BMI MEDIATES THE ASSOCIATION BETWEEN HIV RELATED FACTORS AND HYPERTENSION BUT NOT DIABETES

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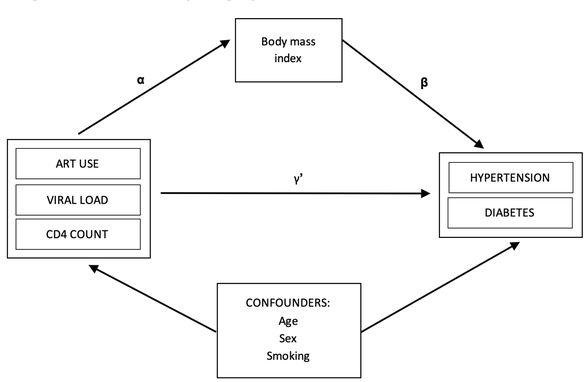
BACKGROUND

- HIV infection is associated with an increased cardiometabolic risk profile. However, the causal pathway is unclear.
- **Aim:** To assess the mediation effect of body mass index (BMI) in the association between HIV-related factors (ART exposure, CD4 count and viral load) and hypertension and type 2 diabetes mellitus among people living with HIV/AIDS (PLWH).

METHODS

- **Study design and sample:** This cross-sectional study included 14,119 consenting adult PLWH from Cameroon enrolled in the International epidemiology Databases to Evaluate AIDS (IeDEA), during 2016 through 2021. Hypertension was defined as Systolic Blood Pressure ≥140/90 mmHg and/or current use of antihypertensive medication; diabetes was defined as a Fasting Blood Sugar ≥126 mg/dL and/or use of antidiabetic medications.
- **Analysis**: We conducted a mediation analysis using the "mediation" package in R. The exposures were ART use (binary), viral load (continuous) and CD4 count (continuous), assessed individually. The mediator was BMI (continuous) and the outcomes were either diabetes (binary) or hypertension (binary). We adjusted for the confounders, age, sex, and smoking (Figure 1).

Figure 1: Directed acyclic graph of the mediation framework



BMI significantly mediated the association of ART use (49.6% mediated) and viral load (27.1% mediated) with hypertension.

RESULTS

- Of the 14,119 participants, 9177 (65%) were women, 1694 (12%) were obese (BMI ≥ 30 kg/m^2) and 8869 (63%) had used ART.
- The median (IQR) CD4 count was 373.0 (199.2, 565.0) cells/mm^3 and the median (IQR) viral load was 1.6 (0.0, 1.9) log10 copies/mL.
- With adjustment for age, sex, and smoking, BMI partially mediated the association between ART use and hypertension (49.6%) and between viral load and hypertension (27.1%) (Table 1).
- BMI had no mediating effects on the associations between ART use, CD4 count, or viral load with diabetes (Table 1).

Table 1: **Results of mediation analysis of the mediation effect of BMI on the association between HIV related factors with hypertension and diabetes, adjusted for age, sex and smoking.**

Outcome /	**ART use** (Yes/No)			**CD4 Count** (cells/mm^3)			**Viral load** (Log10 copies/mL)		
Effect type	**Estimate**	**95% CI**	**p-value**	**Estimate**	**95% CI**	**p-value**	**Estimate**	**95% CI**	**p-value**
HYPERTENSION									
Mediation Effect (Indirect effect)	0.019	0.012 to 0.023	<0.001	5.23×10^{-5}	4.16×10^{-5} to 6.41×10^{-5}	<0.001	- 0.003	- 0.005 to - 0.002	<0.001
Direct Effect	0.020	0.003 to 0.035	0.014	2.23×10^{-5}	2.23×10^{-5} to 6.62×10^{-5}	0.314	- 0.009	- 0.018 to - 0.001	0.022
Total Effect	0.039	0.022 to 0.055	<0.001	7.46×10^{-5}	3.26×10^{-5} to 11.43×10^{-5}	0.002	- 0.013	- 0.021 to - 0.005	<0.001
Proportion of total effect mediated (%)	49.59	34.22 to 86.27	<0.001	68.75	40.81 to 159.64	0.002	27.13	13.70 to 71.15	<0.001
DIABETES									
Mediation Effect (Indirect effect)	0.001	- 0.0003 to 0.0033	0.121	$- 7.69 \times 10^{-7}$	$- 9.61 \times 10^{-6}$ to 0.93×10^{-5}	0.871	- 0.001	- 0.002 to 0.001	0.012
Direct Effect	- 0.037	- 0.058 to - 0.018	<0.001	$- 4.07 \times 10^{-6}$	$- 5.42 \times 10^{-5}$ to 3.01×10^{-5}	0.911	0.004	- 0.003 to 0.009	0.226
Total Effect	- 0.034	- 0.053 to - 0.017	<0.001	$- 4.84 \times 10^{-6}$	$- 5.30 \times 10^{-5}$ to 2.74×10^{-5}	0.884	0.003	- 0.004 to 0.008	0.344
Proportion of total effect mediated (%)	- 4.05	- 13.29 to 1.14	0.122	- 0.707	- 289.02 to 277.15	0.960	- 18.17	- 394.35 to 206.83	0.352

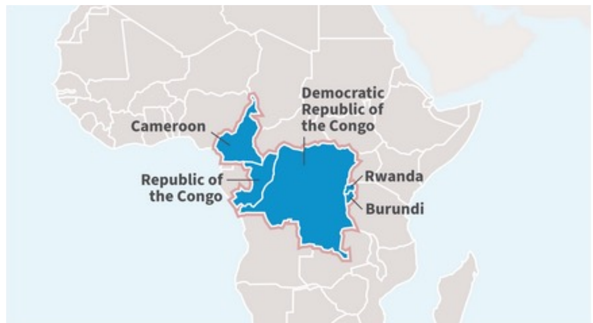
CONCLUSIONS

- Findings suggest that BMI partially mediates the associations between ART use and viral load and hypertension but not diabetes among PLWH.
- Also, monitoring and controlling obesity, particularly for patients on ART, is important for reducing risks of hypertension.

STRENGTHS & LIMITATIONS

- Study strengths include a large sample of men and women living with HIV.
- Limitations include potential unmeasured confounding and measurement error, which could bias indirect and direct effect estimates.

Central Africa International Epidemiology databases to Evaluate AIDS (IeDEA),



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