IMPLICATIONS OF INSULIN RESISTANCE IN OBESE AND OVERWEIGHT CHILDREN: A COHORT ANALYSIS

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NO CONFLICT OF INTEREST. NO FUNDING

INTRODUCTION

- Both obesity and diabetes have shown a dramatic increase worldwide, both in adult and pediatric population.
- Insulin resistance gives way to frank diabetes.
- Hence its imperative to study insulin resistance in obese children.

OBJECTIVES

Primary: To evaluate insulin resistance in obese & overweight children. Secondary: To examine the co-morbidities in obese children.

METHODS

- Approval from Institutional Ethics Committee taken.
- Fifty 5-18 years overweight and obese children (>90th percentile of WHO charts).
- Informed assent/consent taken.
- Cross sectional observational study.
- Data collected:
  - Anthropometric (height, weight, mass index, waist circumference),
  - Clinical (Blood Pressure),
  - Biochemical (fasting and post prandial blood glucose, lipid profile, fasting and post prandial insulin) data
  - Ultrasound- fatty liver
- Insulin resistance – HOMA (homeostasis model assessment index) > 3.5
- HOMA – IR = fasting glucose (mg/dl) x fasting insulin (µU/ml) / 405
- Hypertension – BP > 95th centile of age and gender matched data
- Abdominal obesity > 90th percentile of ethnic specific waist circumference data
- Dyslipidemia - Total Cholesterol > 200mg/dl / Triglycerides > 130mg/dl / HDL < 35mg/dl / LDL > 130mg/dl as per National Cholesterol Education Program expert panel on cholesterol levels in children
- Correlation between various parameters done.

RESULTS

BASELINE DATA

Mean age =>10.76±2.48 years
BMI => 24.18±3.12 ±kg/m²
WC => 72.55±9.12 cms
Fasting and post prandial blood glucose, fasting insulin, lipid profile – normal limits.
Mean HOMA-IR = 3.29

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total (n=50) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal obesity (WC &gt; 90th percentile)</td>
<td>33 (66)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>15 (30)</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>15 (30)</td>
</tr>
<tr>
<td>Insulin resistance</td>
<td>18 (36)</td>
</tr>
<tr>
<td>Metabolic syndrome</td>
<td>9 (18)</td>
</tr>
<tr>
<td>Acanthosis nigricans</td>
<td>4 (8)</td>
</tr>
<tr>
<td>NAFLD (Non Alcoholic Fatty Liver Disease)</td>
<td>9 (18)</td>
</tr>
</tbody>
</table>

INSULIN RESISTANCE

Of 50 subjects – 18 insulin resistant.
Higher - BMI (24.89±3.06 vs 23.78±3.14 kg/m²) and
- waist circumference (76.02±8.07 vs 70.6±9.21 cms)
Pubertal children more prevalence of insulin resistance (46.4% vs 22.7%)

COMPARISON - INSULIN RESISTANT & INSULIN SENSITIVE SUBJECTS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Insulin resistant (n=18)</th>
<th>Non insulin resistant (n=32)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPG (mg/dl)</td>
<td>86.6±7.1</td>
<td>80.6±6.4</td>
<td>0.00</td>
</tr>
<tr>
<td>PPG (mg/dl)</td>
<td>117.3±13.4</td>
<td>109.5±9.6</td>
<td>0.02</td>
</tr>
<tr>
<td>Fasting insulin(µU/ml)</td>
<td>21.45±2.32</td>
<td>12.86±2.57</td>
<td>0.00</td>
</tr>
<tr>
<td>2hr insulin(µU/ml)</td>
<td>25.69±4.02</td>
<td>17.30±3.76</td>
<td>0.00</td>
</tr>
<tr>
<td>HOMA-IR</td>
<td>4.58±0.82</td>
<td>2.56±0.59</td>
<td>0.00</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>156.6±29.5</td>
<td>142.1±19.2</td>
<td>0.04</td>
</tr>
</tbody>
</table>

COMORBITIES IN INSULIN RESISTANT(IR) & INSULIN SENSITIVE (IS)

CONCLUSIONS

- Insulin resistance is observed more in pubertal age group (46.4%).
- Its associated with increased risk of other co-morbidities like dyslipidemia, hypertension.
- HOMA of 2.91 best predicted the occurrence of metabolic abnormalities and had positive correlation with post prandial glucose, insulin and total cholesterol.
- Early evaluation of insulin resistance and metabolic derangements mandatory for sensitization and interventions.

REFERENCES

- WHO growth standards. Geneva
- Kuriyan R. Waist Circumference and Waist for Height Percentiles in Urban South Indian Children Aged 3-16 Years. Indian pediatr.

CORRELATION OF INSULIN RESISTANCE

HOMA-IR values correlated significantly and positively with:
- Post prandial glucose (r=0.46)
- Post prandial insulin (r=0.79)
- Total cholesterol (r=0.28)

ROC CURVE ANALYSIS OF HOMA VALUES IN THE STUDY BASED ON PRESENCE AND ABSENCE OF METABOLIC ABNORMALITIES. (AUC=0.87).