The Temporal Relationship between Metabolically Healthy Obesity and Carotid Atherosclerosis in Men

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There is conflicting evidence regarding the relationship between metabolically healthy obesity and the burden of carotid atherosclerosis, but whether metabolically healthy obesity is related to the progression of atherosclerosis remains unclear.

Purpose: We investigated the cross-sectional and follow-up associations between metabolically healthy obesity and carotid atherosclerosis.

Methods: Cardiometabolic risk factors and carotid artery intima-media thickness (CIMT) in 556 men, mean aged 51yrs (36-76 yrs), were measured at baseline and one year later. All participants were free of hypertension and type 2 diabetes at baseline. Participants were divided into four groups based on cross-classifications of body mass index (BMI) and metabolic health status using the ATP-III criteria: metabolically healthy normal weight (NHNW, less than one metabolic abnormality with BMI <25 kg/m^2), metabolically unhealthy normal weight (NUNW, more than one metabolic abnormality with BMI <25 kg/m^2), metabolically healthy obesity (MHO, less than one metabolic abnormality with BMI ≥25 kg/m^2), metabolically unhealthy obesity (MUO, more than one metabolic abnormality with BMI ≥25 kg/m-^{2}). Carotid atherosclerosis was defined as >75 percentiles of CIMT. The changes in CIMT were calculated as the difference between the first and second examinations (median interval 367days).

Results: At baseline, mean CIMT was not significantly different between the MHNW and the MHO (0.58±0.12mm vs. 0.62±0.13mm, *P*=0.13), but was different between the MHNW and the MUO (0.64±0.13mm, *P*=0.01) after adjusting for age. The prevalence of carotid atherosclerosis tended to be higher in the MHO as compared to the MHNW after adjusting for age, heart rate, CRP, and VO$_{2peak}$, but this was not statistically significant (Odds Ratio (OR) 1.80 95% Confidence Interval (CI) 0.93-3.52). There was an increase in the OR for carotid atherosclerosis in the MUO (OR 2.08 95% 1.16-3.73). After one year, the progression of mean CIMT was not significantly different between the MHO and the MHNW after adjusting for covariates (Δ 0.03±0.11mm vs. Δ 0.05±0.10mm, *P*=0.52). Furthermore, the MHO at baseline was not significantly associated with the prevalence of carotid atherosclerosis at the second examination (OR 0.85 95% 0.39-1.87) when compared with MHNW.

Conclusions: These results demonstrate that the burden of carotid atherosclerosis was not increased in the MHO when compared with the MHNW in both cross-sectional and longitudinal associations.