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Abstract

Introduction: Persons with normal-range body mass index (BMI) but adverse metabolic characteristics associated with obesity have been described as metabolically-obese normal weight (MONW). We sought to determine whether adverse metabolic profile is associated with alterations in left ventricular (LV) structure or function among adults with normal BMI.

Methods: From the 1794 Framingham Heart Study Offspring cohort adults who underwent cardiac magnetic resonance imaging (CMRI) , we identified 446 free of non-skin cancer and prevalent clinical cardiovascular disease (CVD) who had 18.5≤BMI<25.0 kg/m2 and complete covariates. We calculated a metabolic score (MS) where 1 point was assigned for each of: a) fasting glucose≥100 mg/dL or diabetes; b) SBP≥140 or DBP≥90 mmHg or antihypertensive treatment; c) TG≥150 or HDL_C <40(M)/<50(W) mg/dL or lipid treatment; d) HOMA-IR≥2.5; e) waist circumference ≥102/88cm for M/W. Participants were classified as MS0 (no points), MS1 (exactly 1 point), or MS2+ (≥2 points). LV mass (LVM), end-diastolic volume (EDV), ejection fraction (EF), and concentricity (LVM/EDV) were measured from breathhold cine SSFP CMR scans; we calculated LVM/BSA. Analysis of covariance (ANCOVA) was used to compare MS1 and MS2+ groups to the MS0 group. CMRI variables were adjusted for sex, age, heart rate (HR) and body size (BSA); LVM/BSA was adjusted for sex, age, HR only. We also tested for linear trend across metabolic groups.

Results: LV concentricity increased with worsening metabolic status. This was driven by lower LV EDV, not increased LVM. LVM did not differ across (trend) or between MS-groups. LVEDV decreased across groups but only MS2 differed significantly from MS0. LVEF increased slightly but significantly across MS-groups.

Conclusions: In a community-dwelling cohort, among participants who were free of cancer and clinical CVD and had normal BMI, worsening metabolic profile was associated with adverse remodeling of the left ventricle, reflected by greater LV concentricity.

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