

# Circulating C1q Complement/TNF-related Protein (CTRP)-13 Levels in Obese Children and Its Relationship with Metabolic Disorders

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## INTRODUCTION

- C1q/tumor necrosis factor-related proteins (CTRPs) are the recently recognized members of the adipokine family.
- CTRP-13 plays an important role in energy metabolism<sup>1,2</sup> and was found as an anorexigenic factor<sup>3</sup>.

## AIM

- To investigate serum CTRP-13 levels in obese and healthy children, as well as the relationship between CTRP-13 and other adipokines, metabolic parameters, or binge eating disorder (BED).

## METHODS

- A single-center cross-sectional study was conducted between May 2020 and April 2021, with participants aged 12-18 years.
- Clinical and biochemical variables were assessed.
- There was no organic etiological cause in children with obesity.
- Serum levels of leptin and adiponectin levels were measured by ELISA, based on the principle of solid-phase enzyme immunoassay.
- CTRP-13 level was measured by ELISA kit employing the sandwich phase enzyme immunoassay technique.

## RESULTS

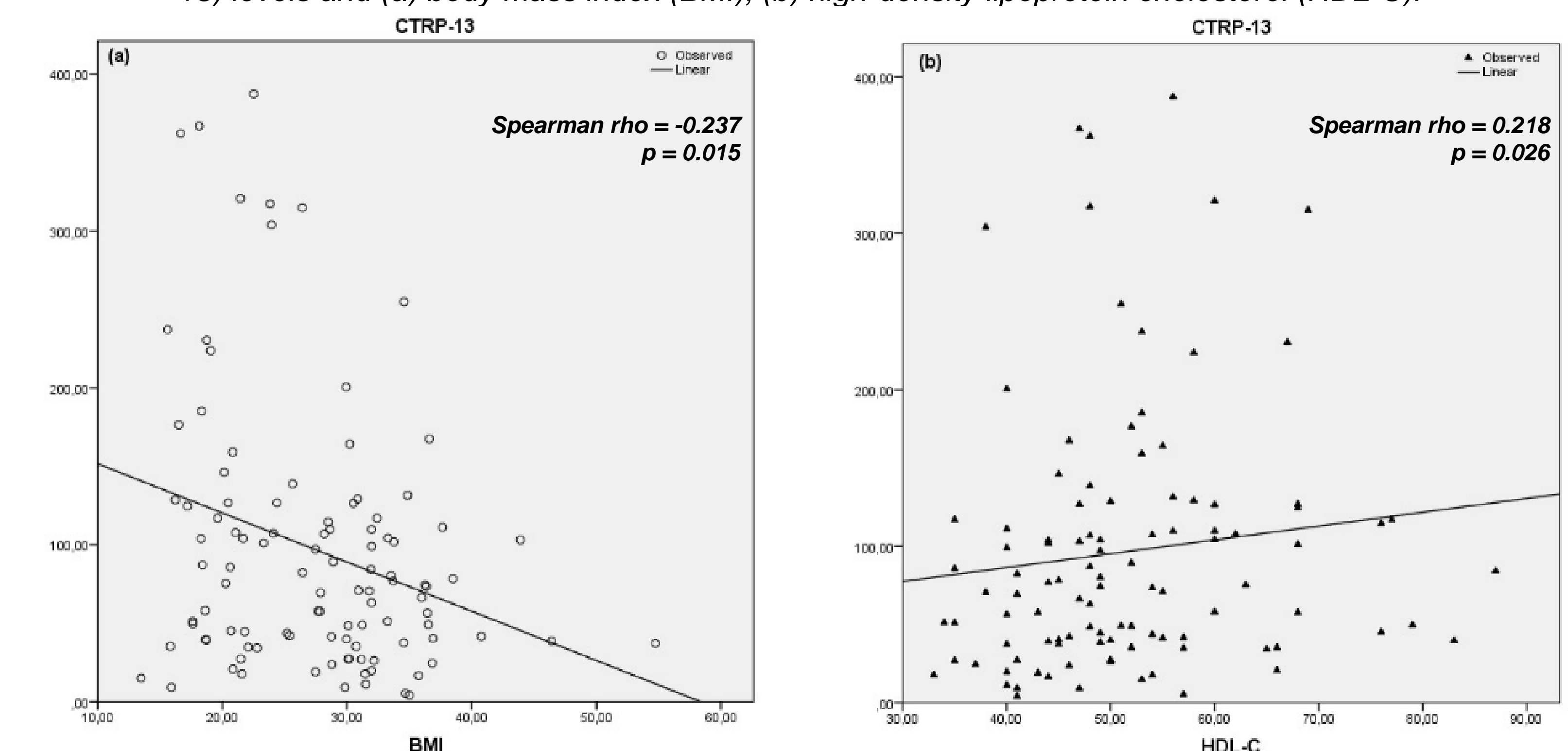
- Serum adiponectin and CTRP-13 median levels were significantly lower in children with obesity than those in healthy children (7.1 vs 20.1 µg/mL,  $p < 0.001$ ; 64.7 vs 103.8 ng/mL,  $p < 0.001$ , respectively). (**Table 1**)
- Serum leptin levels were significantly higher in patients with obesity than the control group (median; 46.4 vs 7.2 ng/mL,  $p < 0.001$ ) (**Table 1**).
- CTRP-13 levels correlated negatively with BMI SD scores (Spearman rho = -0.237,  $p = 0.015$ ) and positively with high-density lipoprotein-cholesterol levels (HDL-C) (Spearman rho = 0.218,  $p = 0.026$ ) (**Figure 1**).
- There was no significant difference in serum CTRP-13 concentrations in terms of the presence of metabolic syndrome or BED (**Table 2**).

**Table 1.** The clinical and laboratory characteristics of children with obesity and healthy controls.

	Children with obesity (n=60)	Controls (n=45)	p
Age (year)	14.7 (13.0 - 16.4)	15.2 (14.1 - 16.5)	0.154
Gender (Male) [n (%)]	24 (37.1)	15 (40%)	0.484
BMI SD score	2.7 (2.3 - 3.1)	-0.5 [(-1.2) - 0.6]	<b>&lt;0.001</b>
Glucose (mg/dL)	85.5 (80.3 - 91)	85 (81 - 92)	0.766
Insulin (uIU/mL)	19.3 (15.8 - 25.9)	10.9 (7.7 - 14.6)	<b>&lt;0.001</b>
HOMA-IR	4.1 (3.3 - 5.8)	2.3 (1.5 - 3.3)	<b>&lt;0.001</b>
TG (mg/dL)	90.5 (77.8 - 140.3)	82 (59.5 - 101.5)	<b>0.017</b>
TC (mg/dL)	171 (155 - 195)	166 (152.5 - 192)	0.524
LDL-C (mg/dL)	103.9 (86.1 - 123.7)	95.4 (83.1 - 110.3)	0.138
HDL-C (mg/dL)	53 (47.5 - 64)	48 (41 - 54.8)	<b>0.004</b>
Leptin (ng/mL)	46.4 (31.1 - 80.5)	7.2 (2.5 - 13.4)	<b>&lt;0.001</b>
Adiponectin (µg/mL)	7.1 (3.1 - 13.1)	20.1 (7.3 - 46.4)	<b>&lt;0.001</b>
CTRP-13 (ng/mL)	64.7 (35.7 - 103.9)	103.8 (42.9 - 167.8)	<b>0.013</b>

Data were given as mean ± standard deviation or median (25 - 75p). BMI SD score: standard deviation score of body mass index, HOMA-IR: homeostasis model assessment-insulin resistance, TG: Triglyceride, TC: total cholesterol, LDL-C: low-density lipoprotein cholesterol, HDL-C: high-density lipoprotein cholesterol, CTRP-13: C1q/tumor necrosis factor-related protein-13.

**Figure 1.** The correlation between serum C1q/tumor necrosis factor-related protein-13 (CTRP-13) levels and (a) body mass index (BMI), (b) high-density lipoprotein cholesterol (HDL-C).



	MS (+) group (n=18)	MS (-) group (n=42)	p
Leptin (ng/mL)	38.2 (23.8 - 63.0)	51.2 (22.9 - 98.0)	0.129
Adiponectin (µg/mL)	4.6 (1.7 - 7.6)	9.9 (3.3 - 17.6)	<b>0.021</b>
CTRP-13 (ng/mL)	64.7 (34.6 - 105.9)	63.5 (33.2 - 104.9)	1.000
	BED (+) group (n=23)	BED (-) group (n=37)	p
Leptin (ng/mL)	49.5 (32.4 - 98.9)	42.1 (30.7 - 78.2)	0.538
Adiponectin (µg/mL)	6.6 (3.5 - 13.2)	7.7 (2.6 - 14.1)	0.855
CTRP-13 (ng/mL)	73.3 (40.2 - 103.0)	57.5 (27.1 - 105.5)	0.447

**Table 2.** The clinical and laboratory characteristics of children with obesity according to metabolic syndrome and binge eating disorder.

Data were given as median (25 - 75p). BED: binge eating disorder, MS: metabolic syndrome, CTRP-13: C1q/tumor necrosis factor-related protein-13.

## CONCLUSIONS

- For the first time in the literature, we found significantly lower CTRP-13 levels in children with obesity.
- The positive correlation between CTRP-13 and HDL-C levels suggested a possible effect of this adipokine on lipid metabolism in children.

## REFERENCES

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