

645

THE ASSOCIATION BETWEEN PHYSICAL ACTIVITY, SEDENTARY BEHAVIOUR, AEROBIC FITNESS IN ADOLESCENTS WITH NONALCOHOLIC FATTY LIVER DISEASE

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Adolescents are spending increasing amounts of their leisure time engaged in non-exercise activity. Nonalcoholic fatty liver disease (NAFLD) is being diagnosed at alarming rates amongst adolescents. This project aims to determine if physical activity, sedentary behaviour and aerobic fitness are important risk factors for the development of NAFLD in adolescents. Methods: 1170 individuals in the Western Australia Pregnancy Cohort (Raine) Study underwent assessment at 17 years of age including liver ultrasound, anthropometry, biochemistry as well as questionnaires regarding diet, alcohol intake, sedentary behaviour (total daily hours spent sitting, watching television or computer screens) and physical activity (the international physical activity questionnaire). Aerobic fitness was quantified using a bicycle ergometer test (PWC170). The association between physical activity, sedentary behaviour and aerobic fitness with NAFLD was examined by multivariable logistic regression. Results: NAFLD was diagnosed in 12.8% of the cohort (10.1% male, 15.6% female, $p=0.004$). Adolescents with NAFLD had greater waist circumference and BMI than those without NAFLD ($p<0.005$). Females but not males with NAFLD compared to those without, were more likely to watch more hours of television on weekdays ($p=0.06$) and weekends ($p=0.048$), however, this relationship was lost after adjustment for waist circumference (OR 1.04, 95% CI 0.84-1.29 and OR 1.06, 95% CI 0.87-1.30). The mean (SD) daily level of physical activity was not different in subjects with NAFLD compared to those without [661 (704) vs. 701 (730) METs, $p=0.6$] nor was the mean daily time spent doing physical activity different between NAFLD and non-NAFLD subjects (154 (146) vs 153 (148) minutes, $p=0.9$). Furthermore, there was no association between walking, moderate or vigorous activity and NAFLD ($p>0.1$ for all). However, subjects with NAFLD had a lower aerobic fitness capacity than those without NAFLD [1.47 (0.47) vs. 1.97 (0.56) W/kg, $p<0.001$]. After adjustment for gender, waist circumference and caloric intake, a higher aerobic fitness capacity remained associated with a significantly reduced risk of NAFLD (OR=0.35, 95%CI 0.18-0.66, $p=0.001$). Aerobic fitness was also inversely associated with alanine aminotransferase levels after adjustment for gender ($\beta=-0.18$, $p<0.001$). Conclusion: The relationships between sedentary behaviour, levels of physical activity and aerobic fitness and adolescent NAFLD differ. Aerobic fitness is independently associated with a lower risk of NAFLD in adolescents. Preventative and treatment interventions should be aimed at increasing aerobic fitness.

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