Obesity or Hypertension at ART Initiation and Outcomes Amongst HIV Patients in South Africa

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BACKGROUND

Aging, antiretroviral therapy (ART), and HIV infection itself have all been associated with increasing rates of chronic comorbidities in HIV patients, but there are limited data on chronic disease risk factors and HIV treatment outcomes in resource-limited settings.

OBJECTIVE

We evaluated the association between high body mass index (BMI) or hypertension at ART initiation and mortality, loss to follow-up (LTF), and immunological and virologic response among ART patients in South Africa.

METHODS

- Prospective cohort study.
- ART naïve adults initiating ART in Johannesburg April 2004-July 2009.
- Cox regression was used to model the association with mortality and LTF of:
  - BMI (<18, 18-24.9, 25-29.9, >30kg/m^2)
  - Blood pressure (BP) grouped as normal (systolic <140 & diastolic <90 mmHg), mild (systolic 140-159.9 and/or diastolic 90-99.9) or moderate/severe (systolic >160 and/or diastolic >100).
- For mortality and LTF, person-time started at ART initiation and ended at the earliest of death, LTF, transfer, or dataset close (July 2013).
- Linear and log-binomial regression were used to evaluate associations with CD4 increase and viral load >400 copies/mL, respectively.

RESULTS

Table 1. Characteristics of patients at ART initiation, Themba Lethu Clinic, Johannesburg, South Africa (n=9693)

Variable		Total
Gender (n, %)	female	6095 (62.9)
Age (years)	median (IQR)	36.2 (31.2-42.5)
BMI (kg/m^2) (n, %)	<18	2006 (20.7)
	18-24.9	5574 (57.5)
	25-29.9	1506 (15.5)
	≥30	607 (6.3)
BMI (kg/m^2)	median (IQR)	21.4 (19.0-24.5)
BP (n, %)	normal	8948 (92.3)
	mild	562 (5.8)
	moderate/severe	183 (1.9)
Diastolic BP (mm/Hg)	median (IQR)	76 (68-85)
Systolic BP (mm/Hg)	median (IQR)	116 (105-128)
CD4 count (cells/mm^3) (n, %)	>350	86 (0.9)
	200-350	816 (8.4)
	101-200	3427 (35.4)
	51-100	2078 (21.4)
	≤50	3286 (33.9)
CD4 count (cells/mm^3)	median (IQR)	86 (33-154)
WHO stage (n, %)	III/IV	4324 (44.6)

MAIN FINDINGS:

- 63% of the 9693 patients included were female and the majority (92%) initiated stavudine-lamivudine-efavirenz.
- At ART initiation median (IQR) CD4 count was 86 cells/mm3 (33-154), BMI 21.4 kg/m2 (19.0-24.5), systolic BP 116 mm/Hg (105-128), and diastolic BP 76 mm/Hg (68-85).
- By 48 months, 1001 (10%) patients died and 2069 (21%) were LTF.

Table 2. Crude and adjusted relative risks of the association between BMI or BP at ART initiation and death, loss to follow-up, and mean CD4 change from ART initiation at 12 and 48-months post ART initiation in Johannesburg, South Africa (n=9693)

Variable		12 months		48 months	
		No. Events (%)	Adjusted HR* (95% CI)	No. Events (%)	Adjusted HR* (95% CI)
		Death			
BMI (kg/m^2)	<18	161 (8.0)	1.6 (1.3-2.0)	297 (14.8)	1.4 (1.2-1.7)
	18-24.9	233 (4.2)	Reference	519 (9.3)	Reference
	25-29.9	55 (3.7)	0.9 (0.7-1.3)	119 (7.9)	0.9 (0.7-1.1)
	>30	39 (6.4)	1.8 (1.3-2.6)	66 (10.9)	1.3 (1.0-1.8)
BP at ART initiation	normal	450 (5.0)	Reference	910 (10.2)	Reference
	mild	28 (5.0)	1.0 (0.7-1.5)	64 (11.4)	1.1 (0.9-1.5)
	mod/severe	10 (5.5)	1.1 (0.6-2.1)	27 (14.8)	1.4 (1.0-2.1)
		Loss to follow-up			
BMI (kg/m^2)	<18	281 (14.0)	1.4 (1.2-1.6)	538 (26.8)	1.3 (1.2-1.5)
	18-24.9	548 (9.8)	Reference	1185 (21.3)	Reference
	25-29.9	126 (8.4)	0.9 (0.8-1.2)	262 (17.4)	0.9 (0.7-1.0)
	>30	33 (5.4)	0.6 (0.4-0.9)	84 (13.8)	0.7 (0.6-0.9)
BP at ART initiation	normal	922 (10.3)	Reference	1925 (21.5)	Reference
	mild	52 (9.3)	1.0 (0.7-1.3)	112 (19.9)	1.0 (0.8-1.2)
	mod/severe	14 (7.7)	0.8 (0.4-1.4)	32 (17.5)	0.9 (0.6-0.9)
		CD4 Response			
BMI (kg/m^2)	<18	6.9 (-12.7, 10.9)		-17.2 (-12.9, 48.3)	
	18-24.9	Reference		Reference	
	25-29.9	-1.0 (-12.7, 10.9)		17.7 (-19, 48.3)	
	≥30	8.6 (-7.3, 24.5)		40.7 (-12.4, 93.8)	
BP at ART initiation	normal	Reference		Reference	
	mild	-6.0 (-19.7, 7.6)		29.8 (-15.3, 74.8)	
	mod/severe	-8.2 (-27.4, 11.0)		3.9 (-71.2, 79.1)	

MAIN FINDINGS (Cont.):

- We found patients with a BMI >30 kg/m2 had an increased hazards in mortality over 48 months on ART compared to patients with a BMI of 18-24.9 kg/m2, but lower LTF and improved immune response during follow-up.
- We found no association between obesity and having a detectable viral load.
- Patients with moderate/severe hypertension (vs. normal) had a slight increase in mortality (~40%) but no increase in LTF, CD4 response, or having a detectable viral load.

CONCLUSIONS

Chronic disease risk factors at ART initiation may be associated with small increases in mortality but appear to be protective against LTF and poor immunological response. Successful management and treatment of comorbidities, specifically amongst obese patients that present with moderate to severe hypertension, may help decrease mortality in HIV-infected patients.

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