



Lindsey Yoojin Chung, Hyo-Kyoung Nam, Rimm Huh,
Young-Jun Rhie, Kee-Hyoung Lee

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

BACKGROUND

Adolescent idiopathic scoliosis (AIS) is most common form of scoliosis. This form is diagnosed in the period of growth spurts and puberty changes. In patients with central precocious puberty(CPP), growth spurts start earlier than their peers. Therefore AIS in patients with CPP is expected to develop earlier before 10 years of age, especially in girls.

OBJECTIVE

- Determine the incidence of AIS in girls with central precocious puberty
- Evaluate an effect of GnRH agonists treatment for CPP patients on progression of scoliosis

METHODS

- **Subject**
 - Medical records of 553 girls, 338 with CPP and 215 without CPP
 - CPP group
 - Onset of breast development before the age of 8 yr
 - LH peak ≥ 5.0 IU/L by leuprolide stimulation test
 - Non-CPP group (Control)
 - Visited to check for growth/development btw 8-9 yrs old
 - Age, Height, Weight, BMI, bone age and peak LH level
- **Definition of Scoliosis**
 - Cobb angle(CA) $\geq 10^\circ$ (measured on standing frontal radiograph)
- **CPP group, follow up spine radiographs after 1yr of GnRH agonists treatment**

RESULTS

Table 1. Baseline Characteristics and Incidence of AIS

	CPP (n=338)	Control (n=215)	P-value*
Age (year)	8.3 \pm 0.7 [†]	8.4 \pm 0.3	0.130
Height (cm)	132.6 \pm 6.6	129.2 \pm 5.0	<0.001
Weight (kg)	30.9 \pm 5.6	29.4 \pm 5.8	0.002
BMI (kg/m ²)	17.5 \pm 2.3	17.5 \pm 2.6	0.948
Ht SDS	0.8 \pm 0.9	0.1 \pm 0.9	<0.001
Wt SDS	0.6 \pm 1.0	0.5 \pm 1.2	0.115
BMI SDS	0.3 \pm 1.0	0.3 \pm 1.1	0.993
Bone age	9.9 \pm 0.8	9.2 \pm 0.7	<0.001
Cobb angle (°)	4.6 \pm 3.9	4.3 \pm 3.6	0.486
Scoliosis (Cobb angle >10°)	39(11.5%)	13(6.0%)	0.031 [‡]

* Statistical significance was evaluated by t-test

[†] Mean \pm Standard deviation

[‡] Statistical significance was evaluated by chi-square test

Table 2. Correlation of the Cobbs' Angle with Anthropometric Characteristics and Peak LH in CPP group

	Total (n=553)		CPP (n=338)	
	Correlation	P-value *	Correlation	P-value *
Age (year)	-0.044	0.300	-0.019	0.725
Height (cm)	0.010	0.806	0.004	0.947
Weight (kg)	-0.030	0.485	-0.050	0.360
BMI (kg/m ²)	-0.040	0.347	-0.063	0.251
Height SDS	0.038	0.367	0.017	0.758
Weight SDS	-0.008	0.853	-0.066	0.225
BMI SDS	-0.037	0.388	-0.064	0.243
Bone age	0.021	0.615	0.011	0.838
Peak LH (mIU/mL)	-	-	0.123	0.023

* Statistical significance was evaluated by Pearson correlation

Table 3. Scoliosis Predictors Selected by the Logistic Regression Model

Predictors	Coefficient value	S.E.	P-value	Odd ratio	95% CI	
					Lower	Upper
CPP	0.706	0.333	0.034	2.027	1.055	3.892
Age	-0.441	0.204	0.031	0.643	0.431	0.960
Height (cm)	-0.011	0.023	0.629	0.989	0.945	1.035
Weight (kg)	-0.044	0.027	0.106	0.957	0.908	1.009
BMI(kg/m ²)	-0.115	0.065	0.077	0.892	0.785	1.013
Height SDS	0.136	0.151	0.371	1.145	0.851	1.541
Weight SDS	-0.127	0.142	0.372	0.881	0.667	1.164
BMI SDS	-0.251	0.148	0.090	0.778	0.582	1.040

Table 4. Change of scoliosis after 1 year of GnRH agonists treatment in CPP patients

	at diagnosis of CPP	1yr after GnRHa treatment	p-value
Cobbs' angle	5.24 \pm 4.34*	4.30 \pm 3.19	0.315 [†]
AIS $\geq 10^\circ$	17/116	3/116	<0.001 [‡]

* Mean \pm Standard deviation

[†] Statistical significance was evaluated by paired t-test

[‡] Statistical significance was evaluated by chi-square test

SUMMARY & CONCLUSIONS

- An incidence rate of idiopathic scoliosis in CPP girls is **higher (11.5%)** than control (6.0%, p=0.031)
- Peak LH level correlated with Cobb angle (p=0.023) and diagnosis of CPP and Age are predictors of AIS
- **No progression** of scoliosis during GnRH agonists treatment
- Further longitudinal study regarding the effects of GnRH agonists for patients of AIS with CPP is needed

