

## RESEARCH ARTICLE

# Factors associated with virological non-suppression among HIV-positive children receiving antiretroviral therapy at the Joint Clinical Research Centre in Lubowa, Kampala Uganda

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## Abstract

### Background

While the proportion of HIV-positive children (under 15 years) enrolled on antiretroviral therapy (ART) has increased in recent years, up to 60% of children started on ART do not achieve virological suppression. We set out to determine the factors associated with virological non-suppression among children living with HIV receiving ART at a peri-urban HIV care clinic in Kampala, Uganda.

### Method

This was a retrospective cohort study conducted at the pediatric HIV/AIDS clinic at the Joint Clinical Research Centre (JCRC) in Kampala, Uganda. Three hundred (300) HIV-positive children (0–14 years) were randomly selected from existing medical records and data on children's socio-demographic and clinical characteristics (age at ART initiation, WHO clinical staging, and ART-induced side effects) were abstracted using a data abstraction form. Virological non-suppression was defined as a viral load  $\geq 1000$  copies/ml of blood after six months of ART initiation. Incident rate ratios (IRRs) were determined as a measure of association between virological non-suppression and child/patient characteristics. The IRRs were obtained via a modified Poisson regression with corresponding 95% confidence intervals (95%CI). All analyses were done using statistical package, Stata version 15.

### Results

The overall non-suppression rate among HIV-positive children on ART was 23%. Being at WHO clinical stage 4 at ART initiation [adj. IRR 2.74; 95%CI: 1.63, 4.61] and ART-induced side effects [adj. IRR 1.77; 95%CI: 1.06, 2.97] were significantly associated with non-suppression. Older age at ART initiation (age 5–9 years: [adj. IRR 0.42; 95%CI: 0.28, 0.65]; age

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**Abbreviations:** ART, Antiretroviral therapy; ARV, Antiretroviral; CI, Confidence Interval; EFV, Efavirenz; HAART, Highly Active Antiretroviral Therapy; HIV, Human Immunodeficiency Virus; IAC, Intensive Adherence Counseling; IRR, Incidence Rate Ratio; JCRC, Joint Clinical Research Centre; LP/vr, Lopinavir/ritonavir; MoH, Ministry of Health; NVP, Nevirapine; TB, Tuberculosis; UNAIDS, The Joint United Nations Programme on HIV/AIDS; VL, Viral Load; WHO, World Health Organization.

10–14 years: [adj. IRR 0.34; 95%CI: 0.18, 0.64] was less likely to be associated with virological non-suppression.

## Conclusion

Nearly a quarter of HIV-positive children on ART had a non-suppressed viral load after six months of treatment. Being at WHO clinical stage 4 at ART initiation and ART-induced side effects were significantly associated with virological non-suppression while older age at ART initiation was protective. Our findings suggest a need for age-specific interventions, particularly those targeting children below five years of age, to improve virological suppression among HIV-positive children receiving ART in this setting.

## Background

In East and Southern Africa out of the 1,400,000 HIV-positive children, only 51% are on antiretroviral therapy (ART) [1]. Although the overall suppression rate is estimated to be 47% [2], the suppression rate among children is not documented. HIV prevention and treatment efforts primarily aim at reducing morbidity and mortality among people living with HIV, but also to reduce the risk of transmission, hence the need to ensure virological suppression to undetectable levels among children on ART. It is recommended that children with initial positive virological test results are initiated on ART immediately and routine viral load monitoring be carried out at 6 and 12 months, then every 12 months if the patient's viral load becomes stable [3].

In low and middle income countries, a viral load (VL) < 1000 copies/ml defines treatment success (suppression), a measure of ART efficacy, which also indicates treatment adherence and reduced risk of HIV transmission [3]. Several factors like; low adherence rate [4], WHO clinical stage 4 and TB co-infection have been highlighted to be associated with virological non-suppression among adults [5]. Likewise, viral load suppression rates among children on ART have been shown to be low [1] and considerably poorer [6,7]. However, the factors associated with virological non-suppression among children (0-14years) receiving ART are not documented.

In Uganda, regular VL monitoring is done at the Central Public Health Laboratory through the districts' laboratory hubs and in case of virological non-suppression, that is; two consecutive viral loads above 1000 copies/ml done at least 3–6 months apart [8], 3 sessions of intensive adherence counseling (IAC) are offered. IAC is offered to the caregiver or to both the child and the caregiver at one-month intervals by mainly counselors although at times by nurses, clinicians and peer-educators [9]. After the third session, a post-IAC VL test is done and if suppressed, the patient continues with usual treatment and repeats VL test after a year [10]. During IAC, barriers to adherence are identified and the possible ways to overcome these barriers are explored by assessing the patient's adherence level, advising on how to improve adherence and further assisting to make, and arrange an adherence plan. Treatment failure and resistance testing among children must be confirmed before switching to second- or third-line regimens respectively [8].

In Uganda, approximately 95,000 children are living with HIV, 47% of them receiving ART, with a non-suppression rate of 60.1%, which is higher than that observed among adults (40.4%) and also far above the national target of 10% [11]. Although reasons for high non-suppression rates have been explored among adult HIV-positive patients, and young age indicated