PHYSICAL AND SEXUAL DEVELOPMENT IN BOYS WITH AUTOIMMUNE THYROIDITIS

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Abstract

This article examines the impact of autoimmune thyroiditis on the physical and sexual development of boys. The study analyzes growth patterns, sexual maturation stages, and hormonal profiles in patients diagnosed with autoimmune thyroiditis. Findings indicate that thyroid dysfunction may lead to delayed growth, alterations in puberty timing, and imbalances in sex hormone levels. Early diagnosis and appropriate management are essential to minimize developmental delays and ensure normal physical and sexual maturation. The article emphasizes the importance of a multidisciplinary approach, including endocrinological evaluation, growth monitoring, and hormonal assessment, to optimize the management of boys with autoimmune thyroiditis.

Keywords: autoimmune thyroiditis, boys, physical development, sexual maturation, thyroid hormones.

Annotatsiya

Ushbu maqolada autoimmun tireoiditning o‘g‘il bolalarning jismoniy va jinsiy rivojlanishiga ta’siri o‘rganilgan. Tadqiqotda bemorlarning o‘sish ko‘rsatkichlari, pubertat bosqichlari va gormonal profillari tahlil qilingan. Natijalar qalqonsimon bezning disfunksiyasi o‘sishning kechikishi, pubertat bosqichlarining o‘zgarishi va jinsiy gormonlar muvozanatining buzilishiga olib kelishi mumkinligini ko‘rsatdi. Erta tashxis va tegishli davolash o‘sish va jinsiy rivojlanishdagi kechikishlarni minimallashtirish va normal rivojlanishni ta’minlash uchun muhimdir. Maqola multidisipliner yondashuvning, jumladan endokrinologik baholash, o‘sish monitoringi va gormonal tekshiruvning ahamiyatini ta’kidlaydi.

Kalit so‘zlar: autoimmun tireoidit, o‘g‘il bolalar, jismoniy rivojlanish, jinsiy rivojlanish, qalqonsimon bez gormonlari.

Аннотация

В данной статье рассматривается влияние аутоиммунного тиреоидита на физическое и половое развитие мальчиков. Исследование включает анализ роста, стадии полового созревания и гормональные показатели у пациентов с диагнозом аутоиммунный тиреоидит. Результаты показывают, что дисфункция щитовидной железы может приводить к задержке роста, изменениям сроков полового созревания и нарушению баланса половых гормонов. Ранняя диагностика и соответствующее лечение необходимы для минимизации задержек развития и

обеспечения нормального физического и полового созревания. Статья подчеркивает важность многопрофильного подхода, включая эндокринологическую оценку, мониторинг роста и гормональное обследование, для оптимального ведения мальчиков с аутоиммунным тиреоидитом.

Ключевые слова: аутоиммунный тиреоидит, мальчики, физическое развитие, половое созревание, гормоны щитовидной железы.

INTRODUCTION

The thyroid gland is a critical endocrine organ that regulates metabolism, energy balance, cardiovascular function, and overall growth in children. Proper thyroid function is essential for maintaining homeostasis and supporting normal physical and sexual development during childhood and adolescence. The thyroid produces key hormones, including thyroxine and triiodothyronine, which influence cellular metabolism, skeletal growth, and the timing of puberty[1].

Autoimmune thyroiditis is one of the most common thyroid disorders in pediatric populations and occurs when the immune system produces antibodies that attack thyroid tissue. In boys, this condition can significantly affect growth patterns and sexual maturation. Hashimoto thyroiditis, the most prevalent form of autoimmune thyroiditis, often leads to hypothyroidism, causing delayed growth and impaired development. The deficiency of thyroid hormones can result in delayed bone age, reduced height velocity, and disturbances in the onset and progression of puberty. In some cases, subclinical hypothyroidism may exist without obvious symptoms, making early detection crucial for preventing long-term developmental complications [2].

The impact of autoimmune thyroiditis on sexual development in boys is particularly important. Thyroid hormones play a regulatory role in the hypothalamic-pituitary-gonadal axis, which controls the onset and progression of puberty. Thyroid hormone deficiency can alter gonadotropin secretion, affecting testicular growth and the development of secondary sexual characteristics. Consequently, boys with autoimmune thyroiditis may experience delayed genital development, slower pubertal progression, and changes in hormone levels, such as luteinizing hormone, follicle-stimulating hormone, and testosterone. Monitoring these parameters is critical to ensure timely interventions and support normal sexual maturation.

Clinical evaluation of boys with autoimmune thyroiditis should include assessment of growth charts, Tanner staging for sexual development, and measurement of thyroid function. Laboratory investigations typically involve measurement of thyroid-stimulating hormone, free thyroxine, and thyroid autoantibodies. These assessments, combined with physical examination, allow clinicians to detect developmental delays and tailor therapeutic approaches. Furthermore, early diagnosis and treatment with hormone replacement therapy or other interventions can prevent or mitigate the adverse effects of thyroid dysfunction on physical and sexual development.

Recent studies emphasize the need for a multidisciplinary approach to managing autoimmune thyroiditis in pediatric patients. Pediatric endocrinologists, nutritionists, and primary care physicians should collaborate to monitor growth velocity, pubertal progression, and thyroid function. Such comprehensive monitoring enables the identification of subclinical abnormalities, adjustment of therapy, and optimization of overall development outcomes.

The aim of this study is to evaluate the effects of autoimmune thyroiditis on physical growth and sexual maturation in boys, analyze growth and hormonal parameters, and provide recommendations for early diagnosis, monitoring, and management. Understanding the interplay

between thyroid dysfunction and developmental processes is essential for ensuring optimal health and quality of life in affected children.

LITERATURE REVIEW

Autoimmune thyroiditis (AIT) is one of the most frequent endocrine disorders in pediatric populations, with a significant impact on both physical growth and sexual maturation in boys. The disorder is characterized by immune-mediated destruction of thyroid tissue, which can lead to hypothyroidism and altered thyroid hormone levels. Thyroid hormones are crucial for the regulation of metabolism, bone growth, and sexual development. In boys, thyroid dysfunction during childhood and adolescence can result in delayed growth, delayed onset of puberty, and hormonal imbalances that affect reproductive system development [3].

Hashimoto thyroiditis is the predominant form of AIT in boys and is associated with gradual thyroid failure. Clinical studies indicate that boys with Hashimoto thyroiditis often present with reduced height velocity, delayed bone age, and impaired weight gain compared to age-matched healthy peers. The deficiency of thyroid hormones disrupts the hypothalamic-pituitary-gonadal axis, delaying the onset of puberty and affecting the development of secondary sexual characteristics. These manifestations may not always be overt, highlighting the importance of early screening and continuous monitoring [4].

Several studies have emphasized the role of thyroid autoantibodies, such as anti-thyroid peroxidase (anti-TPO) and anti-thyroglobulin (anti-TG), as markers for disease progression. Elevated levels of these antibodies are correlated with more severe hypothyroidism and delayed growth in boys. Moreover, the presence of autoantibodies often precedes significant clinical symptoms, which underscores the need for serological evaluation in at-risk pediatric populations[5].

The effect of AIT on sexual maturation in boys has been less extensively studied than growth, but emerging evidence suggests significant consequences. Thyroid hormones influence gonadotropin secretion and testicular function. In boys with hypothyroidism due to AIT, luteinizing hormone and follicle-stimulating hormone levels may be altered, resulting in delayed testicular enlargement, slower progression through Tanner stages, and delayed appearance of pubic and facial hair. Early recognition of these delays is critical for planning hormonal therapy and preventing long-term reproductive complications [6].

Longitudinal studies have demonstrated that early intervention with thyroid hormone replacement can improve growth velocity and support timely progression through puberty. For instance, boys treated promptly for hypothyroidism secondary to Hashimoto thyroiditis show normalization of height velocity and catch-up growth over time. Similarly, thyroid hormone therapy helps restore gonadotropin balance and facilitates normal sexual maturation, emphasizing the importance of early diagnosis and individualized treatment strategies [7].

Furthermore, a multidisciplinary approach involving pediatric endocrinologists, primary care physicians, and nutritionists is recommended for optimal management of boys with AIT. Regular monitoring of growth parameters, pubertal staging, and laboratory evaluations allows clinicians to detect subtle developmental delays and adjust therapy accordingly. Studies also suggest that psychosocial support is important, as delayed growth and sexual maturation can affect self-esteem and social interactions in adolescents [8].

Overall, the literature indicates that autoimmune thyroiditis significantly affects both physical growth and sexual development in boys. Integration of clinical assessment, laboratory investigations, and long-term follow-up is essential to minimize developmental delays and optimize health outcomes.

The interplay between thyroid dysfunction and gonadal development underscores the necessity of early detection and a comprehensive treatment approach.

ANALYSIS AND RESULTS

The study included forty boys diagnosed with autoimmune thyroiditis, ranging in age from seven to sixteen years. The primary objective was to evaluate the impact of autoimmune thyroiditis on physical growth and sexual development using clinical examination, laboratory tests, and growth monitoring over a twelve-month period. All participants underwent assessment of thyroid function, measurement of height and weight, bone age evaluation, and pubertal staging according to Tanner criteria.

Laboratory results revealed that a majority of patients with Hashimoto thyroiditis exhibited elevated thyroid-stimulating hormone levels, while free thyroxine and triiodothyronine concentrations were within or slightly below the normal range. These findings are consistent with hypothyroidism and demonstrate a significant impact on overall metabolism and growth patterns. Anti-thyroid peroxidase antibodies were elevated in nearly eighty percent of patients, and anti-thyroglobulin antibodies were present in approximately sixty percent of the cohort, indicating active autoimmune involvement of the thyroid gland.

Physical growth assessment indicated that the average height of patients was below the age-matched 50th percentile, with delayed height velocity in thirty-two boys. Weight gain was also affected, with twelve patients presenting mild underweight conditions. Bone age, as determined by radiographic examination of the left hand and wrist, was delayed by an average of 1.5 years compared to chronological age. These findings confirm that thyroid dysfunction in autoimmune thyroiditis has a significant negative effect on skeletal growth and somatic development.

Pubertal assessment revealed that twenty-four boys experienced delayed onset of puberty. Tanner staging demonstrated that testicular enlargement and the development of pubic hair lagged behind chronological age by an average of twelve months. In patients with more severe hypothyroidism, both gonadotropin levels and testosterone concentrations were lower than expected for age, suggesting that thyroid hormone deficiency disrupts the hypothalamic-pituitary-gonadal axis. In contrast, boys with subclinical hypothyroidism displayed milder delays, highlighting the importance of early detection and monitoring even in cases with subtle laboratory abnormalities.

Correlation analysis demonstrated a clear relationship between thyroid function and both physical and sexual development. Higher levels of thyroid-stimulating hormone were associated with greater delays in height velocity and puberty progression, while normal or slightly elevated free thyroxine and triiodothyronine levels corresponded with more moderate developmental delays. Similarly, elevated anti-thyroid peroxidase antibody titers were correlated with slower pubertal progression and reduced testicular volume, indicating that autoimmune activity contributes directly to developmental impairments.

The study also evaluated the response to thyroid hormone replacement therapy. Fifteen boys who received levothyroxine supplementation demonstrated significant improvement in growth velocity within six months. Height percentile increased, and catch-up growth was observed in twelve patients. Pubertal progression accelerated, with testicular volume and secondary sexual characteristics advancing in alignment with chronological age. Hormonal levels, including luteinizing hormone, follicle-stimulating hormone, and testosterone, showed normalization in response to therapy, indicating that appropriate treatment can mitigate the adverse effects of autoimmune thyroiditis on sexual maturation.

Ultrasonographic examination of the thyroid gland revealed diffuse hypoechogenicity and enlargement in thirty-five patients, while nodular formations were observed in five boys. Structural changes in the gland correlated with both elevated antibody levels and clinical severity, reinforcing the role of ultrasound as a valuable tool for assessing disease progression and guiding treatment decisions.

Overall, the analysis demonstrates that autoimmune thyroiditis in boys significantly affects physical growth and sexual development. Early identification, regular monitoring of height, weight, bone age, pubertal staging, and thyroid function, coupled with timely hormone replacement therapy, is essential to ensure normal developmental outcomes. The study emphasizes the necessity of a multidisciplinary approach, integrating endocrinology, pediatrics, and growth monitoring to optimize patient care and improve quality of life for affected children.

CONCLUSION

Autoimmune thyroiditis significantly affects both physical growth and sexual maturation in boys. The disease disrupts normal thyroid hormone production, which in turn influences skeletal development, height velocity, and the timing of puberty. Clinical evaluation, combined with laboratory assessment of thyroid function and autoantibody levels, provides critical information for detecting growth delays and pubertal disorders early.

The literature and study findings indicate that boys with Hashimoto thyroiditis often exhibit delayed growth, delayed bone age, and impaired progression through Tanner stages, while thyroid hormone replacement therapy can restore growth velocity and support normal sexual development. Early diagnosis and individualized treatment are essential to prevent long-term complications and optimize developmental outcomes.

A multidisciplinary approach, including pediatric endocrinologists, primary care physicians, and nutrition specialists, is crucial for effective monitoring and management. Regular follow-up, growth and pubertal assessments, and timely intervention can ensure that boys with autoimmune thyroiditis achieve normal physical and sexual maturation. Overall, comprehensive evaluation and management strategies improve both health outcomes and quality of life for affected patients.

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