	0.047
72 hours or greater	0 (0)	21 (14.7)	21 (14.7)	
ARVs regimen				
No ARVs	0 (0)	6 (4.2)	6 (4.2)	
AZT/3TC	0 (0)	3 (2.1)	3 (2.1)	
AZT/3TC/EFV	2 (1.4)	26 (18.2)	28 (19.6)	0.502
TDF/3TC/EFV	7 (4.9)	51 (35.7)	58 (40.6)	
ABC/3TC/EFV	1 (0.7)	2 (1.4)	3 (2.1)	
TDF/3TC/DLT	8 (5.6)	37 (25.9)	45 (31.5)	
ARVs 28 days completion rate.				
Mean ± SD days ARVs were used	26.4 ± 4.53	23.09 ± 7.76	23.52 ± 7.50	
No ARVs	0 (0)	6 (4.2)	6 (4.2)	0.323
Incomplete ARVs	2 (1.4)	34 (23.8)	36 (25.2)	
Complete ARVs*	16 (11.2)	85 (59.4)	101 (70.6)	
Adherence counselling				
Yes	18 (12.6)	114 (79.7)	132 (92.3)	
Not documented	0 (0)	11 (7.7)	11 (7.7)	
Follow-up HIV status at 3 and 6 months.				
Positive	0 (0)	0 (0)	0 (0)	
Negative	5 (3.5)	23 (16.1)	28 (19.6)	0.349
Unknown	13 (9.1)	102 (71.3)	105 (80.4)	

ARVs – Antiretrovirals, AZT- Zidovudine, 3TC – Lamivudine, EFV – Efavirenz,

TDF – Tenofovir, ABC – Abacavir, DLT – Dolutegravir.

Figure 1 shows the trend in the yearly distribution of the patients that presented for HIV nPEP during the study period. There was a progressive rise in the trend of nPEP utilisation among patients presenting with non-occupational exposure between 2011 and 2021. However, the year 2019 to 2021 showed a slight increase in nPEP utilisation after a decline in 2014

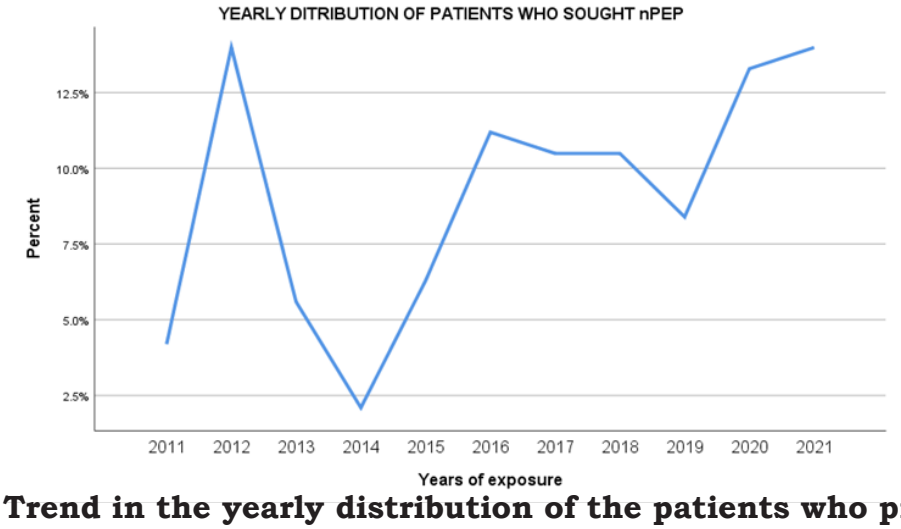

Figure 1. Trend in the yearly distribution of the patients who presented for non-occupation post-exposure prophylaxis.

Discussion

The nPEP has become part of the standard of care in recent times when an individual is exposed to potentially HIV-contaminated body fluids outside the healthcare setting. Several studies, mostly from outside this environment, have demonstrated that timely and correct use of nPEP is effective at preventing HIV seroconversion among exposed persons.[9,14-16] Although data with proven efficacy from animal studies, exposed healthcare workers and prevention of maternal-to-child transmission are common in developed nations,[16,17] only a few exist to support the effectiveness of post-exposure prophylaxis in Nigeria and other parts of Africa.[9,10]

This study showed that the females sought nPEP more than their male counterparts. [18,19] This could be due to the fact that rape accounted for most of the exposure types (83.2%). Another reason for the high preponderance of females may also be due to better female healthcare-seeking behaviours.[20] This finding is similar to that reported from Nigeria and Yaoundé, Cameroon, which belongs to the same geographical spread of West Africa.[9,18,19] In contrast to the present study, Western countries show male predominance among those seeking nPEP,[16,21] probably because most of the patients in the western studies were men who have sex with men (MSM). The poor health-seeking behaviour of MSM in Africa and disclosure issues in order to avoid being stigmatised may also account for more females seeking nPEP.[15] Besides, before the widespread availability of ART for nPEP, preference was given to high-risk exposures like unprotected anal sexual exposure making most data in western countries skewed towards males.

The mean age of exposed patients was 21.4 years (SD = 9.59). This mean age is similar to the previous studies reported among Nigerian patients in which the majority of the patients were in their third decade. [6,10] The highest number of patients were within the age group 20-29 years and 10-19 years, single and students of which the majority were females. This observation was not surprising because the former age group falls within the sexually active population and the latter were children or adolescents who were vulnerable groups exposed to a lot of sexual assaults like

rape and gender-based violence which are quite rife in Nigeria.[22,23] The vulnerability of the females and younger age group to HIV exposure is quite disturbing from this study as evidenced by the source identity in which sexual assaults were also reported among family members, friends, commercial drivers and strangers.[23] Patients seeking HIV nPEP, especially when it occurred among family members, will need continuous counselling, psychological support and emergency contraceptives to prevent pregnancy.[24]

The males tend to present earlier for nPEP, almost by half as much time interval as their female counterparts. This is similar to the previous study from Nigeria where early presentation of males was also documented.[10] The late presentation of the female is not surprising because the majority of the patients seeking nPEP were rape cases who rarely reported to avoid shame and stigmatization by the public.[10] Many of these rape cases also undergo prolonged delays at the hands of law enforcement agents and legal processes that contribute to late presentations by the females.[10] Other factors contributing to delay presentation for nPEP among exposed females have been attributed to their dependence on males for assistance and approval before seeking legal redress and medical care for their HIV exposures, especially when the source person is a male, as in sexual assault.[10]

Nevertheless, it is heart-warming to note that majority (85.3%) of the patients presented for nPEP within the first 72 hours of exposure as recommended by the Nigerian National Guidelines for HIV Prevention Treatment and Care.[24] The high presentation within the first 72 hours, has been reported in earlier studies on nPEP [10,25] which may be a reflection of better awareness in the community. However, a study focusing on awareness and knowledge about nPEP needs to be carried out to ascertain this assumption. Regrettably, less than 5% of patients presented within the first 2hours which is the optimum time for maximum benefit from nPEP.[26,27]

The few patients who presented beyond the recommended 72 hours were also given nPEP. These prescription practices are in line with Nigeria's guidelines Nigeria's guidelines in cases of unknown HIV status of the source, which the guideline stipulates should be assumed to be positive.[24] Other considerations for giving nPEP beyond 72 hours are the high prevalence of HIV in sub-Sahara Africa (Nigeria inclusive), high level of high-risk exposures and the assumption that the source may be a new infection and still be in the window period of seronegativity.[24] It is important to encourage and intensify source persons' baseline HIV screening to avoid inappropriate ART prescriptions and wastage in the exposed person. This study reveals a high completion rate of the prescribed ART regimen among the patients that were offered nPEP. The high proportion of adherence to nPEP is most likely due to proactive phone calls to patients to ensure completion of the recommended 28 days. This method of assessing adherence to nPEP by self-reporting may be biased as the patients may not tell the absolute truth about their ART completion rate.

Another reason for the high completion rate may also be partly due to the high level of adherence counselling (92.3%) at the first visit. Despite the robust adherence counselling at the first visit, only 28 (19.6%) returned physically for follow-up HIV screening at 3 and 6 months and none of them seroconverted. Low follow-up and post-nPEP HIV screening have been reported in previous studies across sub-Sahara Africa (SSA).[6,10,16,28] The poor follow-up has been attributed to issues of psychological factors, the uneven spread of clinics offering HIV and nPEP services, distance facilities and the issue of confidentiality if seroconverted.[16]The progressive increase observed since 2011 was interrupted in 2014 but the reasons for this were not known (Figure 1). Ever since then, there had been a steady increase which may be a reflection of increasing awareness,

more availability of HIV services and probably better coordinated nPEP referral system. The increased number of nPEP seekers observed in 2019 onward may be partly due to the Covid-19 pandemic lockdown when there was a dramatic increase in sexual and gender-based violence against vulnerable groups, who were mostly females.[12,29]

One of the limitations of this study is the low baseline HIV screening of the sources which was only reported in seventeen patients. Sadly, close to half of these sources screened for HIV were positive, indicating the possibility of missing a lot of positive cases among the cohorts of the sources. Another limitation of this study is the poor follow-up visits and incomplete records of nPEP seekers which made it difficult for us to provide data about other important aspects of nPEP like ARVs toxicity, reasons for not completing 28 days of ARVs, post-nPEP HIV status and also measure outcomes of all the patients at 3 and 6 months.[26,28]

Conclusion

This study provides robust information about the characteristics of the HIV-exposed and source individuals as well as some of the key challenges mitigating having effective nPEP services, like delayed presentations, incomplete data, high follow-up dropout, inadequacies in adherence to ART and gender differences in nPEP utilisation. To stem the tide of these obstacles, we recommend proper HIV exposure risk assessment, proper documentation of cases, adherence to the 28-day standard regimen for nPEP and follow-up visits. More proactive measures should be adopted to make nPEP services more available among the sources persons and also scale up the number of sources screened for HIV.[16] Public awareness, education and information about nPEP are highly desirable,[24] and should be made readily available to the populace, especially the most at-risk groups. We also recommend further studies to identify some other factors responsible for delay in presentation as well as default from care to enable the development of effective strategies to address these major challenge that could potentially negatively impact the smooth running of the nPEP services in this environment.

Conflict of interest

There are no conflicts of interest to declare.

Acknowledgement

The authors wish to appreciate the research assistant who assisted in data collection and the Nurses working at the Virology Research Clinic where data were collected for this research.

Authors' contributions

OFO and OMM designed the study and protocol, data collection, managed the literature searches and wrote the first draft of the manuscript. AAA and EAO performed the statistical analysis of data, interpretation of data and critical review and edited the final manuscript.

Funding

This study did not receive any monetary funding in research grant from any agency, public, or non-profit organisation.

References

1. Rawal S, Bogoch II. Evaluation of non-sexual, non-needlestick, non-occupational HIV post-exposure prophylaxis cases. *AIDS*. 2017;19(10): 1500-02. doi:10.1097/QAD.0000000000001497.
2. Ford NP, Mayer KH. World Health Organization Guidelines on Post Exposure Prophylaxis for HIV: Recommendations for a Public Health Approach. *Clinical Infectious Diseases*. 2015; 60, S161-S164. doi.org/10.1093/cid/civ068.

3. Schackman BR, Fleishman JA, Su AE, Bethany KB, Richard DM, Rochelle PW et al. The lifetime medical cost savings from preventing HIV in the United States. *Med Care.* 2015;53(4):293-301. doi:10.1097/MLR.0000000000000308.
4. McDougal SJ, Alexander J, Dhanireddy S, Harrington RD, Stekler JD. Non-occupational post-exposure prophylaxis for HIV: 10-year retrospective analysis in Seattle, Washington. *PLoS One*. 2014; 20:9(8):e105030. doi: 10.1371/journal.pone.0105030.
5. Patel P, Borkowf CB, Brooks JT, Lasry A, Lansky A, Mermin J. Estimating per-act HIV transmission risk: a systematic review. *AIDS*. 2014 Jun 19;28(10):1509-19. doi: 10.1097/QAD.0000000000000298.
6. Iloanusi SH, Mgbere OO, Abughosh SM, Essien EJ. HIV Non-Occupational Post Exposure Prophylaxis in Nigeria: A Systematic Review of Research Evidence and Practice. *Int J MCH AIDS*. 2019;8(2):101-19. doi: 10.21106/ijma.287.
7. Oke OO, Akinboro AO, Olanrewaju FO, Oke OA, Omololu AS. Assessment of HIV-related stigma and determinants among people living with HIV/AIDS in Abeokuta, Nigeria: A cross-sectional study. *SAGE Open Medicine*. 2019;7:2050312119869109. DOI:10.1177/2050312119869109.
8. Ohayi RS, Ezugwu EC, Chigbu CO, Arinze-Onyia SU, Iyoke CA. Prevalence and pattern of rape among girls and women attending Enugu State University Teachi ng Hospital, southeast Nigeria. *International Journal of Gynaecology and Obstetrics:the Official Organ of the International Federation of Gynaecology and Obstetrics*.2015;130(1):10–13.
9. Kouanfack C, Meli H, Cumber SN, Bede F, Nkfusai CN, Ijang PY et al. Non-occupational HIV post-exposure prophylaxis: a 10-year retrospective review of data following sexual exposure from Yaounde Central Hospital, Cameroon.*Int J MCH AIDS*. 2019;2:138–45. https://doi.org/10.21106/ijma.311.
10. Onyedum CC, Chukwuka C, Iyoke CA, Omotola OF. HIV Post Exposure Prophylaxis (PEP) services in a Nigerian Health institution. J. Int. Assoc. Physicians AIDS. 2017;10(3):171-175. doi.org/10.1177/1545109710397893
11. Mehta SA, Silvera R, Bernstein K, Holzman RS, Aberg JA, Daskalakis DC. Awareness of post-exposure HIV prophylaxis in high-risk men who have sex with men in New York City. Sex Transm Infect. 2011;87(4):344-8. doi: 10.1136/sti.2010.046284.
12. Osawe CO. Increase Wave Of Violent Crime And Insecurity: A Threat To Socio-Economic development in Nigeria. IOSR Journal Of Humanities And Social Science (IOSR-JHSS). 2015;20(1):123-133. DOI: 10.9790/0837-201123133
13. Oladele TT, Olakunde BO, Oladele EA, Ogbuoji O, Yamey G. The impact of COVID-19 on HIV financing in Nigeria: a call for proactive measures. BMJ Glob Health. 2020;5(5):e002718. doi:10.1136/bmjgh-2020-002718.
14. Irvine C, Egan KJ, Shubber Z, Van Rompay KK, Beanland RL, Ford N. Efficacy of HIV Postexposure Prophylaxis: Systematic Review and Meta-analysis of Nonhuman Primate Studies. Clin Infect Dis. 2015;60 Suppl 3:S165-S169. doi:10.1093/cid/civ069.
15. Hugo JM, Stall RD, Rebe K, Egan JE, Jobson G, De Swardt G et al. Knowledge, Attitudes and Beliefs regarding Post Exposure Prophylaxis among South African Men who have Sex with Men. AIDS Behav. 2016;20(Suppl 3):350-356. doi:10.1007/s10461-016-1520-9.
16. Tissot F, Erard V, Dang T, Cavassini M. Nonoccupational HIV post-exposure prophylaxis: a 10-year retrospective analysis. *HIV Medicine*. 2010;11(9):584592. doi:10.1111/j.1468-1293.2010.00826.x.
17. Otwombe K, Dietrich J, Laher F, Hornschuh S, Nkala B, Chimoyi L et al. Health-seeking behaviours by gender among adolescents in Soweto, South Africa. *Glob Health Action*. 2015;8:25670. doi: 10.3402/gha.v8.25670.

18. Egro FM, Nwaiwu CA, Smith S, Harper JD, Spiess AM. Seroconversion rates among health care workers exposed to hepatitis C virus-contaminated body fluids: The University of Pittsburgh 13-year experience. *Am J Infect Control*. 2017;45(9):1001-1005. doi: 10.1016/j.ajic.2017.03.011.
19. Nwokeukwu H, Ikeanyi R, Emma-Ukaegbu U. Human Immune Deficiency Virus (HIV) Post Exposure Prophylaxis in a Tertiary Institution, South East Zone, Nigeria. 13th World Congress on Public Health. April 23-27. *Addis Ababa (Ethiopia)* 2012:327–331.
20. Wu Y, Zhu Q, Zhou Y, Liang S, Li R, Liang N, et al. Implementation of HIV non-occupational post-exposure prophylaxis for men who have sex with men in 2 cities of Southwestern China. *Medicine*. 2021;100:43(e27563).
21. Okwundu, SC. Gender-based Violence in Nigeria: A Review of Attitude and Perceptions, Health Impact and Policy Implementation. *Texila International Journal of Public Health*. 2017;5:429-49. doi.org/10.21522/TIJPH.2013.05.04.Art042.
22. Sodipo OO, Adedokun A, Adejumo AO, Olibamoyo O. The pattern and characteristics of sexual assault perpetrators and survivors managed at a sexual assault referral centre in Lagos. *African Journal of Primary Health Care & Family Medicine*. 2018;10(1):e1-e5. 33.
23. Hassan M, Awosan KJ, Panti AA, Nasir S, Tunau K, Umar AG, et al. Prevalence and pattern of sexual assault in UsmanuDanfodiyo University Teaching Hospital, Sokoto, Nigeria. *Pan Afr Med J*. 2016 Aug 30;24:332. doi: 10.11604/pamj.2016.24.332.9462.
24. Federal Ministry of Health (FMOH). National Guidelines for HIV Prevention Treatment and Care. *National AIDS and STI Control Programme*. 2016:131-33.
25. Chan ACH, Gough K, Yoong D, Dimeo M, Tan DHS. Non-occupational post-exposure prophylaxis for HIV at St Michael's Hospital, Toronto: a retrospective review of patient eligibility and clinical outcomes. *International Journal of STD & AIDS*. 2013;24(5):393-397. doi:10.1177/0956462412472826.
26. DeHaan E, McGowan JP, Fine SM, Steven MF, Rona V, Samuel T. et al. PEP to Prevent HIV Infection [Internet]. *Baltimore (MD): Johns Hopkins University*; 2021 Nov. Available from: https://www.ncbi.nlm.nih.gov/books/NBK562734/.
27. Olowookere SA, Fatiregun AA. Human immunodeficiency virus postexposure prophylaxis at Ibadan, Nigeria. *J Int Assoc Physicians AIDS Care (Chic Ill)*. 2010;9(3):187-190. Epub 2010 Mar 31.
28. Ekama SO, Gbajabiamila TA, Herbertson EC, Musa AZ, Oladele DA, David A et al. Pattern and Rate of Occupational and Non-Occupational Exposures: The Experience of a Major HIV Treatment Centre in Nigeria. *Journal of Advances in Medicine and Medical Research.* 2017;23(12):1-7.
29. Kwaskebe J. Covd19 lockdown and outbreak of rape in Nigeria: a review of the public health implications. *SFJESGS*. 2020;2(3):49-54.