



Serum Kisspeptin in Obese Children and Its Relation to Glucose Metabolism

¹Kochakorn Sithinamsuwan, ¹Preamrudee Poomthavorn, ¹Pat Mahachoklertwattana, ²Suwanee Chanprasertyothin, ¹Patcharin Khlairit, ¹Sarunyu Pongratanakul

¹Department of Pediatrics and ²Research Center, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

Background

Previous studies have demonstrated a possible favorable effect of kisspeptin on glucose metabolism including negative association between serum kisspeptin and body mass index, homeostatic model assessment of insulin resistance (HOMA-IR) and plasma insulin. However, some studies reported conflicting results. Data on serum kisspeptin in obese children are limited.

Objective

To determine serum kisspeptin in obese children and its relation to glucose metabolism

Methods

There were 133 obese children included. All children underwent an oral glucose tolerance test (OGTT) with fasting serum kisspeptin level measurement. Insulin secretion [homeostatic model assessment of β -cell function (HOMA- β) and insulinogenic index (IGI)] and insulin sensitivity [whole body insulin sensitivity index (WBISI) and HOMA-IR] indices were assessed using serum glucose and insulin levels derived during the OGTT. Serum kisspeptin in relation to glucose metabolism was analyzed.

Results

Median (IQR) age of enrolled children was 11.8 (10.8, 13.5) years and 57 of them (43%) were males. There were 18 (14%), 83 (62%) and 32 (24%) patients with normal glucose tolerance (NGT), hyperinsulinemia with normal glucose (HI) and abnormal glucose tolerance (AGT), respectively. Serum kisspeptin levels were significantly higher in males as compared with females [68 (37, 83) vs. 48 (25, 73) pg/mL, $p = 0.043$]. Patients with Tanner stages II & III had higher serum kisspeptin levels than those with Tanner stage I [63 (37, 79) vs. 15 (9, 73) pg/mL, $p = 0.049$]. Serum kisspeptin levels were not different among the 3 groups of glucose metabolism [NGT: 67 (32, 83), HI: 48 (27, 78) and AGT: 69 (35, 80) pg/mL, $p = 0.538$] (Table 1). There were no correlations between serum kisspeptin levels and indices of insulin secretion and insulin sensitivity (Table 2). However, after adjusting for sex and puberty, serum kisspeptin level was negatively correlated with fasting plasma glucose (FPG) only in the HI group ($\beta = -1.487$, $p = 0.006$).

Table 1. Clinical characteristics of all children according to their glucose metabolism

Parameters	All children (N = 133)	Glucose metabolism			P
		NGT (N=29)	HI (N=118)	AGT (N=48)	
Age (years)	11.8 (10.8, 13.5)	12.9 (11.4, 14.8)	11.3 (10.6, 12.8)	13.3 (11.1, 14.3)	0.003
Male/female, N (%)	57/76 (43/57)	7/11 (39/61)	38/45 (46/54)	12/20 (38/62)	0.692
Tanner stages, N (%)					
I	9 (7)	1 (6)	7 (8)	1 (3)	0.795
II & III	66 (50)	8 (44)	43 (52)	15 (47)	
IV & V	58 (43)	9 (50)	33 (40)	16 (50)	
Weight SDS	4.7 (3.7, 6.0)	4.5 (3.6, 5.9)	4.9 (3.8, 6.0)	4.2 (3.3, 6.3)	0.830
BMI SDS	2.4 (2.0, 2.8)	2.3 (1.8, 2.7)	2.4 (2.0, 2.9)	2.3 (2.1, 3.2)	0.366
Waist circumference percentile	137 (121, 161)	123 (101, 149)	138 (123, 162)	136 (118, 162)	0.109
Kisspeptin (pg/mL)	55 (28, 79)	67 (32, 83)	48 (27, 78)	69 (35, 80)	0.538
HbA1c (%)	5.7 (5.4, 5.9)	5.4 (5.2, 5.7)	5.6 (5.4, 5.9)	5.7 (5.6, 5.9)	0.010
Fasting plasma glucose (mg/dL)	81 (77, 87)	80 (77, 87)	81 (77, 86)	83 (77, 89)	0.365
2-h plasma glucose (mg/dL)	123 (106, 138)	106 (102, 115)	118 (104, 129)	147 (143, 157)	<0.001
AUC glucose (h.mg/dL)	254 (230, 285)	225 (214, 244)	250 (228, 269)	300 (278, 316)	<0.001
AUC insulin (h. μ IU/mL)	224 (153, 327)	115 (97, 136)	238 (188, 331)	266 (165, 422)	<0.001
HOMA- β	301 (189, 484)	131 (85, 214)	337 (240, 520)	304 (187, 501)	<0.001
IGI	1.8 (1.2, 2.7)	1.6 (0.9, 6.0)	2.0 (1.4, 3.4)	1.3 (0.8, 2.4)	<0.001
WBISI	2.3 (1.8, 3.4)	5.6 (4.4, 7.2)	2.3 (1.8, 3.1)	2.0 (1.2, 2.4)	<0.001
HOMA-IR	3.3 (2.1, 4.6)	1.4 (0.9, 2.3)	3.6 (2.5, 4.8)	3.6 (2.6, 6.5)	<0.001

Data are presented as median (IQR).
P value, comparing among the 3 groups of glucose metabolism (Kruskal-Wallis test and Chi-square test)
AUC, area under the curve

Table 2. Correlations between serum kisspeptin and parameters derived from the OGTT in all children (N = 133)

Parameters	Serum kisspeptin			
	Unadjusted		Adjusted for sex and puberty	
	β	P	β	P
Fasting plasma glucose	-0.143	0.538	-0.189	0.412
2-h plasma glucose	0.010	0.905	0.006	0.938
Glucose area under the curve	0.021	0.654	0.022	0.637
Insulin area under the curve	-0.007	0.733	-0.015	0.472
HOMA- β	-0.001	0.933	-0.001	0.878
IGI	-0.447	0.801	-1.435	0.417
WBISI	1.330	0.354	1.560	0.268
HOMA-IR	-0.808	0.476	-1.168	0.296

Conclusions

Serum kisspeptin levels in obese children were not different among different glucose metabolism categories. Negative correlation between serum kisspeptin and FPG was only found in the HI group.

