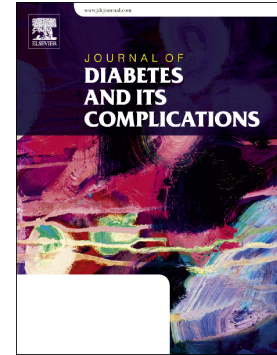


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Waist-to-hip ratio is the most relevant obesity index at each phase of insulin secretion among obese patients

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Abstract

We aimed to explore the relationship between different obesity indices and insulin secretion at each phase among obese subjects and to find out the most relevant obesity index. Height, weight, waist circumference, and hip circumference were obtained among 419 obese subjects to calculate body mass index (BMI), waist-to-hip ratio (WHR), waist-to-height ratio, body adiposity index (BAI), conicity index, abdominal volume index and a body shape index (ABSI). Fasting plasma glucose and fasting insulin were detected to calculate HOMA- β . Early and late insulin secretion indices: $\Delta I_{30}/\Delta G_{30}$ and $DI_{60\sim 120}$ were calculated according to the result of a 75-g oral glucose tolerance test among the 235 subjects not meeting the standard of diabetes. Pearson correlation analysis and multiple linear regression analysis were used. BMI ($\beta = 0.022$, $p = 0.000$) and WHR ($\beta = -1.557$, $p = 0.000$) were independent correlation factors with HOMA- β . In 235 OGTT subjects, WHR was independently and negatively associated with $\Delta I_{30}/\Delta G_{30}$ and $DI_{60\sim 120}$ ($\beta = -1.187$, $p = 0.026$; $\beta = -1.241$, $p = 0.001$, respectively). ABSI was independently and negatively associated with $\Delta I_{30}/\Delta G_{30}$ ($\beta = -17.249$, $p = 0.012$). WHR was the best and consistently correlated factor with insulin secretion at each phase among obese subjects from Hunan Province in China.

Keywords: Obesity indices, waist-to-hip ratio, insulin secretion

1. Introduction

Obesity is a disease of excessive body fat accumulation induced by disorder between food intake and energy consumption.¹ Overweight and obesity are prevalent globally, and the rate of which are increasing year by year.²⁻⁴ Obesity is the most common risk factor for type2 diabetes (T2DM). Reportedly, obese individuals are three to seven times more likely to suffer from T2DM than their normal-weight counterparts.^{5, 6} Obesity leads to T2DM through two core pathophysiological defects, insulin resistance and insulin secretion dysfunction of β -cell.^{7, 8} Therefore, studying the obesity indices that are well related to β -cell secretion function is of great importance for the prediction, early intervention, and delay of the deterioration of islet function. Commonly used indicators of β -cell secretion function are the basal insulin secretion index HOMA of beta-cell function (HOMA- β), early phase of insulin secretion index $\Delta I_{30}/\Delta G_{30}$, late phase of insulin secretion index $AUC_{I_{60\sim 120}/G_{60\sim 120}}$, and late phase of insulin secretion index after correcting for insulin sensitivity $DI_{60\sim 120}$. Obesity is divided into global obesity and central obesity. Classic obesity indices, including body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), and waist-to-height ratio (WHtR), are effective methods for screening obesity, and in general, BMI is a valid parameter by which to assess global obesity. WC, WHR, and WHtR are used to measure central obesity. Recently, a variety of new indices have been proposed to reflect central obesity, such as body adiposity index (BAI), conicity index (CI), abdominal volume index (AVI), and a body shape index (ABSI). BAI is an indicator of body fat calculated on the basis of hip

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