

Association of ghrelin levels and insulin resistance in small for gestational age rats

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OBJECTIVES

This study aimed to determine insulin sensitivity index (ISI), variation in ghrelin levels, and their relationship in small for gestational age (SGA) rats.

METHODS

The SGA animal model was established by the starvation method in pregnant rats. Experimental rats were grouped by body length and body weight 4 weeks after birth. Rats were divided into the following groups: (1) SGA with growth catch-up (Group S1, n=26); (2) SGA without growth catch-up (group S2, n=31); and (3) normal matched controls composed of male rats whose mothers ate and drank freely during pregnancy (n=27). Body weight and serum ghrelin levels were measured 4 weeks after birth. Body weight, and levels of serum ghrelin, blood glucose, and insulin on an empty stomach were measured when the rats were 12 weeks old, and then the ISI was calculated. Correlations of all indices were examined.

RESULTS

The ISI of 12-week-old SGA rats (group S1: 2.00 ± 0.58 and group S2: 2.23 ± 0.58) was significantly lower than that in controls (3.17 ± 0.54 , both $P < 0.05$). Serum ghrelin levels in SGA rats (group S1: 1.357 ± 0.548 ng/ml; group S2: 1.428 ± 0.714 ng/ml) were lower than those in controls (1.843 ± 0.459 ng/ml), but this difference was not significant ($P > 0.05$). Ghrelin levels in 12-week-old SGA rats were negatively correlated with fasting insulin levels in blood ($r = -0.836$, $P < 0.01$), and positively correlated with the ISI ($r = 0.810$, $P < 0.01$).

CONCLUSIONS

A decrease in ghrelin levels is correlated with insulin resistance in adult rats that are born SGA. Low levels of ghrelin may result from insulin resistance.

