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Independent association of waist circumference and left ventricular longitudinal dysfunction in patients with uncomplicated type 2 diabetes mellitus

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Topic(s):
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Background: Type 2 diabetes mellitus (DM2) is a well known predictor of heart failure, independently of coexisting coronary artery disease. Two-dimensional echocardiographic derived left ventricular (LV) global longitudinal strain (GLS) is a widely recognised parameter for early detection of LV myocardial systolic dysfunction in diabetic patients.

Purpose: To evaluate LV longitudinal systolic function and its relation with metabolic status in patients affected by DM2 without overt cardiac diseases.

Methods: We enrolled 253 DM2 uncomplicated patients (F/M=84/169, age=64.1±9.4 years, glycated haemoglobin [HbA1c] = 7.1±1.2%, blood pressure [BP] =136.8±20.3/78.1±10.8 mmHg), asymptomatic for cardiac symptoms/signs. Exclusion criteria were coronary artery disease (angina and/or test of inducible ischemia) and previous myocardial infarction, overt heart failure, hemodynamically significant valvular heart disease, primary cardiomyopathies, permanent atrial fibrillation and inadequate echocardiographic-imaging. All patients underwent anthropometric measurements, including body mass index (BMI) and waist circumference (WC), heart rate and BP determinations, metabolic evaluation and echo-Doppler exam including quantification of LV GLS (considered in absolute value). Patients were divided according to GLS tertiles: first tertile = =21.9%, second tertile =21.9 to 19.9%, third tertile = < 19.9%.

Results: According to the tertiles analysis, patients in the third tertile had higher WC (p<0.001) (Figure) and higher LV mass index (LVMi) (p=0.03) than the first tertile, whereas HDL-cholesterol was lower in the third tertile versus both the first (p=0.005) and the second tertile (p=0.004). In the pooled population GLS was negatively related to WC (r=-0.30, p<0.0001), diastolic BP (r=-0.21, p=0.005) and LVMi (r=-0.19, p=0.002), and positively related to HDL-cholesterol (r=0.19, p=0.005). By a multiple linear regression analysis, after adjusting for age, sex, BMI, diastolic BP, HDL- and LDL cholesterol, HbA1c and LVMi, GLS remained independently associated with WC (standardized β coefficient =-0.23, p=0.02) (Cumulative R²=0.15; SEE=2.43%, p=0.008).

Conclusions: In uncomplicated type 2 diabetic patients, the magnitude of GLS is an indicator of the patient's metabolic phenotype. The independent association found between myocardial function and abdominal obesity suggests that LV longitudinal dysfunction could be an expression of metabolic profile in this clinical setting.
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Results: According to the terciles analysis, patients in the third tercile had higher WC (p<0.001) (Figure) and higher LV mass index (LVMi) (p=0.03) than the first tercile, whereas HDL-cholesterol was lower in the third tercile versus both the first (p<0.005) and the second tercile (p=0.004). In the pooled population GLS was negatively related to WC (r=-0.30, p<0.0001), diastolic BP (r=-0.21, p=0.005) and LVMi (r=-0.19, p=0.002), and positively related to HDL-cholesterol (r=0.19, p=0.005). By a multiple linear regression analysis, after adjusting for age, sex, BMI, diastolic BP, HDL- and LDL-cholesterol, HbA1c and LVMi, GLS remained independently associated with WC (standardized ß coefficient =-0.23, p=0.02) (Cumulative R²=0.15; SEE=2.43%, p=0.008).

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