

The difference of body mass index (BMI) score before and after gonadotropin-releasing hormone agonist (GnRHa) treatment in central precocious puberty girls

Yujung Choi, Seonhwa Lee, Seulki Kim, Moonbae Ahn, Shinhee Kim, Wonkyoung Cho, Kyoungsoon Cho, Minhoo Jung, and Byungkyu Suh*

Department of Pediatrics, College of Medicine, Catholic University of Korea

* No conflicts of interest to we solve.

Purpose We investigated the difference of body mass index (BMI) score before and after gonadotropin-releasing hormone agonist (GnRHa) treatment in central precocious puberty girls (CPP).

Methods Medical records of 188 girls with CPP treated with GnRHa were reviewed. All patients completed the therapy. The patients were categorized into two groups according to initial BMI; normal weight group (BMI < 85 percentile) and overweight/obesity group (BMI ≥ 85 percentile). We analyzed chronologic age (CA), bone age (BA), BA advancement (BA-CA), height (Ht), Ht-standard deviation score (Ht SDS), BMI, BMI SDS, predicted adult height (PAH) before treatment initiation and after treatment completion.

Results Initial BA, Ht SDS, PAH, mid-parental height and the total durations of treatment showed no differences between two groups. But initial CA of the overweight/obesity group was lower than that of normal group and BA-CA of the overweight/obesity group was higher than that of the normal group.

When comparing the height outcomes of two groups, ΔPAH showed no differences between two groups.

BMI SDS increased only in the normal weight group. On multiple regression analysis, ΔBMI SDS was negatively correlated with initial BMI SDS ($r = -0.32$, $P < 0.001$), and it showed no correlation with CA, BA, BA-CA, height SDS.

When the group of patients with increased BMI after the therapy was compared with the group of decreased BMI, no difference in ΔBA-CA and ΔPAH was found.

Conclusion BMI SDS increased after GnRHa treatment in CPP girl whose initial BMI SDS was normal. The lower the pre-treatment BMI SDS, the more the post-treatment BMI SDS increased.

Table 1. Auxological characteristics of the study subjects stratified by body mass index before treatment

	Total (N = 188)	Normal (n = 155)	Overweight/Obese (n = 33)	P value ^a
Chronological age (years)	8.36 ± 0.49	8.40 ± 0.46	8.17 ± 0.57	0.016*
Bone age (years)	10.32 ± 0.83	10.30 ± 0.83	10.40 ± 0.87	0.521
BA-CA ^b (years)	1.96 ± 0.78	1.90 ± 0.75	2.23 ± 0.86	0.028*
Height SDS	0.92 ± 0.87	0.87 ± 0.80	1.18 ± 1.14	0.067
BMI SDS	0.31 ± 0.85	0.03 ± 0.58	1.66 ± 0.58	<0.001*
Mid-parent height (cm)	160.28 ± 3.80	160.27 ± 3.71	160.35 ± 4.25	0.915
Predicted adult height (cm)	157.33 ± 6.03	157.50 ± 5.40	156.50 ± 8.44	0.388
Duration of treatment (years)	1.63 ± 0.68	1.65 ± 0.70	1.50 ± 0.57	0.246

Table 2. Changes in the difference between bone age and chronological age and predicted adult height

	Normal (n = 155)	Overweight/Obese (n = 33)	P value ^a
Δ BA-CA ^b (years)	-0.20 ± 0.61	-0.08 ± 0.88	0.352
Δ Predicted adult height (cm)	0.87 ± 4.07	0.73 ± 6.92	0.875

Table 3. Auxological characteristics of the study subjects before and after the treatment

	Normal (n = 155)		Overweight/Obese (n = 33)		P value ^a
	Before treatment	After treatment	Before treatment	After treatment	
Age (years)	8.40 ± 0.46	9.91 ± 0.64	8.17 ± 0.57	9.60 ± 0.59	<0.001* <0.001*
Bone age (years)	10.30 ± 0.83	11.61 ± 0.46	10.40 ± 0.87	11.75 ± 0.52	<0.001* <0.001*
Height SDS	0.87 ± 0.80	0.59 ± 0.87	1.18 ± 1.14	0.82 ± 1.09	<0.001* 0.009*
BMI SDS	0.02 ± 0.58	0.22 ± 0.68	1.66 ± 0.58	1.53 ± 0.72	<0.001* 0.411

Table 4. Percentage of the patients with increased body mass index standard deviation score

	Δ BMI SDS		Total	χ ² (p) ^a
	Decreased	Increased		
Normal weight	51(32.9)	104(67.1)	155	5.485
Overweight/Obese	18(54.5)	15(45.5)	33	(0.019*)

Table 5. Multiple linear regression analysis of the factors that affected the changes in body mass index standard deviation score after the treatment

Covariate	Δ BMI SDS		P value ^b
	β	SE ^a	
Chronological age (years)	-0.03		0.642
Bone age (years)	0.1		0.147
BA-CA ^c (years)	0.13		0.064
Height SDS	0.09		0.208
BMI SDS	-0.32	0.04	<0.001*
Duration of treatment (years)	-0.11		0.121
Δ BA-CA ^c (years)	0.82		0.242
Δ Predicted adult height (cm)	-0.48		0.497

Table 6. Changes in the difference between bone age and chronological age and predicted adult height according to the changes in body mass index standard deviation score

	Δ BMI SDS < 0 (n = 69)	Δ BMI SDS > 0 (n = 119)	P value ^a
Δ BA-CA ^b (years)	-0.21 ± 0.83	-0.16 ± 0.56	0.672
Δ Predicted adult height (cm)	0.90 ± 5.53	0.81 ± 4.12	0.894