



Introduction:

•Metabolic Syndrome is defined by presence of 3 of the following 5 factors: abdominal obesity, hypertriglyceridemia, low HDL-cholesterol, hypertension and insulin resistance (1)

•HIV infection and its treatment have been associated with an increase incidence of metabolic syndrome, diagnosis in younger populations and association with more abnormal surrogate markers for CVD.(2,3)

•In HIV negative populations, metabolic syndrome is associated with an increased risk of cardiovascular mortality and all-cause mortality.(4,5)

•We evaluated the risk of all-cause mortality associated with metabolic syndrome and its five components in an HIV+ cohort.

Methods:

•Survival analysis of 557 participants in the Nutrition for Healthy Living study, a cohort study that examined nutrition and metabolic risk factors in HIV infected patients from 1995-2005.

•Metabolic syndrome was defined as having at least 3 of the following: 1) Waist circumference > 102 cm for men, > 88 cm for women; 2) Triglycerides > 150 mg/dL; 3) High-density lipoprotein (HDL) cholesterol < 40 mg/dL for men, < 50 mg/dL for women; 4) Blood pressure \geq 130/85 mm Hg; 5)Fasting glucose \geq 100 mg/dL.

•Baseline data were taken from the first visit on or after 9/1/2000 in which the diagnosis of metabolic syndrome was made or, for those without metabolic syndrome, from the first visit on or after 9/1/2000.

•Follow-up time was calculated as the time to death or time to censor, at which remaining participants were assumed to be alive after the last review of death registry data on 11/30/2005.

•Cause of death was determined by a panel of physicians with the aid of available medical records and/or death certificate, when no records were available.

•Analyses were performed with SPSS/Windows statistical software Version 11.0.

•Final models were adjusted for previously associated risk factors for mortality in HIV infected individuals and for common risk factors used in previous studies of metabolic syndrome and mortality.

Results:

Table 1. Characteristics of Nutrition for Healthy Living cohort by mortality status as of 11/30/2005

	N*	Dead (%)	Censored (%)	p value**
		62	495	
Mean age in years (SD)	557	46.2 (9.3)	43.4 (7.2)	0.006
Female	557	20 (32.3)	161 (32.5)	1.00
Mean CD4 in counts/ml (SD)	546	306 (299)	469 (292)	<0.001
Race	557			0.61
African American		23 (37.1)	171 (34.5)	
Hispanic		5 (8.1)	48 (9.7)	
White		33 (53.2)	250 (50.5)	
Other		1(1.6)	26 (5.3)	
Smoking history	557			0.14
Never smoked		11 (17.7)	132 (26.7)	
Prior smoker		11 (17.7)	109 (22.0)	
Current smoker		40 (64.5)	254 (51.3)	
HIV transmission				
Men-who-have-sex-with-men	550	21 (34.4)	220 (45.0)	0.13
Heterosexual	549	29 (47.5)	211 (43.2)	0.58
Intravenous drug use	549	23 (37.7)	154 (31.6)	0.38
CD4<200	546	26 (44.1)	82 (16.8)	<0.001
On HAART	555	39 (62.9)	359 (72.8)	0.13
Mean BMI in kg/m ² (SD)	557	25.3 (6.7)	26.7 (5.5)	0.08
Mean Serum albumin in mg/d (SD)	525	3.62 (6.3)	3.95 (4.1)	<0.001
Triglycerides >150mg/dL	545	35 (59.3)	248 (51.0)	0.27
HDL<40mg/dL (M), <50mg/dL (F)	544	44 (74.6)	288 (59.4)	0.024
Fasting glucose <100mg/dL	504	6 (10.2)	53 (11.9)	0.83
Waist circumference >102cm (M), >88cm (F)	557	18 (29.0)	151 (30.5)	0.88
Blood Pressure \geq 130/85mm Hg	544	24 (40.7)	177 (36.5)	0.57
Metabolic syndrome	544	26 (43.3)	201 (41.5)	0.78

*sample size based on available data

**Fisher and chi-square p-values for categorical variables and independent t-test p-values for means

Table 2. Description of Causes of Death among Nutrition for Healthy Living participants (N=62)

HIV related	n (%)	non-HIV related	n (%)
AIDS	6 (9.7)	Cardiac	1 (1.6)
Opportunistic Infection	12 (19.4)	Stroke	2 (3.2)
Malignancy	3 (4.8)	Other Chronic Conditions	2 (3.2)
Wasting	1 (1.6)	Trauma	4 (6.5)
Other	2 (3.2)	Infection	2 (3.2)
Other		Substance Abuse	7 (11.3)
Unknown	5 (8.1)	Cancer	6 (9.7)
Death Cases still open	3 (4.8)	Other	6 (9.7)

Results (cont'd):

Figure 1. Unadjusted Kaplan-Meier hazard curves for risk of death by metabolic syndrome and its components

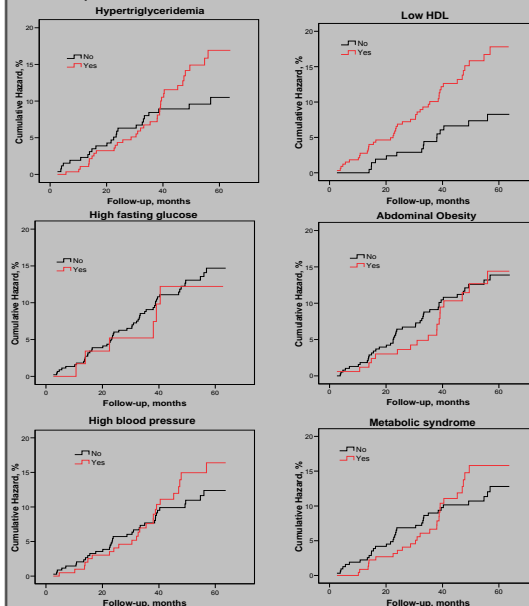


Table 3. Hazard ratios from proportional hazards analysis for metabolic syndrome status and its components among participants in the NFHL study

	Dead/Censored	Unadjusted hazard ratio	p-value	Adjusted hazard ratio ^a	p-value
Triglycerides>150mg/dL	56/457	1.4	0.22	1.75	0.048
HDL<40mg/dL (M), <50mg/dL (F)	56/456	2.52	0.004	2.23	0.012
Fasting glucose <100mg/dL	56/422	1.01	0.98	0.88	0.77
Waist circumference >102cm (M), >88cm (F)	57/459	1.09	0.77	1.12	0.69
Blood Pressure \geq 130/85mm Hg	54/450	1.3	0.34	1.54	0.13
Metabolic syndrome	56/456	1.29	0.34	1.43	0.19

^aAdjusted for age, albumin, current smoker, and CD4<200

Summary of Results:

•There were 62 (11.1%) deaths during the study period with a median time to censor of 53.2 months. Majority of deaths (n=30) were non-HIV related.

•Those who died had a lower mean CD4 count and a lower serum albumin.

•Only low serum HDL and high serum triglycerides were associated with an increased risk of all-cause mortality.

•There was no association seen between all-cause mortality and the presence of metabolic syndrome.

•Gender, race and whether a participant was a current smoker at death/censor were not associated with an increased risk of all-cause mortality in this cohort.

Conclusions:

•Low serum HDL and hypertriglyceridemia, which are common and found in both treated and untreated HIV infected patients are independent risk factors for mortality in HIV. Further research is needed to see if modifying serum HDL and triglycerides will improve survival in HIV+ populations.

•In contrast to previous HIV negative cohorts, there does not appear to be an increased risk of mortality associated with metabolic syndrome for those infected with HIV after a 4-5 year follow-up. Longer follow-up may be needed to see whether metabolic syndrome increases the risk of mortality in HIV.

References:

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