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Alanine aminotransferase/aspartate aminotransferase ratio is the best surrogate marker for insulin resistance in non-obese Japanese adults

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Abstract

Background: The aim of the present study was to examine how liver markers are associated with insulin resistance in Japanese community-dwelling adults.

Methods: This cross-sectional study included 587 men aged 58 ± 14 (mean ± standard deviation; range, 20–89) years and 755 women aged 60 ± 12 (range, 21–88) years. The study sample consisted of 998 (74.4%) non-obese [body mass index (BMI) <25.0 kg/m^2] and 344 (25.6%) overweight (BMI ≥25 kg/m^2) subjects. Insulin resistance was defined by homeostasis model assessment of insulin resistance (HOMA-IR) of at least 2.5, and HOMA-IR and potential confounders were compared between the groups. Areas under the curve (AUC) of the receiver operating characteristic curves (ROC) were used to compare the power of these serum markers.

Results: In non-obese subjects, the best marker of insulin resistance was alanine aminotransferase (ALT)/aspartate aminotransferase (AST) ratio of 0.70 (95% confidence interval (CI), 0.63-0.77). In overweight subjects, AUC values for the ALT/AST ratio and ALT were 0.66 (0.59-0.72) and 0.66 (0.59-0.72), respectively. Multiple linear regression analyses for HOMA-IR showed that ALT/AST ratios were independently and significantly associated with HOMA-IR as well as other confounding factors in both non-obese and overweight subjects. The optimal cut-off point to identifying insulin resistance for these markers yielded the following values: ALT/AST ratio of ≥0.82 in non-obese subjects and ≥1.02 in overweight subjects. In non-obese subjects, the positive likelihood ratio was greatest for ALT/AST ratio.

Conclusions: In non-obese Japanese adults, ALT/AST ratio may be the best reliable marker of insulin resistance.

Keywords: ALT/AST ratio, Insulin resistance, Marker, Body mass index

Background

Obesity is also a major worldwide public health problem and is associated with a high risk of developing insulin resistance [1]. Insulin resistance plays an important role in the pathogenesis of incident diabetes, hypertension, dyslipidemia, and cardiovascular disease (CVD) [2-4]. Detailed measurement of insulin resistance requires the use of diffuse techniques (e.g., glucose clamp technique.) that require expense and time. Alternatives have been sought to simplify the measurement of insulin resistance and one is Homeostatic Model Assessment of insulin resistance (HOMA-IR), which uses fasting insulin and glucose levels to calculate insulin resistance [5] and correlates reasonably with the results of clamping studies. The use of this index is problematic, however, in that insulin levels are not measured during the usual annual health examination and in clinical practice.

Many studies have demonstrated that alanine aminotransferase (ALT), aspartate aminotransferase (AST) and gamma-glutamyl transferase (GGT) levels independently predict type 2 diabetes [6-10], metabolic syndrome [11-14], and CVD [8]. These markers have been shown to be associated with

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