The increased incidence of childhood obesity and related non-alcoholic fatty liver disease (NAFLD) has determined the need to identify a non-invasive technique to diagnose and monitor NAFLD. Two-dimensional shear wave elastography (2D-SWE) has emerged as a reliable, non-invasive, tool to evaluate liver tissue elasticity in clinical practice, but its application in childhood obesity has not yet been widely evaluated.

AIMS

1) To longitudinally evaluate 2D-SWE changes in relation to weight loss, metabolic profile and body composition modifications.
2) To investigate the correlation between 2D-SWE variation and clinical and biochemical indices of cardio-metabolic risk in obese children.

METHODS

Thirty-three children underwent anthropometric (height, weight, BMI, waist circumference) and bioimpedimetric (fat mass; free fat mass; total body water) evaluations, fasting biochemical assessments (glucose, insulin, total cholesterol, HDL, LDL, triglycerides, transaminases, oral glucose tolerance test), ultrasound and SWE evaluations (Mindray Resona 7 US machine equipped with a broadband SC5-1V convex probe), at baseline (V0) and after a 12-months follow-up (V12).

Homeostasis model assessment of insulin resistance (HOMA-IR) and β-cell function (HOMA-β), Matsuda index, triglycerides/HDL-ratio, total cholesterol/HDL-ratio, Areas Under the Curves for glucose (AUCg) and insulin (AUCI) and their ratio were assessed. Standardized diet and exercise programs have been prescribed to all patients.

Variation of all parameters was evaluated in intra- and inter-group comparison analysis in children who had lost weight (Group A) and those who had lost weight (Group B) at V12.

A significant reduction of mean 2D-SWE value was demonstrated both in the entire cohort (p=0.002) and in Group B children (p=0.004). Intra-group comparison analysis between V0 and V12 documented a significant decrease of BMI, BMI SDS and a significant improvement of metabolic profile, documented by the reduction of insulin, glucose, HOMA-IR, Hba1c, triglycerides, triglycerides/HDL-ratio, transaminases, and by an increase of Matsuda-index and HDL, in children of Group B but not in those of Group A. Inter-group comparison analysis of clinical and biochemical parameters, showed significant differences for BMI, BMI SDS, insulin, HOMA-IR, HOMA-β, triglycerides, triglycerides/HDL-ratio, total cholesterol/HDL-ratio, transaminases between Group A and Group B children after 12-months follow-up.

These results suggested an association between weight loss, metabolic profile improvement and 2D-SWE value reduction. SWE could play an important role in the non-invasive assessment of NAFLD in children and adolescents with obesity.