



Impact of obesity on cardiac structure and function in adults without major comorbidities: insights from CV-Prevital

Doctor A. Attanasio (1) , Doctor A E. Malavazos (2) , Doctor G. Disabato (3) , Doctor L.Ramputi (1) , Doctor K. Tissir (1) , Doctor G. Conte (1) , Doctor G. De Angeli (1) , Doctor I. Baroni (1) , Associate Professor D. Mazzaccaro (4) , Doctor R. Cardani (1) , Doctor L V. Renna (1) , Doctor C. Dubini (2) , Associate Professor M. Piepoli (5) , Doctor L. Menicanti (6) , Doctor S. Castelvécchio (7)

(1) IRCCS San Donato Polyclinic, San Donato Milanese, Italy, (2) IRCCS San Donato Polyclinic (Endocrinology Unit, Clinical Nutrition and Cardiometabolic Prevention Service), San Donato Milanese, Italy; (3) IRCCS San Donato Polyclinic (Multimodality Cardiac Imaging Section), San Donato Milanese, Italy, (4) IRCCS San Donato Polyclinic (Operative Unit of Vascular Surgery), San Donato Milanese, Italy (5)IRCCS San Donato Polyclinic (Cardiology University Department), San Donato Milanese, Italy, (6) IRCCS San Donato Polyclinic (Department of Cardiothoracic Surgery), San Donato Milanese, Italy, (7) IRCCS San Donato Polyclinic (Department of Cardiovascular Prevention and Gender Medicine), San Donato Milanese, Italy

Background

Obesity is an important modifiable determinant of cardiovascular (CV) risk and subclinical myocardial remodeling. The recent redefinition of obesity, which takes into account measures of central adiposity such as waist-to-height ratio, can stratify individuals with cardiometabolic risk early on. Therefore, this study aimed to assess the impact of abdominal obesity on cardiac structure and function in a population without overt cardiometabolic disease.

Methods

From a cohort of 1,068 asymptomatic individuals without diabetes or chronic kidney disease (CKD), we selected 512 nonsmoker participants without a diagnosis of hypertension or dyslipidaemia at baseline from the CV-PREVITAL (Primary Cardiovascular Prevention in the Italian Population) study. Obesity was defined as BMI ≥ 30 kg/m² and either a waist-to-height ratio ≥ 0.5 or a waist circumference exceeding WHO sex-specific cut-offs. Anthropometric, clinical, and echocardiographic parameters were compared between participants without obesity (n=443, 87%) and with obesity (n= 69, 13%) using non-parametric and chisquare tests.

Variables	Without obesity N=443 (87%)	With obesity N=69 (13%)	p-value
Age (years)	54 [50-59]	52 [49-57]	0.085
Sex (male)	168 (38%)	23 (33%)	0.463
Score 2/2-OP	3.8 [2.1-6.1]	3.4 [2.3-5.8]	1.000
PAS (mmHg)	120 [110-130]	130 [125-140]	<0.001
PAD (mmHg)	80 [70-80]	80 [80-90]	<0.001
Echocardiographic parameters			
IVS (mm)	8.5 [7.0-10.0]	9.0 [7.7-10.5]	0.053
PW (mm)	8.0 [7.0-9.0]	8.0 [7.0-9.4]	0.043
LVMI (g/mq)	66.0 [56.0-77.0]	72.0 [56.0-82.3]	0.039
Concentric remodeling	86 (19%)	13 (19%)	0.904
RWT	0.36 [0.32-0.42]	0.36 [0.33-0.43]	0.572
LVEDVi (ml/mq)	42.0 [36.0-48.0]	41.0 [35.0-45.5]	0.307
LVEF	63.0 [59.0-66.0]	61.0 [57.0-66.0]	0.012
GLS	-21.8 [-24.0 - -20.0]	-22.0 [-24.0 - -19.0]	0.921
E/e'	7.1 [6.2-8.3]	7.2 [6.3-8.6]	0.322
LAVi	16.0 [13.0-19.0]	18.0 [15.0-23.0]	0.002
TR velocity	206.0 [187.0-225.0]	214.0 [183.5-227.0]	0.671
EATd (mm)	3.0 [2.0-4.3]	3.8 [3.0-5.0]	0.004

Results

Participants affected by obesity exhibited higher but within upper limit systolic and diastolic blood pressure (Table). Left ventricle (LV) wall thickness was slightly higher in obesity (septum: p = 0.053; posterior wall: p = 0.043), with increased LV mass index (72.0 [56.0–82.3] vs 66.0 [56.0–77.0] g/m², p = 0.039). The prevalence of concentric remodelling was comparable (19%, p = 0.904). LV ejection fraction was slightly lower in obese individuals (61.0 [57.0–66.0] vs 63.0 [59.0–66.0], p = 0.012), whereas global longitudinal strain remained preserved (p = 0.921). Left atrial volume index (18.0 [15.0–23.0] vs 16.0 [13.0–19.0], p = 0.002) and epicardial adipose tissue thickness (3.8 [3.0–5.0] vs 3.0 [2.0–4.3] mm, p = 0.004) were significantly higher in participants with abdominal obesity.

Conclusion

In healthy adults without history of hypertension, dyslipidaemia, diabetes, or CKD, obesity—defined by integrated adiposity anthropometric criteria—was associated with early structural cardiac changes, including higher LV mass, larger atrial volumes, and increased epicardial adipose tissue thickness. These findings support the concept that abdominal obesity independently contributes to subclinical cardiac remodelling.