Examining beta-cell reserve in extremely obese children

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Background

Obesity is a major risk factor for developing type 2 diabetes mellitus (T2DM). Despite the obesity epidemics, the incidence of childhood T2DM in Europe is not increased.

Objectives

To assess the beta-cell reserve expressed as an oral glucose disposition index (GDIo), an independent predictor of developing T2DM (Sjaarda et al., 2012).

Methods

80 adolescents (61.3 % girls), aged from 10.0 to 17.6 years (mean 13.59 ± 2.34 years), with age and gender-specific BMI above the 95th percentile (CDC 2000 BMI reference) and waist circumference (WC) above the 90th percentile (Galcheva et al., 2008), were included. The participants underwent anthropometry, fasting blood analyses, OGTT and abdominal ultrasound according to standard procedures.

- Insulin sensitivity = 1/fasting insulin;
- Insulin response = change in insulin/change in blood glucose (BG) from 0 to 30 min;
- GDIo = insulin sensitivity/beta-cell function.

Results

At fasting, a total of 50 adolescents (62.5%) were normoglycemic and 30 (37.5%) were with impaired fasting glucose (IFG).
After OGTT subjects were divided into 3 categories depending on 2 hour postload glucose levels:
- normal glucose tolerance – 63 (78.8 %);
- impaired glucose tolerance (IGT) – 16 (20.0 %);
- T2DM – 1 (1.3 %).

The mean GDIo was 2.2450 ± 2.30 mM-1 (boys 2.8057 ± 1.93, girls 1.8991 ± 2.46, p = 0.096).
The group with the lowest GDIo consisted of 31.9 % of all girls vs. 13.8 % of all boys. The GDIo decreased with increasing of 2 h post load BGLs (p=0.042).
The GDIo also had a strong association with the family history of obesity (p=0.005) and showed no associations with T2DM family history.

Conclusion

The current study confirms the low frequency of type 2DM and impaired parameters of the β cell reserve in the pediatric population. It suggests a stronger correlation between future disease risk and familial obesity.

The worse results in females deserve further exploration.

Conflict of interests: none

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