is still preserved. Given that the onset of the disease in our group falls on adolescence it seems that pubertal insulin resistance also contributes to the features of the course of the disease. Understanding the role of obesity in the progression of disorders of carbohydrate metabolism will allow postponing the acute manifestation of the disease and initiation of insulin therapy through lifestyle modifications in patients at risk. A long period of preserved insulin secretion opens up the possibility of new personalized therapies.

Pediatric Endocrinology

DIABETES, INSULIN, AND LIPIDS IN PEDIATRIC ENDOCRINOLOGY

Hyperglycemic Emergencies in Minority Children and Adolescents With Diabetes Mellitus

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Introduction: Hyperglycemic emergencies in children with diabetes traditionally include diabetic ketoacidosis (DKA) predominantly associated with T1DM, whereas hyperosmolar hyperglycemic state (HHS) that is associated with relative insulin deficiency in T2DM, rarely occurs (2%). There have been increasing reports of mixed DKA-HHS affecting up to 27%. The purpose of this study is to identify clinical features, risk factors, complications and outcomes among minority children presenting with hyperglycemic emergencies at our center. **Methods:** This is a retrospective chart review of children and adolescents (ages 1-21 years) admitted for hyperglycemic emergencies including DKA [defined as glucose >200 mg/dL, metabolic acidosis (pH <7.3 or serum bicarbonate <15 mmol/L) and ketonemia (ß-hydroxybuyrate ≥3 mmol/L) or moderate to large ketonuria], or HHS [defined as glucose >600 mg/dL, effective serum osmolality >320 mOsm/kg, venous pH >7.25 or arterial pH >7.30 or serum bicarbonate >15 mmol/L, absent to mild ketonemia] or mixed DKA-HHS between 2004 and 2019. Descriptive statistics, chi-squared analysis and t-tests were used. **Results:** Of 322 patients, 92% were African American with mean age 13.6 ± 3.5 years, 39% males, consisting of 266 (83%) with DKA, 52 (16%) mixed DKA-HHS, and 4 (1%) HHS. Ninety-eight of the DKA and DKA-HHS groups had T1DM. All 4 patients with HHS had T2DM. Compared to the DKA group, the mixed DKA-HHS group required higher IV fluids rates ($p<0.0001$), 4.3-fold greater odds of acute kidney injury (AKI, mean serum creatinine of 1.6 mg/dl vs 1.1 mg/dl; ref 0.5-1.0 mg/dL) and 3.3-fold greater odds of developing altered mental status (AMS). Risk factors such as insulin adherence, and precipitating factors like infection or stress were not different between both groups ($p=0.06$). There was no significant difference in insulin rates or time to resolution ($p=0.4$) in both groups. Among the HHS group, 50% presented with AMS and AKI (mean Cr 1.1 mg/dl ± 0.31) due to severe dehydration and required higher IV fluids rates (≥2 x maintenance). Creatinine kinase in 2 patients were slightly elevated (mean 1643 units/L, ± 77; ref 39-309). Insulin drip at 0.05 u/kg/hour was started in all 4 patients. None had venous thrombosis, rhabdomyolysis, cerebral edema, or death. Average time of resolution was 10 ±1.63 hours. **Conclusion:** In this study, 16% of patients with hyperglycemic emergencies presented with mixed DKA-HHS which was associated with more complications compared to the DKA group. Serum osmolality should be calculated and checked at diagnosis. Identification of hyperosmolality whether with or without DKA in the emergency setting is important because treatment should be focused on the degree of dehydration (usually moderate to severe) and other complications such as AKI and mental status changes.

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Impact of Covid-19 on the Rate of Diabetic Ketoacidosis in Pediatric New-Onset Type 1 Diabetes

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Introduction: Several demographic and clinical characteristics, including age, low socioeconomic status, and misdiagnosis at initial clinical presentation were previously associated with increased risk of diabetic ketoacidosis (DKA) at diagnosis of type 1 diabetes (T1D) in the pediatric population. However, it is unclear whether the coronavirus (COVID-19) pandemic and subsequent lockdown influenced the rate of DKA in children newly diagnosed with T1D. We undertook this study to identify the impact of the COVID-19 pandemic on the rate of DKA in children newly diagnosed with T1D in a single tertiary care referral center in central Pennsylvania. **Methods:** We performed an extension of a retrospective analysis of all pediatric patients (age ≤18) newly diagnosed with T1D within a tertiary care referral center between 01/01/2017-09/14/2020. Demographics, insurance coverage, and all clinical documents 30 days before their T1D diagnosis were abstracted to assess for symptoms at diagnosis (polyuria, polydipsia, nocturia, weight loss, nausea, vomiting, altered mental status, infection, vision changes, and autism spectrum disorder), lab values (blood glucose, HbA_{1c}, venous pH, and bicarbonate), and any healthcare encounters within 30 days of their diagnosis of T1D. We performed descriptive statistics and univariate analyses [evaluating children diagnosed with T1D during the pre-COVID-19 era (diagnosed between 1/1/2017-2/28/2020) and post-COVID-19 era (diagnosed between 03/01/2020-09/14/2020) associated with the incidence of DKA], followed by logistic regression analysis (incorporating key clinical factors previously associated with DKA and the pre- or post- COVID-19 era classification). **Results:** 412 pediatric patients with T1D [171 F:241 M; 370 pre-COVID-19 era:42 post-COVID-19 era] were included. The percentages of DKA diagnoses at admission were very similar between the pre-COVID-19 and post-COVID-19 groups (47% vs. 48%), as were the severity (13% vs. 14% mild DKA; 33% vs. 31% moderate or severe DKA). There were no temporal associations with the rate of DKA in respect to COVID-19, however, age (0-3 and 9-13 years), misdiagnosis during a preceding healthcare encounter, presenting to the emergency department

directly, elevated HbA_{1c} (>10.0%/13.4mmol/L), and altered mental status were associated with increased risk of DKA on multivariable analysis. **Conclusion:** There were no fluctuations in the rate of DKA among pediatric patients newly diagnosed with T1D throughout the COVID-19 pandemic in central Pennsylvania. Interestingly, some geographic locations observed an increased frequency of DKA in children newly diagnosed with T1D, while others noted a decreased rate. Regardless, our findings suggest previously described predictors of DKA in the pediatric population persist, even in the setting of the COVID-19 pandemic.

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DIABETES, INSULIN, AND LIPIDS IN PEDIATRIC ENDOCRINOLOGY

Insulin Basal Dose Is Associated With Better Metabolic Control in Type 1 Diabetes Children and Adolescents

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Basal insulin dose in type 1 diabetes has been established empirically, since 2011 all guidelines suggest insulin basal dose less than 50% of total insulin dose in the pediatric population. However, in real life, basal dose indication has not changed in all patients in the basal-bolus treatment scheme. **Objective:** To measure how the physician indicates in real-life basal insulin dose in pediatric patients with type 1 diabetes in the basal-bolus scheme, and correlate this dose with metabolic control measured by glycated hemoglobin. Methods. This was a retrospective study, subjects include pediatric T1D (2 to 16 years, non-obese, using insulin more than 0.3 UI/Kg/d), more than 1 year of diagnostic, none of them in ketoacidosis, attended during 2019. The protocol was revised and accepted in the institution. Data were analyzed with Kruskal-Wallis, U Mann Withney, Pearson correlation test. **Results:** There were 141 subjects, male (51%), median age 13.3 years (3.6-15.9), median evolution time since diagnosis 8 years (1-14), pre-pubertal (Tanner stage 1, 22%), total daily dose 1.02 UI/Kg/d (0.3-2.19 UI/Kg/d). Basal insulin was glargine 50.4%, and NPH 49.6%, prandial insulin was lispro 66.7%, and regular human 29.8%. Children using 50% or less basal insulin of total insulin dose was 40.4%. The basal dose was 38% of total insulin dose in children less than 6 years, and 59% in children older than 6 years. (p=0.033). Glycated hemoglobin was less than 7.5% in 12.8%. The persons with glycated hemoglobin less than 7.5% used less basal insulin 0.38 u/kg/d, than those with higher glycated hemoglobin 0.57 U/kg/d (p=0.02) with no impact in total insulin dose (0.86 vs 1.05 UI/Kg/d, p=0.129). The correlation of the percentage of insulin basal dose and glycated hemoglobin was 0.279, p=0.001, meaning, more basal insulin, worse diabetes control. Conclusion: Lower basal insulin dose percentage from total daily dose is associated with better metabolic control in children treated with the basal-bolus scheme. There is high clinical inertia in the indication of basal insulin in older children.

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Insulin Growth Factor 1 Predicts Central Precocious Puberty in Girls 6 to 8 Years-Old: A Retrospective Study

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Background: Central precocious puberty (CPP) in females is characterized by thelarche before 8 years of age. Evidence of reproductive axis activation confirms the diagnosis (basal serum LH ≥ 0.3 IU/L or luteinizing hormone-releasing hormone (LHRH)-stimulated LH ≥ 5 IU/L. Stimulation testing is the diagnostic gold standard but is time-consuming and costly. Serum levels of insulin-like growth factor-1 (IGF-1) and insulin-like growth factor-binding protein 3 (IGFBP-3) are increased in girls with CPP. **Objective:** To assess the utility of serum IGF-1 and IGFBP-3 in identifying CPP in girls aged 6 to 8 years old. **Methods:** The study was a single-center retrospective study. Girls with confirmed CPP (n=44) and isolated premature adrenarche/thelarche (PA/PT, n=16) had baseline biochemical profiling and LHRH stimulation testing. Serum IGF-1 and IGFBP-3 results were converted to standard deviation scores (SDS). Correlations were calculated and receiver operating characteristic curves were plotted. **Results:** Girls with CPP had higher basal and peak LH, IGF-1 SDS, and growth velocity (p<0.05). IGF-1 SDS correlated positively with basal and peak LH (p<0.05). IGF-1 SDS (1.75-2.15) differentiated CPP and PA/PT with 89% sensitivity and 56% specificity (basal LH) and 94% specificity and 55% sensitivity (peak LH). IGFBP-3 SDS did not differ between groups or by CPP parameters. ***Conclusions:*** In clinical practice, IGF-1 SDS may be an additional tool for identifying CPP in girls aged 6 to 8 years-old when baseline clinical and laboratory diagnostic criteria are inconclusive, possibly avoiding more invasive procedures.

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DIABETES, INSULIN, AND LIPIDS IN PEDIATRIC ENDOCRINOLOGY

Investigating Insulin Resistance in Pediatric Cardiomyopathy - A Pilot Study

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Children with cardiomyopathy are a vulnerable population and understanding the factors that contribute to cardiac dysfunction are of great importance. At the biochemical level, energy utilization by cardiomyocytes during stress may provide insight into the progression of cardiomyopathy. There is a large body of literature that describes insulin resistance in adults with cardiomyopathy (1,2).