Obesity has a significant impact on hyperandrogenemia only after puberty in Korean girls

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INTRODUCTION

As metabolic complication and polycystic ovarian syndrome due to childhood obesity is rising, the role of hyperandrogenemia (HA) and hyperinsulinism is receiving attention.

The aim of this study

- To investigate the presence or absence of obvious HA according to pubertal status
- To find potential etiologic determinants of HA in Korean obese girls

SUBJECTS & METHODS

- 91 subjects, aged 6-17 years
- Prepuberty (n=54), Puberty (n=37), Normal weight (NW, n=35), Obese (OB, n=56)
- Blood test was performed early in the morning after at least 8 hours of fasting to measure glucose, insulin, androgens, gonadotropins, and sex hormones

RESULTS

Table 1. Clinical characteristics and hormone results in subjects

	Prepuberty		Puberty	
	NW (n=24)	OB (n=30)	NW (n=11)	OB (n=26)
Age (years)[3,4,5]	8.3 (7.3~8.8)	8.3 (7.8~9.0)	13.8 (11.7~15.1)	14.4 (12.9~14.9)
Insulin (µIU/mL)[1,2,3]	3.4 (0.3~4.8)	5.6 (3.9~10.9)	6.6 (4.3~7.1)	9.8 (4.7~16.0)
HOMA-IR[1,3]	0.79 (0.06~1.19)	1.34 (0.96~2.58)	1.47 (1.01~1.97)	2.31 (1.24~4.08)
DHEAS (µg/dL)[3,4]	39.1 (15.1~88.1)	73.1 (27.1~131.9)	99.3 (86.4~140.5)	150.7 (113.1~193.6)
FT (pmol/L)[2,3,4,5]	3.4 (2.4~4.9)	4.1 (3.2~5.3)	8.6 (5.5~13.8)	14.5 (8.8~29.2)
LH (IU/L)[3,4,5]	0.1 (0.1~0.1)	0.1 (0.1~0.1)	4.3 (2.3~4.7)	4.0 (1.7~9.1)
FSH (IU/L)[3,4,5]	1.8 (0.3~2.8)	1.7 (0.9~2.2)	4.3 (3.0~6.0)	4.7 (4.0~6.1)
Estradiol (pg/mL)[3,4]	0.1 (0.1~0.1)	0.1 (0.1~2.5)	0.3 (0.1~32.2)	28.9 (11.5~41.5)
Progesterone (ng/mL)[3,4,5]	0.4 (0.2~0.6)	0.3 (0.2~0.6)	0.6 (0.4~1.1)	0.7 (0.4~1.1)

Table 2. Multiple regression model of plasma levels of free testosterone and dehydroepiandrosterone sulfate in puberty subjects

	Log FT			Log DHEAS		
	β	SE	*P*-value	β	SE	*P*-value
Age	-0.006	0.031	0.861	0.028	0.030	0.372
BMI Z-score	0.136	0.040	0.002	0.122	0.038	0.003
Log HOMA-IR	0.144	0.102	0.166	-0.155	0.099	0.125
Log LH	0.132	0.080	0.110	0.193	0.078	0.019
Log Progesterone	0.517	0.160	0.003	0.379	0.156	0.021

Log FT, Adjusted R^2= 0.513, *P*<0.001; Log DHEAS, Adjusted R^2=0.450, *P*<0.001
Variance inflation factors for all parameters are below 1.5.

Abbreviations: BMI, Body mass index; HOMA-IR, Homeostatic model assessment of insulin resistance; LH, Luteinizing hormone.

SUMMARY

- Hyperinsulinemia and high HOMA-IR values were found regardless of pubertal status in OB girls.
- The plasma levels of free testosterone (FT) and dehydroepiandrosterone sulfate (DHEAS) were markedly higher in OB girls compared to NW girls in puberty (FT, *P*=0.018; DHEAS, *P*=0.060) but not in prepuberty (FT, *P*=0.127; DHEAS, *P*=0.180).
- The significant related factor to HA in puberty was the body mass index Z-score (*P*=0.002) and progesterone level (*P*=0.003). HOMA-IR and LH levels were not relevant to HA.

CONCLUSIONS

Since OB pubertal girls had HA, further follow-up is mandatory to see the metabolic and reproductive consequences and to determine whether weight control is the important factor for prevention of HA-related complications. And obese prepubertal girls did not show HA in the present study but they should be regularly monitored because they already had hyperinsulinemia.

Data are expressed as median and interquartile ranges.

Abbreviations: NW, normal weight; OB, obese; HOMA-IR, Homeostatic model assessment of insulin resistance; DHEAS, Dehydroepiandrosterone sulfate; FT, Free Testosterone; LH, Luteinizing hormone; and FSH, Follicle-stimulating hormone

[1] *P* <0.05, NW prepubertal girls *vs.* OB prepubertal girls
[2] *P* <0.05, NW pubertal girls *vs.* OB pubertal girls
[3] *P* <0.05, NW prepubertal girls *vs.* NW pubertal girls
[4] *P* <0.05, OB prepubertal girls *vs.* OB pubertal girls
[5] *P* <0.05, OB prepubertal girls *vs.* NW pubertal girls

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