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Fat-to-muscle ratio as a predictor of insulin resistance and metabolic syndrome

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Background/Aims: We evaluated the associations between the fat-to-muscle ratio (FMR) and metabolic syndrome (MetS) and insulin resistance (IR) in South Korean adults using nationally representative survey data. **Methods:** A two-stage stratified sampling method was reflected in a cross-sectional study involving a total of 13,032 participants aged ≥ 19 years who participated in the fourth and fifth Korea National Health and Nutrition Examination Surveys. The homeostasis model assessment was used to evaluate IR and was calculated as follows: fasting plasma glucose level (mg/dL) \times fasting plasma insulin level (μ U/mL)/405. MetS was defined using the 2006 criteria of the International Diabetes Federation, and FMR was measured via whole-body dual-energy X-ray absorptiometry and calculated as follows: total fat mass (kg)/total lean mass (kg). The optimal FMR cutoff values for detecting MetS and the odds ratios (ORs) for MetS risk were determined according to the FMR quartile and sex. **Results:** The proportion of women was 58.4%, and the mean age was 44.22 ± 0.26 years. The FMR significantly differed between men and women (0.30 ± 0.002 vs. 0.53 ± 0.003 , respectively), and the prevalence of MetS and IR gradually increased as the FMR increased. The optimal FMR cutoff value for detecting MetS was higher in women than men (0.555 vs. 0.336). The negative predictive value was highest in normal-weight participants (0.9992 in women and 0.9986 in men), while the positive predictive value was highest in obese participants (0.5994 in women and 0.5428 in men). Based on the derived cutoff FMR, a high FMR was associated with poor outcomes in terms of markers of cardiometabolic risk. The multivariate-adjusted ORs for MetS, abdominal obesity, and IR were 5.35 (95% CI: 4.39–6.52), 7.67 (95% CI: 6.33–9.30), and 3.25 (95% CI: 2.70–3.92), respectively, in men and 5.59 (95% CI: 4.66–6.72), 7.48 (95% CI: 6.35–8.82), and 2.55 (95% CI: 2.17–3.00), respectively, in women. **Conclusions:** A high FMR was significantly associated with the prevalence of MetS and IR. FMR is a novel indicator for detecting MetS, particularly in metabolically healthy normal-weight individuals and metabolically and physically obese individuals.

Figure 1. Cutoff points of Fat to muscle ratio for Metabolic Syndrome

