

ORIGINAL ARTICLE

DETERMINANTS OF VIRAL LOAD SUPPRESSION AMONG ADOLESCENTS LIVING WITH HIV AT THE NKOMO DISTRICT HOSPITAL

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ABSTRACT

Background: The 95% target for viral suppression remains unattainable among adolescents living with HIV in Cameroon. This study aimed to identify the determinants of viral suppression among adolescents monitored in an urban health district of Yaoundé.

Methods: A descriptive study with retrospective data collection was conducted at the HIV Care Unit of the NKOMO health district hospital from January 2024 to August 2025. We included the records of patients aged 10 to 19 years followed during this period. Sampling was consecutive and exhaustive. Exposure history, clinical profile, therapeutic follow-up, and psychosocial status were collected using a pre-tested survey form. Data were analyzed using SPSS 25.0 software, with a significance level set at $p < 0.05$.

Results: A total of 49 records were included. The mean age of participants was 15.9 ± 2.09 years. The male gender was more frequent (55.1%), with a sex ratio of 1.22. One-third of the patients (32.6%) lived in adoptive families. The main point of entry into care was through outpatient consultations (42.8%). The mean age at diagnosis was 9.8 years. The initial viral load was detectable in the majority of cases (65.3%). Most adolescents were classified as WHO clinical stage I (81.6%). The latest viral load was suppressed for the majority (65.3%). Most adolescents presented a low psychosocial risk (92%).

Conclusion: The determinants of viral suppression were intrinsic (age under 15 years, female gender, two-parent household, minimum secondary education, and absence of biological parent death) and extrinsic (full disclosure, psychosocial well-being, treatment compliance, and adherence).

Introduction

HIV infection is a pandemic that affects the immune system. In children, transmission is most often vertical (mother-to-child). Considerable progress has been made in the diagnosis and treatment of affected individuals in pediatrics. Consequently, since the advent of Antiretroviral Therapy (ART), the life expectancy of children infected early has increased, allowing them to reach adolescence.^{1,2}

Approximately 1.8 million adolescents (10–19 years old) are infected worldwide, and 90% live in sub-Saharan Africa.^{3,4} Moreover, the proportion of HIV-related deaths remains high in this age group (50%), making HIV the leading cause of mortality among African adolescents.⁵

This high mortality rate can be attributed to the difficulties in achieving viral load suppression in resource-limited settings. Monitoring the viral response could serve as an indicator of proper patient follow-up.

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The factors that influence it vary across cohorts. It is within this context that this study aimed to identify the determinants of viral suppression among adolescents monitored in an urban health district of Yaoundé.

Methods

We conducted a descriptive study with retrospective data collection at the NKOMO health district, a fifth-category health facility in the Odza Health District. This facility was chosen because it is located at the heart of a highly populated health area, serving approximately 15,000 children aged 0 to 19 years. The research focused on the medical records of adolescents followed at the HIV care unit from January 2024 to August 2025. We included the records of patients aged 10 to 19 years followed during this period. Records with more than 50% incomplete data were excluded. Sampling was consecutive and exhaustive.

Variables concerning exposure history, clinical profile, therapeutic follow-up, and psychosocial status were collected using a pre-tested survey form. The obtained data were kept anonymous and confidential and were analyzed using SPSS 25.0 software. The significance level was defined as $p < 0.05$. Research authorizations

were obtained from the competent departments.

Results

A total of 49 records were retained. The sociodemographic characteristics of the adolescents are described as follows.

I-Sociodemographic Characteristics of Adolescents

Most adolescents were aged [16–19] years at the time of the survey, accounting for 57.2% of cases. The mean age was $15,9 \pm 2,09$ years, with extremes of 10 and 19 years. The male gender was more frequent (55.1%), with a sex ratio of 1.22. The most common level of education was secondary (79.6%). One-third of the patients (32.6%) lived in adoptive families (Table 1).

II-Exposure History

The main points of entry into care were outpatient consultations (42.8%) and screening after an index case (28.6%). The mean age at diagnosis was 9.8 years, with extremes ranging from 4 to 17 years. Vertical transmission was the majority route (69.4%). The mean age at ART initiation was 9.6 years, with extremes ranging from 4 to 17 years (Table 2).

The initial viral load was detectable in the majority of cases (65.3%), and comorbidities were present in only 4% of adolescents, primarily tuberculosis disease.

III-Disease Monitoring History

The mean age at diagnosis disclosure was 12.9 years, with extremes ranging from 6 to 17 years. Disclosure was full for most adolescents (55.1% of cases). The most common treatment protocol found was TLD (Tenofovir, Lamivudine, Dolutegravir) in 91.8% of cases. The majority were compliant and adherent to treatment, with respective proportions of 89.8% and 91.8%. The main caregiver involved in the follow-up of adolescents living with HIV was the psychosocial assistant in 75.5% of cases (Table 3).

IV-Clinical Status and psychosocial well-being

Most infected adolescents were classified as WHO clinical stage I of the disease (81.6%) with good nutritional status in 91.8% of cases. The most recent viral load was suppressed for the majority (65.3%), and only 6.1% had an opportunistic infection, which was tuberculosis disease in 100% of these cases (Table IV).

Family relationships were good for most adolescents (93.9%). The majority had future plans, and participated in school and extracurricular activities with respective proportions of 98%, 93.9%, and 77.5% of cases. The consumption of psychoactive substances and anxiety-depressive disorders were rare, at similar proportions of 98% (Table 4). Furthermore, most adolescents had a low psychosocial risk (92%).

V-Determinants of Viral Load Suppression

The independent risk factors associated with viral suppression were age < 15 years (ORa: 1.44; $p=0.004$), female gender (ORa: 1.30; $p=0.002$), two-parent family type (ORa: 2.54; $p=0.001$), and at least a secondary level of education (ORa: 1.15; $p=0.004$). The absence of a biological parent's death (ORa: 13.34; $p < 0.001$), full disclosure of the diagnosis, and psychosocial well-being (ORa: 1.57; $p=0.003$) increased the odds of viral suppression in adolescents.

Good compliance and adherence to treatment were also associated with viral suppression (Table 5).

Table 1. Sociodemographic characteristics

Variables	Frequency (N=49)	Percentage (%)
Age (in years)		
[10-15]	21	42,8
[16-19]	28	57,2
Sex		
Male	27	55,1
Female	22	44,9
Level of education		
None	2	4
Primary	5	10,2
Secondary	39	79,6
University	3	6,1
Family type		
Single parent	15	30,6
Two parents	14	28,6
Blended	4	8,2
Adoptive	16	32,6

Table 2. Exposure data

Variables	Frequency (N=49)	Percentage (%)
Point of entry		
Consultation PMTCT	5	10,2
Index case screening	14	28,6
Hospitalization	9	18,4
Outpatient consultations	21	42,8
Route of transmission		
Mother-child	34	69,4
Blood transfusion	1	2
Sexual intercourse	3	6,1
Unknown	11	22,5
1st viral load		
Detectable	32	65,3
Undetectable	17	34,7
Comorbidities		
Yes	2	4
No	47	96

Table 3. Therapeutic monitoring

Variables	Frequency (N=49)	Percentage (%)
Nature of disclosure		
Partial	21	42,9
Complete	27	55,1
Not done	1	2

Treatment regimen		
TLD	45	91,8
ABCDC3TCATV-R	4	8,2
Compliance to ART		
Yes	44	89,8
No	5	10,2
Adherence to ART		
Yes	45	91,8
No	4	8,2
Availability of ARVs		
Yes	49	100
No	0	0

Table 4. Clinical follow-up and psychosocial well-being

Variables	Frequency (N=49)	Percentage (%)
Stage of HIV infection		
I	40	81,6
II	5	10,2
III	4	8,2
Nutritional status		
Good	45	91,8
Acute malnutrition	4	8,2
Last viral load		
Detectable	17	34,7
Undetectable	32	65,3
Opportunistic infection		
Yes	3	6,1
No	46	93,9
Family relationships		
Good	46	93,9
Bad	3	6,1
Future plans		
Yes	48	98
No	1	2
School activities		
Yes	46	93,9
No	3	6,1
Extra curricular activities		
Yes	38	77,5
No	11	22,5
Use of psychoactive substances		
Yes	1	2
No	48	98
Anxiety and depressive disorders		
Yes	1	2
No	48	98
Psychosocial risk		
Poor	45	92
Moderate	4	8

Table 5. Factors associated with viral suppression

Variables	Viral load suppressed N=32; n (%)	Viral load un-suppressed N=17 ; n (%)	ORa [IC à 95%]	Adjusted p-value
Age (years)				
<15	14 (43,75)	5 (29,4)	1,44 [1,36-2,40]	0,004
Sex				
Female	16 (50)	6 (35,3)	1,30 [1,06-2,57]	0,002
Family type				
Two parents	10 (31,5)	4 (23,5)	2,54 [1,60-4,73]	0,001
Niveau d'éducation				
At least secondary	26 (81,2)	13 (76,4)	1,15 [1,03-2,29]	0,004
Nature of disclosure				
Complete	24 (75)	3 (17,6)	1,57 [1,36-4,40]	0,003
Availability of ARVs				
Yes	32 (100)	17 (100)		0,146
Observance to ARTs				
Yes	32 (100)	11 (64,7)	1,87 [1,06-2,47]	0,004
Adherence to ARTs				
Yes	32 (100)	13 (76,4)	1,76 [1,06-2,47]	0,003
Psychosocial risk				
Poor	49 (73,1)	62 (28,9)	17,80 [5,61-69,93]	< 0,001

Discussion

The mean age of the study population was 15,9 ± 2,09 years, and the mode was that of older adolescents. These results differ from other Cameroonian studies which reported ages under 15 years.^{6,7} The advanced age of this cohort could be evidence of the impact of ART on the life expectancy of infected children who are surviving longer.

The sex ratio was 1.22, suggesting equitable access to health facilities by both sexes in this health area. More than two-thirds of the children were orphaned of one or both parents and lived in adoptive or single-parent families. These proportions were higher than those in Benin and Togo, highlighting the social vulnerability of these patients and exposing them to irregular follow-up.^{8,9}



The mean age at diagnosis was 9.8 years and occurred during the course of an illness. This mean age at inclusion was higher than those reported by other international series and demonstrates that the diagnosis of HIV infection remains late in our context despite systematic screening promoted through Prevention of Mother-to-Child Transmission (PMTCT).¹⁰⁻¹⁴ However, all children were immediately placed on ART after diagnosis, in accordance with national guidelines. At initiation, more than half of the sample had a detectable viral load. This suggests, on the one hand, the gradual progression of the infection in the absence of treatment and, on the other hand, provides a parameter for monitoring the immediate effectiveness of ART.

The majority of the population were on first-line treatment, and reported being compliant and adherent to ART. ARVs were available with no stock-outs reported. This justifies the good clinical status described in these adolescents, who were mostly asymptomatic and well-nourished with undetectable viral loads. Indeed, treatment adherence has been described as a challenge in the management of pediatric HIV due to the lack of psychological follow-up and monitoring of these patients.¹⁵ In our study, adherence was self-reported and could represent a potential bias; however, the concordance with the clinical response allowed us to minimize its impact.

The subjects in this study presented a status of psychosocial well-being across family, school, and extracurricular dimensions. Drug use and anxiety-depressive disorders were rare. These parameters reflect the impact of psychosocial care on the retention and mental health of infected children.¹⁶

The determinants of viral suppression among adolescents living with HIV in this cohort were multifactorial and included both extrinsic and intrinsic factors. Intrinsic factors included age under 15 years, female gender, two-parent family, minimum secondary education level, and absence of biological parent death. Gender disparity in viral suppression has also been reported in other studies.¹⁷ This finding necessitates that CD4 counts be systematically sought in this cohort to assess the restoration of immune function. Similarly, the impact of family dynamics on the viral response was found and explained by the lack of parental monitoring of children in adoptive/single-parent families.^{18, 19}

Among the extrinsic factors were those related to medical follow-up and treatment. Full disclosure of the diagnosis and psychosocial well-being influenced viral suppression. National HIV management guidelines have recommended since 2015 that full disclosure be made between 12 and 13 years of age. According to published data, the positive effects of disclosure include good compliance, adherence, and psychosocial well-being.^{20, 21}

Despite the reported good adherence, the viral load suppression rate in this series remains below the national target of 95%. This calls for an in-depth evaluation of treatment adherence and the factors associated with sustained viral suppression among adolescents in this cohort.

Conclusion: The determinants of viral suppression were intrinsic (age under 15 years, female gender, two-parent household, minimum secondary education,

and absence of biological parent death) and extrinsic (full disclosure, psychosocial well-being, treatment compliance, and adherence).

Compliance with Ethical Standards

Funding: None

Conflict of Interest: None

References:

1. Idele P, Gillespie A, Porth T, Suzuki C, Mahy M, Kasedde S, et al. Epidemiology of HIV and AIDS among adolescents: current status, inequities, and data gaps. *J Acquir Immune Defic Syndr.* 2014;66 Suppl 2:S144-53.
2. Masson D. Children infected by HIV in French-speaking Africa. *Méd Thérap/Pédiatr.* 2016;19(1):67-76.
3. Szubert A, Prendergast A, Spyer M, Musiime V, Musoke P, Bwakura-Dangarembizi M, Nahirya-Ntege P, Thomason MJ, Ndashimye E, Nkanya I, et al. Virological response and resistance among HIV infected children receiving long-term antiretroviral therapy without virological monitoring in Uganda and Zimbabwe: Observational analyses within the randomized ARROW trial. *PLoS Med.* 2017;14:e1002432.
4. Aubry P, Gaüzère B. Infection par le VIH/SIDA et Tropiques. *Méd Trop. Mise à jour 08/07/2018.* Disponible sur: www.medicinetropicale.com [Consulté le 1 Janvier 2024].
5. Idele P, Gillespie A, Porth T, Suzuki C, Mahy M, Kasedde S, Luo C. Epidemiology of HIV and AIDS among adolescents: Current status, inequities, and data gaps. *J Acquir Immune Defic Syndr.* 2014;66 Suppl 2:S144-S153.
6. Dobseu RS, Fokam J, Kamgaing N, Fainguem N, Ngoufack Jagni Semengue E, Tommo Tchouaket MC, Kamgaing R, Nanfack A, Bouba Y, Yimga J, et al. Determinants of Immunovirological Response among Children and Adolescents Living with HIV-1 in the Central Region of Cameroon. *Trop Med Infect Dis.* 2024;9(2):48.
7. Fokam J, Billong SC, Jogue F, Moyo Tetang Ndiang S, Nga Motaze AC, Paul KN, et al. Immuno-virological response and associated factors amongst HIV-1 vertically infected adolescents in Yaounde'-Cameroon. *PLoS ONE.* 2017;12(11):e0187566.
8. Dalmeida M, Sagbo G, Lalya F, et al. Profil des enfants infectés par le VIH suivis au centre national hospitalier et universitaire (CNHU) de Cotonou: Etude transversale, descriptive et analytique. *Mali Méd.* 2013;28(2):44-6.
9. Atakouma DY, Tsolenyanu E, Gbadoe A, et al. Le traitement antirétroviral des enfants infectés par le VIH/SIDA à Lomé (Togo): Premiers résultats. *Arch Pédiatr.* 2007;14(11):1178-82.
10. Ahoua L, Guenther G, Rouzioux C, et al. Immunovirological response to combines antiretroviral therapy and drug resistance patterns in children: 1-and 2-year outcomes in rural Uganda. *BMC Pediatr.* 2011;32(3):124-32.
11. Musoke PM, Mudiope P, Barlow-Mosha LN, et al. Growth, immune and viral responses in HIV infected African children receiving highly active antiretroviral therapy: a prospective cohort study. *BMC Pediatr.* 2010;19(2):42-6.
12. Okomo U, Togun T, Oko F, et al. Treatment outcomes among HIV-1 and HIV-2 infected children initiating antiretroviral therapy in a concentrated low prevalence setting in West Africa. *BMC Pediatr.* 2012;41(3):77-82.
13. Janssen N, Ndirangu J, Newel ML, Bland RM. Successful paediatric HIV treatment in rural primary care in Africa.

- Arch Dis Child. 2010;95(6):414-21.
14. Isaakidis P, Raguenaud ME, Te V, et al. High survival and treatment success sustained after two and three years of first line ART for children in Cambodia. *J Int AIDS Soc.* 2010;70(5):214-9.
 15. Isaac E, Ajani A, Iliya J, Christianah O, Hassan D. HIV Viral Suppression in Children in a Subnational Antiretroviral Treatment Programme in Nigeria. *World J AIDS.* 2020;10:170-85.
 16. Plan stratégique national de lutte contre le VIH, le SIDA et les IST 2024-2030. CNLS-Septembre; 2023.
 17. Fokam J, Billong S, Jogue F, Moyo S, Nga A, Koki P, Njom A. Immuno-virological response and associated factors amongst HIV-1 vertically infected adolescents in Yaounde-Cameroon. *PLoS ONE.* 2017;12:e0187566.
 18. World Health Organization. Consolidated Guidelines on the Use of Antiretroviral Drugs for Treating and Prevention HIV Infection. Geneva: World Health Organization; 2016.
 19. Ásbjörnsdóttir K, Hughes J, Wamalwa D, Langat A, Slyker JA, Okinyi HM, Overbaugh J, Benki-Nugent S, Tapia K, Maleche-Obimbo E, et al. Differences in virologic and immunologic response to antiretroviral therapy among HIV-1-infected infants and children. *AIDS.* 2016;30:2835-43.
 20. Ferris M, Burau K, Schweitzer AM, et al. The influence of disclosure of HIV diagnosis on time to disease progression in a cohort of Romanian children and teens. *AIDS Care.* 2007;19(9):1088-94.
 21. Menon A, Glazebrook C, Campain N, Ngoma M. Mental health and disclosure of HIV status in Zambian adolescents with HIV infection: implications for peer-support groups. *J Acquir Immune Defic Syndr.* 2007;46(3):349-54.