



Scientific Conference on Multidisciplinary Studies

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Website: econfseries.com

11th June, 2025

REPRODUCTIVE SYSTEM CHARACTERISTICS IN OVERWEIGHT MALE ADOLESCENTS

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Annotation

This thesis examines the complex relationship between excess weight and reproductive system development in male adolescents. Current evidence demonstrates that overweight status significantly alters hormonal patterns, pubertal timing, and reproductive function through disruption of the hypothalamic-pituitary-gonadal axis. Key findings indicate altered testosterone metabolism, modified pubertal progression, and potential long-term fertility implications. The research underscores the critical importance of weight management during adolescence for optimal reproductive health outcomes.

Keywords: male adolescents, overweight, testosterone, puberty, hypothalamic-pituitary-gonadal axis, reproductive hormones, fertility

Today, the global prevalence of overweight and obesity among adolescents has reached unprecedented levels, with approximately 160 million adolescents worldwide classified as obese according to recent World Health Organization data. This epidemic poses significant concerns for reproductive health, particularly in male adolescents where excess adipose tissue fundamentally alters hormonal homeostasis and sexual development pathways.

Overweight male adolescents demonstrate distinctive alterations in reproductive hormone profiles compared to their normal-weight counterparts. Free testosterone levels serve as a more accurate indicator of androgen status than total testosterone in obese adolescent boys, with increased aromatization of testosterone to estradiol underlying the dissociation between normal clinical sexual maturation and advanced bone age. This enhanced aromatase activity in adipose tissue converts testosterone to estrone and estradiol, creating a state of relative hypogonadism despite apparently normal sexual development. The timing of pubertal onset



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exhibits complex patterns in overweight adolescents. Testicular enlargement in obese boys occurs significantly earlier compared to population-based normal-weight reference cohorts, suggesting accelerated initiation of puberty. However, this early onset paradoxically coexists with subsequent delays in pubertal progression and achievement of full sexual maturity. Childhood obesity profoundly affects puberty in boys, altering timing, progression, and associated hormonal changes, with potential impairment of later male fertility due to inflammatory markers impacting semen quality. The underlying pathophysiology involves multiple interconnected mechanisms. Increased peripheral conversion of testosterone to estrone and elevated inflammation due to increased fat mass both contribute to suppression of the hypothalamic-pituitary-gonadotropin axis and delayed development of secondary sexual characteristics. This hormonal disruption extends beyond testosterone to affect luteinizing hormone and follicle-stimulating hormone secretion patterns, creating cascading effects throughout the reproductive system. Physical manifestations of these hormonal alterations are clinically significant. Childhood obesity represents an important determinant of lower testosterone levels and reduced penis development, necessitating improved measurement methods in normal-weight and overweight boys. These observations carry substantial implications for adult genital development and overall reproductive capacity. The inflammatory component of obesity contributes significantly to reproductive dysfunction. Adipose tissue functions as an active endocrine organ, secreting pro-inflammatory cytokines including tumor necrosis factor-alpha and interleukin-6, which directly suppress gonadotropin-releasing hormone secretion. This inflammatory state creates a chronic suppression of the hypothalamic-pituitary-gonadal axis, perpetuating hormonal imbalances even after weight normalization in some cases.

In conclusion, overweight in male adolescents leads to significant changes in the reproductive system, affecting hormonal balance and pubertal development. These changes may have both short-term and long-term consequences for fertility. Early diagnosis and effective weight management are crucial for maintaining reproductive health. Further research should aim to develop targeted treatments addressing both metabolic and reproductive issues.



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