

Patient	Age at diagnosis	Clinical manifestation at presentation	Lipid levels at diagnosis	Genetic mutation	Management
1	18 months	Xanthomas over the wrist and Achilles tendon	TC 9.8mmol/l LDL 8mmol/l Plant sterol 0.2mmol/l	Compound heterozygous ABCG5	Ezetimibe Low sterol diet
2	11 years	Incidentally detected fatty liver on US.	TC 8.5mmol/l LDL 4.6mmol/l Plant sterols	Homozygous ABCG5	Ezetimibe Low sterol diet
3	18 years	Menoerhagia associated with macrothrombocytopenia and haemolytic anaemia	TC 5.2mmol/l LDL 3.5mmol/l Plant sterols 0.9mmol/l	Homozygous ABCG5	Ezetimibe Low sterol diet
4	15 years	Incidentally detected macrothrombocytopenia and haemolytic anaemia following investigation for underweight status.	TC 3.1mmol/l LDL 1.9mmol/l Plant sterols 1.2mmol/l	Homozygous ABCG5	Ezetimibe Low sterol diet

Normal plant sterol level <0.02mmol/l

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Overweight and obesity in childhood and adolescence is associated with an increased fracture risk - Results of a systematic literature review

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Introduction: Up to now, no systematic literature review has studied whether overweight or obesity compared to normal weight in childhood and adolescence is associated with an increased fracture risk (fractures overall and by site).

Methods: The systematic literature search was conducted in PubMed/Medline, Embase, Cochrane Library, BIOSIS databases using defined keywords and MeSH terms. 1,677 publications were identified (N=320 duplicates). 1,295 publications were excluded after screening the title/abstract and full text. 62 publications were included in the analysis.

Results: 7/10 studies showed an increased fracture risk in children and adolescents with obesity compared to children and adolescents with normal weight (range reported OR/RR: 1.1-4.4). In 8/12 studies, obesity was associated with a significantly increased risk of fractures compared to children and adolescents with normal weight (range reported OR/RR: 1.1-13.2). Children and adolescents with extreme obesity had a 1.4 to 1.5-fold increased risk of fractures compared to children and adolescents with normal weight (2/2 studies). In 5/16 studies, the percentage of children and adolescents with overweight and/or obesity was higher than the percentage of children and adolescents with normal weight in the group of children and adolescents who suffered a fracture. In n=7 studies, a trend for higher BMIz/fat mass was observed in children and adolescents with fractures compared to children without fractures. The remaining publications reported only the percentage of children and adolescents with obesity in the presence of a fracture, without the comparison with a control group. Another result of this systematic literature review was that we identified factors discussed in the literature as increasing the risk of fractures in children and

adolescents with overweight and/or obesity. These factors include lower physical activity, poorer balance, lower serum vitamin D concentrations, higher leptin and lower adiponectin concentrations in children and adolescents with overweight and/or obesity compared to children and adolescents with normal weight.

Conclusion: Compared to normal weight, overweight or obesity in childhood and adolescence is associated with a 2-fold increased fracture risk (fractures overall and by site). Treating physicians should be aware of this increased risk of fractures in children and adolescents with overweight or obesity and encourage an increase in physical activity in them and regularly determine parameters of bone metabolism such as serum vitamin D concentration.

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Dietary and physical activity habits of children and adolescents after a personalized intervention for the management of obesity

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Introduction: Obesity in childhood and adolescence has been recognized by the WHO as a global epidemic and a major public health problem. Greece, is one of the main countries in Europe where the problem of childhood obesity has increased rapidly. This rise can be attributed to dietary and physical activity risk factors. Recently, there has been a need for a detailed recording and assessment of the lifestyle habits of children and adolescents

receiving personalized intervention for the management of obesity.

Aim: To determine the dietary and exercise habits of children and adolescents before and after their participation in an interventional program within the context of the study 'BigO: Big Data against Childhood Obesity' (<http://btgoprogram.eu>, Horizon2020, No. 727688).

Methods: Three hundred ninety-four (n=394) children and adolescents, aged 8-18 years, attending our Out-patient Clinic for the Prevention and Management of Overweight and Obesity in Childhood and Adolescence participated in the study prospectively. All subjects underwent a personalized management intervention program that provided guidance on diet, sleep and physical activity. The data collection system included the BigO technology platform, which interfaces with a Smartphone and Smartwatch, and records data on diet, sleep and exercise objectively for each patient. Participants used the BigO system for 4 weeks and wore the watch for specific periods during the week. Subsequently, they entered a personalized life-style intervention program for 4 months and used the system again for 4 weeks.

Results: Of all participants, 74.4% were obese, 25.1% overweight and 0.5% had normal BMI. Following the intervention, a statistically significant decrease was observed in the amount of cheese, cereal with added sugar, savory snacks, pasta and fried potatoes consumption in all BMI categories. Also, an increase in the number of children who drank water between the meals daily was noted in all BMI categories (p-value=0.001). Furthermore, there was a decrease in the consumption of evening snack or dinner watching television (p-value<0.05). Boys showed a decrease in the amount of savory snacks and pasta (p-value<0.05) and drank more water between meals daily (p-value<0.001).

Conclusion: A personalized and multidisciplinary intervention based on the BigO study improves dietary and physical activity habits of children and adolescents.

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Effect of growth hormone on thermogenic and endocrine activity of brown adipose tissue and on the lipidome of children born small for gestational age

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Introduction: Brown adipose tissue (BAT) secretes molecules capable of modulating systemic metabolism. Growth hormone (GH) has hyperglycemic action, produces lipolysis and increases

muscle mass. However, there are no human studies on its effect on the BAT and lipidome.

Aim: To evaluate the effect of GH on BAT and lipidome in small for gestational age (SGA) patients and its relationship with adherence to treatment.

Material and Methods: Eleven prepubertal SGA patients between 3-9 years of age were recruited. They were classified into two groups: a) treated with GH (SGA-GH: 7 patients) and b) not treated with GH (SGA: 4 patients). The indicated GH was somatotropin (Salzen[®] from Merck-Serono) using the EasyPodSystem device at a dose of 0.035mg/kg/day.

A baseline visit to all patients and follow-up were done in the SGA-GH group at 3 and 12 months of treatment. At each visit (baseline, 3 and 12 months post-treatment) anthropometric and adherence data were collected using the EasyPodConnect[®] app, as well as a fasting blood sample. Basic blood count and biochemistry, hormone levels, and concentrations of molecules of interest were measured. The thermogenic capacity of the supraclavicular BAT was also determined by infrared thermography after cold stimulation. Finally, a lipidomic analysis by mass spectrometry was performed on the serum of these patients. Statistical analysis was performed using IBMSPSS-Statistics19.0.

Results: The adherence to GH was correct. At the lipidomic level, 42 lipid species appeared modulated in SGA vs. SGA-GH at baseline. SGA-GH group showed increased levels of odd-chain fatty acids (OCFAs) that are associated with cardiovascular protection. Some lipid species related to cellular senescence appeared elevated in the SGA-GH serum after the treatment.

After GH treatment, there was a trend of increasing concentrations of CXCL14, FGF21, IL-8, leptin, and MCP1, and a slight decrease in GDF15, adiponectin, and resistin. The SGA group showed lower basal resting temperature of the supraclavicular BAT than the SGA-GH group. Treatment with GH did not produce remarkable changes in the thermogenic capacity except in one patient whose low growth response to GH coincided with a worsening of the thermogenic capacity of BAT.

Conclusions: GH treatment increases some lipid species related to cardiovascular protection and markers of cellular senescence. This study opens a door about the GH effect on BAT activity by modulating the levels of some batokines with a systemic effect.

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The early identification of glycaemic dysregulation with the use of continuous glucose monitoring in children and young people with obesity

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Introduction: Impaired glucose tolerance and type 2 diabetes mellitus are known complications associated with childhood obesity. At present, an oral glucose tolerance test (OGTT) is the gold standard investigation. Continuous glucose monitors (CGM) are used in children and young people (CYP) with type 1 diabetes mellitus. The aim of our study is to investigate whether the use of a CGM is more effective in identifying glycaemic dysregulation, compared to an OGTT.