

A Clinical Cutoff to Identify Metabolically Unhealthy Obese and Normal-Weight Phenotype in Young Adults

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Abstract : Rationale: Cardiorespiratory fitness (CRF) and functional capacity in young obese and normal-weight people are associated with metabolic and cardiovascular diseases and mortality. However, it remains unclear whether their metabolically healthy (MH) or at risk (AR) phenotype influences cardiorespiratory fitness in this vulnerable population such as obese adults but also in normal-weight people. HOMA insulin resistance index (HI) and leptin-adiponectin ratio (LA) are strong markers for characterizing those phenotypes that we hypothesized to be associated with physical fitness. We also hypothesized that an easy and feasible exercise test could identify a subpopulation at risk to develop metabolic and related disorders. Methods: Thirty-nine sedentary men and women (20-45y; $18.5 < \text{BMI} < 24.9$ or $\text{BMI} > 30 \text{ kg.m}^{-2}$) underwent a clinical evaluation, including the six-minute step test (ST), a well-validated and reliable test for young people. Body composition assessment was done by a tetrapolar bioimpedance in a fasting state and in the follicular phase for women. A maximal cardiopulmonary exercise testing, as well as the ST, evaluated the oxygen uptake at the peak of the test ($\text{VO}_{2\text{peak}}$) by an ergospirometer Oxycon Mobile. Lipids, glucose, insulin were analysed and the ELISA method quantified the serum leptin and adiponectin from blood samples. Volunteers were divided in two groups: AR or MH according to a HI cutoff of 1.95, which was previously determined in the literature. T-test for comparison between groups, Pearson's test to correlate main variables and ROC analysis for discriminating AR from up-and-down cycles in ST (SC) were applied ($p < 0.05$). Results: Higher LA, fat mass (FM) and lower HDL, SC, leg lean mass (LM) and $\text{VO}_{2\text{peak}}$ were found in AR than in MH. Significant correlations were found between $\text{VO}_{2\text{peak}}$ and SC ($r = 0.80$) as well as between LA and FM ($r = 0.87$), $\text{VO}_{2\text{peak}}$ ($r = -0.73$), and SC ($r = -0.65$). Area under de curve showed moderate accuracy (0.75) of SC < 173 to discriminate AR phenotype. Conclusion: Our study found that at risk obese and normal-weight subjects showed an unhealthy metabolism as well as a poor CRF and functional daily activity capacity. Additionally, a simple and less costly functional test associated with above-mentioned aspects is able to identify 'at risk' subjects for primary intervention with important clinical and health implications.

Keywords : aerobic capacity, exercise, fitness, metabolism, obesity, 6MST

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