Association between APOE genotype with body composition and cardiovascular disease risk markers is modulated by BMI in healthy adults: findings from the BODYCON study

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The relationship between APOLIPROTEIN (APO)E genotype and cardiovascular disease (CVD) risk is extensively studied due to its effect on the plasma lipid profile1. However, studies investigating the associations between APOE genotype with CVD risk markers have generated inconsistent results, with a small number of human studies suggesting that BMI might play an important role in this relationship2–3. Therefore, we assessed the association between APOE genotype with body composition and CVD risk markers, with further examination of the role of BMI on this association.

BODYCON (impact of physiological and lifestyle factors on body composition) was a cross-sectional observational study in which 360 healthy men and women aged 18–70 y with a BMI of 18.5–39.9 kg/m2 underwent a measure of body composition by dual energy x-ray absorptiometry, assessment of physical activity level using a tri-axial accelerometer and habitual dietary intake using a 4-day weighed food diary. Circulating lipid CVD risk markers were measured in a fasting blood sample and participants were genotyped retrospectively for APOE (rs429358 and rs7412). A general linear model was used to determine the impact of genotype on body composition measures and CVD risk markers, and interaction between APOE and BMI on these outcome measures.

In the study cohort, n = 46 participants were APOE2/E3, n = 228 the wild type APOE3/E3 group and n = 81 E4 carriers (APOE3/E4 and APOE4/E4). The APOE2/E3 group had on average 9%–18% lower fasting total, low-density lipoprotein and non-high density lipoprotein cholesterol concentrations compared to the APOE4 carrier and APOE3/E3 groups (p ≤ 0.01). Significant APOE x BMI interactions were observed for body weight and android fat mass (p ≤ 0.01). When the group were stratified into normal-weight and overweight/obese BMI groups, lean body mass was 6.4% lower in the APOE3/E3 group (mean ± SE, 45.2 ± 0.5 kg) compared to the APOE4 carriers (48.1 ± 0.9 kg) in the normal BMI group (p ≤ 0.02), while in the overweight/obese BMI group, the android:gynoid fat ratio was 7.6% lower in the APOE4 carriers (1.10 ± 0.03) compared to the APOE3/E3 group (1.19 ± 0.02)(p = 0.04). Differences in fasting lipid concentrations between the APOE2/E3 and other genotype groups was only found within the normal weight (p ≤ 0.04) but not overweight/obese BMI subgroup. Moreover, the APOE2/E3 participants within the normal-weight BMI group had a lower dietary fibre and trans-fat intake compared to the APOE4 carriers and lower carbohydrate intake compared to the APOE3/E3 group while there were no differences between genotypes in the overweight/obese BMI group. Physical activity levels were similar between genotype groups within each BMI group.

Our findings confirm previous studies suggesting that the impact of APOE genotype on CVD risk markers is modulated by BMI but indicate that diet may also play a role in this relationship. Further research is needed to draw a firm conclusion on the underlying mechanisms.

References
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