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## Background and Objective

In idiopathic central precocious puberty (ICPP), puberty is advanced, and the increase of sex hormone level can lead to accelerated maturation and early closure of the epiphysis, and the space and time for growth are greatly reduced, thus affecting the adult height of the child [1].

Small for gestational age (SGA) is an infant whose birth weight is below the 10<sup>th</sup> percentile of the average body weight of the same gestational age. Related studies have shown that SGA is a risk factor for ICPP. Compared with children born appropriate for gestational age (AGA), the incidence of ICPP in SGA is earlier and progresses faster[2]. So children with SGA are at a higher risk of being below the target height. It has been reported that SGA children have a rapid increase in body weight during early childhood (ie, catch-up growth), which is associated with an increased risk of metabolic syndrome in adults [3, 4].

This study aims to compare the physical development status, level of blood glucose and lipid metabolism in small for gestational age (SGA) and appropriate for gestational age (AGA) groups with idiopathic central precocious puberty (ICPP).

## Methods

A retrospective analysis of 322 girls with ICPP was divided into AGA group (304 cases) and SGA group (18 cases) according to gestational age and birth weight.

Physical index such as height, weight and body mass index (BMI), as well as blood lipid levels, fasting blood glucose, insulin levels and homeostasis model assessment for insulin resistance (HOME-IR) were compared between the two groups.

## Results

**Table 1.** Basic situation of the two groups(x ± s)

Group	N	CA(year)	BA (year)	Tanner stage
SGA	18	8.23±0.91	9.96±0.90	2.39±0.61
AGA	304	8.26±1.08	10.18±1.01	2.66±0.70
t		0.139	0.915	1.616
P		0.889	0.361	0.107

**Table 2.** Comparison of physical indicators between the two groups (x ± s)

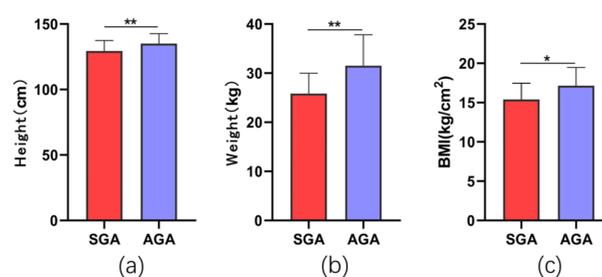
Group	Height(cm)	Weight(kg)	BMI(kg/m <sup>2</sup> )
SGA	129.44±8.06	25.83±4.16	15.40±2.08
AGA	135.00±7.63	31.50±6.31	17.16±2.31
t	2.996	5.43	3.148
p	0.003	<0.001	0.002

**Table 3.** Comparison of fasting blood glucose and fasting insulin levels between the two groups (x ± s)

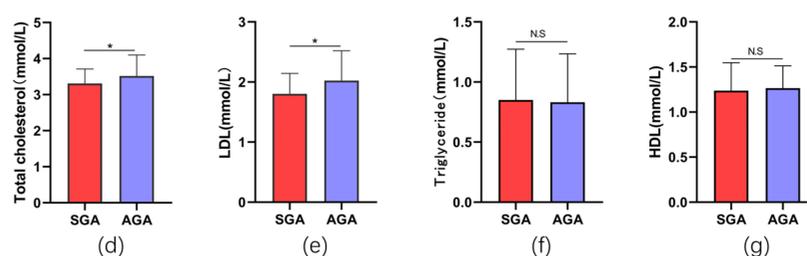
Group	FPG(mmol/L)	FINS(mIU/L)	HOMA-IR
SGA	4.66±0.52	5.65±3.68	1.20±0.85
AGA	4.73±0.44	6.81±3.55	1.44±0.78
t	0.658	1.343	1.29
P	0.511	0.181	0.198

**Table 4.** Comparison of blood lipid levels between the two groups(x ± s)

Group	Cholesterol (mmol/L)	Triglyceride (mmol/L)	HDL (mmol/L)	LDL (mmol/L)
SGA	3.31±0.40	0.85±0.42	1.24±0.31	1.78±0.38
AGA	3.52±0.58	0.83±0.40	1.27±0.25	2.02±0.50
t	2.084	-0.189	0.465	2.05
P	0.049	0.85	0.642	0.041



**Figure 1.** Comparison of physical indicators between the two groups (a) height of the two groups (b) weight of the two groups (c) BMI of the two groups (\*P<0.05; \*\*P<0.01)



**Figure 2.** Comparison of blood lipid levels between the two groups (d) cholesterol levels in the two groups (e) LDL levels in the two groups (f) triglyceride levels in the two groups (g) HDL levels in the two groups (\*P<0.05; N.S=no significance)

## Conclusions

Children in SGA with CPP have a higher risk of short stature in adulthood.

The catch-up growth of SGA children may lead to puberty developmental disorders and metabolic diseases;

If the catch-up is not formed, the body will continue to be short and may affect its physiological and mental health.

Therefore, regular follow-up and evaluation should be carried out for growth and development and metabolic indicators of SGA children in order to prevent and promptly intervene in related diseases.

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