Visceral Fat Area and Cardiometabolic Risk: The Kardiovize Study

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OBJECTIVES

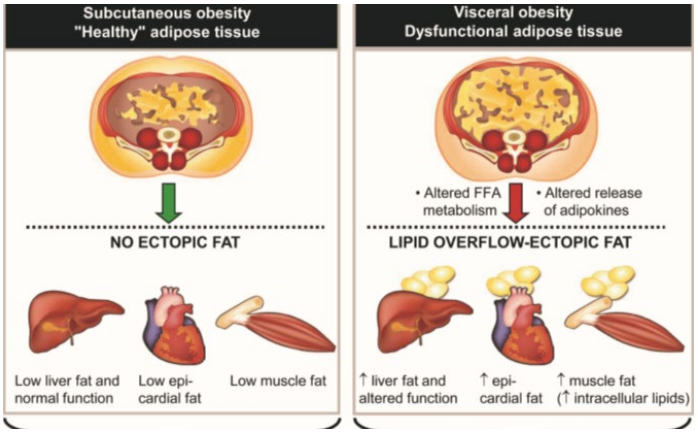
Visceral fat is associated with adiposity-based cardiometabolic complications and may complement predictive assessment by body mass index. The standard method to measure visceral fat is computed tomography, but bioimpedance measurement allows estimation of visceral fat area (VFA) in an easy and low-cost manner. To define high and normal values of VFA, multiple cut-offs have been determined using CT measurement, ranging from 82 cm2 to 140 cm2, with variations according to gender, ethnicity, and criteria used to define the thresholds of cardiometabolic risk.

CASE

Validated cut-off value for VFA by bioimpedance that is associated with elevated cardiometabolic risk in European population is lacking. The aim of this study is to determine the cut-off values of VFA measured via bioimpedance that are associated with increased cardiometabolic risk in a specific European population.

METHODS

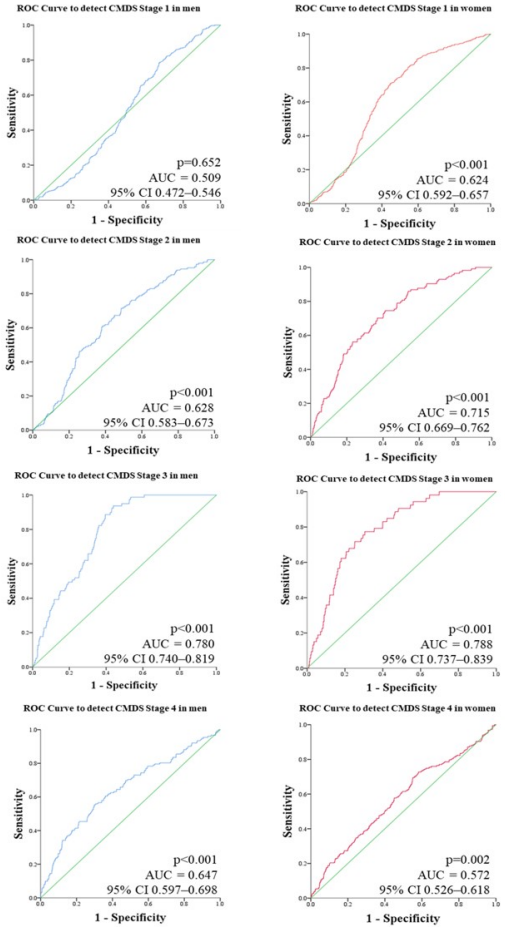
Subjects aged 25 to 64 years were evaluated in a random cross-sectional population-based sample of the Czech population from 2013-2014. Bioimpedance measurements for VFA were determined using InBody 370. Sex-based Receiver Operating Characteristic (ROC) curves were used and the area under the curve (AUC), sensitivity, and specificity were calculated to determine the best cut-off values of VFA associated with cardiometabolic risk. The Cardiometabolic Disease Staging System (CMDS) (10) was used to classify cardiometabolic risk: Stage 1 – one or two metabolic syndromes (MetS) components, without impaired fasting glucose (IFG); Stage 2 – MetS or IFG; Stage 3 – MetS with IFG; and Stage 4 – type 2 diabetes and/or cardiovascular disease.



Despres, J.P. Body fat distribution and risk of cardiovascular disease: an update. *Circulation* **126**, 1301-1313 (2012).

DISCUSSION

This is the first analysis designed to determine cut-off values of VFA measured via BIA applying the CMDS and taking into account gender differences in a Central European population. A cut-off VFA value of 90 cm2 in men and 109 cm2 in women showed the best performance to detect subjects with CMDS 3 (metabolic syndrome and prediabetes) in both genders. The performance to detect other CMDS stages was poor.



RESULTS

In total, 2052 participants were included (54.5 % females, median age 49 years). Median VFA (inter-quartile range) were 82.2 cm² (54.8) in men and 89.8 cm² (55.6) in women (p =0.001). In men and women, the AUCs were Stage 1: 0.509 (p=0.652) and 0.624 (p<0.001); Stage 2: 0.628 (p<0.001) and 0.715 (p<0.001); Stage 3: 0.780 (p<0.001) and 0.788 (p<0.001); Stage 4: 0.647 (p<0.001) and 0.572 (p=0.002), respectively. In men and women, the best VFA cut-offs associated to CMDS Stage 1 were 71 cm² (sensitivity=0.654; specificity=0.427) and 83 cm² (sensitivity=0.705; specificity=0.556); Stage 2: 84 cm² (sensitivity=0.673; specificity=0.551) and 98 cm² (sensitivity=0.702; specificity=0.628); Stage 3: 90 cm² (sensitivity=0.886; specificity=0.605) and 109 cm² (sensitivity=0.755; specificity=0.704); Stage 4: 91 cm² (sensitivity=0.625; specificity=0.611) and 81cm² (sensitivity=0.695; specificity=0.448), respectively.

CONCLUSIONS

These cut-off values could further improve the interpretation of the VFA values estimated via BIA in European population, taking into account ethnic and gender differences. Prospective studies are required to assess the predictive value of these cut-offs and efficacy with VFA-guided prevention.

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ECO ONLINE 2021 28TH EUROPEAN CONGRESS ON OBESITY 10-13 MAY, 2021