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Epidemiological and Virological Aspects of People Living with HIV-1 on Antiretroviral Therapy in Thierno Birahim NDAO Regional Hospital of Kaffrine, Senegal

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Abstract

Background: Human immunodeficiency virus infection remains a public health challenge, mostly in sub-Saharan Africa. This region accounts for 65% of those infected and contributes to 50% of new infections. WHO advocates for early antiretroviral therapy (ART) initiation for all newly diagnosed individuals. If monitoring viral load (VL) after ART initiation is increasingly common, baseline VL testing is under-utilized in resource-limited settings. This study intends to describe the epidemiological, virological, and therapeutic aspects of people living with HIV on antiretroviral therapy in Kaffrine Regional Hospital. **Methods:** We performed a retrospective analysis of data from an open cohort of PLWHIV followed at the Thierno Birahim NDAO Regional Hospital of Kaffrine who initiated antiretroviral therapy from 2020 to 2022. For diagnosis, a three-test HIV screening algorithm was used in accordance with the recommendations of the National AIDS Control Council (NACC). HIV RNA was quantified by using GeneXpert® technology assay. **Results:** There were 257 PLWHIV included, women were the most representative gender group with 68.5%. The median age was 45 years at the inclusion and 99.6% (n = 256) of patients were infected with HIV-1 and 0.4% (n = 1) with HIV-1 and HIV-2 dually. The majority of people living with HIV (66.5%; n = 171) were diagnosed following medical care for various HIV-related conditions. All patients were on antiretroviral treatment and the most commonly used treatment was the combination Tenofovir + Lamivudine + Dolutegravir (98.44%; n = 253). Majority of people living with HIV (57.2%; n = 147) had an

undetectable viral load. Distribution of viral load according to age group showed a significant pattern ($p < 0.001$), with higher viral loads observed in the 41 - 50 years age group. Among people living with HIV on antiretroviral therapy, 49 patients (19.1%) experienced virological failure. **Conclusion:** These results suggest the need to make new therapeutic classes available for first-line treatment and to promote actions improving retention in care.

Keywords

HIV, Epidemiology, Viral Load, Antiretroviral Therapy, Senegal

1. Introduction

Human Immunodeficiency Virus (HIV), the causative agent of the Acquired Immunodeficiency Syndrome (AIDS) pandemic, remains a major public health problem and continues to challenge the scientific community, despite the diagnostic and therapeutic advances achieved to date. HIV targets the immune system and weakens the body's immune surveillance and defense mechanisms against infections and certain types of cancer. Through the impairment and destruction of immune cell functions by the virus, immunodeficiency progressively develops in infected individuals [1]. Decades after the discovery of HIV, the advent of highly active antiretroviral therapy (HAART) has greatly improved the life expectancy of people living with HIV, but achieving the UNAIDS 95-95-95 goal, in particular the third target, remains one of the greatest challenges [2]. The global target aims to ensure that by 2025, 95% of people living with HIV (PLWHIV) know their HIV status, 95% of people who know their status are receiving treatment and 95% of people with HIV treatment have a suppressed viral load so their immune system remains strong, and the likelihood of their infection being passed on is greatly reduced [3]. In 2020, an estimated 37.6 million people were living with HIV worldwide, including 35.9 million adults and 1.7 million children (aged 0 - 14 years). In the same year, HIV serostatus was known for 84% of all people living with HIV [4]. In Senegal, the HIV/AIDS epidemic is of moderate magnitude and has been declining markedly. The latest Spectrum 2021 estimates indicate a progressive decrease in HIV prevalence among individuals aged 15 - 49 years since 2005, from 0.75% to 0.32%. In Senegal, HIV prevalence was estimated at 0.4% among women and 0.3% among men aged 15 - 49 years [4]. The HIV/AIDS epidemic in Senegal is classified as a concentrated epidemic, characterized by low prevalence in the general population but higher prevalence in certain localities and among the most vulnerable populations. According to Spectrum estimates, in Senegal in 2021, the number of people living with HIV (adults and children) was estimated at 40,277 individuals, including approximately 21,703 women and 3957 children under the age of 15 years [4].

On a global scale, it has been estimated that out of 38.0 million (31.6 - 44.5 million) people living with HIV (PLWHIV) at the end of 2019, 25.4 million of

PLWHIV were receiving an anti-HIV treatment by the end of the same year and 82% of people on treatment had suppressed viral load (VL) [5] [6]. An estimated 42% of the 6.1 million PLWHIV in West and Central Africa knew about their HIV status at the end of 2016. Of these, 83% had access to antiretroviral (ARV) therapy, and of those on treatment, 73% had viral suppression. These data translate into a treatment coverage rate of 35% and a viral suppression rate of 25% among all PLWHIV in the region [2] [7]. The main objective of HAART is not only to decrease HIV-related morbidity and mortality, with the major challenge being to reduce viraemia and the transmission of HIV by more than 96% [6], but also to decrease and prevent levels of virological failure [8]. Depending on studies and countries, levels of virological failure, with or without resistance mutations in the region of sub-Saharan Africa, in children, range between 13% and 56% and in adults 10% and 41% [9] [10].

Knowing that the baseline virologic and immunologic parameters significantly correlate with virological outcomes in individuals living with HIV who initiate ART [10] [11], this study intends to describe the epidemiological, virological, and therapeutic aspects of people living with HIV on antiretroviral therapy in Kaffrine Regional Hospital.

2. Methods

2.1. Study Design and Setting

A retrospective, descriptive, and analytical study was performed on data from an open cohort of PLWHIV followed up at the Thierno Birahim NDAO Regional Hospital of Kaffrine, Senegal. This study reviewed data collected between 2020 to 2022.

2.2. Participants

Participants in the study were HIV-positive patients 6 years of age and older, who are being followed for the management of their HIV infection. The eligibility criteria for inclusion in the analysis were being newly on treatment during the study period and having VL measurement prior to ART initiation. We defined it as a virological failure, a virological rebound after a viral load greater than 1000 copies ml^{-1} after 6 months of treatment. This definition is in accordance with WHO recommendations in countries with limited resources unlike the standards of Northern countries where virological failure is fixed on a VL threshold < 50 copies/ml.

At the time of patient registration, the therapeutic guidelines at the CTA were those of the 2016 WHO recommendations, consisting of a dual-nucleoside or nucleotide reverse transcriptase inhibitor (NRTI) plus a non-nucleotide reverse transcriptase inhibitor (NNRTI) as the preferred first-line regimen, while the lopinavir-boosted protease inhibitors were used in children. All patients included in this study were previously diagnosed with HIV-1 according to the national testing algorithm, which consists of three rapid assays, and they were all ART-experienced.

2.3. Viral RNA Extraction and Plasma Viral Load Quantification

HIV RNA was quantified by using GeneXpert® technology assay (Xpert HIV-1 Viral Load®). This automated system integrates RNA extraction and purification, reverse transcription, and real-time quantification within a single, fully integrated cartridge. As the cartridges are self-contained, the risk of cross-contamination between samples is minimized. The HIV-1 viral load assay includes reagents for the detection of HIV-1 RNA in samples and two internal controls used for HIV RNA quantification. These internal controls are also used to monitor the presence of inhibitors affecting the reverse transcription and PCR reactions. The Probe Check Control (PCC) verifies reagent rehydration, proper filling of the PCR tube within the cartridge, probe integrity, and dye stability. The assay allows quantification of HIV-1 RNA over a linear dynamic range of 40 to 10,000,000 copies/mL

2.4. Data Analysis

Data were collected into Excel 2016, and statistical analyses were performed using Stata version 14.0. A difference was considered statistically significant when the p-value was less than 0.05.

3. Results

3.1. Participants Sociodemographic Characteristics at ART Initiation

Over all, 257 PLWHIV were initiated on antiretroviral therapy during the study period. The median age was 39 years (CI 95%, 43.2 - 46.9), 68.5% (176/257) were female, 31 - 40 years was most representative age with 23.7% (Table 1).

Table 1. Socio-demographic characteristics of PLWHIV.

	Number	%
Gender		
Women	176	68.5
Men	81	31.5
Sexe ratio M/W	0.46	
Mean age [Extremes]	45 years (CI 95%, 43.2 - 46.9) [6 - 97 years]	
Age range (years)		
[0 - 10]	5	2
[11 - 20]	9	3.5
[21 - 30]	26	10
[31 - 40]	61	23.7
[41 - 50]	64	25
[51 - 60]	44	17.1
>60	48	18.7
Total	257	100

3.2. Clinical and Therapeutic Data

99.6% (n = 256) of patients were infected with HIV-1 and 0.4% (n = 1) with HIV-1 and HIV-2 dually. The majority of people living with HIV (66.5%; n = 171) were diagnosed following medical care for various HIV-related conditions (Figure 1).

All patients were on antiretroviral treatment. The most commonly used treatment was the combination Tenofovir + Lamivudine + Dolutegravir (98.44%; n = 253), followed by the Abacavir + Lamivudine + Dolutegravir and Abacavir + Lamivudine + Lopinavir with 0.78% (n = 2) each. Two patients who were treated with combination Abacavir + Lamivudine + Lopinavir were children.

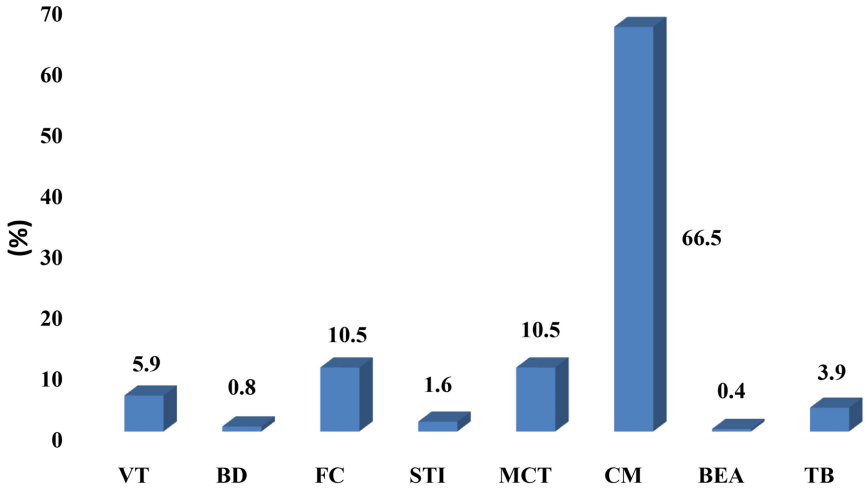

Figure 1. Distribution of the study population by entry point into care. VT = voluntary testing, BD = blood donation, FC = familial case, STI = sexually transmitted infection, MCT = mother-to-child transmission, CM = care and management, BEA = blood exposure accident, TB = tuberculosis.

3.3. Virological Data

The values of the patients' latest viral load show that majority of people living with HIV (57.2%; n = 147) had an undetectable viral load. A low viral load was observed in 21.7% of patients (n = 56), while a moderate viral load was found in 4.3% of patients. High and very high viral loads were observed in 8.2% and 8.6% of patients, respectively (Table 2).

Table 2. Viral loads distribution.

Viral loads (copies/mL)	N	%
<40	147	57.2
40 - 1000	56	21.7
1001 - 10,000	11	4.3
10,001 - 100,000	21	8.2
>100,000	22	8.6
Total	257	100

Distribution of viral load according to age group showed a significant pattern ($p < 0.001$), with higher viral loads observed in the 41 - 50 years age group and no significant according to sex ($p = 0.394$) (Table 3).

Table 3. Distribution of viral load by age and sex.

	Viral loads						
Age group	<40	[40 - 1000]	[1001 -10,000]	[10,001 -100,000]	>100,000	Total	p-value
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
W	101 (39.3)	39 (15.2)	10 (3.9)	12 (4.7)	14 (5.4)	176 (68.5)	0.394
M	46 (17.9	17 (6.6)	1 (0.4)	9 (3.5)	8 (3.1)	81 (31.5)	
[0 - 10]	0 (0)	1 (0.4)	0 (0)	2 (0.8)	2 (0.8)	5 (2)	<0.001
[11 - 20]	3 (1.8)	1 (0.4)	1 (0.4)	3 (1.2)	1 (0.4)	9 (3.5)	
[21 - 30]	11 (4.3)	9 (3.5)	1 (0.4)	1 (0.4)	4 (1.6)	26 (10.1)	
[31 - 40]	28 (10.9)	11 (4.3)	5 (1.9)	7 (2.7)	10 (3.9)	61 (23.7)	
[41 - 50]	42 (16.3)	15 (5.8)	3 (1.2)	2 (0.8)	2 (0.8)	64 (24.9)	
[51 - 60]	27 (10.5)	9 (3.5)	1 (0.4)	4 (1.6)	3 (1.2)	44 (17.1)	
>60	36 (14.0)	10 (3.9)	0 (0)	2 (0.8)	0 (0)	48 (18.7)	
Total	147 (57.2)	56 (21.8)	11 (4.3)	21 (8.2)	22 (8.5)	257 (100)	

Among people living with HIV on antiretroviral therapy, 49 patients (19.1%) experienced virological failure, defined as a viral load >1000 copies/mL after 6 months of treatment. A viral load below 1000 copies/mL was observed in 201 patients (78.2%) after 6 months of treatment (Table 4). No statistically significant association was found between follow-up duration and viral load ($p = 0.276$).

Table 4. Assessment of virological failure according to treatment duration.

Months of follow-up	<1000	>1000	Total
	N (%)	N (%)	N (%)
≤6 months	4 (1.6)	3 (1.1)	7 (2.7)
>6 months	201 (78.2)	49 (19.1)	250 (97.3)
Total	205 (79.8)	52 (20.2)	257 (100)

$p = 0.276$.

4. Discussion

Scaling up antiretroviral therapy is essential to achieving the elimination goals of HIV. In Senegal, the implementation of decentralized Health care center for PLHIV has resulted in a significant increase in the number of patients on antiretroviral therapy [12]. However, there is still the challenge of optimizing antiretroviral therapy with high prevalence of treatment failure and also attrition on ARVs. Within that framework, research into the determinants of therapeutic outcomes (leaving the treatment circuit and therapeutic failures in patients on ARVs)

is nowadays crucial in order to inform programmatic decisions and to help healthcare providers in targeting interventions.

Our study, which included 257 people who initiated ART in Thierno Birahim NDAO Regional Hospital of Kaffrine, shows that PLWHIV were mostly women with 68.5%. The female face of HIV infection is reported by several authors in sub-Saharan African countries [13] [14] as observed in our study. Chas *et al.* [15] in their analysis of the Souro Sanou University Hospital day-hospital patients from 2002 to 2012 noted that 71.1% of the patients were females. In Nigeria, Umar *et al.* reported that 68% of PLHIV initiating ART were female [16]. A multi-center, health facility-based cohort of newly diagnosed PLHIV who initiated first-line ART in eastern Ethiopia showed that 70.6% of them were female [17]. Indeed, women account for more than half (65%) of all people with HIV and 65% of new HIV infections among adults (15 years and older) in sub-Saharan Africa [18]. Likewise, adolescent girls and young women are twice as likely to become infected with HIV as their male counterparts [19]. The well-known physiological vulnerability of women is exacerbated by other socio-cultural, economic, social, and systemic factors [20]. In addition, the prevention of mother-to-child transmission of HIV programs with testing during pregnancy also provides an opportunity to screen women.

The median age at onset was 45 years. This result is similar to that found by Balestre *et al.* [21] [22], which is 40.6 years old, but differs from that of Ayelola *et al.* [22], which is 57 years among PLHIV who suffered from stroke. Age groups 41 - 50 years and 31 - 40 years were the most represented, accounting for 25% and 23.7% of the study population, respectively. A study conducted in Senegal reported that the 30 - 39 years and 50 - 59 years age groups were the most represented, each accounting for 30% [23]. According to statistics reported in the National Strategic Plan, HIV prevalence increased proportionally with age up to 44 years in both men and women [12].

HIV-1 infection was predominant (99.6%) in our study. Similar proportion was reported by Deguenonvo *et al.* [24] with 90% of HIV-1. Similar proportion of HIV-1 infection was also reported in West Africa with 93.6% in the Ivorian [25]. This broad prevalence of HIV-1 infection is consistent with the fact that HIV-1 has a higher transmission rate compared to HIV-2 and is generally less pathogenic [26] [27].

The most treatment line used was 2 NRTI (Nucleoside/Nucleotide Reverse Transcriptase Inhibitors) + 1 II (Integrase Inhibitor) with 99.2% of patients (n = 255), followed by the combination 2 NRTI + 1 PI (Protease Inhibitor) in 0.8% (n = 2). WHO recommendations [28] suggesting the use of protocols based on Dolutegravir as first-line treatment of the patient infected with HIV are applied in Senegal. This recommendation could help within the optimization of the ART but also the monitoring of therapeutic failures. Several studies in Africa have confirmed that viral load suppression remains significant for patients treated with Dolutegravir [29] [30]. A study conducted in Ethiopia in 2024 showed that the proportion of participants with a plasma viral load below 50 copies/mL was 79.8% at three months and 91.7% at six months [31].

More than half of the treated patients (57.2%) had an undetectable viral load, and the majority of people living with HIV (78.9%) had a viral load < 1000 copies/mL, demonstrating the effectiveness of antiretroviral therapy. The goal of antiretroviral treatment is to achieve and maintain viral load suppression for as long as possible.

Viremia appeared to be higher in males compared to females. Sex differences have been described for diverse aspects of HIV1 infection and disease progression [32] [33]. The biological and genetic factors lead to these differential disease courses and outcomes in men and women. Farzadegan *et al.* reported that HIV-1 VL in untreated women was up to 40% lower than that in males [34]. These sex-based differences were described to be in part linked to innate immunity, in which the differential ability of plasmacytoid dendritic cells to produce interferon α following stimulation of Toll-like receptor 7 and upregulation of interferon-stimulated genes play a central role [32] [33] [35].

Virological failure in our series was 19.1% (n = 49). This prevalence is like the one described by Boender [36] and Selly [37] in countries with limited resources, and lower than those described in the sub-region precisely in Togo [38] and Burkina-Faso [39]. This high prevalence of virological failure in first-line treatment suggests the need to make new treatment classes, namely integrase inhibitors, available to improve the quality of first-line treatment for patients infected with HIV.

Our study includes some limitations, namely the non-documentation of resistance mutations associated with therapeutic failure. This is due to the limited accessibility of genotyping which is done only in reference laboratories.

5. Conclusion

In this study, we showed that monitoring of PLHIV under HAART is essential for assessing clinical improvement of HIV-infected patient and early identification of treatment failure. The clinical, virological, and immunological efficacy and tolerability of DTG-based combination therapies were observed in our study in terms of viral load suppression. This drug remains the weapon of choice for the treatment of HIV/AIDS infection. Integrase inhibitors with a strong genetic barrier must urgently be made available in Senegal to optimize antiretroviral treatment, but also to develop programmatic strategies to promote early diagnosis and ART initiation and PLHIV retention in care, which are important pledges to reach the 90-90-90 targets.

Authors' Contributions

All authors contributed to the conduct of the research. All authors have read and approved the final version of the manuscript.

Data Availability

The data that support the findings of this study are not publicly available due to

their containing information that could compromise the privacy of research participant but are available from the corresponding author A.D.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] ONUSIDA (2015) Recommandations pour le traitement du VIH. https://www.unaids.org/sites/default/files/media_asset/JC2484_treatment-2015_fr_1.pdf

[2] UNAIDS (2017) Ending AIDS Progress Towards the 90-90-90 Targets. https://www.unaids.org/sites/default/files/media_asset/Global_AIDS_update_2017_en.pdf

[3] ONUSIDA (2014) Accélérer la riposte: Mettre fin à l'épidémie de sida d'ici à 2030. https://www.unaids.org/sites/default/files/media_asset/JC2686_WAD2014report_fr.pdf. 2014

[4] ONUSIDA (2021) Suivi mondial de la lutte contre le Sida. https://www.unaids.org/sites/default/files/media_asset/2021-global-aids-update_fr.pdf

[5] WHO (2021) HIV/AIDS. https://www.who.int/data/gho/data/themes/hiv-aids

[6] Ahmed, M., Merga, H. and Jarso, H. (2019) Predictors of Virological Treatment Failure among Adult HIV Patients on First-Line Antiretroviral Therapy in Woldia and Dessie Hospitals, Northeast Ethiopia: A Case-Control Study. *BMC Infectious Diseases*, **19**, Article No. 305. https://doi.org/10.1186/s12879-019-3924-4

[7] UNAIDS (2019) Global HIV & AIDS Statistics—2019 Fact Sheet. https://www.unaids.org/en/resources/fact-sheet accessed 26 June 2021

[8] Agegnehu, C.D., Merid, M.W. and Yenit, M.K. (2020) Incidence and Predictors of Virological Failure among Adult HIV Patients on First-Line Antiretroviral Therapy in Amhara Regional Referral Hospitals; Ethiopia: A Retrospective Follow-Up Study. *BMC Infectious Diseases*, **20**, Article No. 460. https://doi.org/10.1186/s12879-020-05177-2

[9] Ciaranello, A.L., Chang, Y., Margulis, A.V., Bernstein, A., Bassett, I.V., Losina, E., *et al.* (2009) Effectiveness of Pediatric Antiretroviral Therapy in Resource-Limited Settings: A Systematic Review and Meta-Analysis. *Clinical Infectious Diseases*, **49**, 1915-1927. https://doi.org/10.1086/648079

[10] Brhane, B.G., Nibret, E. and Abay, G.K. (2017) HIV/AIDS Treatment Failure and Its Determinant Factors among First Line HAART Patients at Felege-Hiwot Referral Hospital, Bahir Dar, Northwest Ethiopia. *Journal of AIDS & Clinical Research*, **8**, Article 11. https://doi.org/10.4172/2155-6113.1000744

[11] Bulage, L., Ssewanyana, I., Nankabirwa, V., Nsubuga, F., Kihembo, C., Pande, G., *et al.* (2017) Factors Associated with Virological Non-Suppression among HIV-Positive Patients on Antiretroviral Therapy in Uganda, August 2014-July 2015. *BMC Infectious Diseases*, **17**, Article No. 326. https://doi.org/10.1186/s12879-017-2428-3

[12] Conseil National de Lutte Contre le Sida au Sénégal (2022) Plan national stratégique de lutte contre le VIH au Sénégal 2018-2022. https://www.cnls-senegal.org/wp-content/uploads/2018/07/PSN-2018-2022.pdf

[13] Essomba, N.E., Mbatchou Ngahane, B.H., Nida, M., Temfack, E., Mapoure Njankouo,

Y., *et al.* (2015) Clinical and Immunological Profile of HIV-Infected Patients at the Initiation of Antiretroviral Therapy in Douala. *Bulletin de la Societe de Pathologie Exotique*, **108**, 255-261.

[14] Mouhari-Toure, A., Patassi, A., Nabroulaba, K.T., Djadou, K.E., Edou, K., Nyametso, D., *et al.* (2011) Biological Profile of Adult Patients Infected with HIV at Initiation of Antiretroviral Therapy in Togo. *Medical Malpractice and Infection*, **41**, 229-234.

[15] Chas, J., Hema, A., Slama, L., Kabore, N.F., Lescure, F., Fontaine, C., *et al.* (2015) The Day-Hospital of the University Hospital, Bobo Dioulasso: An Example of Optimized HIV Management in Southern Burkina Faso. *PLOS ONE*, **10**, e0125588. https://doi.org/10.1371/journal.pone.0125588

[16] Oripelaye, M., Umar, A., Olanrewaju, F., Onayemi, O., Olasode, O. and Oninla, O. (2020) Determinants of Discordant Immune Response in a Cohort of Human Immunodeficiency Virus-Infected Patients Initiating Antiretroviral Therapy. *Sahel Medical Journal*, **23**, 22-28. https://doi.org/10.4103/smj.smj_1_19

[17] Gemechu, A., Mihret, A., Atire, F.A., Aseffa, A., Howe, R., Seyoum, B., *et al.* (2023) Virological Non-Suppression among Newly Diagnosed HIV-Positive Individuals on Dolutegravir-Based Antiretroviral Treatment in Eastern Ethiopia: Follow-Up Study. *Tropical Medicine and Infectious Disease*, **8**, Article 391. https://doi.org/10.3390/tropicalmed8080391

[18] UNAIDS (2024) Global Data on HIV Epidemiology and Response. https://crossroads.unaids.org/wp-content/uploads/2024/09/UNAIDS-GLOBAL-REPORT-EXECUTIVE-SUMMARY-French.pdf

[19] Kharsany, A.B.M. and Karim, Q.A. (2016) HIV Infection and AIDS in Sub-Saharan Africa: Current Status, Challenges and Opportunities. *The Open AIDS Journal*, **10**, 34-48. https://doi.org/10.2174/1874613601610010034

[20] Dunkle, K.L. and Decker, M.R. (2012) Gender-Based Violence and hiv: Reviewing the Evidence for Links and Causal Pathways in the General Population and High-Risk Groups. *American Journal of Reproductive Immunology*, **69**, 20-26. https://doi.org/10.1111/aji.12039

[21] Balestre, E., Lokossoue, A., Eholié, S.P., Dabis, F., Ekouevi, D.K. and Thiébaut, R. (2010) Comparaison de deux méthodes classiques d'analyse de la réponse immunologique des patients adultes infectés par le VIH, traités par thérapie antirétrovirale (TAR) et suivis dans une cohorte internationale en Afrique de l'Ouest. *Revue d'Épidémiologie et de Santé Publique*, **58**, S96. https://doi.org/10.1016/j.respe.2010.06.155

[22] Ayelola, K. and Balogou, A. (2016) Prévalence de l'infection à VIH chez les patients victimes d'accident vasculaire cérébral au CHU Campus de Lomé. *Revue Neurologique*, **172**, A65. https://doi.org/10.1016/j.neurol.2016.01.153

[23] Maguette, S.N., Rena, D., Babacar, M., *et al.* (2017) Profiles of Peripheral CD4+T Cells Count during Antiretroviral Treatment in Senegalese Adults Infected by HIV: Impact of Therapeutic Associations. *Journal of Immunology and Infectious Diseases*, **2**, 2-10.

[24] Deguenonvo, L.F., Manga, N.M., Diop, S.A., *et al.* (2011) Current Profile of HIV-Infected Patients Hospitalized in Dakar (Senegal). *Bulletin de la Societe de Pathologie Exotique*, **10**, 366-370.

[25] Abrogoua, D.P., Aulagner, G., Kablan, B.J. and Petit, C. (2010) Study of Meta-Trajectories of CD4 Cells Count from Taxonomy in the Antiretroviral Response of Efavirenz-Based Regimen with Naive Symptomatic Patients in Abidjan. *Annales Pharmaceutiques Francaises*, **69**, 7-21.

[26] Lewden, C., Chêne, G., Morlat, P., Raffi, F., Dupon, M., Dellamonica, P., *et al.* (2007) HIV-Infected Adults with a CD4 Cell Count Greater than 500 Cells/mm3 on Long-Term Combination Antiretroviral Therapy Reach Same Mortality Rates as the General Population. *Journal of Acquired Immune Deficiency Syndromes*, **46**, 72-77. https://doi.org/10.1097/qai.0b013e318134257a

[27] Marlink, R. (1996) Lessons from the Second AIDS Virus, HIV-2. *AIDS*, **10**, 689-700. https://doi.org/10.1097/00002030-199606001-00002

[28] WHO (2018) Updated Recommendations on First-Line and Second-Line Antiretroviral Regimens and Post-Exposure Prophylaxis and Recommendations on Early Infant Diagnosis of HIV: Interim Guidance. https://www.who.int/publications/i/item/WHO-CDS-HIV-18.51

[29] NAMSAL ANRS 12313 Study Group, Kouanfack, C., Mpoudi-Etame, M., Omgba Bassega, P., Eymard-Duvernay, S., Leroy, S., *et al.* (2019) Dolutegravir-Based or Low-Dose Efavirenz-Based Regimen for the Treatment of HIV-1. *New England Journal of Medicine*, **381**, 816-826. https://doi.org/10.1056/nejmoa1904340

[30] Abstract Supplement Oral Abstracts from the 23rd International AIDS Conference, 6-10 July 2020 (2020). *Journal of the International AIDS Society*, **23**, e25547.

[31] Gebremedhin, T., Aynalem, M., Adem, M., Geremew, D., Aleka, Y. and Kiflie, A. (2024) Dolutegravir Based Therapy Showed CD4+ T Cell Count Recovery and Viral Load Suppression among ART Naïve People Living with HIV AIDS: A Pilot Evaluation. *Scientific Reports*, **14**, Article No. 3297. https://doi.org/10.1038/s41598-024-53282-y

[32] Addo, M.M. and Altfeld, M. (2014) Sex-Based Differences in HIV Type 1 Pathogenesis. *Journal of Infectious Diseases*, **209**, S86-S92. https://doi.org/10.1093/infdis/jiu175

[33] Ziegler, S. and Altfeld, M. (2016) Sex Differences in Hiv-1-Mediated Immunopathology. *Current Opinion in HIV and AIDS*, **11**, 209-215. https://doi.org/10.1097/coh.0000000000000237

[34] Farzadegan, H., Hoover, D.R., Astemborski, J., Lyles, C.M., Margolick, J.B., Markham, R.B., *et al.* (1998) Sex Differences in HIV-1 Viral Load and Progression to Aids. *The Lancet*, **352**, 1510-1514. https://doi.org/10.1016/s0140-6736(98)02372-1

[35] Meier, A., Chang, J.J., Chan, E.S., Pollard, R.B., Sidhu, H.K., Kulkarni, S., *et al.* (2009) Sex Differences in the Toll-Like Receptor-Mediated Response of Plasmacytoid Dendritic Cells to HIV-1. *Nature Medicine*, **15**, 955-959. https://doi.org/10.1038/nm.2004

[36] Boender, T.S., Sigaloff, K.C.E., McMahon, J.H., Kiertiburanakul, S., Jordan, M.R., Barcarolo, J., *et al.* (2015) Long-Term Virological Outcomes of First-Line Antiretroviral Therapy for HIV-1 in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis. *Clinical Infectious Diseases*, **61**, 1453-1461. https://doi.org/10.1093/cid/civ556

[37] Ba, S., Ba, N.D., Sembene, L., Anne, T.S.B., Dia, H., Ndiaye, J.L., *et al.* (2020) Factors Associated with Adverse Therapeutic Outcomes in People Living with HIV (PLHIV) Monitored in Roi Baudouin Health Care Center, Dakar, Senegal. *World Journal of AIDS*, **10**, 23-35. https://doi.org/10.4236/wja.2020.101003

[38] Konou, A.A., Dagnra, A.Y., Vidal, N., Salou, M., Adam, Z., Singo-Tokofai, A., *et al.* (2015) Alarming Rates of Virological Failure and Drug Resistance in Patients on Long-Term Antiretroviral Treatment in Routine HIV Clinics in Togo. *AIDS*, **29**, 2527-2530. https://doi.org/10.1097/qad.0000000000000906

[39] Penot, P., Héma, A., Bado, G., Kaboré, F., Soré, I., Sombié, D., *et al.* (2014) The Vulnerability of Men to Virologic Failure during Antiretroviral Therapy in a Public Routine Clinic in Burkina Faso. *Journal of the International AIDS Society*, **17**, Article 18646. https://doi.org/10.7448/ias.17.1.18646