BMI IS A POOR SURROGATE FOR EXCESS VISCERAL ADIPOSITY AND CARDIOVASCULAR RISK IN PEOPLE WITH HIV (PWH)

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Background

- Recent studies demonstrate substantial weight gain among PWH starting modern antiretroviral (ART) regimens, as well as a high prevalence of obesity among those on long-term treatment.[1-3]
- Routine body mass index (BMI) measurements have been proposed to assess cardiovascular (CV) and other comorbid illness risk.[4,5] However, prior studies show substantial variability in visceral abdominal fat accumulation among PWH.[6]
- We sought to investigate the relationships between BMI, excess visceral abdominal fat (EVAF), and cardiovascular risk factors in PWH in the modern ART era.

Does BMI fully address the CV risk of PWH in the modern ART era?

Methods

- The **V**isceral **A**diposity **M**easurement and **O**bservations **S**tudy (**VAMOS**) is a cross-sectional, multi-center observational study in PWH who:
  - Had virologic suppression on ART for at least 1 year; and,
  - BMI between 20 to 40 kg/m^2
- *Study period:* Measurements were completed in 2023.
- Participants completed study visits, abdominal and chest computed tomography (CT) scans, and labs in the overnight fasting state.
- EVAF was quantified via CT abdominal scan at the L4-5 vertebrae and defined as a visceral adipose tissue (VAT) surface area ≥130 cm^2. CV risk was evaluated by 10-year ASCVD risk scores (ACC/AHA).
- *Statistical analysis:* Kruskal-Wallis and Dunn's tests were performed to determine how cardiovascular risk factors differed by BMI and EVAF classifications.

Results

- To explore relationships between BMI, EVAF and CV risk factors, four distinct groups were created (Table 1).

Table 1. Distribution of patients across the 4 EVAF-BMI categories.

	Without EVAF (VAT < 130 cm^2 on CT)	With EVAF (VAT > 130 cm^2 on CT)
Low BMI (BMI 20 – 29.9 kg/m^2)	62	52
High BMI (BMI 30 – 40 kg/m^2)	10	46

BMI Underestimates CV Risk: Many PWH with normal or overweight BMI have high EVAF, missing key CV risk factors.

EVAF Drives CV Risk: PWH with low BMI but high EVAF had the highest CV risk, even greater than those with high BMI.

Study Population

- 170 participants had paired CT scans and lab measurements. 89% were male, 70% white, with a mean age of 54 years. The prevalence of EVAF was 58%.
- While individuals with BMI 30-34.9 kg/m^2 had the highest prevalence of EVAF (88%), EVAF was still present in 47% and 43% of participants with overweight and normal BMI, respectively.

Figure 1: Prevalence of EVAF across BMI categories for participants.

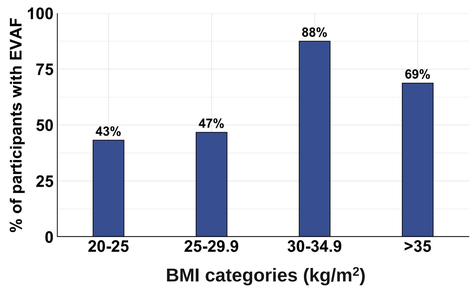
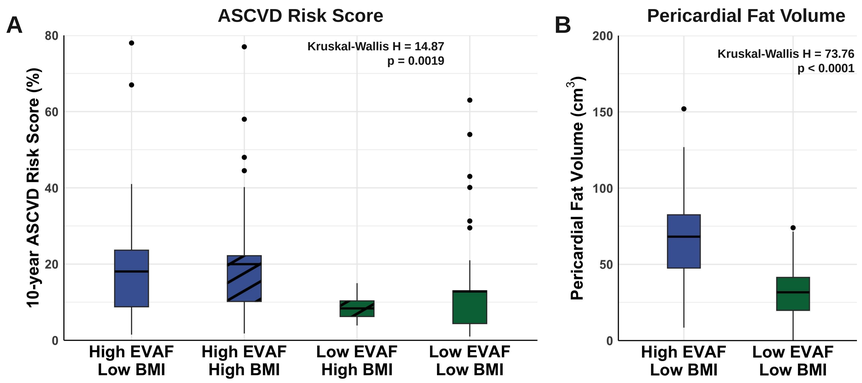


Figure 2: Higher CV risk and pericardial fat volume are found in those with high excess visceral abdominal fat (EVAF).

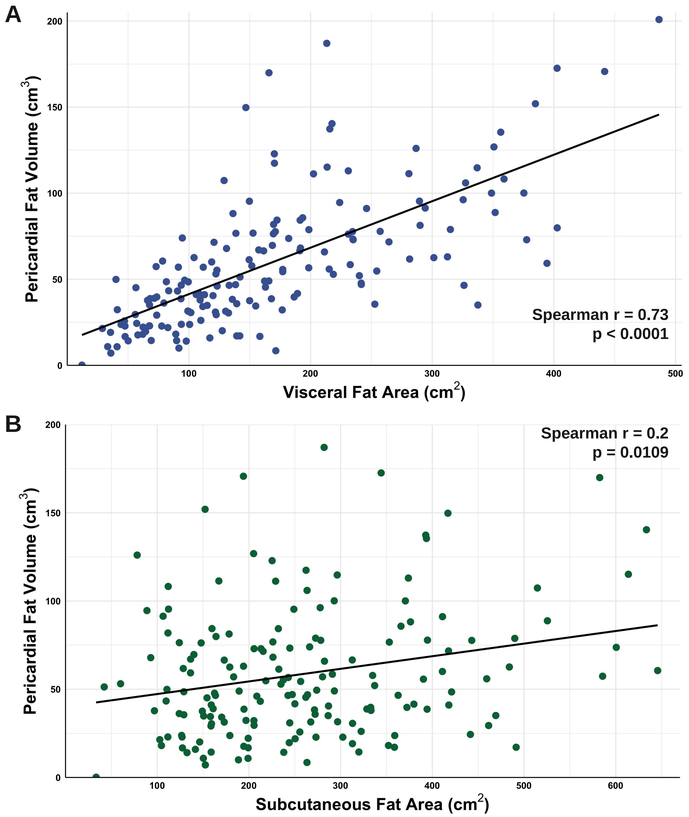


Kruskal-Wallis tests were used to assess whether there is a significant difference in 10-year ASCVD risk score (A) and pericardial fat mean attenuation (B) across the four groups. The p-values (A: p=0.0019; B: p<0.0001) indicate a highly significant difference in CV risk score and pericardial fat volume between the groups.

- A statistically significant difference was seen across the different EVAF-BMI groups ($\chi^2(3)=14.87$, p=0.0019) with High EVAF groups having the highest ASCVD risk score when compared to the Low EVAF groups, irrespective of BMI (Fig. 2A).
- Participants with High EVAF and low BMI had higher levels of pericardial fat volume (PFV) when compared to others that had low EVAF levels (Fig. 2B).

Results

Figure 3: Visceral abdominal fat area has a stronger correlation with pericardial fat volume than subcutaneous fat area in PWH.



A Spearman correlation was performed to determine the associations between visceral (A) and subcutaneous (B) abdominal fat levels and pericardial fat volume, as measured by CT scan. Increasing visceral fat surface area was strongly correlated with pericardial fat volume (A: ρ=0.73, p<0.0001), while SAT showed a weak positive correlation (B: ρ=0.2, p=0.0109).

Conclusions

- These data highlight the limitations of utilizing BMI alone in assessing CV risk among PWH, particularly given the high CV risk seen in participants with low BMI but high EVAF.
- EVAF is highly prevalent in PWH, even among individuals with a normal BMI, underscoring the need to incorporate EVAF screening with BMI to better identify PWH at risk of CVD.

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