PHYSICAL ACTIVITY AND SERUM METABOLIC PROFILE FROM ADOLESCENCE TO EARLY ADULTHOOD

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Objectives

In adults physically active lifestyle is associated with healthier metabolic profile compared with inactive peers. The aim of this study was to investigate the longitudinal associations of physical activity with serum metabolic profile in adolescence and early adulthood.

Methods

Serum metabolome was quantified with nuclear magnetic resonance spectroscopy at the age of 15 and 19 years in a longitudinal atherosclerosis prevention study (STRIP). The analysis yielded 135 metabolic measures, of which ~60 key variables were selected. Leisure-time physical activity (LTPA) was assessed with a questionnaire, and metabolic equivalent hours/week of LTPA were calculated by multiplying weekly mean exercise intensity, duration and frequency. Data on both serum metabolome and LTPA were available for 454 participants at age 15, and 362 at age 19. Repeated measures analysis of covariance was used for the analyses (sex and age included in the model).

Results

LTPA was associated with several lipid and lipoprotein metabolites related mainly to high-density lipoprotein (HDL) and very-low-density lipoprotein (VLDL). HDL particle size, large HDL total lipid concentration, HDL-, and HDL2-cholesterol concentrations were directly associated with LTPA, while VLDL particle size, VLDL total lipid, and large VLDL triglyceride concentrations showed an inverse association with LTPA (p all <0.010). LTPA was not associated with serum amino acids whereas polyunsaturated fatty acids-to-total fatty acids concentration increased with increasing LTPA level (p=0.041). LTPA was directly associated with creatinine, citrate and urea concentrations (p all <0.010). α1-acid glycoprotein, linked to e.g. inflammation, decreased with increasing LTPA (p=0.0027).

Conclusions

Physical activity in adolescents and young adults is reflected in several serum metabolites indicative of better cardiometabolic risk profile.