Annals of Nutrition and Metabolism

Ann Nutr Metab
DOI: 10.1159/000533360

Published online: August 29, 2023

The 32nd Annual Congress of the European Childhood Obesity Group

Albena, Bulgaria, September 7–9, 2023

Abstracts

Short Title: Congress Abstracts 2023

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Keywords: Pediatric Obesity, prevention, treatment, workshop

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Significant weight loss following ketogenic diet and intermittent fasting in a child with monogenic obesity due to homozygous mutation in Melanocortin-4 receptor: A case report

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Introduction: Genetic mutations in the hypothalamic melanocortin-4 receptor (MC4R) cause dysregulation in body weight, appetite-feedback circuit, and blood pressure. The most common cause of non-syndromic inherited monogenic obesity in early childhood is MC4R mutations. (*Drabkin et al.*)

Case presentation: A five-year-old boy was referred to the pediatric endocrinology clinic for a further evaluation of rapid weight gain, severe obesity, and continuously seeking food since infancy.

Conclusion: A remarkable improvement was observed upon the compliance of a long-term customized diet targeting the defect in monogenic obesity. There was significant weight loss, in addition to homeostasis restoration of body weight, appetite-feedback circuit, and blood pressure. The medical literature is deficient in diagnosis-based treatment methods for monogenic obesity. Thus, this case report will elaborate on the efficacy of long-term low-carbohydrate ketogenic diet with intermittent fasting as a defect-specific natural therapy in a case of homozygote MC4R-linked monogenic obesity.

The Biopsychosocial Approach to the Newly Established Cambridge Complications of Excessive Weight (CEW) Service – Case Study

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Background/Aims: To routinely collect psychological and dietetic outcomes and patient's feedback from the children who attend the paediatric CEW clinic, in order to understand patterns of presenting problems to refine a pilot paediatric CEW service in the East of England, UK. We will demonstrate these patterns and problems on one case example.

Method: Registered service evaluation. Examination of clinical notes and outcome reviews with a detailed focus on one patient.

Results: In the case presented there has been an intentional 7.77% weight loss and 3.25 BMI point drop within a 6 month intervention. Improvements to overall nutritional status and food variety allowed the patient to meet 5 portions of fruit/vegetables a day, as per recommendations from The World Health Organisation and The Department of Health. Improved level of life satisfaction reported via PedsQL scores and observed. Patient self-reported reduced symptoms of anxiety and depression, also observed. Following the 6 month intervention the patient and family have been able to stay away from the family home for multiple nights in succession, when previously there was reported fear of leaving the house for a short period. Patient has also been able to engage in a weekly non-sedentary hobby for a substantial duration outside of the house. Overall family functioning has improved with patient's parent reporting own diet previously being neglected, reduced meal time anxiety and less parental worry.

Conclusion: A Biopsychosocial model frame work has been used and has shown potential when treating children with excess weight. This model is utilising medical, psychological and dietetic support, virtually, with a focus on an individualised formulation over a duration of 6 months intensively, that is subject to revision based on patient feedback. We will demonstrate this approach with one patient who was referred in the infancy of the clinic set up and has completed the intervention.

"Shame on you! It is your fault…."- the relationships between body or weight-related shame, blame and guilt and mental health among children and adolescents with healthy and excessive body weight

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Background/Aims: Childhood obesity is associated with various comorbidities including psychosocial consequences. A major reason of mental health issues is social stigmatization of children's excessive body weights and exposure to multiple forms of weight-related discrimination and mistreatment. The aim of this systematic review was to assess the relationship between body or weight-related blame, guilt and shame and mental health among children and adolescents with heathy and excessive body weight.

Methods: Articles were searched up using PubMed and Web of Science in June 2023. The following search query was used: (blame or guilt or shame or body shame or body shaming or weight shame) AND (mental health or psychological health or psychological functioning or psychological factor) AND (children or

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adolescent or pediatric population or pediatric sample) and (obesity or obese or excessive body weight or overweight). The search was done without limiting the years of publication. The inclusion criteria included: (1) pediatric samples, (2) full text available, (3) original research articles. Articles were excluded if they were editorials, letters, replies from authors, review articles, and articles without a full text.

Results: The initial search returned 187 results. The repeated results of search were ruled out. After screening of abstracts, 23 results were chosen for full-text analysis. After analyzing the collected data, the relationships included associations between body or weight-related blame, guilt and shame and such variables as i.a.: (a) social stigma related to being overweight, (b) overweight-related shaming and bullying, (c) disordered eating (e.g. emotional eating, loss-of-control-eating, eating disorders risk, secretive eating, food preoccupation, vomiting-purging behaviors), (d) fear of getting fat, (e) discrimination, victimization and teasing history, (f) social connection and openness to friendship, (g) self-compassion and mindfulness, (h) quality of life (i) self-esteem, (j) weight language used by parents in conversations with adolescents about their weight, (k) motivation for help seeking and successful lifestyle changes, (l) anxiety and depression, (m) cognitive emotion regulation strategy.

Conclusions: Considering rapid growth of childhood obesity rates, understanding the experiences of weight stigma and its impact on mental health in children and adolescents is of growing importance.

Prevention of stigmatization in families living with childhood obesity: A qualitative study of mechanisms and dynamics that can potentially lead to stigmatization

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Background: There are widespread and well-documented challenges with stigmatization in life with childhood obesity in general and in relation to obesity treatment interventions in particular. Stigmatization is a latent contextual feature and intervention activities run the risk of either activating or amplifying the mechanisms of stigmatization. Existing research on the subject has primarily focused on reducing stigmatization rather than actively preventing it.

Objectives: To explore mechanisms and dynamics underlying and preceding the development of stigmatization - in order to prevent actual stigmatization mechanisms being activated or amplified.

Method: We interviewed 11 families enrolled in a childhood obesity intervention about their experiences with living with childhood obesity and participating in a childhood obesity intervention. The interviews were semi-structured on topics related to mechanisms and dynamics related to daily life and health-related self-understandings. The interview guide was developed based on existing literature and micro-sociological theories focusing on relational aspects of health. Data was analyzed and interpreted using radical hermeneutics.

Findings: The analysis identified four main themes: 1) Familial self-understandings and health identities define if and how the family members are able to adapt to the intervention without identity conflicts, 2) The widespread feelings of guilt and shame among parents (particularly among mothers) often turn into severe stigmatization, 3) Maintaining or gaining a balanced view of the role of weight and being weighed is essential in order to avoid underlying mechanisms of stigmatization, 4) When the obesity intervention is perceived as authentic, trustworthy and relevant by the whole family, it is much easier to discuss difficult subjects without generating feelings of being stigmatized.

Conclusion: The four themes have potential implications for how to include prevention of stigmatization in treatment of childhood obesity. Communicative elements in existing interventions would have to be evaluated and reconsidered with a significant focus on the prevention elements. To the best of our knowledge, this will be the first structured childhood obesity stigmatization prevention initiative ever developed.

Attrition rate and predictors of a monitoring mHealth application in adolescents with obesity

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Background: Integrating mobile health (mHealth) into pediatric obesity treatment can provide opportunities for more personalized and lifetime treatment. However, high attrition rates pose a significant challenge. The current study attempts to better understand attrition by exploring 1) attrition rates of a monitoring mHealth application for usage over 14 days and 2) testing predictors of attrition in adolescents with obesity.

Methods: Participants were 69 adolescents between 12 and 16 years old who engaged in a multidisciplinary obesity treatment (MOT) center (either outpatient or inpatient) in two countries (Belgium and France). To assess the attrition rates, frequency distributions were used. To test the predictors of attrition, zero-inflated negative binomial regression was performed.

Results: Attrition rates were high, in the outpatient group, more than half of the participants (53.3%) used the app for only 0-7 days. In the inpatient group, this percentage was 24.1%. Only deficits in initiating (a component of executive functions) was a negative predictor of attrition, indicating that deficits in initiating lead to lower attrition rates.

Conclusions: This study provides evidence for high attrition rates in mHealth interventions for adolescents with obesity and

was the first to investigate psychological predictors of attrition to an mHealth monitoring tool in adolescents with obesity in treatment. Findings regarding predictors of attrition should be approached with caution due to the small sample size.

Metabotyping children using rectal MetaSAMP®-LA-REIMS: the MetaBEAse cohort

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Background/Aims: The application of metabolomics in diseases manifesting in childhood is timely as early exposures severely impact adult health and functionality[1]. The richness of feces, incorporating the influence of the microbiota we host and the food we eat, provides tantalizing capacities for metabolic exploration in childhood obesity. Yet, practical issues like sample availability and stability have cast its clinical applicability in an unfavorable light[2]. With this in mind, our aim was to develop a device that could integrate sampling, sample preparation, and auxiliary desorption and ionization for rapid fingerprinting.

Methods: A nanofibrous electrospun membrane (MetaSAMP®, WO2021/191467)[3] was developed toward holistic metabolome coverage. The analytical performance and clinical applicability of our rectal MetaSAMP®-LA-REIMS platform (Fig.) were evaluated in the MetaBEAse cohort (N=232, 9-12 years, IOTF range [-3,3]) and compared to conventional fecal metabolomics and lipidomics analyses. For better (patho)physiological understanding, metabolomic data were integrated with anthropometric, clinical, fecal microbiome, and other relevant (meta)data.

Results: The rectal MetaSAMP® was devised as a kit with an integrated membrane comprising a core layer, which is a blend of hydrophilic (polyvinylpyrrolidone) and hydrophobic (polystyrene) polymers (60/40, *w/w*), covered with a biocompatible polyacrylonitrile layer, and that is directly amenable to our automated LA-REIMS platform[4]. Compared to feces, the MetaSAMP®-LA-REIMS metabotyping approach demonstrated superior metabolome coverage, increased transport stability (48 h at 4°C), and reduced total sampling and analysis speed (<20 min, Fig.). Integration of anthropometrics, clinical, microbiome, and MetaSAMP® metabolome data, enabled significant (p<0.05) weight-driven predictions and correlations (*e.g.,* Spearman's ρ-value up to 0.6 between fecal metabolic features, weight, and markers indicative of inflammation, dyslipidemia, and insulin resistance) and the putative identification of metabolites reflective of microbiome-metabolome crosstalk (*e.g.,* phytosterols and bile acids).

Conclusion: Collection, transport, and short-term stability were substantially facilitated using the rectal MetaSAMP®, thereby decreasing the possible loss of clinically relevant metabolites in the time period between home sampling and laboratory-scale analysis. Our rectal MetaSAMP® fingerprints reflected gut microbiome-metabolome crosstalk, reinforcing the medical relevance of metabolomics research for studying the multifactorial nature of obesity and its potential as a metabotyping tool for the first-line segregation of increased metabolic risk at a young age.

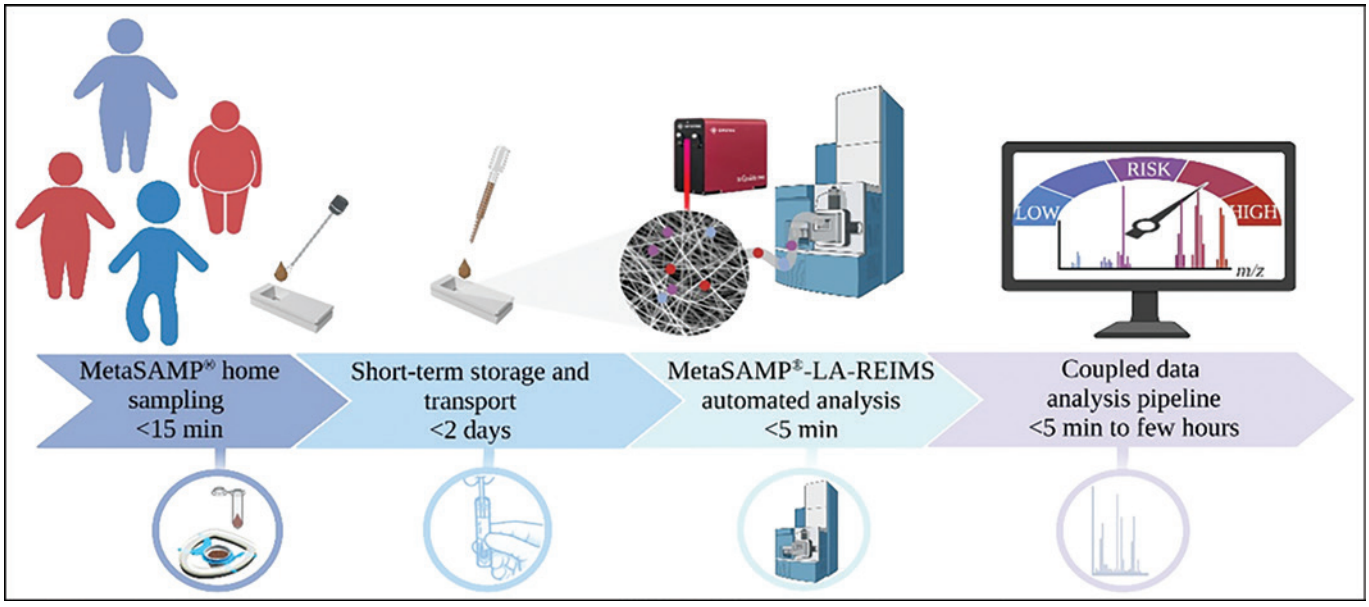

Fig. 1: Workflow for rectal MetaSAMP® sampling and LA-REIMS analysis.

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Obesity surveillance among first graders in Bulgaria (2008 to 2019) – main results, trends and conclusions

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Background/Aims: The surveillance of childhood obesity is one of the recommended approaches in public health to tackle the current childhood obesity epidemic. The aim of the present study is to highlight the main results, trends and conclusions from the obesity surveillance among first graders in Bulgaria in the period 2008–2019.

Methods: Four cross-sectional studies on nationally representative samples of approximately 3,500 7-year-old students in first grade were carried out in 2008, 2013, 2016 and 2019. The studies were conducted within the framework of the WHO European Childhood Obesity Surveillance Initiative (COSI) in strict compliance with the protocol developed by the WHO (World Health Organization). The nutritional status of the students was assessed through the z-scores of the Body Mass Index-for-age (BMI-for-age) and the WHO Reference for school-aged children and adolescents, 2007.

Results: Among the studied population of 7-year-old first-graders, every third child was overweight, and every seventh was obese. The analysis of the results revealed a trend for increase in the prevalence of overweight and obesity within the period 2008-2019. The observed trend was more pronounced among boys, children living in rural areas and families with a lower socio-economic status. The profile of the foods available at the school premises improved, along with better inclusion of the nutrition education into the curriculum. Changes in the sport facilities and initiatives to stimulate the physical activity of students were more limited. Significant unfavorable characteristics were observed in the dietary pattern and physical activity among a large proportion of the first-graders.

Conclusion: The surveillance of obesity and related environmental factors among 7-year-old first graders in Bulgaria within the period 2008-2019 is a valuable approach for outlining the problem and monitoring of the trends. In the field of prevention, the obtained results are an important prerequisite for the development of effective policies to reverse the childhood obesity epidemic.

Four-year follow-up of metabolic risk factors in children treated for obesity in the preschool age: Pooled secondary outcomes from a randomized controlled trial

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Introduction: Childhood obesity is related to metabolic risk factors. However, it is unknown when these pathological processes are first manifested and if obesity treatment in children of preschool age can reduce these risk factors long-term. Therefor the aim was to assess long-term metabolic health in preschool children with obesity and the association to change in child weight status.

Methods: A total of 177 families with 4- to 6-year-old children with obesity were recruited to the randomized controlled More and Less Study (ML). ML aimed to compare the effect of a parent support program on child weight status to standard treatment. In addition to anthropometrics, metabolic risk factors; fasting insulin, Hemoglobin A1c (HbA1c), cholesterol, high-density lipoprotein (HDL), low-density lipoprotein (LDL), triglycerides were collected at baseline, 12- and 48-months. The association between metabolic risk factors and weight status (body mass index standard deviation score, BMI-SDS) were assessed outside of randomization at baseline and at follow-up after 12 and 48 months by linear mixed models.

Results: A total of 92 children had blood samples collected, age 5.3, 61% female, 2.9 BMI-SDS. Overall, there was a positive association between BMI-SDS over time (per unit) and HbA1c 1.5 (95%CI 1.48 – 3.96, p<0.001), fasting insulin 2.72 (1.48 – 3.96, p<0.001) and HDL -0.16 (-0.23 to -0.09, p<0.001). Importantly, a reduction of BMI-SDS by ≥0.25 was associated with improvement of HbA1c -1.37 (95%CI -0.28 to -2.46, p=0.015) and triglycerides -0.19 (-0.36 to -0.03, p=0.02) at 12-month follow-up. At 48-month follow-up, reduced BMI-SDS by ≥0.5 was associated with improved levels of total cholesterol -0.3 (95%CI -0.57 to -0.03, p=0.03).

Conclusions: Metabolic risk factors can be seen already in preschool children with obesity. However, early initiated treatment interventions resulting in a clinically relevant reduction of weight status can lead to long-term improvement on metabolic risk factors and thus lower the negative effects on future health. The protocol for the study is registered with the clinical trials registry clinicaltrials.gov (ID: NCT01792531)

Patient-centred growth chart for paediatric patients with severe obesity

M.Engsner; *Ciba, I.; Aydin, B.; Stenlid, R.; Söderhall, J.; Bergsten, P.; Forslund, A.*

Background/Aims: There are well documented methodological growth chart errors for children with severe obesity. Thus, improved tools to motivate behaviour change and to follow treatment results in these children are needed. We aim *the standardized body mass index (s-BMI) growth chart* to be more useful in clinics and in the meeting with parents and caregivers.

Methods: The s-BMI growth chart applies International Obesity Task Force calculations to create cut-offs for the World Health Organisation (WHO) growth standard and reference population (0-19 years old). Making it possible to have cut-offs from the first years of life and to higher levels of BMI (BMI>40). To relieve methodological issues for this population with severe obesity, distances for higher levels of obesity are fixed. In addition, the growth chart layout has horizontal s-BMI lines to improve readability.

Results: Regular standard deviation score growth charts which follow an increasing s-shape, characterizes a child's increase in body composition by a larger distance from the curved line. Contrary, s-BMI will only visually increase if the child increases in s-BMI and deviate from the horizontal line. This exposes increases/decreases in a more obvious way and allows earlier detection.

Conclusion: We hypothesise that s-BMI charts will be a useful tool in specialized paediatric obesity clinics by allowing patients and caregivers to understand growth charts and treatment outcomes.

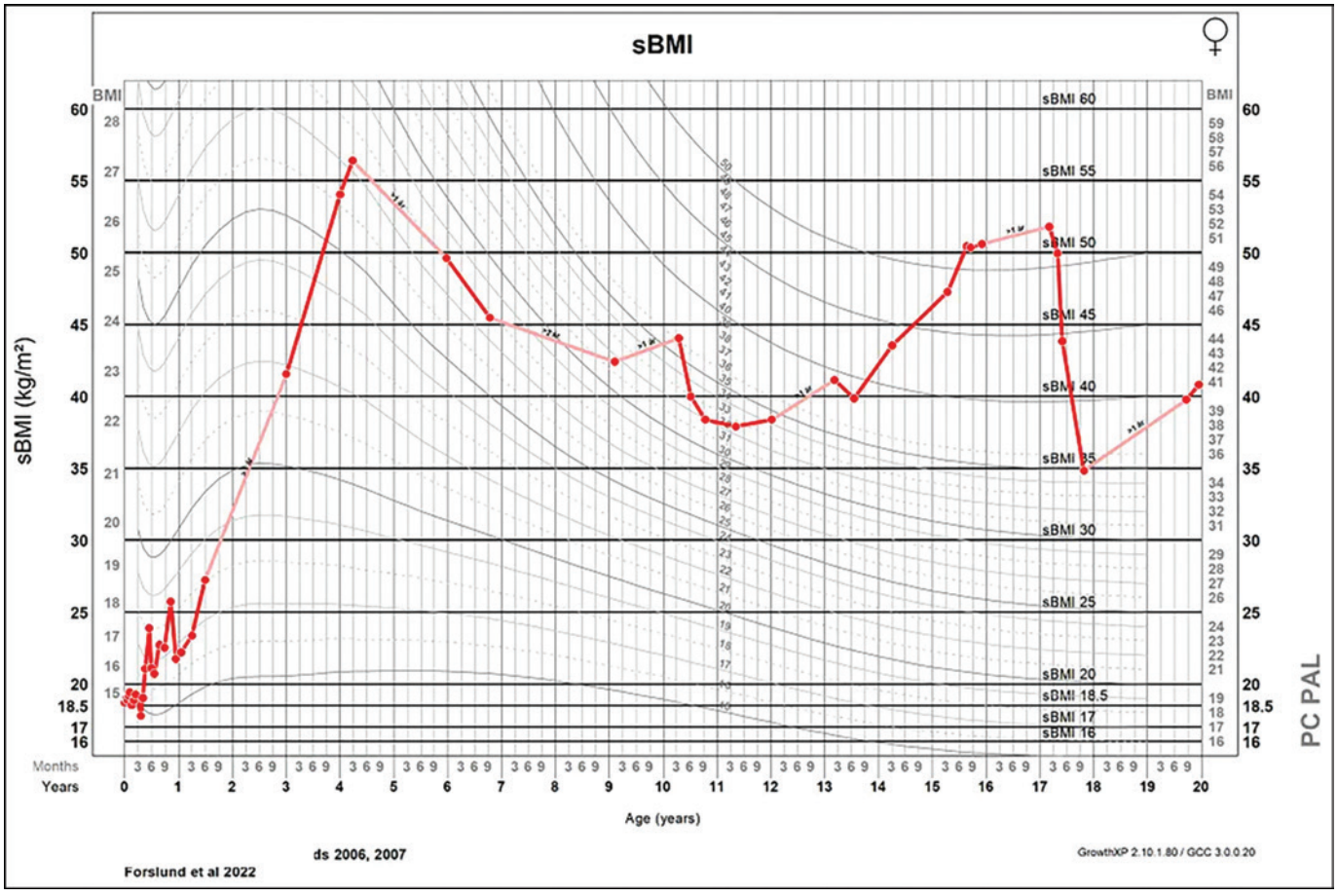

Fig. 1:

Cardiovascular damage in obese children – early predictive markers

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Background/Aims: The new pediatric obesity epidemic brings along an increased risk of multiple comorbidities and mortality at a young age. The link between obesity and the increased risk of cardiovascular disease, type 2 diabetes mellitus, neoplasia, is well established. One of the crucial aims of preventing the comorbid conditions associated with obesity is to detect children with higher cardiovascular risk at an early stage. In this study, we evaluated the presence of early markers of cardiovascular risk represented by interleukine-6 (IL-6), Intercellular Adhesion Molecules (ICAM) and endotoxemia.

Methods: We conducted a prospective study, on two groups: the study group included 85 obese pediatric patients between 6 and 18 years old with obesity without associated pathologies, and the control group that included 30 pediatric patients with normal BMI. We evaluated anthropometric parameters, Total lipid profiles, liver function tests, total protein, blood glucose. The cardiovascular risk parameters were defined by age and sex. IL 6, ICAM, endotoxemia, insulinemia, plasma cortisol and HOMA-IR (Homeostasis model assessment) evaluated the inflammatory and metabolic status.

Results: Inflammatory markers, IL-6, ICAM 1 and endotoxemia were significantly higher in obese patients versus the control group. We identified significant correlations between the changes of the inflammatory markers in the obese patients and BMI. IL-6 is significantly correlated with glucose ($p = 0.001$) and BMI value ($p = 0.031$). ICAM correlates significantly with triglycerides ($p = 0.001$), glucose ($p = 0.044$) and BMI percentile ($p = 0.037$). For pediatric obese patients, endotoxemia has been significantly correlated only with BMI percentile ($p = 0.001$). We made a multivariate analysis to evaluate the contribution of each biochemical parameter but also of BMI percentile in the variation of the inflammatory markers. The results indicated a significant predictive power of BMI percentile on inflammatory markers: IL-6 (AUC = 0.803, $p < 0.001$), ICAM (AUC = 0.806, $p < 0.001$) and endotoxemia (AUC = 0.762, $p = 0.019$).

Conclusions: The study highlighted the importance of IL-6, ICAM, endotoxemia as early markers of cardiovascular risk in obese pediatric patients.

Acknowledgment: This work was supported by a project funded by the RO-MD Cross-Border Program, Priority 4.1 - "Support to the development of health services and access to health", project code: 1HARD/4.1/93.

Preventing obesity in preschool children – A vignette study of public health nurses' experiences from child health clinics in Norway

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Background/Aims: Childhood obesity is a serious concern for public health, and it is essential to identify the risk for obesity early in childhood. This study aims to gain insight into the experiences of public health nurses (PHNs) in preventing obesity in preschool children and following national guidelines in Norway. This knowledge should help improve practices at child health clinics and better meet the needs of parents.

Methods: A digital questionnaire with vignettes and open-ended questions explored the experiences of 13 PHNs regarding obesity prevention. Data were analysed using content analysis.

Results: One main theme occurred: The strong and complex feelings of responsibility PHNs had towards supporting parents in preventing obesity in preschool children. Three sub-themes also emerged: 1) assessing children's weight categories and following national guidelines were complex and demanding, 2) PHNs held difficult and vulnerable conversations with parents concerning obesity, and 3) obesity prevention was seen as an isolating task with little (yet sought after) interdisciplinary and organisational support. The national guidelines were seen as valuable but difficult to follow. PHNs acknowledged using different sources to assess a child's weight category, including parents and other healthcare providers, some also evaluated the child's appearance. BMI curves were viewed as a helpful tool for assessing a child's weight category and a supporting one when communicating with parents. However, it could also lead to scepticism concerning the accuracy of the weight categories. PHNs found conversations about weight to be difficult if parents were unaware of their child's overweight status and acknowledged the need to achieve mutual understanding.

Conclusion: This study contributes new insight into how municipalities' healthcare services for obesity prevention might be improved. Most of the barriers were at the organisational level, with a systematic failure to prioritise obesity prevention in the community and the special health care service. The PHNs called for increased employer support and competency building for assessing children's weight, motivational interviewing skills, better organised inter-disciplinary collaboration, and increased resources to carry out their work with parents. Organisational and personnel-related resources must be prioritised so research on prevention can be implemented in practice and national guidelines followed.

French Bariatric Adolescent (FBA) cohort : population's baseline characteristics and post-surgical follow-up results at 5 years

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Background: Bariatric surgery in teenagers has been practiced in France since late 2000s in centers trained for management of severe obesity patients and under strict conditions for preparation and follow-up. We started a collaborative work on data from five French pediatric university centers which practice bariatric surgery in adolescents. The final aim of this work is to test the accuracy of the artificial intelligence-based postoperative BMI prediction calculator already established for adult patients: international cohort SOPHIA study (submitted and accepted in The Lancet Digital Health). This work is in progress for adolescents. First results from data collection already allow us to describe the FBA cohort and to discuss the 5-year follow-up results.

Methods: We performed retrospective data collection of the following pre-operative characteristics: age, sex, BMI, surgery technique, type 2 diabetes, smokers. We collected total weight loss (%) and BMI at 1,3,12,24 and 60 months after surgery, as well as the number of second bariatric surgery interventions; pregnancies and lost for follow-up patients for the same period. The anonymous collection of patients' data was authorized by the Lille University medical data protection delegation.

Results: We enrolled 329 patients from 5 centers. Patients underwent bariatric surgery between 2008 and 2022. Their mean age at surgery was 17.4 years (range 14.9 to 19.9) and the sex ratio was 1 male for 3 female patients. Half patients received adjustable gastric banding (AGB); 29% underwent vertical sleeve gastrectomy (VSG) and 21% Roux-en-Y gastric bypass (RYGB). Data at 5 years was available for 63% of the patients; 13% had less than 5 years follw-up and 26% were lost of view. One percent has T2D, and 5% glucose intolerance at surgery. Twelve percent were smokers. Mean BMI at surgery was 45.9. Mean total weight loss at 12, 24 and 60 months was respectively : 12 – 15 – 14 % for AGB; 30 – 30 – 20% for VSG and 33 – 32 – 30% for RYGB. Second surgery occurred in 11% of patients, with a medium delay of 24 months after the first (range 3 to 60 months). Thirteen percent of female patients got pregnant within the 5-year period.

Conclusion: Preliminary results from our adolescent cohort show similar mean weight losses as adults from SOPHIA study but with greater dispersion of values particularly at 60 months. Mean weight loss is quite similar at 2 and 5 years after surgery, except for VSG. Second intervention and lost for follow-up rates are relatively low.

Obesity surveillance among first graders in Bulgaria (2008 to 2019) – main results, trends and conclusions

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Background/Aims: The surveillance of childhood obesity is one of the recommended approaches in public health to tackle the current childhood obesity epidemic. The aim of the present study is to highlight the main results, trends and conclusions from the obesity surveillance among first graders in Bulgaria in the period 2008–2019.

Methods: Four cross-sectional studies on nationally representative samples of approximately 3,500 7-year-old students in first grade were carried out in 2008, 2013, 2016 and 2019. The studies were conducted within the framework of the WHO European Childhood Obesity Surveillance Initiative (COSI) in strict compliance with the protocol developed by the WHO (World Health Organization). The nutritional status of the students was assessed through the z-scores of the Body Mass Index-for-age (BMI-for-age) and the WHO Reference for school-aged children and adolescents, 2007.

Results: Among the studied population of 7-year-old first-graders, every third child was overweight, and every seventh was obese. The analysis of the results revealed a trend for increase in the prevalence of overweight and obesity within the period 2008-2019. The observed trend was more pronounced among boys, children living in rural areas and families with a lower socio-economic status. The profile of the foods available at the school premises improved, along with better inclusion of the nutrition education into the curriculum. Changes in the sport facilities and initiatives to stimulate the physical activity of students were more limited. Significant unfavorable characteristics were observed in the dietary pattern and physical activity among a large proportion of the first-graders.

Conclusion: The surveillance of obesity and related environmental factors among 7-year-old first graders in Bulgaria within the period 2008-2019 is a valuable approach for outlining the problem and monitoring of the trends. In the field of prevention, the obtained results are an important prerequisite for the development of effective policies to reverse the childhood obesity epidemic.

Liraglutide 3 mg in the management of childhood obesity: a case study

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Background: According to the latest World Obesity Atlas 20 % of all boys and 18 % of all girls in Bulgaria will leave with obesity by 2035 year. This data shows a significant increase in obesity in children and adolescents compared with the data from 2020 where 10 % of boys and 8 % girls were with obesity. There is a huge need for a multidisciplinary approach based on a proper diet, increased physical activity and efficient and safe pharmacotherapy of childhood obesity.

Case Report: A 12-year-old girl presented with obesity (weight 98 kg, height 1.60m, BMI 38kg/m^2), extreme appetite, hunger and periods of trembling and sweating before meal. The patient has a family history for obesity, diabetes, and hypothyroidism. The blood test analyses showed prediabetes (fasting glucose 6.45 mmol/l, fasting insulin 36.4 mkIU/ml) and HOMA-IR 10.6. Additionally, hypertriglyceridemia (triglycerides 2.53 mmol/l) and hypercholesterolemia (total cholesterol 5.67mmol/l, LDL-cholesterol 3.45mmol/l) was estimated. The TSH level was above the normal (TSH 4.16 mIU/l) without positive immunology markers for Hashimoto disease. A therapy with Liraglutide 3.0 mg/daily s.c. combined with lifestyle change were started for a period of six months. The control biochemical analyzes at the third month showed normalization of the fasting insulin (6.8 mkIU/ml and glucose level (5.17mmol/l), lipid metabolism (triglycerides 1.3mmol/l, total cholesterol 4.94 mmol/l, LDL-cholesterol 2.65mmol/l) and a loss of 12 kg body weight. The TSH level was 3.12mlU/l. No adverse reactions from the therapy were encountered/ administrated during the treatment.

Conclusions: Liraglutide 3 mg exerts multiple beneficial metabolic effects in a child with extreme obesity along with balanced diet and increased physical activity. More data are needed for evaluation of the long-term effects of the drug therapy.

The utility of bioimpedance analysis as a clinical tool for understanding body composition in children and adolescents with severe obesity. Preliminary results of the Polish-German study project on severe early-onset obesity

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Aim: Childhood obesity has emerged as a global concern. This study aimed to investigate associations between data obtained from bioimpedance analysis with anthropometric measurements, as well as biochemical results in children and adolescents with severe obesity.

Methods: The study included 128 children aged 9-18 years with severe obesity, defined as BMI>35 kg/m2 in children aged 6-14 years, BMI>40 kg/m2 in adolescents>14 years recruited in four centers including 70 girls (54.7%) and 58 boys (45.3%). Derived parameters were: BMI 41.7 (range 35-63.8, SD=4.7), BMI Z-score 3.7 (range 2.6-6.3), WHR 0.9 (range 0.7-1.2, SD=0.1), WHtR 0.7 (range 0.6-1, SD=0.07). Bioimpedance analysis was performed using TANITA MC-580 M S MDD, MC-780MA-N and MC-780 P MA to measure fat mass (FM, kg) and fat-free mass (FFM, kg). ALT, AST, glucose, insulin, and triglyceride levels were assessed in fasting. HOMA IR was calculated. Spearman's rank correlation was used for statistical analysis, with the threshold of statistical significance p=0.05.

Results: FM was positively correlated with BMI (p=0.8), WHtR (p=0.3), SBP (p=0.3) and HOMA IR (p=0.1). FFM was associated with SBP (p=0.4), BMI (p=0.3), ALT, AST (p=0.3 for both), WHR (p=0.3) and triglycerides (p=0.1). BMI was positively correlated with systolic blood pressure (SBP) (p=0.3) and HOMA IR (p=0.2). WHtR was strongly correlated with BMI (p=0.6) and SBP (p=0.2). There was no statistically significant correlation between WHR and BMI. WHR was positively associated with the liver enzymes (p=0.4) and triglycerides (p=0.2). ALT and AST were positively associated with triglycerides (p=0.3 and p=0.2 respectively).

Conclusion: Bioimpedance analysis is a valuable tool for identifying cardiometabolic risk factors in children and adolescents with severe obesity. Associations between FM, FFM, and cardiometabolic risk factors were stronger than those observed when considering BMI alone. Increased BMI and FM were associated with a higher risk of arterial hypertension (AH) and carbohydrate metabolism disorders. Increased FFM was linked to a greater risk of AH, metabolic-associated fatty liver disease (MAFLD) and hypertriglyceridemia. WHtR appeared to be a better indicator of severe obesity compared to WHR. WHR was found to be a better predictor of MAFLD and hypertriglyceridemia, while WHtR was a better predictor of AH.

Asthma and Obesity in Children. Obese-asthma phenotype and treatment options

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Background/Aims: Currently about 4.8 million children under the age of 18 have asthma. Obesity may predispose to asthma, asthma may increase the risk of obesity, and both conditions may occur together. Obesity in childhood is a vast public health problem, and a risk factor and a disease modifier for asthma in childhood. Obese children have increased risk of asthma, and obese asthmatic children have worse asthma control with more respiratory symptoms, frequent and severe asthma exacerbations, and comorbidities like gastroesophagel reflux, obstructive sleep apnea and depression. Obesity may contribute to the pathogenesis of asthma due to several factors like anatomic changes in airway and breathing, increases inflammation, metabolic factors like increasing insulin secretion and resistance, changes in appetite and in gut microbiome. Studies suggest that there are at least two phenotypes of obesity related asthma – early allergic asthma and late onset asthma. Physical inactivity and systemic steroid therapy increase the risk of developing obesity in asthmatic children. Additionally, the obese asthmatics have insufficient response to several asthma medications. The aim of this review is to provide characteristics of 'obese asthma' phenotypes and evaluate currently available therapeutic options to manage asthma in obese children.

Methods: We reviewed the Global Strategy for Asthma Management and Prevention (GINA) guidelines updated 2023, SmPC of asthma medications registered for children and adolescent and PubMed database to search for studies published from January 2012 to January 2023 using the key words: "asthma" and "overweight" or "obesity" and "children" or "adolescent" or "pediatric" and "obese-asthma phenotype"

Results: Several authors described "obese-asthma phenotype" characterized by additional symptoms, worse control, more frequent and severe exacerbations, reduced response to inhaled corticosteroids, and lower quality of life. Obese asthmatic children more often have insufficient treatment effect to bronchodilators and corticosteroids but may have a better response to leukotriene receptor antagonists. Nevertheless GINA does not advise different treatment approach. Weight loss and lifestyle changes are strongly recommended.

Conclusion: Obese children with asthma generally should receive the same guidelines-based management as lean children. However, encourage physical activity, weight loss and change in family lifestyle should be considered by physicians managing obese asthmatic children.

The NOURISHING and MOVING policy indexes: assessing obesity prevention for child and adolescent obesity

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Background: Nutrition and physical activity policies are key to creating environments that are conducive to preventing child and adolescent obesity. The NOURISHING and MOVING policy indexes provide an at-a-glance assessment on the nutrition and physical activity policy status in 30 European countries.

Methods: National level nutrition and physical activity policy actions were identified through a comprehensive scan with a set methodology. The policy actions were benchmarked and compared using evidence-informed, aspirational attributes that assess the quality of policy design.

Results: The NOURISHING policy index found that all included countries offered healthy food and set standards in schools and other specific settings, which was the strongest policy area of those targeting children and adolescents. Although targeted and income related subsidies for school meal programmes were implemented by 10 countries, these were often not well-not complemented by other actions using economic tools to tackle accessibility and affordability of healthy foods, or supply chain actions such as healthy food procurement for school meals. Key weaknesses were identified in policies restricting food advertising and other forms of commercial promotion across Europe, with 29 countries receiving either a poor or fair assessment. The MOVING policy index found that action was strongest across physical activity initiatives in schools and across the community, and on public communication that promotes physical activity. All 30 European countries acted in these areas. Least action was identified in implementing transport infrastructure and opportunities such as active travel to school and access to green spaces. Across both policy indexes, policy areas that include structural policy actions were weaker compared with policies that focus on education and individual behavioural change.

Conclusion: The NOURISHING and MOVING policy indexes show that greater action is needed to implement adequate policies across Europe that focus on child and adolescent obesity prevention. The key gaps across the 30 European countries include increased attention to structural policies, such as procurement policies for healthy foods in schools. Greater focus on these areas should be given by policymakers, researchers, and civil society, to inform advocacy for and design of nutrition and physical activity policies for obesity prevention.

Conflicts of Interest: This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774210. This document reflects only the authors' views, and the European Commission is not responsible for any use that may be made of the information it contains.

Funding: The "Confronting Obesity: Co-creating policy with youth (CO-CREATE)" project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774210 (https://www.fhi.no/en/studies/co-create/). All authors and their institutions report grants under this agreement and have declared their conflict of interest.

The energy content of meals matched for relative protein might affect appetite sensations but not food reward in adolescents with obesity: A secondary analysis

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Background/Aims: The energetic and protein composition of a meal has been shown to influence postprandial responses in homeostatic and hedonic appetite. However, it is not clear how increases in energy with protein held constant affects these processes in adolescents with obesity. This study assessed how the energy content of a meal independent of relative protein simultaneously influences subsequent appetite sensations and food reward in adolescents with obesity.

Methods: Using a randomised, counterbalanced crossover design, $N = 14$ adolescents with obesity ($M_{age} = 12.71$, $SD_{age} = 0.99$; 71% female) consumed lunch meals that progressively increased in energy by 250kcal increments, but not relative protein, on 3 different test days. Explicit liking and implicit wanting for images varying in fat and taste were assessed at baseline and immediately after meal consumption. Appetite sensations were assessed in half-hour intervals from baseline to 1-hour post-meal.

Results: Despite the attenuated experience of hunger ($p < .001$), desire to eat ($p = .001$), and level of prospective food consumption ($p < .001$) after consumption of additional energy derived from a similar proportion of protein, there was no apparent concomitant change of significance in explicit or implicit reward for high-fat and sweet foods relative to low-fat and savoury foods, respectively.

Conclusion: The consumption of additional calories with little change in relative protein during a meal appears to affect appetite sensations more reliably than reward responses to food in adolescents with obesity. Macronutrient distribution may be a more critical factor in regulating short-term postprandial food reward responses than energy content.

The association between obesity degree and food reward in adolescents: An individual participant data meta-analysis

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Background/Aims: Children and adolescents tend to be more responsive to external cues representing palatable foods than adults as demonstrated by effects on subsequent energy intake and weight gain. Although there is evidence to suggest that adolescents with obesity are more food cue responsive than their lean counterparts, it is relatively unclear how food reward varies along a spectrum of obesity severity. This study investigated the association between food reward and degree of obesity in adolescents when in fasted and fed states.

Method: Data from seven distinct studies were pooled together to form a grand sample of $N = 137$ adolescents with obesity ($M_{age} = 12.84$, $SD_{age} = 1.25$, 76% female) and analysed using a one stage approach to an independent participant data meta-analysis. Associations between baseline anthropometrics and food reward (i.e., liking and wanting) were explored in both fasted and fed

states. Additionally, reward for high fat and sweet foods were compared amongst subsamples varying in severity of obesity.

Results: There were no significant associations between reward for high fat and BMIz scores, weight, and fat mass when fasted. However, implicit wanting for sweet was negatively associated with fat free mass (p = .012). For postprandial reward, implicit wanting for high fat was negatively correlated with fat mass (p = .012). In both fasted and fed states, explicit and implicit food reward did not significantly vary between levels of obesity when partitioned according to statistical or clinical considerations (all ps > .05).

Conclusion: The severity of obesity does not appear to be associated with hedonic responses to sweet or high fat (i.e., energy dense) foods in adolescents when fasted or fed. Preliminary evidence suggests that the distribution of fat mass could be more closely associated with food reward, but more data is needed to investigate this link.

Obesity and Hypertension pose a significant burden for the health of children and adolescents in Greece

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Background/Aims: Obesity and hypertension during childhood and adolescence are significant public health concerns. We estimated the prevalence of obesity and hypertension in a large sample of children and adolescents in Greece and investigated their association with various important factors.

Methods: The study was nested within the National Survey of Morbidity and Risk Factors (EMENO) health-examination survey, conducted during 2013-2016, in a representative sample of adults living in Greece. EMENO participants with children aged 2-18 years, who agreed to participate, were visited at their home by trained physicians. Children's blood pressure (BP), body height and weight were measured using standardized methodology. Hypertension was defined according to 2016 European Society of Hypertension guidelines and obesity according to WHO guidelines, respectively.

Results: Among 409 children and adolescents, 103(25.2%) were obese, from them 22 (5.4%) severely obese, 62 (15.2%) were overweight and 11 (2.7%) were underweight; 78 (19.1%) children had abdominal obesity. In total, 73 (17.9%) children had abnormal BP; 53 (13.0%) had high normal BP, 33(8.1%) had stage 1 and 14 (3.4%) stage 2 hypertension and 26 (6.4%) had isolated systolic hypertension. Results from multivariable logistic regression showed that obesity was positively associated with Greek origin, with having an obese mother or a diabetic household member. Abdominal obesity was positively associated with having an obese mother or a diabetic household member, with child's medical history of chronic pharmacological treatment and negatively associated with the number of siblings. A U-shaped relationship between hypertension and age was detected, with higher odds during infancy and adolescence. Results from multivariable ordinal logistic regression revealed a strong positive relationship between hypertension status and BMI status.

Conclusion: A strong association between obesity and hypertension was evident in this sample of children and adolescents. The prevalence of obesity and hypertension among children was also associated with the presence of obesity and diabetes mellitus (both indices of metabolic syndrome) among children's household members. This may probably reflect the impact of various adverse lifestyle behaviors not only on the child's health, highlighting the importance of implementing intervention programs for the whole family to prevent and treat obesity and hypertension.

Differences in assessment of underweight and overweight among children based on measurements and parental perceptions

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Background/Aims: It is necessary to improve the knowledge of mothers for healthy nutrition and for the assessment of young children's physical development.

The aim of this study is to determine the prevalence of underweight and overweight among children aged 1-9 years in Bulgaria.

Methods: In 2020 a cross-sectional survey on a nationally representative sample of 470 children from 1 to 9 years of age was conducted. The height (cm) and weight (kg) were measured. Children's nutritional status was assessed by the WHO Child Growth Standards, 2006 and WHO Reference 2007. Data about children's health status, knowledge and skills of their mothers for nutrition and childrearing were obtained by active interview of the mothers.

Results: According to WHO standards, the prevalence of children aged 1-5 years with underweight was 3.5%, overweight - 12.0 %, and of children aged 5-9 years with underweight - 2.4 %, overweight - 30.6 %.

According to the assessment of the children's mothers, the prevalence of children aged 1-6 years with underweight was 3.0%, overweight - 2.3%, and of children aged 7-9 years with underweight – 7.5 %, overweight - 8.1%.

The prevalence of underweight among children aged 1-6 years assessed by the mothers was comparable to the one of the WHO Growth standards. The relative proportion of underweight among children aged 7-9 years evaluated by the mothers was higher than the one assessed by WHO Reference 2007. The prevalence of overweight among all the children was underestimated by the mothers.

Conclusion: The overestimation of children's underweight and underestimation of overweight among all studied children from their mothers link to inadequate dietary intake and increase substantially the risk of obesity in children.

Weight reduction after 6 months of setmelanotide treatment in patients with hypothalamic obesity

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Background: Hypothalamic obesity (HO) is an acquired form of severe obesity resulting from hypothalamic insult—primarily caused by tumor invasion, resection, or radiotherapy—that can impair melanocortin-4 receptor (MC4R) pathway signaling. Treatment with the MC4R agonist setmelanotide resulted in weight and hunger reduction in a 16-week Phase 2 trial of patients with HO. Here, we report weight changes after 6 months of setmelanotide treatment in patients with HO who entered a long-term extension (LTE) trial.

Methods: A Phase 2, multicenter, open-label study (NCT04725240) examined the efficacy and safety of setmelanotide in patients aged ≥6 to ≤40 years with a clinical diagnosis of HO. Patients who met the primary endpoint of ≥5% body mass index (BMI) reduction from baseline at Week 16 or demonstrated clinically meaningful benefit and adequate safety were eligible to enroll in the LTE trial (NCT03651765). We assessed the proportion of patients who achieved ≥10% BMI reduction, mean percent change in body weight in adults (aged ≥18 years), and mean change in BMI Z score and percent of the 95th BMI percentile (%BMI95) in children (aged <18 years) from index trial baseline to Month 6 of setmelanotide treatment.

Results: Of 18 patients enrolled in the index trial, 14 (77.8%) continued into the LTE and 13 (72.2%) had received ≥6 months of setmelanotide treatment at the time of this analysis. HO was diagnosed secondary to treatment of craniopharyngioma (n=11), hamartoma (n=1), and juvenile pilocytic astrocytoma (n=1). At Month 6, 11 of 13 patients (84.6%) achieved ≥10% BMI reduction from index trial baseline; the remaining 2 patients achieved ≥5% reduction. In adults (n=2), the mean (standard deviation [SD]) percent change in body weight from baseline to Month 6 was −16.2% (7.2%). In children (n=11), the mean (SD) change from baseline in BMI Z score was −1.7 (1.1) and in %BMI95 was −34.8 (14.9) percentage points at Month 6. The most frequent adverse events were nausea (n=9 [69.2%]), skin hyperpigmentation (n=5 [38.5%]), and vomiting (n=4 [30.8%]).

Conclusions: In patients with HO, 6 months of setmelanotide treatment was associated with sustained meaningful weight and BMI improvements with no new safety signals.

Treatment history and comorbidities reported by patients with hypothalamic obesity treated with setmelanotide in a Phase 2 trial

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Background: Hypothalamic obesity (HO) is an acquired form of severe obesity that can occur following surgical resection or radiotherapy of brain tumors. Multiple factors associated with the development of HO—including degree of hypothalamic damage from tumor treatment, comorbidities (eg, pituitary deficiencies), polypharmacy used to treat comorbidities, and unique pathophysiology—confer treatment challenges; HO is often unresponsive to lifestyle modifications and traditional obesity pharmacotherapies. In a Phase 2, 16-week trial of setmelanotide in patients with HO, 16 of 18 patients (88.9% [90% confidence interval, 69.0%-98.0%]; $P<0.0001$) achieved ≥5% body mass index (BMI) reduction from baseline, with a mean percent BMI change of −15.4% in patients adhering to treatment (n=17). We assessed patient histories reported in the trial to further characterize this patient population.

Methods: Patients aged ≥6 to ≤40 years with documented evidence of HO were enrolled in an open-label Phase 2 trial (NCT04725240) and received setmelanotide once daily for 16 weeks. The primary endpoint was the proportion of patients with ≥5% BMI reduction from baseline at Week 16. Patient histories (ie, tumor treatments, prior attempts to lose weight, and comorbidities) are summarized narratively.

Results: Eighteen patients with HO (age range, 6-24 years) were treated with setmelanotide. HO was diagnosed in patients following treatment of craniopharyngioma (n=14), hamartoma (n=3), or juvenile pilocytic astrocytoma (n=1). Six patients (33.3%) had tumor recurrence and/or multiple tumor treatments. Thirteen patients (72.2%) reported prior lifestyle modifications (ie, calorie restriction [n=4], low-carbohydrate diet [n=6], dietary tracking/modification [n=4], food access restriction [n=1], personal training [n=1]) and/or pharmacotherapy use (ie, exenatide [n=3], semaglutide [n=1], liraglutide [n=2], metformin [n=2], methylphenidate [n=2], dextroamphetamine [n=1], lisdexamfetamine [n=2], naltrexone [n=3], oxytocin [n=3], phentermine [n=1]) without substantial benefit. Comorbidities occurring in ≥25% of patients were diabetes insipidus (n=14), hypothyroidism (n=14), growth hormone deficiency (n=11), adrenal insufficiency (n=10),

hypogonadism (n=8), pan/hypopituitarism (n=8), psychiatric disorders (n=8), vision problems (n=6), gastrointestinal symptoms (n=6), obstructive sleep apnea (n=5), and hypothalamic-pituitary disorder (n=3). All patients adhering to treatment (n=17) experienced BMI reductions with setmelanotide.

Conclusion: Despite complex medical histories, hypothalamic damage, and various prior failed interventions, setmelanotide reduced BMI in patients with HO in a Phase 2 trial.

Higher energy flux might contribute to better short term subsequent appetite control in adolescents with obesity: the NEXT study

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Context: The use of nutritional strategies and physical activity in the management of pediatric obesity helps to reduces energy balance whose dysregulation largely contribute to the epidemic. Although the available literature mainly explored the effect of acute exercise alone of in comparison to similar energy deficits induced by dietary restriction, recent evidence suggests better appetite control in states of high energy flux in both adults and lean children. Nevertheless, it is unknown whether this extends to youth with obesity. The objective of this study is to compare the effects of low, moderate, or high energy flux on short-term appetitive control in adolescents with obesity.

Methods: In a within-participants design, sixteen adolescents with obesity (12-16 years, Tanner stage 3-5, 11 females) randomly completed three conditions: i) low energy flux (LEF); ii) moderate energy flux (MEF + 250 kcal); and iii) High Energy Flux (HEF + 500 kcal). Energy flux was achieved in MEF and HEF through elevated energy intake (EI) and concomitant increase in energy expenditure (using cycling exercises at 65% VO_{2peak}). *Ad libitum* EI, macronutrient intake and relative EI were assessed at dinner, subjective appetite sensations taken at regular intervals, and food reward measured before dinner.

Results: *Ad libitum* EI at dinner was greater in LEF compared to HEF (p=0.008) and REI was higher in LEF compared to MEF (p=0.003) and HEF (p<0.001). Total area under the curve (AUC) for hunger and desire to eat was lower in HEF compared with LEF (p<0.001) and MEF (p=0.038 and p<0.001 respectively). Total AUC for prospective food consumption (PFC) was lower on HEF compared with LEF (p=0.004). Food choice sweet bias was higher in HEF (p=0.005) compared with LEF.

Discussion: Increasing energy flux may improve short-term appetite control in adolescents with obesity.

Improved walking energy efficiency might persist in presence of simulated full weight regain after multidisciplinary weight loss in adolescents with obesity: The POWELL study

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Context: Weight loss leads to a reduction of the energy cost, but the respective implications of the metabolic changes or mechanical download remain unknown. The present study compares the post-weight loss energy cost of walking (Cw) with and without a total reload of the induced weight reduction in adolescents with obesity.

Methods: The energy Cw and substrate use during a graded walking exercise were measured (using indirect calorimetry, 4x6-min at 0.75, 1, 1.25, and 1.5 $m.s^{-1}$) before and after a 12-week multidisciplinary intervention in 21 adolescents with obesity (11 girls; 13.8 ± 1.4 years). After weight loss, the walking exercise was randomly performed once without weight reload (V2) and once with a loading corresponding to the total induced weight loss during the program (V2L). Body composition was assessed by absorptiometry before and after the intervention.

Results: Body weight and fat mass significantly decreased after the 12-week intervention ($p<0.001$), while FFM did not change. The absolute gross Cw ($ml.m^{-1}$) was significantly higher on V1 compared with V2 at every speed. The absolute net Cw ($ml.m^{-1}$) was also significantly higher on V1 compared to V2L at 0.75 $m.s^{-1}$ ($p=0.04$) and 1 $m.s^{-1}$ ($p=0.02$) and higher on V2L compared with V2 at 1.5 $m.s^{-1}$ ($p=0.03$). Net Cw was higher on V1 compared with V2 at 0.75 $m.s^{-1}$ ($p=0.01$) and 1 $m.s^{-1}$ ($p=0.003$) and V2L significantly higher compared with V2 at 1.5 $m.s^{-1}$ ($p=0.02$). Gross and net Cw normalized to baseline body weight was higher on V1 than V2L at 0.75 $m.s^{-1}$ ($p=0.051$ and 0.003) and 1 $m.s^{-1}$ ($p=0.002$) for the net values.

Conclusion: Adolescents with obesity might not show an entire rise back of their metabolic cost of walking, corresponding to what was observed before weight loss, suggesting then some metabolic and physiological adaptations of the energy metabolism that remain to be clarified.

Family socioeconomic code of childhood overweight and obesity in North Macedonia

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Background/Aims: Globally, childhood overweight and obesity rates have steadily increased over the past few decades. Drawing from a nationally representative sample of children in North Macedonia (MKD), the aims of our study were to: (1) estimate rates of childhood overweight and obesity and (2) explore associations between family socioeconomic status (SES) indicators and overweight and obesity rates.

Methods: As part of the 5th round of the World Health Organization (WHO) European Childhood Obesity Surveillance Initiative (COSI), a cross-sectional study was conducted with MKD children (aged 6-9 years) and their parents/caregivers. Each child's anthropometric measurements (height, weight) were objectively assessed, family indicators of socioeconomic status (SES) and demographic characteristics were collected through parental/caregiver completion of a questionnaire. Mirroring methodology employed in previous WHO COSI studies, SES was assessed by self-reported level of parental education attainment (low, medium, and high), parental employment (low and high), and family-perceived wealth (low, medium, and high). Children with missing data on anthropometric measurements and/or SES variables were excluded from our analyses. Childhood overweight and obesity were defined using established WHO 2007 cut-offs. Differences across SES categories were tested using *Pearson* $\chi 2$ test. Statistical significance was set at 0.05 *a priori*.

Results: A total of 2498 children were included in the sample (boys: n=1215 and girls: n=1283). Overall prevalence of overweight was 19.3% while obesity was 20.0%. Level of urbanization of the family's place of residence ($p=.002$), language spoken at home ($p=.002$) and parental employment ($p<.001$) were significant predictors of childhood overweight or obesity. MKD children at greatest risk of overweight or obesity lived in an urban area, spoke Macedonian at home, and had parents with higher levels of employment.

Conclusions: To our knowledge, our study is the first to explore overweight and obesity rates in relation to the family environment, among a nationally representative sample of children and their families. Overall, a large proportion of young children are overweight and affected by obesity. Additionally, our findings indicate that the family environment is relevant determinant of childhood obesity and warrants further investigation to develop evidence-based public health interventions in the future.

Conflict of interest: None

Funding: The study is funded through the National annual programme for public health in North Macedonia.

Evaluation of obesity outpatient care at an established pediatric tertiary center in Varna

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Backgrounds: The obesity pandemic is growing at a pace that humanity, and medical professionals in particular, are unlikely to be able control unless extensive action is taken. In childhood, there is a progressive increase in the number of obese children, supposedly related to the consumption of high-calorie foods, reduced physical activity and spending a large part of the active part of the day on social networks.

Aims: To evaluate the effectiveness of the outpatient follow-up and treatment of children with a weight problem at the tertiary pediatric center in Varna.

Methods: For the period March 2022-March 2023, a total of 181 patients sought specialized medical help for a problem with excess weight and they were included in the study. The consultation was performed by a well trained pediatric endocrinologist and nurse. Demographic and physical data were collected and BMI was estimated based on height and weight. Family history and pubertal development were assessed. Overweight (OW) was defined as

>85th percentile, and obesity over 95th percentile (www.cdcgrowthcharts). At the first consultation, an increase in physical activity and decrease in the daily calory intake were recommended. The patients were invited for evaluation in the next 6 to 12 months. Not increasing their weight was set as a primary goal.

Results: The mean age of the participants was 11.7±3.4 years (3-18 years). The girls were 105 (58%) of which 82,8% are pubertal. The ratio between prepubertal and pubertal patients was 19.4:80.6%; 65.7% of patients had a family history of obesity in the first or second generation. The average weight was 70.89±25 kg and the average height was 150.7±17.2 cm. Based on BMI, 91.1% (165) were found to be obese and 8.9% (16) OW. Only 10 (5.5%) patients returned for a follow-up examination, 7 of whom crossed down from obesity to OW, 2 of them kept their weight off and 1 of them gained extra weight.

Conclusion: Routine outpatient care is not able to supply the necessary medical care to achieve success in decreasing excess weight in the adolescence.

High consumption of sweetened beverages is associated with elevated ALT in children with obesity

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Background/Aims: Metabolic associated fatty liver disease (MAFLD) is a known complication of obesity. MAFLD may progress to hepatic steatosis, cirrhosis, and in extreme cases hepatic cell carcinoma and complete liver failure. At least early in the disease process MAFLD can be reversed, validating early treatment. However, the therapeutic options for MAFLD are limited. The aim of this study was to, in the Uppsala Longitudinal Study of Childhood Obesity (ULSCO) cohort, retrospectively study reported lifestyle patterns and their association with liver damage, quantified as elevated alanine aminotransferase (ALT).

Methods: Patients were recruited to the ULSCO cohort from the pediatric obesity clinic at Uppsala University Hospital. All patients in the ULSCO cohort who had completed a food frequency questionnaire (FFQ), a regular meal questionnaire (RMQ) and with measured ALT (n=207) were selected for analysis. Spearman's correlation was performed to investigate associations. A multivariate regression analysis was then performed with ALT as the dependent variable and all studied lifestyle factors as independent variables, to analyze the odds ratio (OR) of the different lifestyle factors.

Results: The average age was 13 years (+/- 3.2), BMI-sds averaged at 3.1 (+/- 0.6). 42 % of the patients were female. Elevated ALT was observed in 40,6 % (n=84) patients. Consumption of sweetened beverages was positively associated with ALT (r=0.221, p=0.002). Snacking (r=-0.331, p<0.001), fruit consumption (r=-0,201, p=0.004) and hours of sleep (r=-0,304, p<0.001) were negatively associated with ALT. The multivariate regression analysis showed a reduced odds ratio of having an elevated ALT for snacking (0.596, 95% CI 0.385 – 0.922, p=0.02), hours of sleep (0.668, 95% CI 0.452 – 0.987, p=0.04) and a trend towards an increased risk with consumption of sweetened beverages (1.458, 95% CI 0.994 – 2.137, p=0.05).

Conclusion: Whereas sweetened beverage consumption is associated with a higher ALT, sleeping, fruit consumption and snacking are associated with a lower ALT. We propose that future lifestyle intervention studies in pediatric MAFLD should focus specifically on reducing sweetened beverage consumption and increasing fruit intake, healthy snacking and hours of sleep.

Conflict of Interest: the authors declare no Conflict of Interest.

Pharmacological interventions for the management of children and adolescents living with obesity – an update of a Cochrane systematic review with meta-analyses

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Background/Aims: Anti-obesity medications (AOMs) can form an integral component of obesity treatment. A 2016 Cochrane review by Axon et al. suggested that AOMs (metformin, sibutramine and orlistat) may help older children and adolescents living with obesity to achieve a small reduction in body mass index (BMI (kg/m2)) (-1.3; 95% confidence interval (CI) [-1.9; -0.8]), when delivered alongside a concomitant lifestyle intervention. New AOMs for paediatric obesity and further randomised controlled trials (RCTs) require an update of the evidence base.

Methods: We used Cochrane methodology and data from Axon et al., ran searches on 7th of September 2022 in two electronic databases (Cochrane CENTRAL, MEDLINE) and two trials registries (ClinicalTrials.gov, WHO ICTRP). We included any AOM including withdrawn/unlicensed. We evaluated BMI, serious adverse events (sAEs), quality of life (QoL; change in points of the Impact of Weight on Quality of Life Questionnaire), type 2 diabetes mellitus (T2DM), mental (e.g., bullying) and social health (e.g., isolation). Where possible, we undertook pairwise random-effects meta-analyses to pool effect sizes comparing AOMs to placebo, using mean difference, or risk ratio (RR) and respective 95%-CI and investigated potential effect modifiers: age (12 years), sex, drug type (e.g., glucagon-like peptide 1 receptor agonists (GLP-1RA)), treatment length (six months).

Results: We included 35 RCTs (4,331 participants). AOMs included sibutramine, metformin, topiramate, phentermine/topiramate, exenatide, liraglutide, semaglutide, and orlistat. AOMs demonstrated a large range of differences in reduction of BMI: orlistat -0.8 [-1.1; -0.5], topiramate -0.9 [-2.2; 0.5], metformin -1.3 [-1.7; -0.9], sibutramine -1.7 [-2.9; -0.5], phentermine/topiramate -4.6 [-6.2; -3.0] and for GLP-1RA -1.0 [-4.2; 2.2] (exenatide), -1.6 [-2.5; -0.7] (liraglutide) and -5.9 [-7.0; -4.8] (semaglutide), respectively without other effect modifiers. Overall, there was a trend for improvement in QoL (1.97 [0.2: 3.8]), with no increase in risk for sAEs (RR 1.2 [0.7; 1.9]). Data were not available for T2DM, mental or social health.

Conclusion: Phentermine/topiramate and semaglutide plus behavior change produced the greatest BMI reduction with 8 in 1000 adolescents experiencing a serious adverse event.

Conflict of Interest: GT, AG, AJ, JM, MIM, LJE, GG, and TB have nothing to disclose. ASK engages in unpaid consulting and educational activities for Boehringer Ingelheim, Eli Lilly, Novo Nordisk, and Vivus; receives donated drug/placebo from Novo Nordisk and Vivus for National Institutes of Health-funded clinical trials. DW has received lecture and consulting fees from Novo Nordisk A/S.

Funding: No external funding to report. We thank the respective universities for the in kind support.

Reference

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Impact of Triglyceride Waist Phenotype (htgw) on HOMA-IR and cIMT on children with obesity as compared to normal weight controls

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Background/Aims: The Triglycerides Waist (HTGW) phenotype is an index that predicts disorders such as cardiovascular disease and metabolic syndrome. The prevalence of the HTGW phenotype in children varies between 3.3% and 20.7% in different studies. The aim of the study was to assess the impact of HTGW phenotype on HOMA-IR and Carotid Intima-media Thickness (cIMT) among children with obesity, overweight and normal weight.

Methods: The study included 101 children (48 males) with mean age 9.14±2.18 years. Eighty-seven (86.1%) of them were prepurbetal. Children were defined as overweight if BMI was ≥85th but <95th percentile for age and sex and as obese if BMI was ≥95th percentile. HOMA-IR index was used as predictor of insulin resistance (cut-off value≥2.5). The HTGW phenotype was defined as WC≥90th CDC percentile and triglyceride levels ≥100 mg/dL for children 0-9 years of age and ≥130 mg/dL for 10-19 years old. Anova or Kruskal Wallis tests were used for the comparison of variables between groups and Spearman's and Pearson correlation analysis for the associations between variables.

Results: Forty-one children (40.6%) were of normal weight,18 (17.8%) had overweight and 48 (41.6%) had obesity. Age and sex did not differ among groups. Children with obesity had higher levels of LDL, triglycerides, mean cIMT and HOMA-IR and lower levels of HDL as compared to children with normal weight. In overall population, mean cIMT was correlated with triglycerides (r_s=0.250, p=0.012), BMI z-score (r_s=0.250, p=0.012), HOMA-IR (r_s=0.260, p=0.011) and inversely correlated with HDL (R=-0.245, p=0.014). Six (14.3%) children with obesity had HTGW phenotype and none of those with normal weight or overweight. Children with HTGW phenotype had higher levels of total cholesterol (p=0.056) and LDL (p=0.04) and lower levels of HDL (p=0.015). Mean cIMT did not differ between children with HTGW phenotype and those without (p=0.406). Four (66.7%) children with HTGW phenotype had HOMA-IR≥2.5 compared to 33 (36.7%) of those without HTGW phenotype but this difference was not statistically significant (p=0.144).

Conclusion: In our study, HTGW phenotype was present in 14,3% of children with obesity. HTGW did not have an impact on HOMA-IR or cIMT in the group of children with obesity.

Hepatic dysfunction in Greek children and adolescents with severe obesity, insulin resistance and thyroid dysfunction

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Background: Pediatric obesity is a public health issue. Elevated alanine transferase (ALT) may co-exist with suboptimal thyroid function in this population.

Objectives: The aim of this cross-sectional study was to investigate and compare the association of thyroid function tests, ALT and metabolic profile in children and adolescents with obesity and severe obesity.

Methods: 279 children with body mass index (BMI) ≥95th percentile, were divided in two groups (obese: 95th≤BMI<99th percentile and severely obese: BMI≥99th percentile). Insulin resistance was defined as homeostatic model assessment of insulin resistance (HOMA-IR) ≥ 3. Screening markers of suboptimal thyroid and liver function were expressed as 0.7 ng/dl<FT4<1ng/dl, ALT>22mg/dl (females) and >26mg/dl (males) respectively.

Results: Elevated ALT was appreciated in children with FT4:<1 in comparison to peers with FT4:≥1 (53.3% vs 25%, p:0.024). Children with severe obesity were younger (p: 0.003) and had higher ALT levels (p: 0.001). In multivariate logistic regression, severe obesity status, FT4:<1 and HOMA-IR: ≥3 were predictive of higher ALT (ORs: 2.23, 3.37, 3.21 with p:0.029, 0.04, 0.007, respectively).

Conclusions: We suggest that children with severe obesity and increased insulin resistance are routinely screened for FT4 and ALT, as surrogate markers of obesity related thyroid and liver dysfunction.