OBSERVATIONS

Ability of Lipid Accumulation Product to Identify Metabolic Syndrome in Healthy Men From Buenos Aires

The metabolic syndrome is a constellation of cardiovascular and metabolic risk factors associated with insulin resistance, which predisposes individuals to diabetes, and appears to be a multifactorial risk factor for cardiovascular disease, although its clinical significance remains controversial (1). Since it may become useful to be able to predict who will develop metabolic syndrome, we explored the value of lipid accumulation product (LAP), a novel index of central lipid accumulation, which has been associated with cardiovascular disease (2) and diabetes (3). LAP is based on a combination of waist circumference and triglyceride: [LAP = (WC − 65) × TG for men and (WC − 58) × TG for women] (2), where TG is triglyceride and WC is waist circumference.

We conducted a cross-sectional population-based survey on metabolic syndrome in Argentinian healthy individuals in order to identify single parameter/index as LAP/surrogates of insulin resistance, with high efficiency in predicting metabolic syndrome. After obtaining ethics committee approval, we recruited (from the Department of Hemotherapy of the Hospital "José de San Martín," University of Buenos Aires) 601 healthy, unrelated male blood donors who had normal findings on medical examinations and were not taking antihypertensive medications. Their ages ranged between 18 and 65 years (mean ± SD 36.9 ± 10.8 years). Clinical and biochemical (lipids, glucose, and insulin) measurements were performed using standardized procedures. Metabolic syndrome was assessed using the National Cholesterol Education Program/Adult Treatment Panel III (NCEP/ATP III) criteria (1). Homeostasis model assessment (HOMA), quantitative insulin sensitivity check index (QUICKI), and LAP were calculated.

The prevalence of NCEP/ATP III–defined metabolic syndrome was 26.3%. Receiver operating characteristic curves were built for 552 men. The LAP showed the best area under the curve (AUC) for metabolic syndrome (0.91) and was significantly higher than all variables including HOMA of insulin resistance ($P < 0.0001$), QUICKI ($P < 0.0001$), and triglyceride–to–HDL cholesterol ratio ($P = 0.0385$). The overall performance of the LAP was similar when individuals were stratified into quartiles for age: quartile 1 (18–28 years; AUC 0.95), quartile 2 (28–36 years; 0.93), quartile 3 (36–45 years; 0.81), and quartile 4 (45–65 years; 0.91). Analysis across quartiles demonstrated that AUCs of LAP were significantly higher than those of fasting insulin, HOMA of insulin resistance, and QUICKI, but not significantly higher than AUCs of triglyceride–to–HDL cholesterol ratio. The AUC of triglyceride–to–HDL cholesterol ratio was the second-highest AUC in the whole sample (0.86) and in quartiles 2 (0.89), 3 (0.78), and 4 (0.89).

These findings were confirmed using 20,000 bootstrap samples. The cutoff 53.63 of LAP showed the highest diagnostic accuracy for metabolic syndrome (sensitivity 0.83, specificity 0.83, Younden's index 0.66, predictive value of positive test 0.62, and predictive value of negative test 0.93), and the triglyceride–to–HDL cholesterol ratio of 3.80 was the second most important (sensitivity 0.81, specificity 0.81, Younden's index 0.62, predictive value of positive 0.59, and predictive value of negative 0.92).

LAP could be associated with highly lipolytic adipose tissue. Adipose tissue with high levels of lipolysis is an early and critical abnormality in the development of cardiovascular disease, type 2 diabetes, and metabolic syndrome (1,4).

This is the first report to find, in Argentinian healthy men, that LAP has a high rate of accuracy for diagnosing metabolic syndrome. The reliability and potential utility of LAP in early detection of metabolic syndrome and cardiovascular disease indicate that further research should be undertaken using larger sample sizes and prospective designs. For example, it will be important to fully explore the performance of LAP in predicting metabolic syndrome compared with that of the triglyceride–to–HDL cholesterol ratio, a robust test to identify insulin-resistant individuals (5).

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