

Optimal cutoff values for 3-Dimensional fat volume and mass to predict metabolic syndrome in a Korean population

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Background: Previous studies have reported the association between visceral fat and metabolic syndrome (MS); however, just few studies have been conducted to evaluate the relationship between actual visceral fat volume (VFV) and MS. This study aimed to obtain 3 dimensional VFV and subcutaneous fat volume (SFV) using abdominal computed tomography (CT) and determine MS-predictive cutoff values.

Methods: A total of 250 individuals, aged 27 to 80years, who underwent health screening with abdominal CT between November 2019 and May 2020 were included. The subcutaneous (SFA) and visceral (VFA) fat areas were quantified using axial images obtained at the level of the lowest to the highest part of the umbilicus. The SFV and VFV were quantified from the highest level of the liver dome to the pelvic floor on axial CT images. The Aquarius iNtuition software program (TeraRecon, Foster City, CA) was used to calculate the SFA, VFA, SFV, and VFV. Subcutaneous fat mass and visceral fat mass (VFM) were measured using an adipose tissue density of 0.9g/mL. We used the modified criteria of MS proposed by the Third National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults and waist circumference of ≥ 90 cm in men and ≥ 85 cm in women to define MS.

Results: Multivariate analysis of covariance was used to compare the fat areas, volumes, and mass according to the presence of MS and sex. Additionally, a receiver operating characteristic curve analysis was performed to determine the cutoff values for VFV, SFV, VFM, subcutaneous fat mass, VFA, and SFA associated with MS. Of the assessed variables, VFV and VFM had the highest area under the receiver operating characteristic curve value for predicting MS in both men and women: 0.811 (95% confidence interval, 0.743–0.868) for men and 0.826 (95% confidence interval, 0.727–0.900) for women.

Conclusions: The MS-predictive cutoff values were 4852cm³ and 4366.8g for men and 3101cm³ and 2790.9g for women, respectively. Further, large, population-based studies are needed to validate these cutoff values.