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Rogers Syndrome after Growth Hormone Therapy, Children's Adult Height

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Abstract

Turner Syndrome (TS) is a genetic disorder characterized by short stature in affected females. Growth hormone therapy (GHT) has emerged as a successful intervention to improve linear growth and maximize adult height in these individuals. This abstract summarizes the effects of GHT on the adult height of children with Turner Syndrome. Several studies have shown that GHT significantly increases adult height in girls with Turner Syndrome. Early initiation of treatment, preferably before the age of 4-6 years, is associated with the best outcomes. The duration of treatment also plays a crucial role, with longer treatment periods leading to greater height gains. GHT not only enhances adult height but also improves growth velocity during childhood and adolescence. The therapy stimulates bone lengthening and overall skeletal development, enabling individuals with Turner Syndrome to achieve a height closer to the normal range for their age group. Factors such as dose, compliance, and genetic variations influence the response to GHT. Appropriate dosage and adherence to treatment regimens are essential for optimal results. Genetic modifiers and variations in the growth hormone receptor gene may impact the growth response and adult height outcomes.

Keywords: Growth hormone therapy; Turner Syndrome; growth velocity

Introduction

Turner Syndrome (TS) is a genetic disorder that affects females, resulting from the absence or partial absence of one of the two X chromosomes. Among the various challenges faced by girls with Turner Syndrome, short stature is a common characteristic, with the average adult height falling significantly below the average height of females without the syndrome. Growth hormone therapy (GHT) has emerged as a promising intervention to enhance linear growth and maximize adult height in these individuals. This article explores the effects of growth hormone therapy on the adult height of children with Turner Syndrome [1].

Understanding growth hormone therapy in turner syndrome: Growth hormone therapy involves the administration of synthetic human growth hormone (GH) to individuals with growth disorders, including Turner Syndrome. It aims to stimulate linear growth by increasing bone length and promoting overall skeletal development. GHT is typically initiated at an early age, often before puberty, and continued until near completion of growth.

Benefits of growth hormone therapy

Increased adult height: One of the primary goals of growth hormone therapy in Turner Syndrome is to optimize adult height. Studies have shown that girls with Turner Syndrome who undergo GHT achieve significantly greater height compared to those without treatment. Although the absolute height gain varies, GHT can potentially increase adult height by several centimetres [2].

Improved growth velocity: Growth hormone therapy not only increases final adult height but also improves growth velocity during childhood and adolescence. By accelerating growth, GHT helps these individuals reach a height closer to the normal range for their age group.

Factors influencing height outcomes: Age of Initiation: Early initiation of growth hormone therapy, preferably before the age of 4-6 years, yields the best results in terms of adult height. Starting treatment at an older age may limit the potential for catch-up growth.

Duration of treatment: The longer the duration of growth hormone therapy, the better the chances of achieving improved height outcomes. Treatment spanning several years increases the likelihood of maximizing the individual's growth potential.

Dose and compliance: The appropriate dosage of growth hormone and strict adherence to treatment regimens are crucial for achieving optimal results. Compliance with therapy is vital to ensure consistent hormone levels and sustained effects. Genetic Variations: Genetic factors unique to each individual may influence the response to growth hormone therapy [3]. Variations in the growth hormone receptor gene and other genetic modifiers can affect the growth response and adult height outcomes.

Long-term follow-up and monitoring: Long-term follow-up is necessary to assess the efficacy and safety of growth hormone therapy in Turner Syndrome. Regular monitoring of height, growth velocity, bone age, and hormonal parameters ensures appropriate adjustment of the treatment regimen. Ongoing evaluation also helps identify any potential side effects and address them promptly.

Method

To evaluate the effects of growth hormone therapy (GHT) on the adult height of children with Turner Syndrome, a systematic approach involving clinical studies and longitudinal observations can be employed. The following method outlines the key components of such an investigation:

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Study design: Retrospective or prospective cohort studies involving Turner Syndrome children receiving GHT. Randomized controlled trials (RCTs) comparing GHT with a control group (without GHT) for adult height outcomes. Longitudinal observations with regular follow-up assessments to track growth and height progression [4].

Participant selection

Inclusion criteria: Girls diagnosed with Turner Syndrome, receiving GHT as part of their treatment.

Exclusion criteria: Individuals with other medical conditions affecting growth or height, individuals with incomplete data or inadequate follow-up.

Data collection: Gather baseline demographic information, including age, bone age, pubertal stage, and Tanner staging. Record details of growth hormone treatment, including dosage, frequency, and duration of therapy. Document height measurements at regular intervals throughout the treatment period and into adulthood. Collect relevant data on genetic variations [5].

Control group: For RCTs, assign a control group of Turner Syndrome children not receiving GHT or receiving a placebo. Control group participants should match the treatment group in terms of age, bone age, and other relevant factors.

Data analysis: Calculate growth velocity (cm/year) for each participant during the treatment period. Compare adult height outcomes between the GHT group and the control group, if applicable. Perform statistical analysis using appropriate methods (e.g., t-tests, chi-square tests, regression analysis) to assess the significance of the results. Consider potential confounding factors (e.g., compliance, genetic variations) in the analysis.

Long-term follow-up: Conduct regular follow-up assessments to track adult height outcomes beyond the treatment period. Monitor for any adverse effects or side effects associated with growth hormone therapy. Continue data collection and analysis to evaluate the long-term effects of GHT on adult height.

Ethical considerations: Obtain informed consent from participants or their legal guardians. Adhere to ethical guidelines and regulations for the conduct of research involving human subjects. Ensure confidentiality and privacy of participant data [6].

Results

Several studies have investigated the effects of growth hormone therapy (GHT) on the adult height of children with Turner Syndrome. Here are some key findings from the research:

Increased adult height: Girls with Turner Syndrome who received GHT demonstrated significantly increased adult height compared to those without treatment. The average height gain varied across studies but ranged from several centimetres to over 10 centimetres.

Improved growth velocity: Growth hormone therapy not only increased final adult height but also improved growth velocity during childhood and adolescence. Turner Syndrome children receiving GHT showed a more rapid rate of growth compared to untreated individuals.

Age of initiation: Early initiation of growth hormone therapy, preferably before the age of 4-6 years, was associated with better adult height outcomes. Starting treatment at an older age may limit the potential for catch-up growth and result in a less significant height increase [7].

Duration of treatment: Longer durations of growth hormone therapy were generally associated with greater height gains. Studies have reported positive outcomes with treatment durations ranging from several years to near completion of growth.

Genetic variations: Genetic factors unique to each individual may influence the response to growth hormone therapy. Variations in the growth hormone receptor gene and other genetic modifiers can affect the growth response and adult height outcomes.

Compliance: Adherence to treatment regimens and proper dosage administration are crucial for optimal height outcomes. Good compliance with growth hormone therapy is essential to maintain consistent hormone levels and sustain the positive effects [8].

Individual variability: It is important to note that individual responses to growth hormone therapy may vary due to factors such as age, compliance, and genetic variations. While significant height gains are observed on average, some individuals may show a more limited response. Overall, growth hormone therapy has shown to be effective in increasing adult height and improving growth velocity in children with Turner Syndrome. Early initiation of treatment and longer durations of therapy tend to yield better outcomes. However, individual variability and genetic factors play a role in the response to treatment. Close monitoring and long-term follow-up are crucial to evaluate the sustained effects of growth hormone therapy and address any potential side effects or limitations [9].

Discussion

The discussion of the effects of growth hormone therapy (GHT) on the adult height of children with Turner Syndrome encompasses the findings, implications, limitations, and potential future directions of the research.

Effectiveness of GHT: The results of various studies consistently demonstrate that GHT significantly increases adult height in girls with Turner Syndrome. The average height gain achieved through GHT ranges from several centimetres to over 10 centimetres. This improvement in adult height is primarily attributed to the stimulation of linear growth, bone lengthening, and overall skeletal development by growth hormone [10].

Importance of early initiation: Early initiation of GHT, preferably before the age of 4-6 years, has been shown to yield better adult height outcomes. This highlights the importance of early diagnosis and intervention in Turner Syndrome to optimize the benefits of treatment. Initiating therapy at a younger age allows for a longer duration of treatment, enabling the individual to maximize their growth potential.

Duration of treatment: Prolonged duration of growth hormone therapy is associated with greater height gains. Studies have indicated that treatment durations ranging from several years to near completion of growth produce positive outcomes. Therefore, it is crucial to continue treatment for an appropriate duration to achieve optimal results.

Genetic factors: Genetic variations, including those in the growth hormone receptor gene and other genetic modifiers, can influence the response to GHT. These genetic factors may contribute to individual variability in the height outcomes. Further research into the genetic determinants of response to growth hormone therapy could help personalize treatment approaches and enhance outcomes.

Compliance and dosage: Compliance with treatment regimens and proper dosage administration are critical for optimal height

outcomes. Strict adherence to the prescribed dosage of growth hormone ensures consistent hormone levels and sustained effects. Healthcare professionals should educate patients and their families about the importance of compliance to maximize the benefits of GHT.

Individual variability and limitations: It is important to acknowledge that not all individuals with Turner Syndrome will respond equally to GHT. Factors such as age, compliance, genetic variations, and other patient-specific factors contribute to individual variability in the height response. While the average height gains are significant, some individuals may exhibit a more limited response. Long-term follow-up and monitoring are necessary to assess the sustained effects and individual variability in treatment outcomes [11, 12].

Conclusion

Growth hormone therapy has revolutionized the management of Turner Syndrome, specifically regarding short stature. Early initiation and prolonged treatment duration of growth hormone therapy have been associated with significant improvements in adult height and growth velocity. However, it is important to recognize that individual responses to therapy may vary due to factors such as age, compliance, genetic variations, and other patient-specific factors. Close collaboration between healthcare professionals, patients, and their families is vital to optimize the benefits of growth hormone therapy and enhance the quality of life for individuals with Turner Syndrome; GHT has revolutionized the management of short stature in Turner Syndrome children. It has shown significant improvements in adult height and growth velocity. However, individual responses may vary due to factors such as age, compliance, and genetic variations. Collaborative efforts between healthcare professionals, patients, and their families are crucial for optimizing the benefits of GHT and improving the quality of life for individuals with Turner Syndrome.

Acknowledgement

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Conflict of Interest

None

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