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HIV status of individuals who underwent pre-employment medical screening at a federal tertiary health institution in southeast Nigeria

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Abstract:

Background: The human immunodeficiency virus (HIV) targets the host immune system, particularly the CD4 T cells. The host resistance to opportunistic and non-opportunistic infections such as tuberculosis, fungal infections, severe bacterial infections, and several malignancies is weakened as a result of destruction of these CD4 cells by HIV. The purpose of this study was to determine the prevalence of HIV among individuals who participated in pre-employment medical screening at David Umahi Federal University Teaching Hospital Uburu, Ebonyi State, Nigeria, with the aim of connecting those who are HIV-positive to voluntary counseling and treatment programs.
Methodology: This was a retrospective analysis of the medical records of 537 eligible participants who underwent pre-employment medical screening exercise, and whose blood samples were tested for presence of HIV antibodies at the University Teaching Hospital, using the Determine HIV-1/2 (T1) and Unigold HIV-1/2 (T2), and the tie breaker Statpak HIV-1/2 (T3) tests. The serological results were interpreted according to the national HIV testing algorithm, with test result declared negative for HIV antibodies if T1 was negative or if only T1 was positive but T2 and T3 were both negative.
Results: Of the total record of 756 pre-employment participants for the medical screening exercise, only 537 met the inclusion criteria for the study. The mean age of the 537 participants was 34.2±6.9 and age range of 18-67 years; 325 (61.0%) were females while 212 (39.0%) were males. The seroprevalence of HIV among the study participants was 2.4% (13/537), with 1.4% (3/212) in the males and 3.1% (10/325) in the females (x^2=0.879, OR=0.45; 95% CI=0.12-1.60, *p*=0.3485). Only participants in the age range 26–35 and 36–45 years were HIV seropositive, with prevalence of 2.9% (9/310) and 2.4% (4/169) respectively but the HIV seroprevalence was not significantly associated with age and gender of the participants (*p*>0.05).
Conclusion: The study findings provide useful information for the hospital administration of the HIV situation of its planned workforce, which will help with decisions on HIV positive participants to enrol in antiretroviral therapy program.

Keywords: HIV, Prevalence, University Teaching Hospital, Pre-employment, Screening.

Statut VIH des personnes ayant subi un examen médical préalable à l'emploi dans un établissement fédéral de santé tertiaire du sud-est du Nigeria

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Résumé:

Contexte: Le virus de l'immunodéficience humaine (VIH) cible le système immunitaire de l'hôte, en particulier les lymphocytes T CD4. La résistance de l'hôte aux infections opportunistes et non opportunistes telles que la tuberculose, les infections fongiques, les infections bactériennes graves et plusieurs tumeurs malignes est affaiblie en raison de la destruction de ces cellules CD4 par le VIH. Le but de cette étude était de déterminer la prévalence du VIH chez les personnes ayant participé à un dépistage médical préalable à l'emploi à l'hôpital universitaire fédéral David Umahi d'Uburu, dans l'État d'Ebonyi, au Nigeria, dans le but de connecter les personnes séropositives à des conseils volontaires et des programmes de traitement.

Méthodologie: Il s'agissait d'une analyse rétrospective des dossiers médicaux de 537 participants éligibles qui ont subi un exercice de dépistage médical préalable à l'emploi et dont les échantillons de sang ont été testés pour la présence d'anticorps anti-VIH à l'hôpital universitaire, à l'aide du système de détermination du VIH-1/2 (T1) et Unigold HIV-1/2 (T2), ainsi que les tests de départage Statpak HIV-1/2 (T3). Les résultats sérologiques ont été interprétés selon l'algorithme national de dépistage du VIH, le résultat du test étant déclaré négatif pour les anticorps anti-VIH si T1 était négatif ou si seul T1 était positif mais que T2 et T3 étaient tous deux négatifs.

Résultats: Sur le total de 756 participants préalables à l'emploi pour l'exercice de sélection médicale, seuls 537 répondaient aux critères d'inclusion de l'étude. L'âge moyen des 537 participants était de 34,2±6,9 ans et la tranche d'âge était de 18 à 67 ans; 325 (61,0%) étaient des femmes tandis que 212 (39,0%) étaient des hommes. La séroprévalence du VIH parmi les participants à l'étude était de 2,4% (13/537), dont 1,4% (3/212) chez les hommes et 3,1% (10/325) chez les femmes (x^2=0,879; OR=0,45; 95% IC=0,12-1,60; p=0,3485). Seuls les participants âgés de 26 à 35 ans et de 36 à 45 ans étaient séropositifs au VIH, avec une prévalence de 2,9% (9/310) et 2,4% (4/169) respectivement, mais la séroprévalence du VIH n'était pas significativement associée à l'âge et au sexe des personnes les participants (p>0,05).

Conclusion: Les résultats de l'étude fournissent des informations utiles à l'administration hospitalière sur la situation VIH de sa main-d'œuvre prévue, ce qui aidera à prendre des décisions concernant les participants séropositifs à s'inscrire à un programme de thérapie antirétrovirale.

Mots clés: VIH, Prévalence, Hôpital Universitaire, Pré-emploi, Dépistage

Introduction:

The dreaded acquired immunodeficiency syndrome (AIDS) was first identified as being caused by the human immunodeficiency virus (HIV) on June 5, 1981, when the Center for Disease Control (CDC) reported five cases of *Pneumocystis carinii* pneumonia in active homosexual males from three different hospitals in Los Angeles, California (1). Two strains of HIV virus (HIV-1 and HIV-2) infect humans. While HIV-1 is present in every country, West Africa is mostly the only place where HIV-2 is found. HIV-1 is more easily transmissible than HIV-2 and causes AIDS more quickly after infection (2).

The human immune cells are susceptible to HIV infection, especially the CD4^{+} T-cell subtype of white blood cells that supports the ability of the body to recognize and eliminate unwanted pathogens such as bacteria, viruses, parasites, and even some cancer cells. HIV infection gradually destroys CD4^{+} cells, impairing immune function and increasing the risk of infections, serious disease, and death (2). These infections are often referred to as "opportunistic infections" because they are uncommon or moderate in healthy individuals but can take advantage of the opportunity offered by an immune system that has been compromised by HIV and can be fatal.

HIV can also directly harm the tissues, which can result in heart, neurologic and other diseases of the body. The number of CD4^{+} T-cells in one microliter of blood is measured by the CD4^{+} cell count, often known as the T-cell count. The CD4^{+} count is used by HIV-positive individuals and their medical professionals to track the progression of the HIV infection (2). According to the National Library of Medicine (3), AIDS is characterized by an increased susceptibility to opportunistic infections and a CD4^{+} T-cell count of fewer than 200 cells/μL. A key factor in the pathogenesis of HIV is the gradual depletion of CD4^{+} T-cells (4).

One of the biggest public health issues in the world today is HIV/AIDS. Only 28.2 million individuals have access to antiretroviral therapy as of June 2021, while in 2020, there were approximately 37.7 million HIV-positive persons living around the world, 680,000 AIDS-related deaths, and 1.5 million new HIV infections (5). In sub-Saharan Africa (SSA), which is home to 71% of all people living with HIV (PLHIV), it is the main cause of illness and mortality (6,7).

The first case of HIV/AIDS on the African continent was documented in Uganda, East Africa in 1982 (8). The first case of HIV/AIDS in Nigeria was identified and reported in

Pre-employment HIV status

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Lagos, Nigeria in 1985 (9). The first two cases reported by the Federal Ministry of Health were a 13-year-old sexually active child and a female commercial sex worker from a neighboring West African country (1,10). Nigeria, the most populous nation in Africa, has the third-highest HIV burden and the highest number of orphans due to AIDS in sub-Saharan Africa (11-14). According to Mitsunaga et al., (15), heterosexual transmission is the main method of transmission for the AIDS epidemic in Nigeria. Nigeria has 1.9 million people living with HIV (PLHIV) between the ages of 15 and 49 years, with prevalence of 1.4%. According to state-level stratification (16), the highest prevalence rates are found in Akwa Ibom (5.6%), Benue (4.9%), Rivers (3.8%), Taraba (2.7%), and Anambra (2.7%) States, and the lowest prevalence rates are found in Jigawa (0.3%) and Katsina (0.3%) States. Other states in the southeast are Ebonyi (0.8%), Abia (2.1%), Enugu (2.1%), and Imo (1.6%).

HIV testing services (HTS) are acknowledged as crucial entry point for attaining epidemic control and quickly accomplishing the aim of HIV care cascade (17). Globally, HIV diagnosis is frequently performed using algorithms based on HIV rapid tests (RTs). In general, RTs have emerged as the preferred method for HIV diagnosis in low-and-middle-income-countries (LMICS) due to the performance characteristics of HIV RT and the added operational benefits, such as ease of use and interpretation, storage at ambient temperature, and no special laboratory equipment requirements (18).

In 2015, Determine HIV-1/2, Unigold HIV-1/2, and Statpak HIV-1/2 (as a tie-breaker test) were chosen as part of a serial testing methodology that was reviewed nationally for usage in Nigeria (19). Clients who test positive for HIV can know their status and start receiving the right care and treatment right away by bringing testing closer to communities, rather than just the laboratories. Three successive reactive tests should be utilized for HIV diagnosis, and they must be evaluated in the context of HIV prevalence because the overall positive predictive value (PPV) in low prevalence settings is anticipated to be low (20,21).

Antiretroviral therapy (ART) has continued to be the only treatment available in the absence of a cure that has the potential to significantly reduce morbidity and mortality associated with HIV/AIDS while enhancing the situation of people living with HIV (22). It has been successful in lowering viral load, boosting immune system performance, and enhancing the quality of life (QOL) of PLHIV (23,24). Due to the convergent AIDS and COVID-19 pandemics, as well as the economic and humanitarian crises, the global HIV response has become increasingly in jeopardy during the past two and half years. Health services have been affected by a number of worldwide instabilities, including COVID-19, and the absence of millions of students has increased their HIV vulnerability (25).

There are some positive indicators, such as notable declines in the number of new HIV infections per year in the Caribbean, Central and Western Africa, and the latter mostly as a result of developments in Nigeria (26). In an effort to support the fight against HIV and AIDS, this study sought to determine the prevalence of HIV infection among people who attended pre-employment medical screening at David Umahi Federal University Teaching Hospital, Uburu, Ohaozara, Local Government Area, Ebonyi State, South East, Nigeria, with the aim of directing HIV-infected persons to appropriate counselling and treatment program.

Materials and method:

Study setting:

The study was carried out at the David Umahi Federal University Teaching Hospital Uburu in Ohaozara Local Government Area (LGA) of Ebonyi State, Nigeria. The LGA has Obiozara Uburu as its administrative center and other towns in the LGA including Ugwulangwu and Okposi. The LGA has a combined area of 312 km^2 (120 sq mi) and 148,626 residents as of the 2006 census. The hospital is situated at these coordinates; Latitude: N 60 1' 53", Longitude: E 70 43' 10", and Altitude: 56.5m.

Ethical consideration:

As at the time of this study, there was no established Research and Ethics Committee in both the hospital and university as the institutions were very new and young, therefore approval for the study was given by the Chairman, Medical Advisory Committee of the hospital who was in charge of Clinical services.

Study design and participants:

This was a retrospective review of prospective staff who presented for pre-employment screening in David Umahi Federal Teaching Hospital, Uburu, Ohaozara, LGA, Ebonyi State, southeast Nigeria from November 2022 to March 2023. Prospective staff who were being considered for full time, part time and locum appointments in the teaching hospital with properly filled laboratory request forms were included while those whose laboratory request forms were not properly filled or lacked information such as age and sex were excluded from the study.

Data collection:

Data were collected from the record book of the Pathology Department of David Umahi Federal University Teaching Hospital, Uburu between November 2022 and March 2023.

HIV testing algorithm:
    According to the laboratory record, specimens from participants between the ages of 16 and 67 years were tested for HIV using the Nigeria national HIV RT algorithm, which consists of Determine HIV-1/2 [Test 1 (T1)] (Abbott, California, USA) followed by Unigold HIV-1/2 (T2) (Trinity Biotech Plc., Ireland) if T1 was reactive. If the T1 and T2 results were inconclusive, a tie-breaker test called Statpak HIV-1/2 (T3) (Chembio Diagnostic Systems, Inc., New York, USA) was utilized. The test result was declared negative for HIV antibodies if T1 was non-reactive or if only T1 was reactive but T2 and T3 were both negative (18).

Statistical analysis:
    Data were analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. Chi-square test was used to determine the significance of association between HIV status and age group. P value < 0.05 depicts significant association.

Results:

Sociodemographic characteristics of the study participants:
    A total of 756 individuals took part in the pre-employment medical examination but only 537 people matched the inclusion criteria. The mean age of the participants is 34.2±6.9 and age range of 18-67 years, with 325 females (60.5 %) and 212 males (39.5%) (Table 1).
    The age group 26-35 and 36-45 years constituted the largest proportion of the participants, with 57.7% (310/537) and 31.5% (169/537) respectively, while the age groups 66-75 and 56-65 years constituted the least proportion with 0.2% (1/537) and 1.1% (6/537) respectively.

Seroprevalence of HIV among the study participants:
    The overall HIV seroprevalence rate is 2.4% (13/537), with 1.4% (3/212) in the males and 3.1% (10/325) in the females [x^2= 0.879, OR=0.45 (95% CI=0.12-1.60), *p*= 0.3485] (Table 2). Only participants in the age range 26–35 and 36–45 years were HIV seropositive, with prevalence of 2.9% (9/310) and 2.4% (4/169) respectively but the HIV seroprevalence was not significantly associated with age and gender of the participants (*p*> 0.05) (Table 2).

Table 1: Gender and age-group distribution of selected staff who participated in the HIV screening exercise

Age group (years)	Gender		Total (%)
	No. of male (%)	No. of female (%)	
16-25	7 (1.3)	23 (4.3)	30 (5.6)
26-35	117 (21.8)	193 (35.9)	310 (57.7)
36-45	72 (13.4)	97 (18.1)	169 (31.5)
46-55	12 (2.2)	9 (1.7)	21 (3.9)
56-65	4 (0.7)	2 (0.4)	6 (1.1)
66-75	0	1 (0.2)	1 (0.2)
Total	212 (39.5)	325 (60.5)	537 (100.0)

Table 2: Association of HIV seropositivity with age group and gender of the study participants

Age group (years)	HIV seropositivity by gender			x^2	OR (95% CI)	*p*-value
	Males (%)	Females (%)	Total (%)			
16-25	0	0	0			
26-35	2 (1.7)	7 (3.6)	9 (2.9)	0.3917	0.46 (0.09-2.26)	0.5314
36-45	1 (1.4)	3 (3.1)	4 (2.4)	0.04364	0.44 (0.05-4.34)	0.8345
46-55	0	0	0			
56-65	0	0	0			
66-75	0	0	0			
Total	**3 (1.4)**	**10 (3.1)**	**13 (2.4)**	**0.8790**	**0.45 (0.12-1.66)**	**0.3485**

x^2=Chi square; OR=Odds ratio; CI=Confidence interval

Discussion:

The goal of this study was to determine the sero-prevalence of HIV among prospective employees of David Umahi Federal University Teaching Hospital (DUFUTH), Uburu, who showed up for pre-employment medical screening in the hospital. The average age of the participants was 34.20±6.9 years. A total of 13 HIV positive cases were detected yielding a seroprevalence of 2.4% (3.1% in females and 1.4% in males). Compared to the newly admitted students at Ebonyi State University in Abakaliki, southeast Nigeria, this prevalence is higher than reported by Nworie et al., (27). This might be because the students were younger, have recently graduated from secondary schools, and have been living under the relatively close supervision of their parents or guardians, who might have shielded them from several risk factors including sexual activity.

The seroprevalence in our study is also higher than the national prevalence of 1.4% in Nigeria and the prevalence of 0.8% in Ebonyi State (28). This discrepancy may be due to the fact that majority of the study population were more youthful and sexually active than the previous study, which included a wider range of populations and age brackets. All the 13 HIV positive cases were detected in the 26-35 and 36-45-years age groups, with prevalence of 2.9% and 2.4% respectively, which are higher (though not statistically significant) in the females (with 3.6% and 3.1%) than in the males (with 1.7% and 1.4%) for the respective age groups. The higher prevalence in the females might be explained by the fact that females within this age groups frequently travel across state lines and briefly stay somewhere other than their homes, which raises the possibility that they can engage in risky sexual behaviors (29).

We noted that the seroprevalence of HIV among females (3.1%) was higher (though not statistically significant) compared to their male counterparts (1.4%). Similar report was made by NAIIS (28) in which a prevalence of 0.9% and 0.7% respectively were reported among female and male adults of age 15-64 years in Ebonyi State, Nigeria. Our finding is also corroborated by previous reports (27,30). The higher prevalence among females has been attributed to a number of factors, such as their vulnerability, which is frequently linked to low socioeconomic status, shyness toward sex education, and abhorrence of extramarital sex, which results in denying young girls access to sexual health and HIV services (27). To stem the tide of HIV spread in Nigeria, it has become imperative to deliberately improve on case finding through sensitization and testing of the general population especially the youths who are at risk of contracting HIV.

Conclusion:

The HIV seroprevalence of 2.4% in our study is higher than the national average rate. In view of this, HIV testing services should be increased in Ohaozara Local Government Area of Ebonyi State and infected persons should be immediately referred for treatment so as to suppress their viral load to levels that cannot be transmitted to others and as well prevent them from progressing to AIDS.

It is recommended that routine HIV screening should be done before employment. Subsequently, staff should be encouraged to check their HIV status and those with positive results should be enrolled into the HIV care. Moreover, HIV awareness and education should be a part of the routine hospital function.

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Contribution of authors:

EFE was involved in the study design, supervision and manuscript editing; AUM was involved in supervision and manuscript editing; EGO was involved in data collection, analysis and manuscript writing; OSE was involved in the study design and implementation; CCG was involved in data collection and analysis; CAN was involved in the study design and manuscript editing; and NMA was involved in the study design and manuscript editing. All authors approved the final manuscript submitted for publication.

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Conflict of interest:

Authors declare no conflict of interest

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