THE PREVALENCE AND METABOLIC SIGNIFICANCE OF NONALCOHOLIC FATTY LIVER DISEASE IN ADOLESCENT GIRLS WITH POLYCYSTIC OVARY SYNDROME

Oyekoya T. Ayonrinde1,2, Leon Adams1,3, Dorota A. Doherty4, John K. Olynyk2,4, Trevor A. Mori1, Lawrie J. Beilin1,6, Wendy H. Oddy7, Martha Hickey8, Deborah Sloboda9, Roger Hart4,10;
1School of Medicine and Pharmacology, The University of Western Australia, Perth, WA, Australia; 2Gastroenterology and Hepatology, Fremantle Hospital, Fremantle, WA, Australia; 3Liver Transplantation Unit, Sir Charles Gairdner Hospital, Nedlands, WA, Australia; 4School of Women’s and Infants Health, The University of Western Australia, Subiaco, WA, Australia; 5Western Australian Institute of Medical Research, Nedlands, WA, Australia; 6Royal Perth Hospital, Perth, WA, Australia; 7Telethon Institute for Child Health Research, The University of Western Australia, Subiaco, WA, Australia; 8Department of Obstetrics and Gynaecology, University of Melbourne, Melbourne, VIC, Australia; 9Liggins Institute, University of Auckland, Auckland, New Zealand; 10Obstetrics and Gynaecology, King Edward Memorial Hospital, Subiaco, WA, Australia

Adolescents with Polycystic Ovary Syndrome (PCOS) are at risk of nonalcoholic fatty liver (NAFLD) and the metabolic syndrome. Objective and Methods: We determined the prevalence and metabolic significance of NAFLD in adolescent girls with PCOS. Community-based adolescents in the Western Australian Pregnancy Cohort (Raine Cohort) Study participated in the menstruation in teenagers study (n=244 females) between ages 14-17 years and in a NAFLD study (n=578 females, 592 males) at age 17 years. Assessments included questionnaires, anthropometric, cardiovascular, pelvic ultrasound, abdominal ultrasound and fasting blood tests. Two hundred and one girls had both ovarian and liver ultrasounds. PCOS was diagnosed using NIH criteria. NAFLD was diagnosed with liver ultrasound. Results: The prevalence of PCOS and NAFLD in the menstruation study were 16% and 19% respectively. Girls with PCOS had a higher prevalence of NAFLD than those without PCOS (42.3% vs. 14.2%, p=0.001). NAFLD was more prevalent in obese girls with PCOS compared with non-obese girls with PCOS (64.7% vs. 0.0%, p=0.002 using waist circumference, 85.7% vs. 15.4%, p=0.004 using suprailiac skinfold thickness and 83.3% vs. 30%, p=0.54 using body mass index (BMI)). Girls with PCOS plus NAFLD had greater adipose tissue (determined by body weight, waist circumference, BMI, suprailiac skinfold thickness), serum leptin and triglycerides but lower serum adiponectin than girls with PCOS without NAFLD (p<0.05 for all). HOMA-IR, serum ALT, CRP, HDL-cholesterol, LDL-cholesterol and glucose levels were similar between the two groups. Girls with PCOS plus NAFLD had similar body weight, waist circumference, waist/hip ratio, BMI, intensity of hepatic steatosis, subcutaneous fat thickness, visceral fat thickness, skinfold thickness, HOMA-IR, serum glucose, insulin, GGT, triglycerides, HDL-cholesterol and adiponectin levels to boys with NAFLD (p>0.05 for all). However, girls had higher serum CRP and leptin whilst boys had higher ALT and AST levels and systolic blood pressure. Free testosterone concentration (FT) was higher in girls diagnosed with NAFLD than those without NAFLD (25.9 vs. 18.9 pmol/L, p=0.02), however FT was not predictive of NAFLD after controlling for obesity. Suprailiac skinfold thickness (odds ratio 1.16, 95% CI 1.08-1.24, p<0.001) and presence of PCOS (odds ratio 3.87, 95% CI 1.09-13.76, p=0.04) were independent predictors of NAFLD in the menstruation study. Conclusions: NAFLD in adolescent females with PCOS is common and has metabolic similarities with male NAFLD. Obesity and PCOS have a dominant effect over testosterone levels in predicting female NAFLD.

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