

Visceral adiposity index as a potential biomarker for cardiometabolic risks

Nowadays, obesity poses one of the greatest public health challenges worldwide. Visceral adiposity and its associated disorders including dyslipidemia, insulin resistance, diabetes and hypertension, are the key elements characterizing the cardiometabolic risk. Such risk is frequently used to describe the aggregate risk of developing cardiovascular diseases. Computerized tomography and magnetic resonance imaging are the methods of choice for measuring visceral fatness, though their use is extremely limited owing to the complexity, cost, and time. Body mass index (BMI), the classical index to define and classify obesity, does not measure visceral adiposity. Waist circumference (WC), the anthropometrical measure most commonly used to identify visceral adiposity, does not differentiate between visceral and subcutaneous fat.

Visceral adiposity index (VAI) is a recently developed gender-specific mathematical model that uses both biochemical and anthropometric indices including high-density lipoprotein cholesterol (HDL-C), triglycerides (TG), BMI and WC. This index has been shown to conform well to visceral adiposity measured by imaging techniques and has been considered a simple surrogate marker of adipose tissue dysfunction and an indirect predictor of cardiometabolic risk, although the prospective of this notion is not yet elucidated. The AVI has also shown strong links with cardiovascular events and has proved to be a good predictor for metabolic risk components particularly dyslipidemia, WC and BMI. Nevertheless, some studies failed to support this. Thus, VAI usefulness in different population groups has not been confirmed. In fact, the application of VAI in the Arab communities of the Western Middle East region has not yet been reported. Like in most developed countries, these communities are characterized by high prevalence of cardiometabolic risks including obesity, diabetes, dyslipidemia and hypertension.

We used a cross-sectional study consisting of 1,622 Jordanian subjects, 686 men and 936 women between 20 and 80 years old, with and without cardiometabolic conditions. Subjects with normal weight, overweight, obese and with diabetes type 2 not taking medication were included, whereas pregnant and lactating women or subjects with known existing or history of major medical illness or mental or physical disability were excluded. In this study, we investigated the association between VAI and conventional anthropometric adiposity, metabolic and clinical risk indices including BMI, WC, waist-hip ratio (WHR), waist-height ratio (WHtR), fasting serum glucose (FSG), TG, HDL-C, and systolic (SBP) and diastolic (DBP) blood pressure, and examined the risk predictive ability of VAI and compared it with other adiposity indices. The documented VAI age-stratified cut-off points were utilized. The *t*-test was performed for mean differences, partial correlations were used to test associations, and the trend was assessed by regression. Receiver operating characteristic curve was applied and the area under the curve (AUC) was computed to compare the predictive effect between various anthropometric indices for cardiometabolic risk.

Results revealed that the VAI of women was significantly higher than of men, and its severity

increased with age in a dose-response trend in both genders. Furthermore, women had evidently higher prevalence than men of the high risks of VAI and those of all adiposity and cardiometabolic indices. VAI markedly associated with TG, HDL-C, FSG, SBP and DBP or WHR, WC, WHtR and BMI in respective order of correlation potency for cardiometabolic or adiposity risk indices. In men and women, the largest AUC was for VAI, followed by WHR, WC, WHtR and BMI. In essence, the recorded large AUCs for VAI indicate its high predictive discriminatory power.

Taken together, findings suggest that VAI potentially associates with cardiometabolic risks and proves to be superior to other adiposity indices in predicting such risk. Further studies are seemingly necessary to elucidate the suitability of VAI in predicting cardiometabolic risk especially in various populations with different ethnicities.

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