

Sex-specific differences in post-load insulin dynamics are independent of BMI-based adiposity and BIA-derived body composition and pubertal stage in adolescents with obesity.

A.Sonza, A. Faquin, G. Grugni, A. Bondesan, D. Caroli, L. Abbruzzese, A. Sartorio

Journal of Clinical Medicine 15: 3248, 2026.

Background: Sex-related differences in insulin sensitivity during adolescence remain incompletely understood, particularly in the context of obesity. Whether these differences reflect variations in basal insulin resistance or dynamic insulin responses remains unclear.

Objective: To investigate sex differences in glucose and insulin responses during the oral glucose tolerance test (OGTT) and to explore mechanisms underlying potential dissociation between glycemic and insulinemic profiles.

Methods: A cross-sectional analysis of 753 adolescents with obesity who underwent a standard oral glucose tolerance test (OGTT). Plasma glucose and insulin were measured at fasting and at 30, 60, 90, and 120 min. Mixed-effects models were used to examine glucose and insulin trajectories over time, including sex-by-time interactions, and to adjust for body mass index standard deviation score (BMI_SDS), pubertal stage (Tanner), metabolic syndrome (MetS), and body composition (resistance index). Multiple linear regression models were fitted to assess associations of sex with HOMA-IR, HOMA- β , total area under the curve (AUC), and phase-specific insulin AUCs.

Results: Glucose trajectories during OGTT were similar between sexes, with no significant sex or sex-by-time interaction effects after adjustment. In contrast, insulin trajectories differed significantly by sex (sex-by-time interaction $\beta = -0.10$, $p < 0.001$). Boys exhibited higher baseline insulin levels and greater total insulin exposure ($\beta = -11.2$, $p < 0.001$), independent of BMI_SDS, pubertal stage, MetS, and body composition. Sex differences were sustained across all OGTT phases. HOMA-IR did not differ by sex, whereas HOMA- β showed a sex-related difference. BMI was positively associated with both basal and dynamic insulin measures.

Conclusions: In adolescents with obesity, sex differences are characterized by altered dynamic insulin responses rather than differences in glycemic control. Boys exhibit greater compensatory insulin exposure during glucose challenge, independent of BMI-based adiposity, BIA-derived body composition and pubertal development.

Se desidera avere la fotocopia di questo lavoro, per esclusivo uso personale, può fare richiesta per mail a: info@cresceresani.it indicando il titolo, gli autori, la rivista e il proprio recapito lavorativo (nome, cognome, indirizzo, CAP, città).