

Body fat distribution, fat-free mass and cardiovascular function in the UK Biobank

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Funding Acknowledgements: Type of funding sources: Public Institution(s). Main funding source(s): Nuffield Department of Population Health Doctoral Scholarship

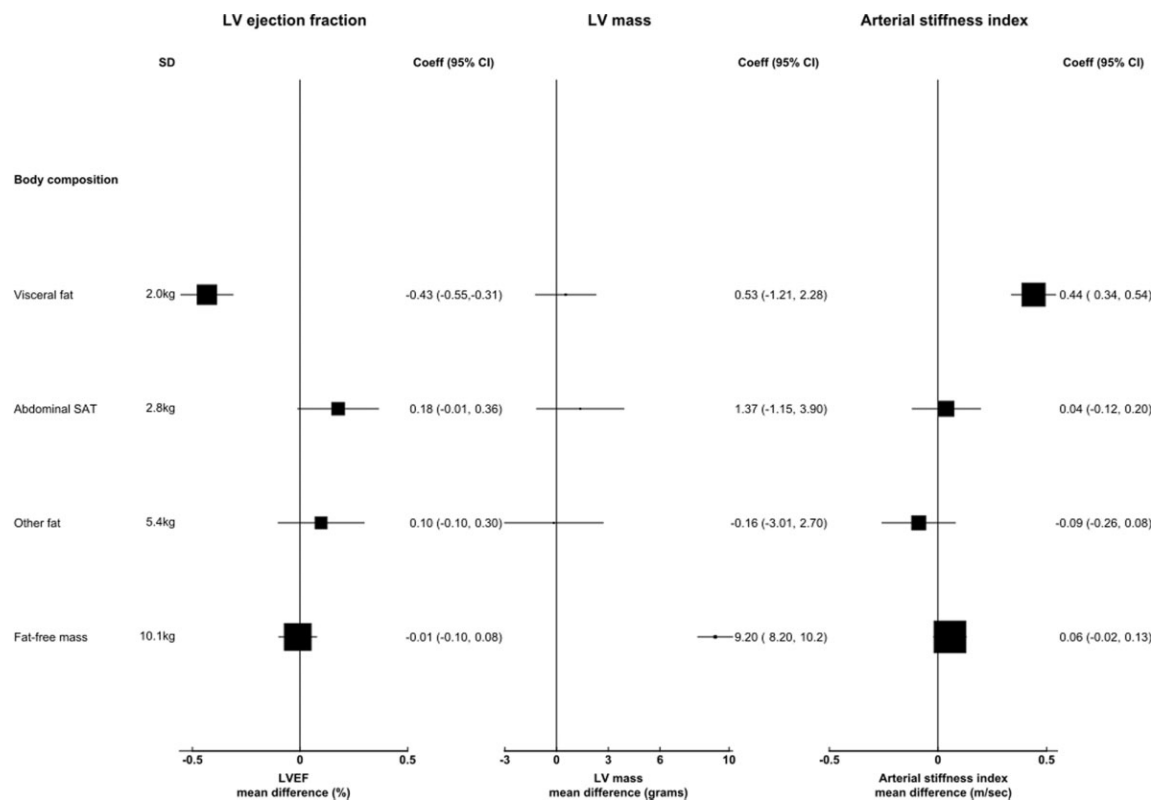
Background: Excess adiposity and high body mass index have been associated with cardiac dysfunction and heart failure. However, the role of whole body imaging and independent associations of regional fat and fat-free mass on left ventricular and vascular function is unclear.

Purpose: This study determined the cross-sectional associations of regional fat depots and fat-free mass on left ventricular function and arterial stiffness to explain obesity-related cardiac dysfunction.

Methods: Participants who underwent whole body magnetic resonance imaging (MRI) and dual energy X-ray absorptiometry (DXA) in an ongoing imaging study of 100,000 individuals in the UK were included in this analysis. Analyses exclude individuals with major cardiac and vascular diseases at initial baseline assessment. Regional fat distribution was quantified using MRI while body fat-free mass was quantified with DXA. Cardiac MRI was used to measure left ventricular (LV) ejection fraction and LV mass while pulse wave velocity from finger photo-plethysmography was used to measure arterial stiffness index. Associations of body fat distribution (visceral fat, abdominal subcutaneous fat, other body fat) and fat-free mass with each of LV ejection fraction, LV mass and arterial stiffness index, after mutual adjustment for one another and potential confounders were determined using multivariable linear regression.

Results: We included 31,088 individuals (mean age 63.4 years, 53% women). Among regional body fat measures, higher visceral fat was associated with lower LVEF ($\beta=-0.43$; 95% CI: -0.55, -0.31 per SD) and higher arterial stiffness index ($\beta=0.44$; 95% CI: 0.34, 0.54 per SD) while none of the regional fat and fat-free mass showed significant association with LV function or arterial stiffness. None of the fat or fat-free mass measures showed significant association with LV mass. These associations were not explained by inflammatory markers, blood pressure or glycaemic profile.

Conclusion: Visceral fat is the main driver of obesity-related cardiac and vascular dysfunction. There is need for further studies to understand the biological causal pathways of obesity-heart disease.



Associations of body composition and LVEF with adjustment for potential mediators

