



## Impact of Antiretroviral Treatment on the Plasmatic Viral Load of HIV-1 in Children Followed at the Charles de Gaulle Pediatric University Hospital (CHU-CDG), Ouagadougou Burkina Faso

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### Abstract

**Introduction:** Despite the improvement in the coverage and effectiveness of Prevention of Mother-to-Child Transmission of HIV (PMTCT) interventions, the pediatric epidemic of HIV infection still persists and the number of PLWHIV in Burkina Faso is estimated at the end of 2018 at 94,000, including 9,400 children under 15 years old.

**Objective:** The objective of this work is to contribute to better medical care for children under-15 living with HIV-1 by studying the impact of ART on virus replication, through the measurement of viral load (VL).

**Methodologies:** This was a retrospective descriptive study carried out at Pediatric University Hospital Charles-de-Gaulle from January 1, 2016 to June 30, 2019. The study included all children under-15 infected with HIV type 1 (HIV-1) and with a plasma viral load measured in the Bacteriology-Virology Department during the study period.

**Results:** Out of a total of 811 children, 51% were boys, i.e. a sex ratio of 1.03 and nearly 80% of our patients came from the ESTHER project. The most represented age group was [10 - 15] years (50.06%). Among children, 47.3% had a treatment duration greater than or equal to 4 semesters and 43.2% had an undetectable plasma viral load after 4 semesters.

**Keywords:** HIV-1; PMTCT; Viral Load; ART; CHUP- CDG

### Introduction

Despite improvements in the coverage and effectiveness of Prevention of Mother-to-Child Transmission of HIV (PMTCT) in-

terventions, the pediatric epidemic of HIV infection still persists, with nearly 1.8 million children (0 - 14 years old) living with HIV in 2019 around the world, with 2/3 of them in Sub-Saharan Africa [1].

Thanks to guidance of UNICEF and its partners, the expansion of prevention of mother-to-child transmission of HIV (PMTCT) services, particularly in the past five years, has proven to be one of the greatest public health success stories of our time.

The integration of care services, the introduction of new methods and antiretroviral therapy have significantly improved the prevention of HIV transmission to children and the preservation of maternal health. Since 2010, thanks to advances in PMTCT, new HIV infections in children have decreased globally by 52%, from 310,000 [200,000 - 500,000] in 2010 to 150,000 [94,000 - 240,000] in 2019 [3].

At the end of 2018, the number of PLWHIV in Burkina Faso was estimated at 94,000, including 9,400 children under the age of 15 [3].

In Burkina Faso, a deeply analysis of recent epidemiological data shows a significant drop in infant and child mortality. In fact, the infant and child mortality rate fell from 129 per thousand live births in 2010 to 82 per thousand live births in 2015, with a decrease of 7.3% per year.

### Aim of the Study

The aim of the present study was to evaluate the achievement of the 3rd "90" of the UNAIDS 90-90-90 targets "90% of people on treatment have undetectable viral load", in order to improve the care of children living with HIV at CHUP CDG.

### Objective of the Study

Contribute to a better care for children under-15 living with HIV-1 by studying the impact of ART on virus replication, through plasmatic viral load (VL) measure.

### Methods

This was a retrospective descriptive study carried out at Pediatric University Hospital Charles-de-Gaulle from January 1, 2016 to June 30, 2019. The study included all children under-15 infected with HIV type 1 (HIV-1) and with a plasma viral load measured in the Bacteriology-Virology Department during the study period.

### Results

The largest age group was [10-14] (50.06%). The distribution of patients according to age groups is given in table 1. Out of 811 chil-

dren, 51% were boys, i.e. a sex ratio of 1,03. Moreover, nearly 80% of our patients came from the project named ESTHER (Ensemble pour une Thérapeutique en Réseau). 47.3% had a treatment duration greater than or equal to 4 semesters and 65.88% had an undetectable plasma viral load. The study involved all children aged 0 to 15 infected with HIV type 1 (HIV-1) and with a plasma viral load achieved in the Bacteriology-Virology unit during the study period.

### Discussion

Our sample consisted of 811 patients. This number was close to that obtained by Janssen N., *et al.* who found 670 patients in 2010 in South Africa in their study on the biological follow up of HIV-positive children on ART. However, it was three time greater than the workforce of Tinto., *et al.* who found a number of 311 children at the CHUSS Bobo Dioulasso in 2013. The high number found in our study could be explained by the fact that the children, once detected positive for HIV serology at birth, are systematically taken care of by the ESTHER project. The average age was 114 months in our study. Tinto., *et al.* noted an average of 108 months at the CHUSS Bobo Dioulasso in 2013 [4].

In our study, the sex ratio was 1.03 in favor of boys. These results were similar to those of Ginette C., *et al.* in Yaoundé in 2012 who found a sex ratio of 1.03 in favor of boys as well. In our study, 56.8% of patients had undetectable viral load versus 43.2% who had detectable viral load. These results are comparable to those obtained by Mounerou S., *et al.* in Togo in 2014 who found 51.6% of cases of viral load undetectable against 49.4% of cases of detectable viral load [5].

The high proportion of detectable viral load cases in this study could be explained by the fact that in children, compliance is generally less rigorous and more complex than in adults. Among the 811 patients followed, 56.8% had viral load which was undetectable versus 43.2% with detectable viral load. Our results are comparable to that of Mounerou Salou., *et al.* in Togo in 2014, who found 51.6% of undetectable viral load. This high failure rate can be explained by the fact that many patients come for their viral load check-up at CHUP-CDG because of the technical platform and are not monitored by the ESTHER project. Among the 811 patients on ART, 47.34% came on a semi-annual and regular basis to check their viral load. Tinto., *et al.* found a proportion of 63% at the CHUSS of Bobo Dioulasso, that is a proportion higher than the proportion found in our study [4].

This difference could be due to the duration of treatment which was shorter in our study and was 03 years and 06 months against 06 years in the study carried out by Tinto., *et al.* In fact, compliance with treatment and biological controls in PLWHIV would improve with the duration of treatment [4].

In Dakar, the studies carried out within the framework of the ENPRISE Project in 2015 and involving nearly 666 children showed that 64% of the children were in virological failure. Anude C., *et al.* in 2013, in Nigeria, reported virological failure rates of 23.3%, lower than those found in our study. Indeed, after a treatment duration of more than 6 months, the viral load should be at an undetectable level. These suspected cases of virological failure could be explained in different ways: Firstly, it could be a question of non-respect of the dosage and instructions given by the treating physician (times of intake, etc.). Secondly, it may be that the treatments were inappropriate for the type of HIV or that the virus had an antiretroviral resistance phenotype. In this case the solution would be to determine the resistance phenotype and make a therapeutic correction. This could be explained by good treatment adherence in these children. It should be noted that virological suppression of most pediatric cohorts does not reach the 90% target set by UNAIDS [7,8] which underlines the need to adopt simpler treatment regimens that are better tolerated by children and initiate more effective adherence control interventions [9,10].

Age	Frequency	Proportion (%)
< 1	33	04,06
[1-5 ans ]	104	12,82
[5 - 10 ans ]	268	33,04
[10 - 15 ans ]	406	50,06
N	811	100,00

**Table 1:** Distribution of patients according to age group.

Duration (semester)	[1-3[	[3-4[	≥4
	Squad (%)	Squad (%)	Squad (%)
CVP-déetectable	150 (52,9)	71 (51,83)	131 (34,12)
CVP-undéetectable	138 (47,91)	66 (48,17)	253 (65,88)
ART Duration	288 (35,52)	137 (17,13)	384 (47,34)

**Table 2:** Distribution of patients according to viral load and duration of treatment.

## Conclusion

Our study shows that among the patients who had a follow-up period of less than 3 semesters, half had detectable viral load. Also more than half of the patients who had more than 4 semesters of ART follow-up and regular monitoring had undetectable viral load. We can note that immune restoration and virological suppression can be achieved after the first semester or the second semester of antiretroviral therapy. This shows that biological monitoring through the control of CVP makes it possible to highlight the effectiveness of the treatment and the phenotypes of ARV resistant.

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