Sex differences in body composition and association with cardiometabolic risk

Monday 11:40-11:50 AM | SSC09-08 | Room: E450B

PURPOSE

Body composition differs between men and women, with women having proportionally more fat and men more muscle mass. Fat distribution is an important determinant of cardiometabolic risk, with certain ectopic fat depots [visceral adipose tissue (VAT), intramyocellular (IMCL) and intrahepatic lipids (IHL)] being more detrimental than others [femorogluteal subcutaneous adipose tissue (SAT)]. We hypothesized that there are sex-differences in body composition and ectopic fat depots and that these are associated with a sex-specific cardiometabolic risk profile.

METHOD AND MATERIALS

Our study was IRB-approved and HIPAA compliant. Written informed consent was obtained. We recruited 200 young, non-diabetic, overweight and obese subjects who were otherwise healthy (109 women, 91 men, mean age: 37±10 years, mean BMI: 35.2±5.8 kg/m2). After an overnight fast, subjects underwent DXA and CT for body composition, 1H-MRS at 3T of soleus muscle for IMCL and right hepatic lobe for IHL quantification, serum glucose, insulin and lipids. Men and women were compared by ANOVA. Linear regression analyses between body composition measures and cardiometabolic risk markers were performed.

RESULTS

Women and men were of similar age and BMI ($p=0.4$). Women had higher %fat mass by DXA and lower lean mass vs men ($p<0.0001$). However, men had more VAT and VAT/abdominal SAT, muscle mass ($p<0.0001$), IMCL ($p=0.0008$) and IHL ($p=0.005$), while women had more femoral SAT ($p<0.0001$). Compared to women, men had higher measures of cardiometabolic risk, including serum triglycerides, apolipoprotein B, fasting insulin and HOMA-IR ($p<=0.005$). However, in women, VAT, IMCL, and IHL were strongly associated with these measures of cardiometabolic risk ($p<=0.004$), while in men these associations were weaker or non-significant.

CONCLUSION

Obese men have relatively higher VAT, IMCL, IHL, muscle and lean mass, while obese women have more %fat mass and femoral SAT. This female anthropometric phenotype is associated with a better cardiometabolic risk profile at a similar BMI compared to men. However, ectopic fat is more strongly associated with adverse cardiometabolic risk factors in women compared to men.

CLINICAL RELEVANCE/APPLICATION

The female pattern of fat distribution is associated with improved cardiometabolic risk compared to men at similar BMI, while ectopic fat in women portends greater metabolic risk.

Sarcopenic Obesity and cardiometabolic risk in young adults with obesity

Monday 11:50-12:00 PM | SSC09-09 | Room: E450B

PURPOSE

Sarcopenic obesity, reduced skeletal muscle mass in the setting of obesity, is an important risk factor for cardiometabolic disease in the elderly, but it is unknown whether relatively lower skeletal muscle mass for BMI in young adults, i.e. relative sarcopenia, contributes to cardiometabolic risk. We hypothesized that relative sarcopenia is associated with cardiometabolic risk markers in young adults with obesity.

METHOD AND MATERIALS

Our study was IRB-approved and HIPAA compliant. Written informed consent was obtained. We recruited 188 young overweight and obese subjects who were otherwise healthy, including without diabetes mellitus (100 women, 88 men, mean age: 36.8±9 years, mean BMI: 35.0±5.7 kg/m2). All subjects underwent DXA and CT for body composition, an oral glucose tolerance test (OGTT), fasting serum insulin, lipids and inflammatory markers. DXA appendicular lean mass (ALM)/BMI was used as a measure of relative sarcopenia and subjects were divided by the ALM/BMI median. Groups were compared by ANOVA.

RESULTS

Women with lower ALM/BMI (relative sarcopenia) had a higher mean 120-min glucose level ($p=0.02$) and higher glucose area under the curve on OGTT ($p=0.003$), lower HDL cholesterol ($p=0.02$), higher apolipoproteinB (ApoB) and ApoB/LDL ($p=0.02$), higher hsCRP ($p=0.005$) and fibrinogen ($p<0.0001$) and lower muscle attenuation, suggestive of fatty infiltration ($p=0.003$) compared to women with higher ALM/BMI, despite similar age ($p=0.7$) and weight ($p=0.5$). Men with lower ALM/BMI had higher mean insulin ($p=0.001$), HOMA-IR ($p=0.003$), hsCRP ($p=0.008$) and fibrinogen ($p=0.007$), and lower muscle attenuation ($p=0.006$) compared to men with higher ALM/BMI, despite similar age ($p=0.6$) and weight ($p=0.4$).

CONCLUSION

Relative sarcopenia (lower ALM/BMI) is associated with measures of cardiometabolic risk in young adults with obesity, and these effects are stronger in women than in men. Our study suggests that relative sarcopenia may be an under-appreciated mechanism linking obesity to cardiometabolic risk, and prospective studies are needed to determine whether relative sarcopenia predicts incident cardiometabolic disease over time.

CLINICAL RELEVANCE/APPLICATION

Relative sarcopenia may be an under-appreciated mechanism linking obesity to cardiometabolic risk in young adults with obesity, a high-risk group for developing cardiometabolic disease.