Impact of Growth Hormone Therapy on Quality of Life in Short Stature Children at Minya University Hospital: A Cross-Sectional Study

Noura M El Bakry*and Zamzam H Mohamed

Pediatric Department, Faculty of Medicine, Minya University, Egypt

Corresponding Author*

Noura M El Bakry

Pediatric Department, Faculty of Medicine, Minya University, Egypt

Tel: +20-1000-497498

E-mail: Noura_Mohamed@minia.edu.eg

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Abstract

Background: If a child's height is further more two standard deviations under the mean for children of his or her sex also age, then we say that he or she has short stature.

Quality of life (QOL) is a person's perception of their own state of well-being & functioning over a wide spectrum from the best possible to the worst possible. It involves psychological, physical, cognitive, social, functional & behavioral elements. QOL has also become more important in health care practice and research.

Objectives: to assess the QOL in children previously both idiopathic short stature (ISS) and growth hormone deficiency (GHD) were on the list of diagnoses in addition children on treatment with growth hormone (GH) by daily injection.

Methods: This cross-sectional study involved 200 children between the ages of 8 and 18 who were diagnosed to have GHD and ISS and were on treatment by GH daily injection at the Pediatric Endocrinology Unit at Minia University Hospital from March 2020 until October 2021.

Results: 16% of cases were ISS, and 84% of cases had GHD. Ninety-two percent of our studied cases were already on treatment with recombinant growth hormone (rGH). Children with ISS had significantly reduced physical, psychological, & environmental quality of life. Most affected is the social domain. Comparing treated and untreated groups, there is more emotional affection in the untreated group than the treated group (p less than 0.01).

An evaluation of the various sex classes (boys & girls) in respect to several domains amongst persons was made, but no statistically significant distinction was found.

Conclusions: QOL was impaired in cases of short stature, whether on GH theraphy or not. However, our study showed a significant correlation between PedsQL scores for short stature and age if the first administration of treatment donating early GH therapy had better QOL scores.

Keywords: rGH; QOL; Short stature

List of Abbreviations

GH deficiency (GHD)

Growth hormone (GH)

Health-related quality of life (HRQOL)

Idiopathic Short stature (ISS)

Pediatric Quality of Life Inventory (PedsQL)

Background

Improving symptom alleviation, treatment, and rehabilitation can be greatly aided by putting a greater focus on the children's overall QOL with anxiety disorders. Patient-reported quality-of-life data can provide light on treatment and care issues. In addition, QOL is utilized to quantify the variety of patient-related issues [1].

The Pediatric Quality of Life Inventory (PedsQL) is a quick way to assess youths' health-related QOL. Both parents (through the Proxy Report) and children/youth (by the Self-Report) can fill out this assessment [2].

Physical functioning (eight items), social functioning (five items) emotional functioning (five items), & school functioning (five items) are the four Generic Core Scales that make up the PedsQL's 23 total components[3].

Depending on the etiology, a medical diagnosis of short height might be made at a young age. Treatment with GH treatment can begin at a young age. [4] When a child is 2 or extra SDs under the mean height for children of their age & gender, we call them short-statured (SS). The rate of a child's growth is a reliable measure of the quality of that child's health. It is necessary to look into a child's short height thoroughly in order to rule out any underlying medical conditions [5].

Normal variation, genetic abnormalities, malnourishment, chronic systemic illness, endocrine problems, and psychological deprivation are all possible explanations for short stature. SS caused by GHD, in which there is inadequate GH secretion, is uncommon [6]. Children who do not have GHD often have SS might have a variety of causes, including chronic renal insufficiency, Turner syndrome, birth weight, low Prader-Willi syndrome, and others. Idiopathic SS is the form of SS for which the etiology is uncertain [6]. The medical history should also involve the existence of other members of the family who have a similar illness in order to rule out a genetic etiology, familial SS, or constitutional delay of growth & development. The history of the child is a crucial stage in the evaluation of short stature [7].

The present study aimed to evaluate QOL for children with short stature.

Methods

A study of this kind was carried out at the pediatric endocrinology center, as well as was a cross-sectional trial. Unit at Minia University Hospital for children from March 2020 until October 2021 and had laboratory-confirmed GHD.

Inclusion criteria: children who have a height that is less or equal to two standard deviations, which is the diagnostic criteria for SS according to the Egyptian growth chart for children [4].

Participants of both sexes & ages ranging from eight to eighteen years old were involved.

Exclusion criteria: Children who suffer from any additional conditions, dysmorphic characteristics, or disabilities that have an effect on their QOL.

Sample size: The population being studied was determined to be 196 children utilizing the EPI Info 7 program with a test power of eighty-two percent CI (Confidence interval) as well a ninety-five percent sample size of 196 multiplied by 2. The total number of schoolchildren was assumed to be 115,000, as well as the prevalence of SS was fifteen percent. Therefore, the size of the sample was two hundred dollars.

Assessment of a child who has SS begins with taking a history that involves the following information: name, age, sex, sociodemographic characteristics (employment, domicile, and education level of the patient's father and mother), patient's age at the time of diagnosis, commencement and length of GH therapy, history of conditions that might impact QOL, and so on. The family history included consanguinity, cases of small stature in the family, and a history of recurrent diseases in the family. All of these factors were present. second, an examination was performed to rule out dysmorphic appearance, disabilities, or any chronic disease that affects QOL.

Administration: After being presented by a professional administrator, the PedsQL assessment can be self-administered by parents, children, and young people between the ages of 8 and 18, and the procedure takes around 5 minutes to complete. Clinicians are able to give the inventory to younger children and as an alternative in some circumstances, provided that the child or young person is read the instructions word-for-word and that every item on the inventory is also read to them [4].

Scoring and interpretation: Items on the PedsQL Generic Core Scales are given a negative score & then translated onto a scale ranging from 0 to 100. Higher scores reveal better health-related QOL:

0 ("Never") = 100, 1 ("Almost Never") = 75, 2 ("Sometimes") = 50,

3 ("Often") = 25 & 4 ("Almost Always") = 0

There was a 5-point Likert-scale connection among items, as well as the raw scores were converted twice. Raw scores on the first convert are among four & twenty, while domain scores on the second convert are on a scale from 0 to 100 for ease of understanding in addition comparison with the WHO-QOL-100. The scoring was done in accordance with the guidelines laid out in the WHO-QOL Brief. The domain score was determined by averaging the item scores for that domain [6].

QOL questionnaire: It was conducted using the WHOQOL-BREF Quality of Life Assessment [6, 7], An Arabic translation was utilized. Due to the young age of the sample, one of the questionnaire's 26 items—a question about sexual life appreciation—was removed. If the patients were literate enough, they filled out the questionnaire on their own. Individuals under 18 years old had their parents present during the interview process. The investigator will provide detailed explanations for each inquiry. The proposed measures of quality of life are assessed across four broad categories.

The assessed domains included:

• **Physical health:** Perceived inability to carry out necessary daily activities due to discomfort, dependence on medication for relief, dissatisfaction with sleep, low energy levels, a lack of motivation to learn, & so on as well as so forth.

• **Psychological health**: How the individual feels about his or her body, how happy they are, how meaningful their lives feel, how satisfied they are with life, how focused they are and how often they experience negative emotions like sadness, anxiety, hopelessness, along with depression.

• **Social relationships:** Whether or not the person receiving care is happy with their personal relationships as well as the help they've received from their friends.

• **Environmental domain**: How secure the patient feels in his or her day-to-day life in terms of, for example, the patient's physical environment, the individual's living conditions, the individual's means of transportation, the patient's access to health care, the patient's ability to engage in recreational activities, the availability of information necessary to the patient's well-being, in addition to the individual's sense of personal safety.

Data verification & domain score computation procedures were followed as instructed. A better health status is reflected by a higher score. Ethical considerations: Prior to beginning the study, permission was granted by the appropriate authorities. Each parent was informed of the study's purpose before giving their child's verbal assent. The Ethical Committee of the School of Medicine at Minia University gave their blessing for this study to be conducted. Everyone who took part in the study did so voluntarily. No bonuses were offered. The data's privacy was guaranteed. No competing interests were present.

Study design

This cross-sectional study included 200 children between the ages of 8 and 18 who were diagnosed to have GHD and ISS and were on treatment by GH daily injection at the pediatric endocrinology unit at Minia University Hospital during March 2020 until October 2021 and had laboratory-confirmed GHD.

Setting

The study was done in Minia, Egypt (total population: 8 million as of December 31, 2021). Only Minia University Hospital in Minia City offers tertiary-level services. The number of patients treated at the Minia University Hospital can therefore be used to calculate the occurrence of short stature in this cohort.

Participants

Children with diagnosed SS may participate in the research with the approval of the patient and/or their caregiver. This comprises the prospective collection of structured data on the case history and clinical presentation, counting QoL questionnaires and details of outpatient care.

During March 2020 until October 2021, nearly 90% of diagnosed short-stature children were registered, and 72% consented to the QoL questionnaire. Therefore, the number of registered patients reflects the prevalence of short stature among children in the region.

Statistical evaluation: Non-numerical data were given as percentages, whereas numerical data were presented as means±SD. Using two-tailed t-tests, the differences between the control and patient groups were analyzed. P-values < 0.05 were considered statistically significant.. The correlation coefficient of Pearson determined the magnitude of correlations. Using the statistical software Prism 3.0, all data were evaluated (Graph Pad Software, San Diego, CA, USA). Microsoft Office Excel 2016 was employed to calculate the numbers.

Results

Short-statured patients: 72% of cases are severely affected physically, and 24% are moderately affected physically. Socially, 70% of children are severely affected and 30% are moderately affected. 48% of cases have had severe emotional affection, and 52% of cases have had moderate emotional affection (Figure 1).

Table 1: illustrated the socio-demographic characteristics of the examined group. The study involved 200 participants with SS; 70 of them were female (35%) and 130 of them were male (70%) with ages extending from 8 to 18 years. The mean ± SD age of the participants was 12.1±2. 1 years. Number of children in urban was 91(45.5 2 %) and in rural was 109 (54.5 8%).

Table 2: showed that the mean height of participants was 126.1 ± 11.9cm, and the mean of their weight was 27.9 ± 7.3 kg.

16 patients were diagnosed as ISS and other 84 had GH deficiency (GHD) with 92 patients were on treatment by GH therapy.

Table 3: Comparison between treated and untreated children with short stature regarding QOL scores in the emotional domain was more affected in untreated cases.

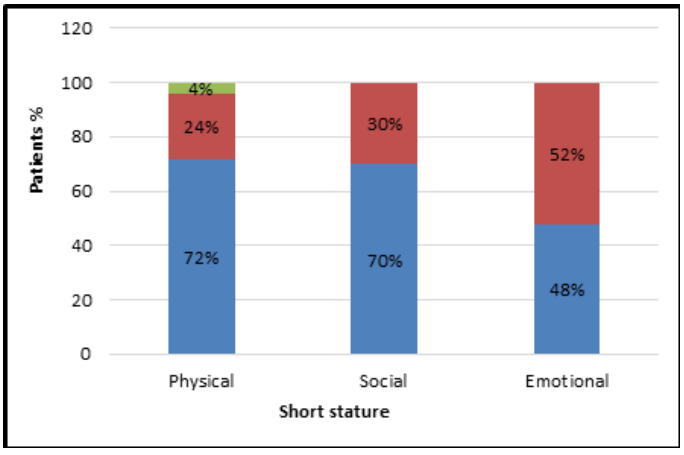

Figure 1: QOL in children with short stature.

Table 1: Demographic data of patients.

	Short stature N=
Age (years)	
Mean ± SD	12.1 ± 2.1
Gender: (N%)	
Males	130 (65%)
Females	70 (35%)
Socioeconomic: (N%)	
urban	91 (45.5%)
rural	109 (54.5%)

Table 2: Clinical data for short stature.

	Short stature
	N= 200
	N %
Idiopathic Short stature (ISS)	16(16%)
GH deficiency (GHD)	84 (84%)
On GH treatment	92 (92%)
Untreated	8(8%)
	Mean ± SD
Weight (kg)	27.08 ± 7.03
Height (Cm)	126.2 ± 11.07
SD of patients	2.11 ± 0.33

Table 3: Comparison between treated and untreated children with short stature regarding QOL scores.

	Group I	**Group II**	
Short stature	**Treated**	**Untreated**	**p value**
	N= 92	**N= 108**	
	Median	**Median**	
	(IQR)	**(IQR)**	
Physical	12.5	10.4	0.759
	(4.02 – 26.10)	(0 – 33.03)	
Social	12.5	20.3	0.445
	(6.03 – 28.01)	(8.56 – 36.97)	
Emotional	25	18.8	**0.016***
	(21.08 – 31.33)	(17.21 – 21.3)	

Table 4: demonstrated that there was a significant correlation among PedsQL scores for short stature and age; the age of the first administration of treatment and the initial dose donated early GH therapy had better QOL scores.

Discussion

Regarding the socio-demographic characteristics of the minors under study, our research involved the socio-demographic characteristics of the group under investigation. The research involved 200 participants with SS, including 70 females (35 percent) and 130 males (70 percent) spanning in age from 8 to 18 years. The mean±SD of the individuals' age was 12.1± 2.1%. The number of urban children was 91 (45.52%), while the number of rural children was 109 (54.58%).

Garganta & Bremer (2019) demonstrated the importance of collecting data beginning in the perinatal and prenatal stages of life [6-9]. Birth weight and length, as well as the mother's general health and lifestyle choices throughout the pregnancy, are particularly important aspects of the history to consider. It is well known that newborns who experience prolonged postnatal SS after having a low birth weight do not fare well in terms of their eventual height. More than two-thirds of the children with SS in our research did not have a history of consanguinity, according to our findings; 1.5 percent had a positive family history of a comparable illness, and 15 percent had a positive family history of chronic disease, such as hypertension and diabetes, but none of the children had a positive family history of SS.

Table 4: Correlation between PedsQL scores for short stature and Age, age of 1st administration of treatment and initial dose.

	Physical		**Emotional**		**Social**	
Short stature	**r**	**p**	**r**	**p**	**r**	**p**
Age	-0.2 26	0.2 36	-0.232	0.112	-0.049	0.746
Age of 1st GH therapy	-0.012	0.922	0.071	0.627	-0.0159	0.27
Dose	-0.03	0.981	0.003	0.824	-0.023	0.892

Rogol and Hayden (2014) study demonstrated that the form of SS known as familial or genetic SS is, in most cases, a benign variety. These people often have a slower-than-average growth rate throughout their lives. When compared to kids with pathologic origins of SS, they often grow at a normal rate [9-12].

Regarding children with SS According to the anthropometric measures in our research, the mean height of cases was 126.1 ± 11.9 cm, and the mean weight was 27.9 ± 7.3 kg.

16 patients were diagnosed as having ISS, and another 84 had GH deficiency (GHD), with 92 patients on growth hormone therapy.

Being overweight relative to one's height is often attributable to hormonal imbalances. Puberty and adult height are often within the normal range in children with GHD or congenital hypothyroidism who are treated adequately [9-13].

Treatment of short-statured children should aim not just to increase linear growth, but also to enhance health-related quality of life (HRQOL). As a result, there is a pressing need for reliable quality-of-life assessment tools that may be tailored to a given medical condition. In this study, we wanted to corroborate previous research on the psychometric properties of the QOL in children with SS.

Wheeler P.et al. (2014) reported academic underachievement while having average IQ, although these findings are likely to reflect particular neurocognitive abnormalities related to certain syndromes rather than the psychosocial effects of having SS. According to the findings of study [14], children with SS have mean test scores that fall within the normal range for IQ, academic success, and conduct (that is, within one standard deviation of the mean).

However, Allen D. (2016) When contrasted head-to-head with children of ordinary height who were otherwise identical to the short children, research consistently revealed that the short children scored worse on academic achievement tests or were more likely to score poor. found that when short children were directly compared to average-height controls who were otherwise similar to the short children, the short children had considerably lower academic achievement test scores or a larger risk of low scores than controls.

Stratford et al.(2019) In the Netherlands, researchers looked into how SS affected students' grades. A random sample of 140 children aged 7-9 years old (below the 3rd centile) was contrasted with a similar number of children aged 7-9 years old (in the range of the 10th & 90th centiles) as a control group. The small children's confidence and demeanor were typical, however they were often distracted and had trouble focusing. They had a moderate intelligence but poor performance, especially in reading [15].

Short children are disproportionately represented in low-income households, which are thought to be a major contributor to their underachievement. Examining demographic differences helped researchers learn more about the ways in which age and gender may influence scale scores, which may then be factored into future studies' scoring and clinical interpretation.

Our results showed the mean value of the physical domain was 12.5, the social domain was 12, and the emotional domain was 25 in treated cases compared to untreated cases, which were more affected in the emotional domain.

Also Rohenkohl A.et al. (2016) showed that Parents of males reported their children having a higher QoL (M = 79.58±14.84) compared to Parents of girls (M = 70.07±17.06) [16].

There was no statistically significant distinction among older and younger individuals or between males and females across all domains studied.

Our study showed a significant correlation between PedsQL scores for short stature and age; the age of the first administration of treatment and the initial dose of early GH theraphy had better QOL scores. Silva et al. (2018) suggested that children who were treated and grew to a normal height had greater QoL than those who were not treated and had SS at the time [17].

Our research shows that raising a child with GHD who reaches a healthy adult height is less stressful than caring for one with ISS and current short stature.

Regardless of the child's diagnosis, treatment status, or current height deviation, we found that improved psychosocial functioning was associated with improved parental quality of life through reduced caregiver stress.

Based on these findings, it is recommended that multidisciplinary approaches in pediatric endocrinology focus on the whole family, not only the child's GH treatment, by addressing the parents' stress in addition to the child's psychosocial functioning [17].

Despite our findings, Bullinger et al.(2019) The following measures indicated significant variations in height across groups: Physical (p = 0.043), Social (p = 0.009) & Emotional (p = 0.044), demonstrating that taller children have greater QOL, as expected. The entire score demonstrated similar discriminated validity (p = 0.035), [2] also Results from the examination of the parent-reported version were similar in that group, with some variations according to height. There were statistically significant distinctions among the groups on the Physical (p = 0.001), Social (p = 0.001), QoL, and Total Score measures (p = 0.003), but not on the Emotional measure (p = 0.06). It's possible that a different questionnaire was used, and that's why we got different findings [18].

This was also supported in a Al-Uzri, A. et al., (2013) study that demonstrated a correlation among children's and adolescents' current height deviation and their coping behaviors and health-related quality of life (HRQOL), indicating that children's & adolescents' height deviation may have indirect consequences on psychological difficulties [19,20].

Conclusion

Short-stature patients, whether on GH therapy or not, have lower QOL. The social domain is the most affected amongst SS children.

Declarations

Ethics approval: All procedures in this study were performed out in agreement with the rules and regulations established by the relevant authorities and with the approval of the medical school's ethical review board.

Consent to participate: In order to participate in the research, each parent gave their written agreement. The participant's privacy and anonymity must be preserved. Keeping away from tricks and traps Allowing people to drop out of our study if they so want. Authorization to publish has been granted.

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