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Childhood obesity: a chance to prevent future male infertility?

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Background: Testicular volume (TV) is a fertility marker directly related to sperm count. About a quarter of young men aged 18-19 years have testicular hypotrophy and, therefore, their future fertility is at risk. Accordingly, meta-regression data have shown that the sperm count has halved in the past forty years worldwide for no apparent reason. Interestingly, the prevalence of childhood obesity has increased in parallel over the past few decades. However, the impact of childhood obesity and of obesity-related metabolic disorders on testicular growth is still unknown.

Aim: This study was undertaken toevaluate the impact of obesity, hyperinsulinemia, insulin-resistance, and type 2 diabetes mellitus (T2DM) on TV in pre-pubertal (<9 years), peri-pubertal (9-14 years), and post-pubertal (14-16 years) periods.

Patients and Methods: We collected data on TV, age, SDS of the body mass index (BMI), insulin, HOMA-index, fasting glycemia, glucose levels at 120 min following the oral glucose tolerance test (OGTT), and glycated hemoglobin of 264 children and adolescents followed-up for weight control. Patients with factors known capable of influencing TV (any acquired or congenital endocrine dysfunction, drug assumption, radiotherapy, major comorbidities) and patients with low BMI (SDS ≤-1) were excluded. Data distribution was analyzed by the Shapiro-Wilk test. Intergroup differences were evaluated using the two-way analysis of variance (ANOVA) of the log-transformed data. Significance was accepted for a p-value <0.05.

Results: The cohort was made of 61, 53, and 150 children/adolescents with normal weight, overweight, or obesity, respectively; 115 had insulin levels <20 μIU/ml and 45 ≥20 μIU/ml; 61 did not have (HOMA-index <2.5) and 97 had (HOMA-index ≥2.5) insulin-resistance; 139 did not have T2DM, 22 had pre-diabetes and 3 had T2DM. The boys of 9-14 years with normal weight had a significantly higher TV compared to those with overweight or obesity. No difference was found in the other age ranges when data were grouped according to the BMI. In contrast, both in pre-pubertal and in post-pubertal phases, children/adolescents with normal insulin levels had significantly higher TV compared to those with hyperinsulinemia. Conversely, peri-pubertal boys with hyperinsulinemia had significantly higher TV compared to those with normal insulin levels. In the post-pubertal phase, these adolescents with insulin-resistance had lower TV compared to those with HOMA-index <2.5, while no difference was found in the other age ranges. Finally, T2DM did not influence TV in any age range.

Conclusion: Children/adolescents with overweight/obesity, hyperinsulinemia, and insulin-resistance have lower TV compared to their age-matched controls. These findings help to understand the reason for the high prevalence of testicular hypotrophy in young men. We speculate that more careful control of body weight in childhood/adolescence could represent a prevention strategy to pursue the maintenance of testicular function later in life.

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