Diabetes Mellitus and Glucose Metabolism

DIABETES COMPLICATIONS I

Increased Incidence of Diabetic Nephropathy in Veterans with Severe Insulin Resistance

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Recently, cluster analysis has been used to classify adult onset diabetes based on pathophysiologic profile. Using autoimmunity status, BMI, insulin resistance, and beta cell function, this classification system can predict diabetes associated complications. Individuals with primarily insulin resistant phenotype have been associated with increased incidence of nephropathy while those with insulin deficient phenotype are associated with retinopathy. Clinically, patients with severe insulin resistance can be defined as those who require high doses of insulin to achieve glycemic control, such as patients on U-500 insulin requiring more than 200 units of insulin a day. To characterize the clinical and metabolic phenotype of insulin-resistant patients from a South Texas VA diabetes clinic, we evaluated presence of macro or microvascular complications and beta-cell autoimmunity and function in this population. A retrospective cohort study was completed at the South Texas VA Diabetes Clinic. Charts were reviewed for anthropometric measurements, presence of macro and microvascular complications, anti-diabetic medication, lipid profile and HbA1c over 3 visits, autoimmunity (anti-GADab), and beta-cell function (fasting C-peptide). Patients with insulin doses >200 U/day or on U-500 insulin were categorized as "severe insulin-resistant". Those with insulin doses < 0.5 U/kg/day were categorized as "mild insulin resistance" as a control group. Out of 120 patients, 30 met criteria for severe insulin resistance (n=30, M/F=29/1 age 61±1.6 years (yr), BMI 41±0.9 kg/m^2, duration of diabetes 18.3±0.3 yr, HbA1c -8.4±0.2%, total daily insulin dose (TDD) 301±31U). 30 patients with insulin use <0.5 U/kg/day met criteria for mild insulin resistance (N=30, M/F: 28/2, age 62±2 yr, BMI 30±1 kg/m^2, duration of diabetes 12±1.2 yr, HbA1c 7.2±0.2%, TDD 17±2U). Prevalence of nephropathy was higher in the insulin resistant group vs the mild insulin resistant group (76% vs 43%, p<0.05). There was no difference in prevalence of retinopathy (p=0.095) or CAD (p=0.6) between the groups. There was no difference in use of ACE-i or SGLT-2i between the groups. Insulin resistant subjects had a higher plasma triglyceride (325±0.3 vs 202±0.3 mg/dl, p=0.04). Prevalence of GAD ab was not different between the groups (3% vs 0%). Fasting C-peptide concentrations were similar in both groups (5.6±0.3 vs 5.2±0.25 ng/ml, p=0.3). HbA1c in the insulin resistant group improved between visits 1 and 3 (p<0.01). Weight increased over three visits in the severe insulin resistant group as opposed to mild weight loss in the mild insulin resistant group.

Our results support the high prevalence of diabetic nephropathy in patients with severe insulin resistance, although it is unclear that insulin resistance is the etiology. Long-term follow up of these patients may provide insight into the underlying mechanisms of these complications.

Adipose Tissue, Appetite, and Obesity

OBESITY TREATMENT: GUT HORMONES, DRUG THERAPY, BARIATRIC SURGERY AND DIET

Racial/Ethnic Contribution and Metabolic Factors of NAFLD/NASH in the US Population: Data from NNANES III

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MON-585

Non-alcoholic fatty liver disease (NAFLD) is a common chronic liver condition. It is manifested by hepatic steatosis (HS) that can progress to non-alcoholic steatohepatitis (NASH), and even liver failure. Interestingly, it is marked by racial/ethnic disparities, with a high prevalence in Hispanics. We aimed to identify the risk factors for these chronic conditions in the US. To this end, we analyzed data from NHANES III (1988-1994) using multiple or multinomial logistic regression considering the design and sample weight. HS was identified by ultrasound. NAFLD was defined as HS in the absence of viral hepatitis or excessive use of alcohol or hepatotoxic drugs. The NAFLD population was further divided into those with NASH (defined by the HAIR score), or with simple NAFLD. The prevalence of HS was 19.8%, 16.6%, and 27.9%; of NAFLD was 17.8%, 14.7%, and 25.5%; and of NASH was 3.2%, 2.5%, and 5.1% in non-Hispanic Whites, non-Hispanic Blacks and Hispanics, respectively. Race/ethnicity was a significant predictor of HS, NAFLD and NASH, with Hispanics having the highest odds for all conditions, and non-Hispanic Blacks having the lowest odds relative to Whites (p<0.05). Other significant risk factors for all three conditions were older age, higher BMI, abnormal levels of C-peptide, and elevated serum glucose and triglycerides (p<0.05). HOMA insulin resistance was associated with HS and NAFLD (p<0.05). While smoking status was not associated with HS (p>0.05), current smokers had lower odds of NAFLD & NASH than non-smokers (p<0.05). Elevation of the liver enzyme aspartate aminotransferase was a significant risk factor of HS, while elevation of the liver enzyme alanine transaminase was a significant risk factor of NAFLD. Elevation in the levels of both liver enzymes was predictive of NASH (p<0.05). Although we included physical activity relative to national recommendation variable and the Healthy Eating Index (a measure of diet quality) in our analyses, neither of these factors was a predictor of any of the liver conditions (p>0.05). Our results showed an independent association between race/ethnicity and HS, NAFLD, and NASH, whereby Hispanics had the highest odds for every condition relative to non-Hispanic Whites. Providers should consider the race/ethnicity of their patients when evaluating the risk for NAFLD and NASH, and also be aware of the other

risk factors, such as BMI and levels of C-peptide, glucose, and triglycerides.

Diabetes Mellitus and Glucose Metabolism

TYPE 2 DIABETES MELLITUS

Comprehensive and Structured Care Program for Patients with Type 2 Diabetes Mellitus: A Preliminary Report from Raipur, Chhattisgarh State of India

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Aim: To assess the glycemic outcomes of T2DM patients enrolled in comprehensive structured care program at the outpatient clinic of Apollo Sugar at Raipur, India. **Methods:** This is a preliminary, prospective, single-center, observational study on T2DM patients from Jan 2018 to December 2018. Uncontrolled diabetes or patients with comorbid conditions with the duration of disease for more than one year and age ≥18 years and who gave consent to enroll in the program were included in the study. The structured care program is a 6 months program where patients were continuously engaged by counseling them on diabetes management- diet and exercise, self-monitoring of blood glucose, health interactions with the remote health coach through a mobile app. Baseline demographics and clinical data were collected at the time of enrollment and were followed up for 6 months. HbA1c reduction is the target measurement of this program. Descriptive statistics were used to analyze and report the data. A paired t-test is used to check the significant reduction in HbA1c from baseline to follow up **Results:** Total 102 patients were included in this study. Mean (SD) age was 50.7 (10.5) years, males were 78 (76%) and females were 24 (24%). The mean (SD) duration of diabetes and BMI were 7.9 (7.0) years and 27.5 (4.5) kg/m2 respectively. At the time of enrollment, patients were at mean HbA1c of 9.0(2.1)%, fasting (F) and post-prandial (PP) blood (BG) glucose was 194(68) mg/dL and 247(94) mg/dL respectively. Among these patients 38% had neuropathy and 15% had retinopathy as their complications. These patients were regularly followed up over the phone call to counsel on diabetes management with a healthy diet, exercise, self-monitoring of blood glucose, and medication compliance. After 6 months followup the HbA1c, FBG, and PPBG were 7.6 (1.5) %, 139 (50) mg/dL, and 196 (75) mg/dL, respectively with a significant mean reduction of 1.4%, 56 mg/dL, and 51 mg/dL ($p < 0.001$). Further analysis of glycemic outcomes between these patients on oral hypoglycemic agents (OHAs) and OHAs+insulin, the reduction in HbA1c (1.5%) was not significant. **Conclusion:** Our study demonstrates that a structured care program might bring a clinically significant glycemic control through tight adherence to SMBG, diet, exercise, and medication. To establish these results a study in large sample is in progress.

Pediatric Endocrinology

PEDIATRIC GROWTH AND ADRENAL DISORDERS

Growth Hormone Treatment Response in Children

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SAT-106

OBJECTIVES: Growth hormone (GH) therapy is an effective treatment in addressing growth failure in children with GH deficiency (GHD). It has also been increasingly used in non-GH deficient (nGHD) conditions. We sought to report the growth response of GHD and nGHD patients who received GH therapy at a tertiary care center. **METHODS:** Data was collected from health records of patients followed in the endocrinology clinic at Alberta Children's Hospital, Calgary, Canada, from 2005 to 2019, and used to analyze clinical responses based on indication for GH treatment. **RESULTS:** A total of 167 patient records (87 males and 80 females) were used for analysis. The average age at the start of GH therapy was 7.3 years (range 0.25 to 16.98 yrs). 74 patients were in the GHD group while 93 were nGHD. Of the patients in the nGHD group, the most common diagnosis were: idiopathic short stature (ISS)(n=45), Turner syndrome (TS)(n=26), and Prader Willi Syndrome (PWS)(n=8). The mean height velocity (HV) in year 1 was highest in the GHD group at 11.68 cm/year (n= 62, sd = 5.93), followed by ISS at 9.41cm/year (n = 52, sd = 4.34). The mean first year HV of those who had received chemotherapy (n= 5, mean = 5.48, sd = 1.92) or had Turner syndrome (n= 24, mean = 7.20, sd = 2.15) was significantly lower than both the GHD and ISS groups. GH peak during a GH stimulation test at baseline was not correlated to the first year height velocity while on GH treatment. However there was a negative linear correlation between baseline IGF1 level and first year height velocity (Spearman's rho = 0.312216, p-value= 0.01516). Age at GH initiation was negatively correlated with height velocity during GH treatment. Height velocity over time decreased sharply from year 1 to year 3, and became stable for the remaining years of GH therapy. For the entire group, HV for years 1-5 was 9.81 (sd=4.83), 7.40 (sd=2.89), 6.29 (sd=2.38), 5.92 (sd=2.56), 5.66 (sd=2.51). There is no significant correlation between GH dose and height velocity response after adjusting for diagnosis. **CONCLUSION:** In our population, the response to GH therapy was consistent with those reported in the literature. Response to GH therapy was not associated with GH peak on stimulation but rather to baseline IGF-1 level and age at initiation. Although peak GH to stimulation is required to obtain public funding for GH therapy, these findings demonstrate that GH stimulation test results may not indicate which patients may benefit the most from GH therapy. Follow-up until final adult height will allow us to have a better understanding of the efficacy of GH therapy in patients with both GHD and nGHD conditions.