Total and acylated ghrelin levels in children and adolescents with growth retardation

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The authors declare that there are no conflicts of interest.

Background: Ghrelin is a natural growth hormone (GH) secretagogue that increases serum GH levels. It also has strong orexigenic properties and increases appetite. It has also many roles including regulation of glucose homeostasis, memory & learning, food addiction and neuroprotection. Ghrelin is acylated by the attachment of a medium-chain fatty acid and circulates in two major forms, acylated and des-acylated ghrelin. This acylation is mandatory for its biologic effects on GH secretion and for binding at the receptor.

Aim: The aim of this study was to investigate total ghrelin (TG) and acylated (AG) levels in children with decline in growth in the form of short stature, low weight, or both and its relationship with growth parameters, serum IGF-1 and appetite, and to compare the results with healthy controls.

Method: : After thorough physical examination and laboratory tests, 60 healthy subjects including 30 with normal weight and height and 30 with idiopathic growth retardation were selected. All the systemic, genetic or mental and psychologic disorders were ruled out. None of the subjects had any history of exposure to inappropriate conditions and feeding practices. The subjects were evaluated with fasting TG and AG levels, growth hormone (GH) provocative test, and IGF-1. Subjects with decline in growth were further divided into three groups based on the presence of low height (LH), low weight (LW) or both (LH-LW).

Table 1: Clinical and biochemical features of cases and controls

	Control group N=30	LH n=5	LW n=17	LH-LW n=8
Age (y)	9.77 ± 2.45	10.08 ± 3.25	8.45 ±4.21	9.19 ± 2.85
Bone age (y)	8.82 ± 2.63	9.08 ± 2.85	7.27 ± 4.79	7.91 ± 2.72
Bone age delay (y)[b]	-0.66 ± 0.96	-1.58 ± 0.69	-1.4 ± 1.31	-1.98 ± 1.12*
Height SDS	-0.50 ± 0.83	- 2.25 ± 0.24*	-1.29 ± 0.68*	-2.17 ± 0.37*
Weight SDS	-0.15 ±0.55	- 0.64 ± 0.18	-1.12 ± 0.35*	-1.25 ± 0.30*
BMI SDS	0.05 ± 0.70	0.20 ± 0.24	-0.87 ± 0.49*	-0.62 ± 0.56*
TG (pg/ml)[c]	333.54 (251.1-688.8)	301.5 (264.2-309.1)	607.5 (253.7-830.7)	565.2 (354.4-1020.5)
AG (pg/ml)[c]	124.1 (53.1-186.7)	92.3 (66.5-105.0)	61.34 (23.1-183.7)	96.6 (51.0-106.9)
IGF-1 SDS	-0.07 ± 0.61	- 0.09 ± 0.26	- 0.28 ± 0.59	- 0.49 ± 0.55

[a]: Values are expressed as mean ± SD; [b]: Bone age delay = bone age – chronological age, [c]: data for total ghrelin is expressed as median(interquartile range); *: significant difference versus control group, $p<0.05$; LH: low height; LW: low weight; LH-LW: low height and low weight.

Feeding behaviour of the children was also assessed.

Results: TG levels were higher in LW and LH-LW subjects compared to that in other subjects but the difference was not significant. AG levels were also not significantly different in the two groups but it showed a trend towards lower active ghrelin in children with poor growth. There was not any significant correlation between ghrelin and parameters of growth. Growth retardation was more prominent in children and adolescents with poor appetite and TG concentration was significantly higher in subjects with poor appetite but AG levels were not significantly different between them.

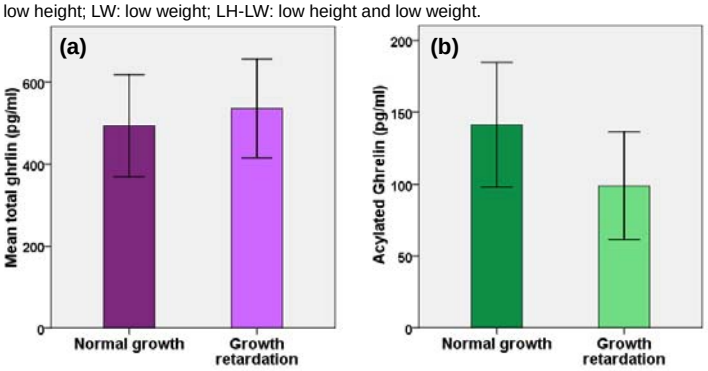

Fig 1: Total (a) and acylated (b) ghrelin levels in normal children and those with poor growth. .

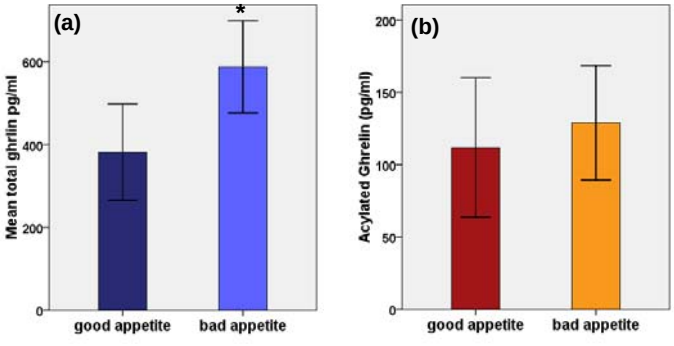

Fig 2: Total (a) and acylated (b) ghrelin levels in children with good appetite and those with poor appetite. * p < 0.05 .

Conclusion: The results of this study show that although ghrelin levels are not significantly different between children and adolescents with poor growth and normal subjects, the ghrelin levels in children with poor appetite is significantly higher than that in good eaters which may be due to a compensatory mechanism. On the other hand the acylated ghrelin levels are not significantly different between the two groups, which suggest inefficient acylation of ghrelin in parallel with its increase.