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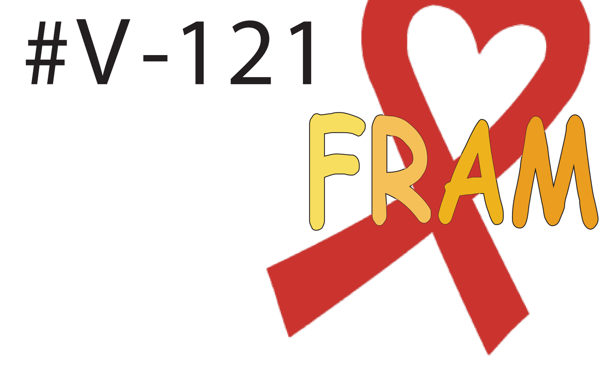

HIV is associated with Increased Prevalence of Microalbuminuria

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Abstract

Background: Microalbuminuria (MA) as a marker of renal disease is associated with increased risk of cardiovascular disease and mortality in the general population, and is frequently seen among patients with HIV-infection. African-Americans have a greater risk of renal disease in the general population and are disproportionately represented among patients with HIV-infection. To determine if the prevalence of MA is increased among patients with HIV-infection and its possible dependence on race, we compared the prevalence of MA in the FRAM cohort of HIV infected patients with the non-HIV infected cohort (CON) from the CARDIA study.

Methods: Urine albumin and creatinine levels were measured in HIV and CON patients. Urine albumin/creatinine ratio (ACR) was determined, and MA was defined as an ACR >30 mg/g. Multivariate logistic regression was used to determine the independent association of HIV infection with MA, and to evaluate independent predictors of MA within HIV positive patients.

Results: Among the 1027 HIV patients, the mean age was 43 ± 9; 70% were men, and 45% were African-American with the remainder being white. Among 303 CON, the mean age was 40 ± 4; 52% were men, and 48% were African-American. MA was present in 83 (8%) of HIV patients, but only 5 (2%) of controls (p<0.001). After multivariate adjustment for age, race, sex, systolic blood pressure (SBP) and triglyceride levels, HIV infection retained an independent association with prevalent MA (adjusted OR: 4.5; 95% confidence interval: 2.0-13.2). We repeated the analysis using a cut-off for MA of ACR <17 mg/g in women and ACR <26 mg/g in men and found similar results; MA prevalence was 10% of HIV patients and 5% of CON with an adjusted OR of 2.1; (1.2-3.9). Among HIV patients, independent predictors of MA included systolic blood pressure categories [OR's 1.0, 2.0 (1.2-3.2), and 5.0 (0.9-28.7) for SBP <120, 120-139, and ≥140, respectively] and African-American race (2.1;1.2-3.5).

Conclusion: HIV has a strong and independent association with MA. HIV patients who are African-American or who have elevated systolic blood pressure are at a particularly high risk. The increased prevalence of MA in HIV could portend increased risk for cardiovascular and renal complications.

Introduction

- The Fat Redistribution and Metabolic Changes in HIV Infection FRAM) study was established to evaluate changes in body composition and metabolism in HIV-infected men and women and a comparison group of control men and women.
- Microalbuminuria is a marker of endothelial dysfunction and a determinant of adverse cardiovascular outcomes.
- HIV causes insulin resistance and dyslipidemia which may be risk factors for microalbuminuria (MA).
- This study evaluated the association of HIV infection versus the control group for predicting prevalent MA.

Methods

- Recruitment:
  - 1183 HIV-infected (825 men, 350 women and 8 transgender) were recruited from 16 geographically diverse HIV or Infectious Disease clinics or cohorts.
  - 303 Controls (155 men and 148 women) were enrolled from 2 research clinics located at Kaiser Permanente, Oakland, CA and University of Alabama, Birmingham that have followed participants longitudinally enrolled in the Visceral Fat and Metabolic Rate in Young Adults (VIM) sub-study of the Coronary Artery Risk Development in Young Adults (CARDIA) study.
- Design: a cross-sectional study from the FRAM Study.
- Measurements:
  - Predictors (see Table 1):
    - Primary: HIV vs. Controls
    - Secondary: Demographic, behavioral, metabolic, blood pressure levels
  - Outcomes:
    - Primary: MA defined as an albumin/creatinine ratio (ACR) >30 based on the National Kidney Foundation recommendations
    - Secondary: ACR >25 for men, >17 for women
- Analyses:
  - Characteristics of HIV+ and control participants were compared
  - Association of HIV with MA was determined using unadjusted and multivariate logistic regression in control and HIV participants.
  - Association of MA within HIV positive participants only was determined using unadjusted and multivariate logistic regression.

Table 1: Demographic and Predictor Summaries by Group*

Characteristic	HIV+	Controls	p-value
Demographics			
Age[1]	43.4 ± 8.9 (1027)	40.2 ± 3.6 (303)	<0.001
Gender[2]			
Female	29.8% (307)	48.5% (147)	<0.001
Male	70.2% (722)	51.5% (156)	
Race/Ethnicity[2]			
African-American	44.7% (460)	47.9% (145)	0.33
White	55.3% (569)	52.2% (158)	
Predictors			
Creatinine[1]	0.9 ± 0.4 (1016)	0.85 ± 0.2 (298)	0.044
CV risk factors[1]			
HDL	44 ± 16 (1016)	52 ± 15 (299)	<0.001
Non-HDL	154 ± 54 (1016)	151 ± 41 (299)	0.92
Cholesterol	198 ± 55 (1016)	203 ± 40 (299)	0.017
LDL	114 ± 42 (896)	127 ± 34 (295)	<0.001
Triglycerides	226 ± 259 (1015)	120 ± 120 (299)	<0.001
Insulin Resistance			
Insulin[1]	14.4 ± 14.8 (1002)	10.6 ± 11.8 (295)	<0.001
Fasting Glucose[1]	97.8 ± 29.3 (1015)	93.3 ±18.6 (297)	0.034
Blood Pressure[1]			
Systolic	117 ± 15 (1014)	118 ± 16 (301)	0.45
Diastolic	78 ± 11 (1014)	78 ± 11 (301)	0.91
Estimated Creatinine Clearance[1]	116 ± 39 (976)	129 ± 35 (296)	<0.001
Current Smoker[2]	44.1% (437)	16.5% (48)	<0.001
Illicit Drug Use (ever)[2]			
Cocaine	50.3% (510)	35.6% (108)	<0.001
Speed	36.0% (365)	26.1% (79)	0.001
Heroin	20.2% (205)	4.6% (14)	<0.001
Hepatitis C (ever)[2]	24.3% (302)	0.3% (1)	<0.001

*Transgenders excluded from analysis; [1]mean ± SD (n); [2]percent (n)

Results

- Prevalence of MA (>30) in HIV participants was 8.1% and 1.7% in controls (p<0.0001). Adjusted OR 4.5 (95% CI 1.8-11.5) (see figure 1).
- Prevalence of MA (>25 men, >17 women) was 9.9% in HIV and 4.6% in controls (p=0.004). Adjusted OR 2.1 (1.2-3.9).

Figure 1: Prevalence of Microalbuminuria

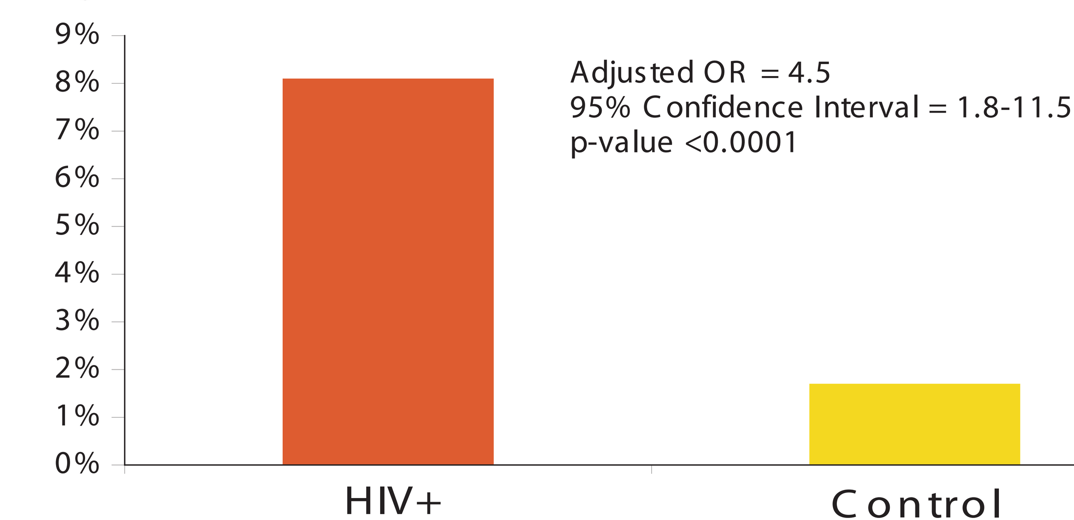

Table 2: Predictors of Microalbuminuria among HIV+ Participants of FRAM

Characteristics	Odds Ratio	Confidence Interval	p-value
African-American race	2.01	1.18-3.44	0.011
Systolic Blood Pressure			
<120	1.0	(reference)	
120-140	2.0	1.22-3.27	0.008
≥140	5.48	0.93-32.2	
Nadir CD4			
<200	1.0	(reference)	
>200	0.68	0.40-1.16	0.16
Log Triglycerides	1.3	0.93-1.83	0.12
Risk Category			
Heterosexual vs. MSM	1.43	0.73-2.79	0.071
IDU vs. MSM	1.64	0.84-3.20	
Other vs. MSM	2.69	1.28-5.66	

Limitations

- Cross-sectional design
- Observational study has a potential for residual confounding

Conclusions

- We found HIV was strongly associated with prevalent microalbuminuria.
- Among HIV+, African-American race and higher systolic blood pressure were strongest predictors of microalbuminuria.
- Increased prevalence of MA may be a harbinger of cardiovascular risk in HIV
- An association of systolic blood pressure 120-140 with microalbuminuria may imply a need for tight blood pressure control in HIV+ persons.

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