The prevalence of Hyperinsulinism, Type 2 DM & Metabolic syndrome among overweight & obese Saudi children

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Outline

- Introduction on type 2 DM in children
- Escalating rates of pediatric obesity with increasing prevalence of type 2 DM
- Pathophysiology
- Clinical presentations
- Local study on children and adolescents with obesity at KAUH- Jeddah, KSA

Introduction

- With the escalating rates of obesity, type 2 diabetes is increasing, not only in adults but also in children and adolescents
- In the SEARCH for Diabetes in Youth study, it is estimated that the number of adolescents per year diagnosed with type 2 diabetes is~ 3700 and still increasing!!!!


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Rising Rate of Childhood Overweight is ALARMING!

Approximately 1 of every 4 children in the United States is considered to be overweight

Prevalence of overweight & obesity in adolescents &Saudi children

Mohammad I. El Mouzan,a Peter J. Foster,b Abdullah S. Al Herbish,a Abdullah A. Al Salloum,a Ahmad A. Al Omer,c Mansour M. Qurachi,d and Tatjana Kecojevicb

2010-*Ann Saudi Med.* May-Jun;

- The national sample size, in Saudi reference was 19 317 healthy children & adolescents from 5-18 years of age

- The prevalence of overweight 23.1%, obesity 9.3 % & severe obesity 2% ,in all age groups

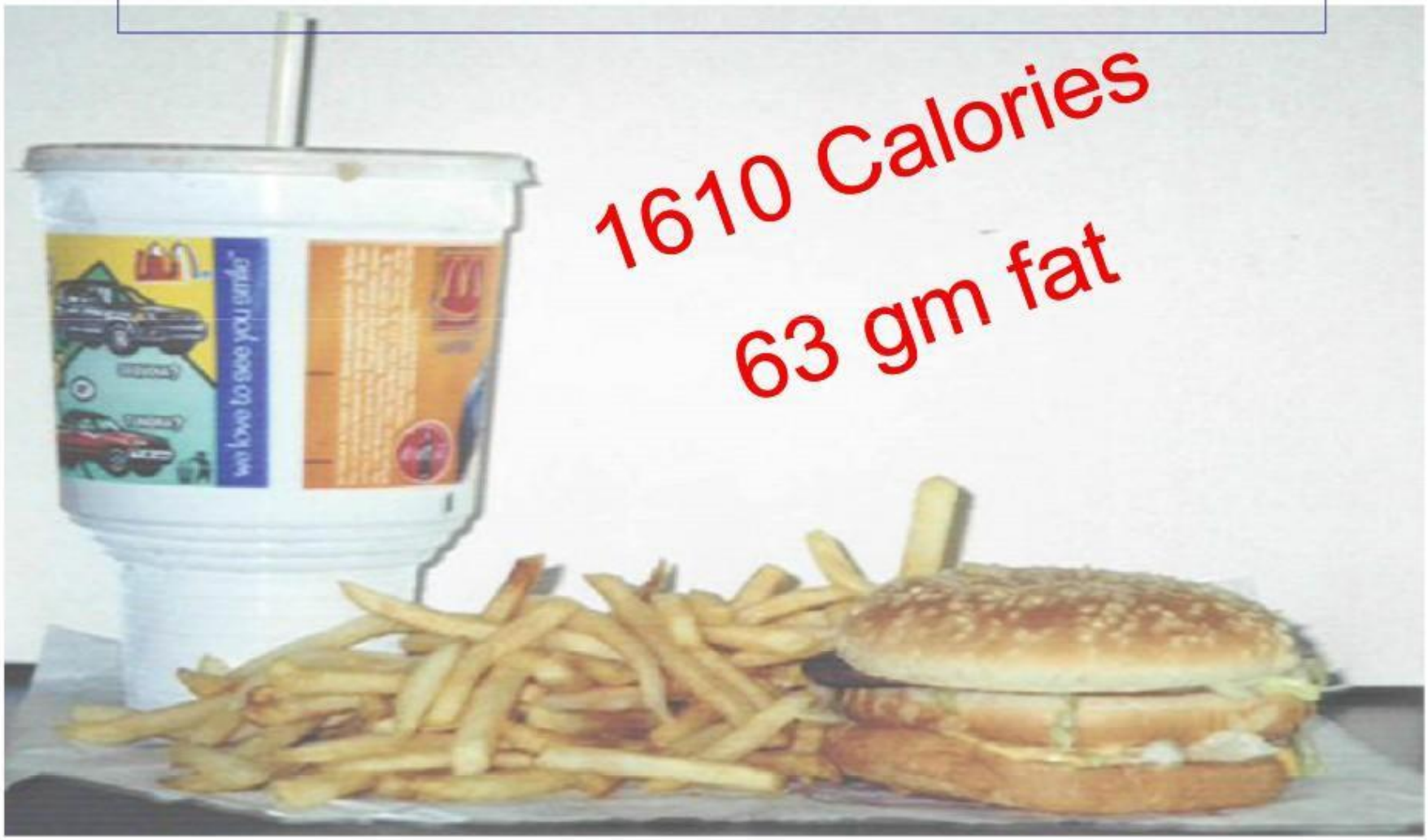
Obesity is a major factor for insulin resistance

Acanthosis nigricans

Preventing Obesity in Young Children

Strategies for Promoting Healthy Eating, Exercise and Parent Involvement

Super Sized Fast Food



Life Style Modifications

Physical Activity

- Increased activity not only increases calorie use but also appears to decrease appetite
- In children younger than 2 yr of age ,AAP recommends avoiding TV computers
- children 2-18 yr of age should have less than 2 hr/day of “screen time” (TV, video games, computer) and TV should be removed from children bedrooms

2M Prevalence of Hyperinsulinism, Type Metabolic Syndrome among Saudi & Overweight & Obese Pediatric Patients at King Abdul-Aziz University, Jeddah, Saudi Arabia

,Al-Agha A, Ocheltree A, Shata N

;Dec2012 Minerva Pediatr.
.31-623:(6)64

Background

- Obesity and overweight among children and adolescents is increasing at an alarming rate, which lead to the increase in the incidence of their related co-morbidities, renders the child prone to insulin resistance, dyslipidemia, type 2 diabetes mellitus (T2DM) and ultimately metabolic syndrome (MS)

Objectives of study

1) To evaluate the prevalence of Hyperinsulinism among overweight & obese pediatric patients
2) The prevalence of T2DM among those with Hyperinsulinism
3) The prevalence of metabolic syndrome and its components among (T2DM) pediatric patients visiting Pediatric Endocrinology clinic at KAUH

Methodology

- A retrospective cross-sectional study conducted on overweight and obese pediatric patients attending the pediatrics diabetes clinic at King Abdul-Aziz University Hospital, Jeddah, Saudi Arabia, from 2010 to 2016
- 387 patients (ages from 2 to 18 years)
- Those with hyperinsulinism underwent further investigations to assess the prevalence (T2DM) and the prevalence of (MS) among (T2DM) patients

Definitions used in the study

- Overweight and obesity for children and adolescents were defined as ≤ 85th and 95th percentile of BMI, respectively, plotted on the CDC BMI charts

Definitions used in the study

- Weight and height measurements at King AbdulAziz University Hospital are taken according to the CDC guidelines and are measured in kilograms and centimeters, respectively
- Weight and waist circumference measurements were taken with cloth
- Waist circumference was measured in centimeters

Definitions used in our study

- Hypertension in children and adolescents was defined as systolic blood pressure and/or diastolic blood pressure ≤95th percentile, plotted on the CDC age-gender specific blood pressure charts and measured on ≤3 separate occasions
- Dyslipidemia was defined as the presence of any of the following:
  - Cholesterol >5.2 mmol/L,
  - Triglycerides <2.3 mmol/L,
  - Low density lipoprotein (LDL) <3.75 mmol/L
  - High density lipoprotein (HDL) >0.9 mmol/L

Definitions used in this study

- The diagnosis of (PCOS) was established via using the Rotterdam consensus on diagnostic criteria for PCOS
- The revised criteria were:
  - Oligo- and/or anovulation
  - Clinical and/or biochemical signs of hyperandrogenism
  - Polycystic ovaries, by pelvic ultrasound (specifically looking for the presence of 12 or more follicles in each ovary measuring 2 ±9 mm in diameter, and/or increased ovarian volume (>10 ml(
- The presence of two out of three criteria confirmed the diagnosis of PCOS
- The LH to FSH ratio was also calculated, a ratio greater than 1:1 was considered elevated

Definitions used in study

- The diagnosis of (T2DM) was established via fasting serum glucose ≥ 7 mmol/L.
- Random or two-hour postprandial serum glucose ≥ 11.1 mmol/L with classic symptoms of hyperglycemia and HbA1c ≥ 6.5%.
- Hyperinsulinism was established by elevated serum levels of insulin > 17 - 3 mIU/L (17 mIU/L) & C-peptide (1.47 < 1.47 - 0.37 nmol/L (nmol/L).
- Serum uric acid > 428 umol/L was considered elevated (428 - 155 umol/L).
- Acanthosis nigricans (AN) was diagnosed clinically

Definitions used in study

(Metabolic syndrome (MS

- Was defined by de Ferranti et al, as the presence of three of the following:
  - fasting serum glucose ≥ 6.1 mmol/L,
  - waist circumference > 75th percentile for age and sex
  - systolic and/or diastolic blood pressure > 90th %ile plotted on pediatric charts
  - triglycerides ≥ 1.1 mmol/L, HDL-C < 1.3 mmol/L

Statistical analysis

- The data was gathered on a datasheet from the university hospital database and patients clinical charts.
- All laboratory information was taken from the university hospital centralized laboratory phoenix database system.
- Tables were exported to the SPSS (version 16) and Epi info (version 3.5.1) software, where the data was analyzed and the formation of tables commenced.
- Analysis of quantitative data was done via the two-sample t-test.
- The level of significance was expressed as P-value; P > 0.05 = non- significant (NS), P < 0.05 = significant (S), and P < 0.001 (= highly Significant (HS

Results

- years) 18 to 2 patients (ages from 387 of Out
  patients had hyperinsulinemia & 44.7%
  (DM2of them had (T20.23%
- 30.04SD for serum insulins were &Mean
  46.15mIU/L in pre-pubertal children & 12.7±
  = mIU/L in pubertal adolescents (P 22.1 ±
  (0.0136

Results

- (DM2The overall prevalence of (MS) among (T .14.29%pediatric patients was
- .of those with (MS) was pre-pubertal1 Only
- The prevalence of each of the diagnostic :components were
  - ,had elevated fasting serum glucose %31.43
  - ,th percentile95had a waist circumference > %23
  - ,had high triglyceride levels %28.57
  - had low levels of HDL %22.86
  - 3% % for SBP and 11 had high blood pressure (%14 (for DBP
  - had Hyperurecemia %2.86

Results

- In our cohort, the overall prevalence of dyslipidemia was 28.57%.
  - had elevated triglycerides % 25.71 –
  - had elevated LDL %2.86 –
  - had low levels of HDL %8.5 –
  - had elevated serum total cholesterol %20 –

Results

- The prevalence of (PCOS) in our cohort was .%21.74
- All pubertal females with (PCOS) had a BMI > 85th percentile, 40% had a BMI > 95th percentile,
  - –All complained of menstrual irregularities, 60% had (MS) and 80% had (AN), all had serum DHEAS > 95th age-gender specific percentile and all showed multiple ovarian cysts by pelvic ultrasound.
- All pubertal females with (PCOS) had an LH / FSH ratio of > .1:1

Discussion

- In our cohort, the prevalence of secondary hyperinsulinism (44.7%) was lower than what was reported by a study conducted in San Diego, California (51.9%) and higher than another study in London (40%)

Discussion

- DM) in our population 2The prevalence of (T) was within the American Diabetes 20.3%(Association (ADA) issued consensus statement DM) in 2regarding the prevalence of (T .children and adolescents
- DM) now accounts for 2The ADA stated that (T of new cases of pediatric 46% to 8 as many as diabetes

Discussion

-), 28.57%Dyslipidemia within our cohort (which almost near to what other studies have (55%to 30% reported, range of dyslipidemia (
- We reported the prevalence of hypertension , two other 34.29%within our cohort as studies in London and Turkey reported a lower (, respectively22%and 32% prevalence (

Discussion

- The overall prevalence of (MS) in our cohort was within the prevalence range to 4.5% used by the WHO which is (.(38.7%
- In our cohort ( ) was higher than 14.29%, and 10%a study in the USA reported ( ), less than what studies in Turkey, Spain , 27.2%and Bolivia have reported (and18.6% respectively .%36

Discussion

- We also reported that the prevalence of (MS) DM) than 2was higher among females with (T males, other studies reported a higher prevalence among males, and some reported no difference in the prevalence with respect to gender
- Furthermore, the prevalence of (MS) was greater among pubertal children and adolescents then pre-pubertal children in our cohort

Conclusions

- Obesity and its co-morbidities were prevalent among Saudi pediatric patients.
- We recommend preventing excessive weight gain through the promotion of a healthy lifestyle, family educational seminars and the reinforcement of indoor exercises.

Our conclusions

- We believe this is due to lack of family education seminars and the abundance of fast food establishments accessible to our youth are the most salient of reasons
- As many studies have proven, parents have an integral role in the management of childhood obesity
- We recommend the promotion of family education seminars in Saudi Arabia, mainly to increase the awareness of obesity and its co-morbidities and the reinforcement of a healthier diet, primarily one with high fiber, low sodium, simple carbohydrates and .saturated fats content

Conclusions

- Saudi Arabia has a desert landscape with a harsh climate, such conditions discourage children and adolescents from outdoor activities, mainly exercises and sports
- In order to overcome such issues, we recommend the promotion of indoor exercises minutes per day and to limit 30 for at least 2 television usage hours to a maximum of .hours per day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Thank you