Integrated Disease Management: Exploring the TB-HIV Nexus Among Ugandan Children and Adolescents

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Background

- Coinfection with tuberculosis (TB) is a significant public health challenge among people living with HIV (PLHIV), and HIV infection is the leading risk factor for active TB disease.
- Pill burden, which can be exacerbated by TB treatment, poses a significant barrier to adherence with antiretroviral therapy (ART).[1]
- Prior studies have shown a range of interactions between TB treatment and viral load among PLHIV, including no interaction, an increase in viral load, and a decrease in viral load among those who have been on TB treatment. Additionally, one study showed differences that varied based on the ART regimen.
- However, studies focusing on TB treatment and viral load among children and adolescents living with HIV (CALHIV) are limited.[2,3,4]

Methods

1. Matched 1:1 ratio of 83 HIV-positive clients aged 0-19 years with TB (on RHEZ or RHZ) to HIV-positive controls without TB, based on age, sex, ART regimen, initial viral load, and client type (time on ART).
2. Categorized viral load as undetectable (≤200 copies/mL), low-level viremia (201–999), or high-level viremia (≥1,000).
3. Used mixed-effects ordinal logistic regression to estimate unadjusted and adjusted odds ratios with 95% confidence intervals.
4. Set significance at p<0.05.
5. Performed analyses using STATA v17
6. Obtained ethical approval from Baylor College of Medicine IRB (Protocol H-26616).

Children and adolescents living with HIV who **received tuberculosis treatment** between 2019 and 2024 were **less likely** than their peers who were not on TB treatment to have **increases** in **HIV viral load**, despite the increased pill burden associated with TB treatment.

Variables at multivariate analysis

Characteristics	Initial VL		VL at 6 months		VL at 12 months	
	aOR (95%CI)	P-value	aOR (95%CI)	P-value	aOR (95%CI)	P-value
Age						
0-4 years	*Ref.*		*Ref.*		*Ref.*	
5-0 years	--	--	0.14 (0.02-0.89)	**0.037**	--	--
10-14 years			0.15 (0.02-0.95)	**0.044**		--
15-19 years			0.14 (0.02-0.99)	**0.049**	--	--
ART regimen						--
ABC-3TC-DTG	*Ref.*		*Ref.*		*Ref.*	--
ABC-3TC-LPV/r	--	--	15.80 (1.10-226.07)	0.042		--
AZTC-3TC-DTG			0.80 (0.10-6.68)	0.835		
TDF-3TC-DTG			0.59 (0.15-2.44)	0.472		
TDF-3TC-DTG-DRV-RTV			--	--		
Others			0.58 (0.04-9.08)	0.607		
Line of Art						
1st regimen	*Ref*		*Ref*		*Ref*	
2nd regimen	6.11 (1.195-19.11)	**0.002**	5.08 (1.66-16.62)	**0.005**	5,54 (1.63-18.72)	**0.006**
3rd regimen	19.52 (1.28- 297.62)	**0.033**	15.67 (0.74- 330.79)	0.077	32.17 (2.09- 495.36)	**0.013**
WHO Stage						
II	--	--	--	--	0.07 (P.01- 0.94)	**0.045**
III	--	--	--	--	0.30 (0.09-1.01)	0.052
IV	--	--	--	--	0.20 (0.06-073)	0.015

Results

- Children and adolescents receiving TB treatment were less likely to experience a rise in viral load (VL) six months after starting TB therapy.
- 10–14 years had better viral suppression compared to younger children aged 0–4 years at 6 months (OR: 0.27; 95% CI: 0.09–0.79; p = 0.016) and 12 months (OR: 0.22; 95% CI: 0.07–0.71; p = 0.012).
- Males showed better VL suppression at 12 months (OR: 0.51; 95% CI: 0.26–1.01; p = 0.053) compared to females.
- Clients on AZT-3TC-DTG were more likely to have higher VL at 12 months (OR: 5.21; 95% CI: 1.10–24.55; p = 0.037), while those on TDF-3TC-DTG had better outcomes (OR: 0.40; 95% CI:0.18–0.85; p = 0.017).
- Clients on 2nd and 3rd line ART regimens had significantly higher odds of elevated VL at all time points.
- WHO clinical stage was associated with VL at 12 months, with Stage II, III, and IV clients showing significantly lower odds of increased VL compared to Stage I.
- CALHIV on TB treatment (cases) among all age groups were significantly less likely to experience an increase in viral load six months after starting treatment, compared to CALHIV not on TB treatment.

Conclusion

- CALHIV who received TB treatment were significantly less likely to move into a higher VL category compared to those not on TB treatment after 6 months.
  - This may be due to increased adherence support and visit frequency associated with TB treatment and may represent improved adherence despite pill burden.
  - These supports include biweekly visits early on in the TB treatment course, meetings with counselors, the TB treatment team, and peer support.
- Extending aspects of that support to all clients may improve adherence and VL suppression.

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