

The role of fibroblast growth factor 21 and irisin in the pathogenesis of obesity in childhood and adolescence



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Background:

Obesity in childhood and adolescence represents a major health problem that reached epidemic proportions in the last decades. Obesity is characterized by an increase in the adipose tissue, which leads to chronic inflammation and release of adipokines, like Fibroblast Growth Factor 21 (FGF21). On the other hand, intense exercise results in decreased adipose tissue, which leads to the release of proteins, the myokines, like irisin. In obesity a resistance in FGF21 and irisin is noted, as an adaptation mechanism.

Objective:

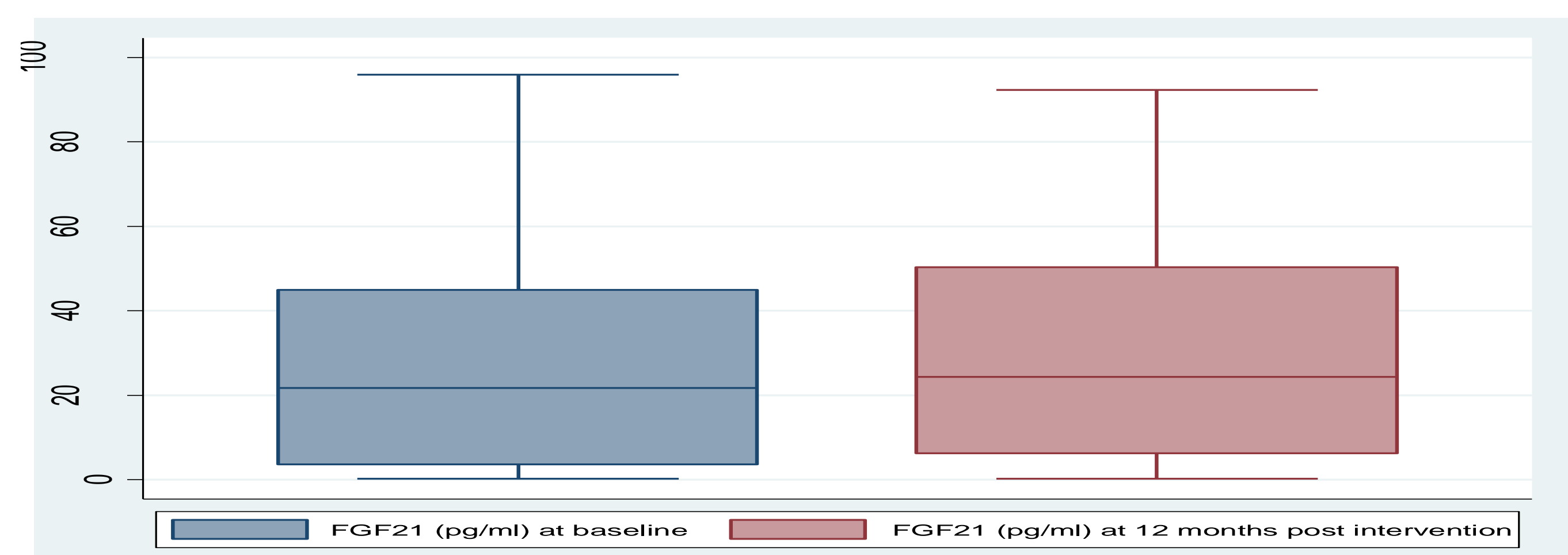
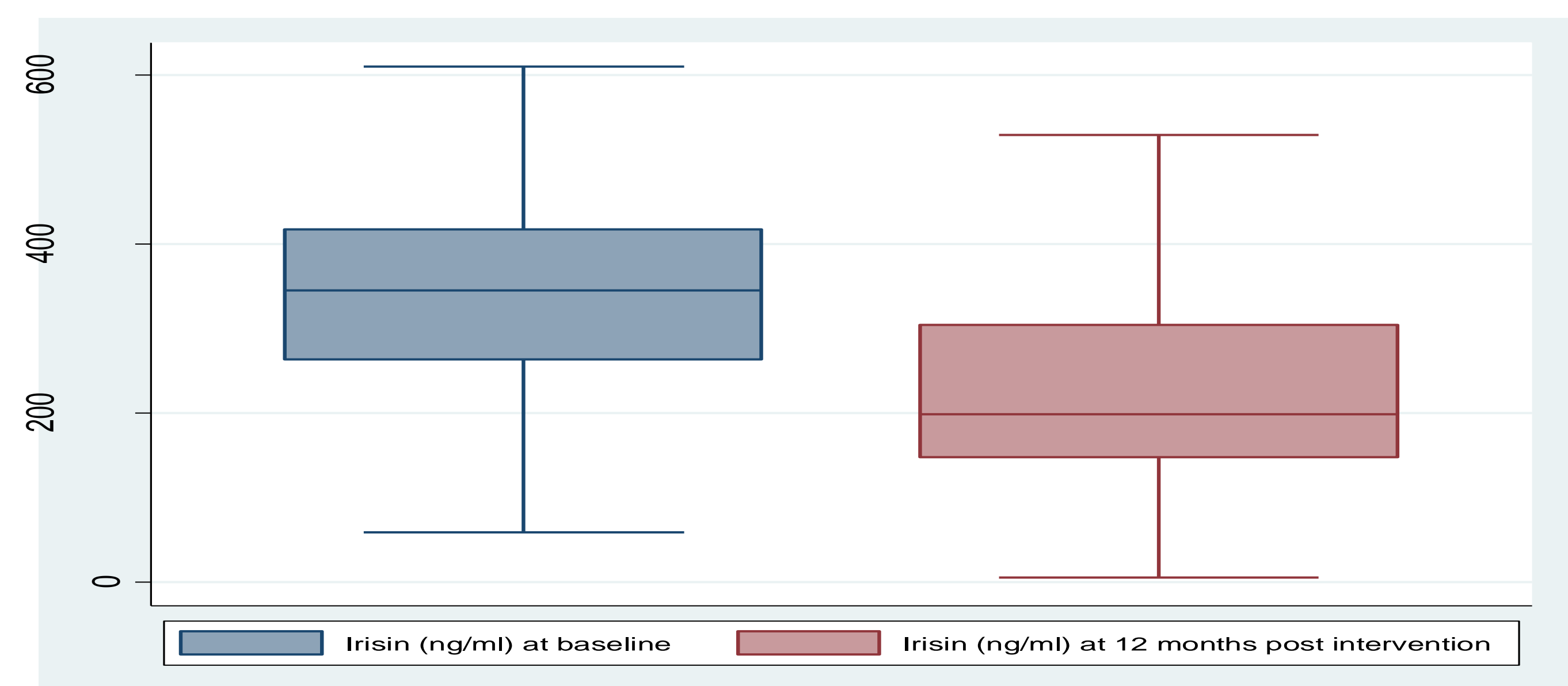
The aim of our study was to determine the role of FGF21 and irisin in the pathogenesis of obesity in childhood and adolescence.

Methods:

Two hundred children and adolescents [106 males (53%), 94 females (47%); 96 prepubertal (48%), 104 pubertal (52%)] aged [mean \pm standard deviation (SD)] 10.7 ± 3 years were studied prospectively for one year. Subjects were classified as obese (141,70.4%), overweight (46,23.1%) and of normal BMI (13,6.5%) according to the International Obesity Task Force cut-off points. All subjects were evaluated by a multi-disciplinary team at frequent intervals and received personalized advice on diet and exercise. Psychologic assessment and management was included when required. Endocrinologic and biochemical investigations were performed at the beginning and at the end of the study. The study was approved by the Committee on the Ethics of Human Research, and written informed consent was obtained by all parents.

Results:

A significant decrease in Body Mass Index (-2.7kg/m^2 , $p<0.001$), Waist/Hip ratio (-0.1 , $p=0.001$), cholesterol (-4.2mg/dL , $p=0.002$), Low Density Lipoprotein (-7.3mg/dL , $p<0.001$), insulin ($-2.5\mu\text{UI/mL}$, $p<0.001$), irisin (-146.4ng/ml , $p<0.001$), leptin (-4.6ng/ml , $p=0.001$) and resistin (-719pg/ml , $p<0.001$) were documented over the study period. Also, a significant increase was observed in high-density lipoprotein (5.1mg/dL , $p<0.001$). No significant differences in glucose, triglycerides, FGF21 and adiponectin concentrations were noted.



Conclusions:

Our findings demonstrate that a personalized multi-disciplinary management plan is effective at reducing the BMI and improving risk factors of cardiovascular disease. There was a significant decrease in irisin concentrations following the reduction of BMI, which supports the hypothesis of irisin resistance during obesity. However, there was no significant difference in FGF21 concentrations following the decrease in BMI, which might be due to a moderate weight loss.

References:

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