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Adipose Tissue, Appetite, & Obesity

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Visceral adiposity index as a measure of cardiometabolic disease in persons living with HIV

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Well-treated persons living with HIV (PLWH) are predisposed to fat redistribution/visceral adiposity, potentially due to anti-retroviral therapy (ART) use and/or the virus itself, and demonstrate a 2-fold higher risk of cardiovascular disease (CVD) compared to those without HIV. Visceral adipose tissue (VAT) is a metabolically unfavorable ectopic fat depot, which is highly inflamed and dysfunctional. Fat redistribution leading to VAT accumulation is related to increased CVD risk. Current gold standard measures of VAT are obtained using CT and MRI, but are not used clinically. The visceral adiposity index (VAI) is a simple tool combining biochemical measures with anthropometrics that can be easily evaluated by the clinician. VAI may be a surrogate measure of VAT and indeed has been shown to relate to insulin resistance, type 2 diabetes mellitus, metabolic syndrome and CVD among the general population. In this study, we evaluated VAI in PLWH and its relation to VAT, anthropometric measures and other cardiometabolic parameters.

45 PLWH on stable ART with no known CVD were recruited as part of a clinical trial to evaluate CVD indices and were included if they were virologically controlled (HIV viral load <200 copies/mL) and demonstrated increased abdominal VAT (VAT area>110cm^2) on CT. For purposes of this study, baseline fasting biochemical, radiologic and anthropometric data were used. VAI was calculated using the standard sex-specific formulas which incorporate waist circumference (WC), BMI, triglycerides and HDL. Presence of coronary plaque was assessed using coronary CT angiography or coronary PET scans. Linear regression was performed to assess relationships with VAI. Non-normally distributed variables were log-transformed for analyses.

Participants were predominantly male (73%), Caucasian (53%), and non-Hispanic (84%) with mean age 55 ± 7 years. Participants had a long duration of HIV and ART use (20 ± 8 and 15 [12,19] years, respectively). The majority of PLWH were obese (BMI 31.9 ± 5.8 kg/m^2) with VAT 189 [127,267]cm^2 and VAI 4.9 [2.8,7.3]. VAI correlated strongly with VAT (r=0.59, P<0.0001), anthropometric measures (BMI r=0.36, P=0.02; WC r=0.43, P=0.004; WHR r=0.33, P=0.03) and ALT (r=0.32, P=0.03), and did not relate to HIV-specific parameters and other metabolic parameters (blood pressure, HbA1c). Participants with coronary plaque tended to have a higher VAI compared to those without coronary plaque (log VAI 0.7 ± 0.3 vs. 0.5 ± 0.3, P=0.056).

These data show VAI, an easily obtained measure, is strongly correlated with abdominal VAT area measured by

CT and may be a useful biomarker for visceral adiposity in HIV. Furthermore, VAI may be related to ALT and coronary plaque, which could help identify those PLWH at risk for fatty liver disease (another ectopic fat depot) and heart disease, respectively. Further studies are needed to assess the utility of VAI in evaluating metabolic disease in HIV.

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