LIVER STEATOSIS IN OBESE CHILDREN WITH ENHANCED INSULIN RESISTANCE AND DYSLIPIDEMIA, WHICH ARE INFLUENCED BY GENDER, PUBERTY, RACE AND BODY FAT DISTRIBUTION.

Gabriel A. Martos-Moreno1,2, Juan Martínez-Villanueva1, Rocío González-Leal1, Arturo Minguez1, Sara Sirvent1, Guillermo Martínez1, Federico Hawkins1, Jesús Argente1,2,3

1Department of Endocrinology, Hospital Infantil Universitario Niño Jesús, IS La Princesa, Universidad Autónoma de Madrid; 2CIBERObn, Instituto de Salud Carlos III, Madrid, Spain. 3Department of Radiology, Hospital Infantil Universitario Niño Jesús, IS La Princesa.

Introduction:
The authors have nothing to disclose.

• Obesity, insulin resistance (IR) and dyslipidemia are major predisposing factors for the development of liver steatosis (LS), although severity of LS is not exclusively related to the degree of overweight.

• The observed increase in obesity prevalence and severity in children in the past decades has turned it into the main cause of LS in children and adolescents, even above drug side effects or biliary diseases.

Objective:
To investigate the differential features of patients diagnosed with obesity associated LS (as diagnosed by ultrasonography).

Patients and methods:
We retrospectively studied 88 obese children with LS (LS-OB: mean age 12.07 ± 2.81 years and BMI 4.60 ± 2.30 SDS) and 88 obese children without LS (no-LS-OB: mean age 11.91 ± 2.76 years and BMI 4.46 ± 3.43 SDS).

• Both groups were age, BMI, gender, race and puberty matched and their composition was: 71.6% males / 28.4% females; 56.5% Caucasians / 41.2% Latinos; 60.2% prepubertal/39.8% prepubertal.

• The analyzed variables included: Anthropometric: Body mass index (BMI-SDS). Metabolic: Baseline and after OGTT (1.75 g/kg, maximum 75g) glucose and insulin levels and derived indexes (HOMA, WBISI); HbA1c; lipid profile, apoprotein-A1 and B, liver enzymes (AST/ALT) and uric acid in both groups. Additionally, body composition measured by Dual energy X-ray absorptiometry (DXA) and abdominal fat distribution measured by magnetic resonance imaging (MRI) were studied in 27 LS-OB.

Results:
• Obesity associated LS was mainly diffuse [97.7%, only 4 cases of focal LS] and mild [Stage I / III, 65.9%]. LS-OB showed a prevalence of IR of 65.8% (as estimated by insulin levels in the OGTT); mean HOMA 4.62 ± 3.36 and HbA1c levels were >5.7% in 35.9% of them. In LS-OB, the prevalence rate for dyslipidemia [low HDL, high LDL, VLDL or triglycerides], 25-OH-vitamin D insufficiency (<20 ng/ml) and IR were 30%, 79.4% y 65.8%, respectively.

• LS-OB showed higher AST/ALT (p<0.001), insulin/HOMA (p<0.05) and triglycerides/VLDL (p<0.01) than no-LS-OB (FIGURE).

• Among diffuse OB-LS, those moderate-severe [Stage II-III; 31.8%] associated lower WBISI and HDL levels (p<0.05) and higher AST (p<0.05), ALT (p<0.01), apoprotein-B (p<0.05) and LDL/HDL ratio (p<0.05). Their trunk to lower limb (DXA) and visceral/subcutaneous (RM) fat ratios were higher (p<0.05) than those in patients with mild LS [Stage I, 65.9%] (TABLE).

• Among LS-OB, increased serum liver enzyme levels [AST/ALT] was observed in 40.5% patients [lower levels in prepubertals and females (p<0.05)]. Compared to those patients with LS but without increased serum liver enzymes, they showed higher glucose and insulin at 30 minutes in the OGTT (p<0.05 and p<0.01), cholesterol, apoprotein-B, cholesterol/HDL and LDL/HDL-ratios (p<0.05) and higher trunk to lower limb (DXA) and visceral/subcutaneous (RM) fat ratios (p<0.05).

• Latinos showed higher rates of dyslipidemia [decrease in HDL and increased LDL/HDL ratio], 25-OH-vitamin D insufficiency (p<0.05 and p<0.001, respectively) and acantosis nigricans (p<0.01) (TABLE).

Conclusions:
1. Liver steatosis in obese children courses with enhanced insulin resistance and dyslipidemia.

2. Severe obesity associated liver steatosis is associated with greater visceral adiposity and metabolic impairment, which are also influenced by race, sex and pubertal stage.

Acknowledgements: This study has been funded by P113-02195 (Fondo de Investigación Sanitaria) and CIBERobn and FEDER funds.