

Original Article

Assessment of Psychosocial Status among Short-stature Children with and without Growth Hormone Therapy and Their Parents

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Abstract. To evaluate the psychosocial status of short children with and without growth hormone therapy (GHT) and that of their parents, self-administered questionnaires were collected from patients and parents who regularly visit the outpatient clinics participating in the Child Health and Development Network. Completed questionnaires were received for one hundred and thirteen patients with GHT and 67 patients without GHT. According to the parents, both children with GHT and without GHT have no difficulty in their daily lives (89% vs. 95%) and are positive (56% vs. 65%), respectively. Ninety-eight percent of parents of children with GHT and 83% of parents of children without GHT had expected the current treatment strategy to be effective. Parents of children with GHT are more satisfied with the current therapy than those without GHT (79% vs. 50%), and feel less anxiety about the on-going therapy than (31% vs. 58%, respectively). Children treated with or without equally reported having no difficulty in their daily lives (90% vs. 93%), and being positive in their lives (81% vs. 75%, respectively) despite their short stature. Although less than one third of the patients have been bullied in their classroom (26% with GHT vs. 29% without GHT), younger and shorter children tend to be bullied more often. Short children undergoing GHT and their parents have anxiety regarding their height and expectations of the effect of GHT. It is important for doctors to inform their patients regarding realistic height expectations before starting GHT. Additionally, medical consultation is recommended for patients who remain below -2 SD in height despite GHT.

Key words: hort stature, growth hormone therapy, quality of life

Introduction

It has been reported that many short children suffer from problems at school and with peer relationships. These difficulties with peer relationships, as well as low self-esteem seem to influence the psychosocial status of some individuals with short stature. Additionally, short stature children are often found to exhibit behavioral disturbances including immaturity, inhibition and anxiety and are victims of bullying

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Table 1 Number of cases

	GHT	Not on GHT
Patient	80 (boys=66, girls=14)	31 (boys=11, girls=21)
Family	113 (F=6, M=107)	67 (F=8, M=59)

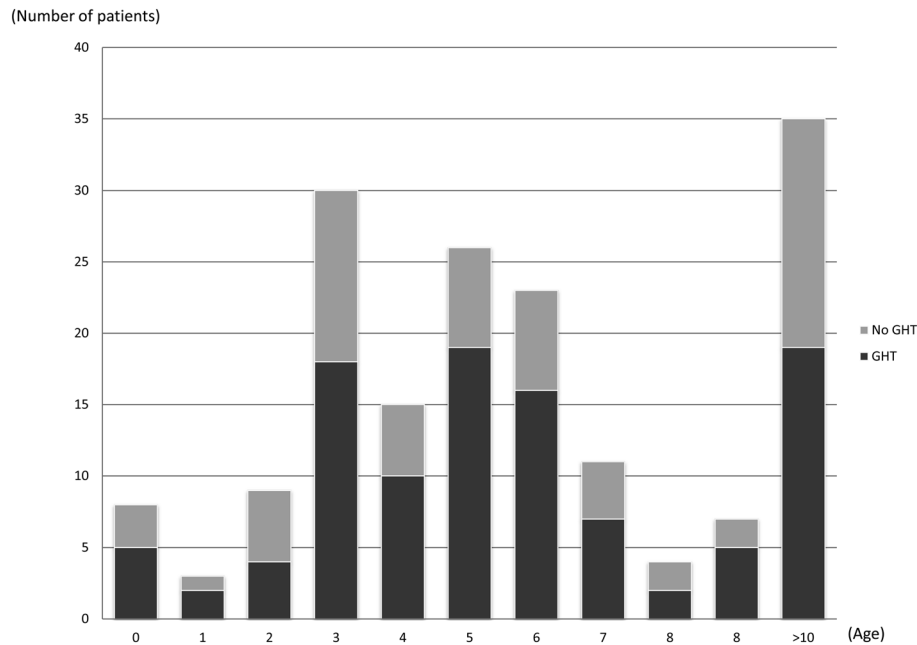


Fig. 1 Age distribution of patients at first visit complaining of short stature. Black bars indicate patients with GHT, and gray bars indicate those without GHT.

by peers (1). Often attributed to overprotection by families and aversive social experience related to the child's short stature, these difficulties can lead to impaired emotional and social development, poor-self perceptions of well-being, and a reduced quality of life (QOL).

In contrast to the well-established physiological benefits of growth hormone treatment (GHT), the potential psychological effects of the treatment are less clear. Recently, there is increased research focused on the effect of GHT on the QOL of patients (2, 3). However, a few studies have shown multiple impairments in QOL in short versus normal height children (4).

We undertook a multicenter study to evaluate the psychosocial status of short-stature children and their parents with or without GHT.

Short stature children with and without GHT enrolled in the Child Health and Development Network were compared.

Subjects and Methods

One hundred and thirteen children diagnosed as having growth hormone deficiency were treated with the recommended dose of growth hormone, and 67 children diagnosed with idiopathic short stature were observed without GHT. Self-administered questionnaires were collected from children with short stature (age range: 3 to 18 yr) and their families who regularly visit the outpatient clinics participating in the Child Health and Development Network. Numbers of collected answers are shown in Table

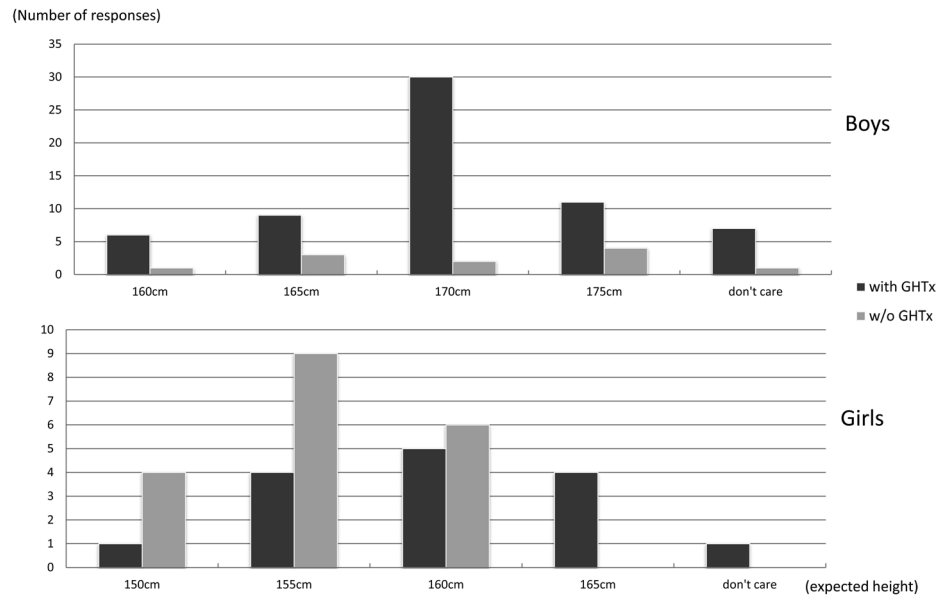


Fig. 2 Distribution of expected adult height of children according to GHT status. The upper panel shows boys, and the lower panel shows girls. Black bars indicate patients with GHT, and gray bars show those without GHT.

1, while the age distribution of children is shown in Fig. 1. The mean \pm SD of the height SD scores (HtSDS) were -1.99 ± 0.98 SD and -2.29 ± 0.74 SD for patients with and without GHT, and the difference was not significant ($p=0.057$). There are peaks in the number of children aged 3, 5, 6 and older than 10 yr. Children younger than 6 yr old who could not answer the questionnaire by themselves were excluded.

Statistical analysis was performed by Fisher's exact test and Pearson product-moment correlation coefficient. $p < 0.05$ was defined as statistically significant. Statistical analysis was performed using GraphPad Prism (GraphPad software, La Jolla, CA). Medical ethics review committees had not yet been established at our hospital when this study was designed, but informed consent was obtained from all participants.

Results

The distributions of the expected adult

height of both children and parents with or without GHT are shown in Figs. 2 and 3, respectively. The half of expected adult height of boys who received GHT was around 170 cm, but it varied widely among boys without GHT. The median expected adult height of girls who received GHT was 160 cm, but it ranged between 150 cm and 160 cm among girls without GHT (Fig. 2). The expected adult height of boys as estimated by their parents was greater than that the estimation of the boys themselves, regardless of GHT.

There was no correlation between the target height and the expected adult heights predicted by the father, mother or by the boys themselves. Only the expected adult heights as estimated by the girls with or without GHT correlated with the target height ($R^2=0.003$ and 0.093 , respectively).

As summarized in Table 2, most parents reported that the current therapy is effective (98% with GHT vs. 83% without GHT). However, parents of children receiving GHT were more satisfied with the therapy than

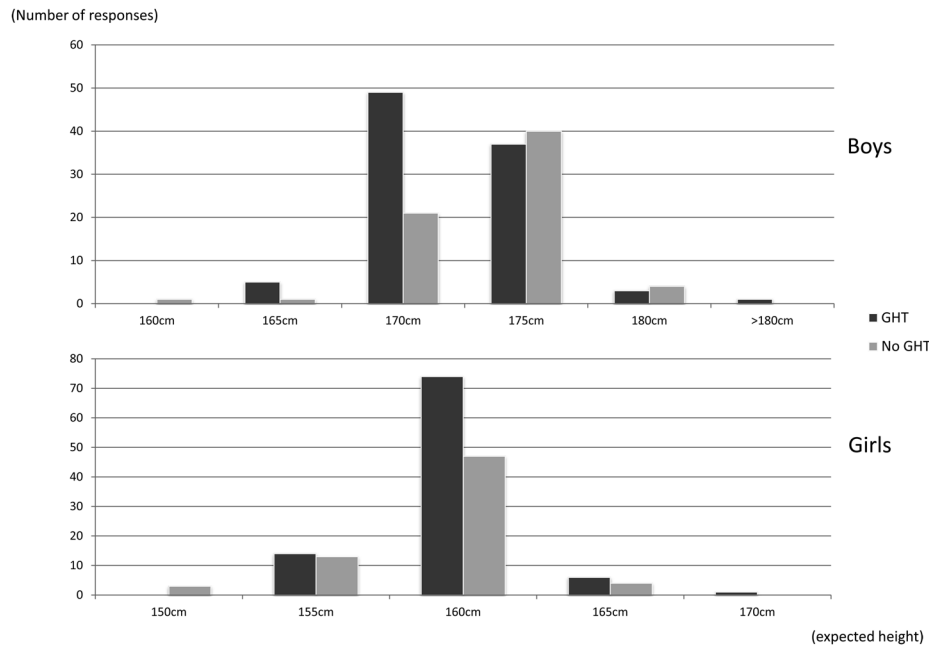


Fig. 3 Distribution of parents' expected adult height according to GHT status of their children. The upper panel shows boys and the lower one shows girls. Black bars indicate patients with GHT, and gray bars show those without GHT.

parents of children without GHT (79% vs. 50%, respectively). Additionally, parents of children not receiving GHT were more anxious about therapy than parents of children with GHT (58% vs. 31%, respectively). These questions revealed statistically significant differences between parents of children with and without GHT ($p=0.0005$). Most parents worried about their children's height (92% with GHT vs. 97% without GHT). According to parents of children with and without GHT, respectively, their children were having no difficulty in their daily lives (89% vs. 95%), were positive (56% vs. 65%), had been bullied in their classroom (25% vs. 25%), and were worried about their own height (61% vs. 63%). No significant differences were observed for these questions.

Children who received GHT and those who did not reported a similar likelihood of feeling inferior about their shortness (79% vs. 83%), being unsatisfied with their height (84% vs. 90%), expecting GHT to make them taller

(81% vs. 75%), having no difficulty in their daily lives (90% vs. 93%), being positive (81% vs. 75%), having been bullied in their classroom (26% vs. 29%), and worrying about their height (56% vs. 55%), respectively. However, children receiving GHT showed a greater expectation to be taller versus those without GHT (97% vs. 83%, respectively). Also, there was a tendency for patients of a younger age and shorter stature to be more likely to be bullied (Fig. 4).

Lastly, responses to each question by parents of children receiving GHT were divided according to their children's height (Table 3). In this analysis, anxiety regarding treatment and expectations for GHT effectiveness were greater among parents of children with an HtSDS that was still below -2 SD despite GHT. The need for medical consultation was also significantly higher in children shorter than -2 SD.

Table 2 Responses to questionnaires by children

Questions	Ratio of positive responses by parents		
	GHT (n=113)	Not on GHT (n=67)	
Expectation for efficacy of on-going therapy	98%	83%	p=0.0004
Satisfaction with on-going therapy	79%	50%	p=0.0002
Anxiety regarding efficacy of on-going therapy	31%	58%	p=0.0005
Family's anxiety for children's height	92%	97%	n.s.
Having no difficulty in their daily life	89%	95%	n.s.
Child's positivity	56%	65%	n.s.
Bullying in classroom	25%	25%	n.s.
Child's anxiety regarding their own height	61%	63%	n.s.

Questions	Ratio of positive responses by children		
	GHT (n=81)	Not on GHT (n=31)	
Realizing their shortness	79%	83%	n.s.
Satisfaction with height	16%	9%	n.s.
Expectation to be taller	97%	83%	p=0.0169
Expectation for GHT	81%	75%	n.s.
Enjoying their own life	90%	93%	n.s.
Positivity in their own life	81%	75%	n.s.
Being bullied in the classroom	26%	29%	n.s.
Anxiety regarding their own height	56%	51%	n.s.

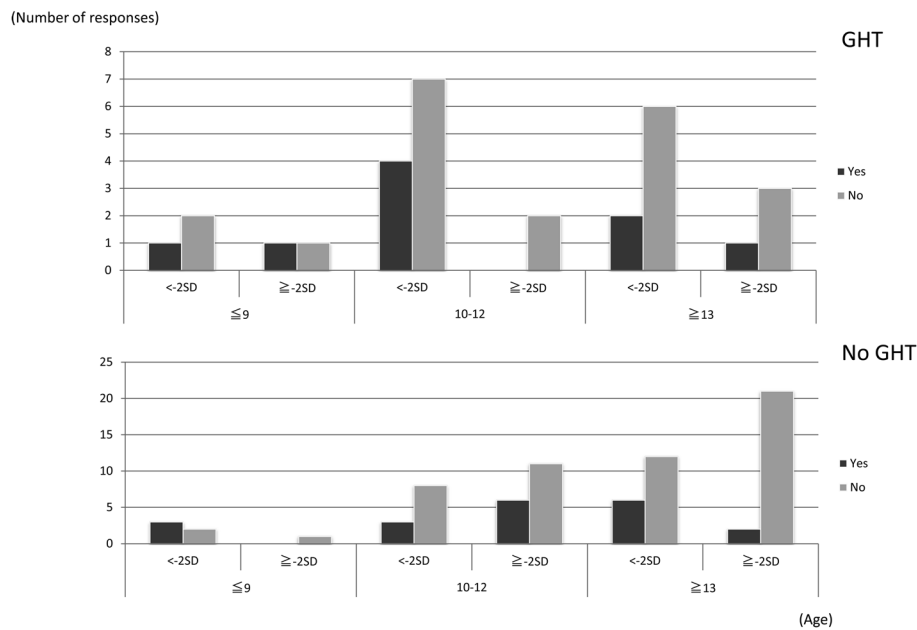


Fig. 4 Numbers of children being bullied by peers according to their GHT status, age range and height. The numbers are divided by the patient's age (younger than 9 yr old, age between 10 to 12 yr old and older than 13 yr old). Each group was also divided by patient height below or above -2SD. The upper panel shows patients with GHT, and the lower panel shows those without GHT. Black bars indicate numbers of patients that have been bullied and gray bars show the numbers of those who have not been bullied.

Table 3 Responses to questionnaires by children

Questions	Number of positive responses by family		p-value
	GHT (n=113)		
	patient's height <-2.0 SD	patient's height >-2.0 SD	
Do you think your child is short?	52 (100%)	42 (85%)	p=0.0024
Do you have positive expectations for your child's on-going treatment?	50 (96%)	47 (100%)	n.s.
Are you satisfied with your child's on-going treatment?	37 (75%)	38 (80%)	n.s.
Are you worried about the on-going treatment?	7 (77%)	7 (14%)	p=0.0003
Do you think your child will grow up to your expected height?	8 (13%)	9 (18%)	n.s.
Do you need medical consultation?	21 (42%)	8 (16%)	p=0.0076
Do you think your child has no difficulty in one's daily life?	48 (92%)	43 (87%)	n.s.
Is your child bullied by other children?	11 (21%)	10 (21%)	n.s.
Does your child have a good appetite?	23 (44%)	31 (63%)	n.s.
Questions	Number of positive responses by patients		p-value
	GHT (n=80)		
	patient's height <-2.0 SD	patient's height >-2.0 SD	
Do you feel you are short?	30 (88%)	31 (75%)	n.s.
Do you have positive expectations for your on-going treatment?	34 (100%)	40 (97%)	p=0.0012
Are you satisfied with your on-going treatment?	22 (65%)	31 (75%)	n.s.
Do you need medical consultation?	13 (39%)	3 (6%)	p=0.0003
Do you have no difficulty in your daily life?	32 (88%)	38 (90%)	n.s.
Are you bullied by other children?	12 (34%)	8 (19%)	n.s.
Do you have a good appetite?	21 (60%)	32 (76%)	n.s.

Discussion

The subjects in this study are patients who visited the hospital complaining about short stature and did not include individuals who did not visit a hospital despite their shortness. Thus, this study may be limited by a selection bias. The age distribution of patients at first visit peaks at 3 and 6 yr of age. These are the ages at which children receive public health checks, which are effective for detecting disorders of growth. Children younger than 6 yr rarely feel psychosocial stress because of their short stature. However, parents of these young children, especially mothers, feel anxiety regarding their child's stature. Thus, in most cases, these children are brought to a clinic not because they want to be taller, but because of parental concern. This

may also be true for older children who answered the questionnaires, since parents' anxiety for their children's height is much higher than the children's anxiety for their own height.

Many children with short stature have been reported to have behavioral problems. Short boys were more than twice as likely to be bullied in comparison with boys of normal height. Social rejection, name calling, and bullying by peers may have deleterious effects on social and emotional maturity and may lead to poor adaptation in adult life (5).

In this study, however, most short children appeared to have no difficulty in their daily lives, and their parents recognized this positive attitude. However, approximately 25 to 30% of short children reported experiencing bullying in the classroom. Tanaka *et al.* (4) compared

QOL between short and normal height children and reported that 20% of both groups reported bullying. Indeed, in the current study, the percentage of short children being bullied was not significantly greater than that of normal children.

Although short children have no difficulty in their daily lives, they are not satisfied with their height, feel inferior, and worry about their stature. It has previously been reported that GHT ameliorated problems in behavior (3) and improved the psychological problems caused by short stature (6). In this study, we could not evaluate the effect of GHT because we did not collect questionnaires before GHT. But this study addressed the psychological problems of short children according to GHT status. Although parents of both children receiving and not receiving GHT have some anxiety about their children's height, the anxiety regarding on-going therapy is greater among parents with children not on GHT. It is understandable that growth improvement in short children who are on GHT decreases the anxiety of their families and increases the satisfaction and the expectation for on-going therapy.

Short children receiving GHT are more likely to expect to become taller than children not receiving GHT. The medians of the expected adult heights for the short boys and girls on GHT were 170 cm and 160 cm, respectively. However, the mean achieved adult heights of GH-treated boys and girls were reported to be 160.3 cm and 147.8 cm, respectively (7). In reality, it is difficult for most patients with GHT to reach their expected adult height. Therefore, it is important for doctors to inform patients and parents before starting treatment that GHT cannot guarantee the attainment of their expected adult height. An unrealistically high expectation might result in patients disappointment at the end of GHT.

Short children on GHT and their parents have high expectations of the treatment. However, parents of children who are still below -2 SD despite active GHT worry about

the efficacy of GHT. Medical consultation is recommended for such patients and families. In this situation, medical counseling is needed to encourage such patients and families to continue GHT. Additionally, it might be necessary for doctors to increase the GH dosage to ensure the growth promoting effect of GHT.

In conclusion, although short children have no difficulty in their daily lives despite their short stature, they are not necessarily satisfied with their height. Short children on GHT and their parents are anxious regarding their height and their expectations of the treatment effectiveness. Before starting GHT, patients should be properly informed by their physicians regarding realistic expectations of the treatment effect. Finally, medical consultation is recommended for the patients who remain below -2 SD despite being on GHT.

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