

Leptin is associated with serum aldosterone in paediatric subjects, independently of body mass index, blood pressure and plasma renin activity.

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Background:

Leptin is considered to play an important role in the development of hypertension in obesity. The excessive synthesis of aldosterone contributes to the development and progression of metabolic and cardiovascular dysfunctions. Leptin is a newly described regulator of aldosterone synthesis that acts directly on adrenal glomerulosa cells to increase CYP11B2 expression and enhance aldosterone production in human adrenal cells lines and in animal models.

Aldosterone in vascular and metabolic dysfunction

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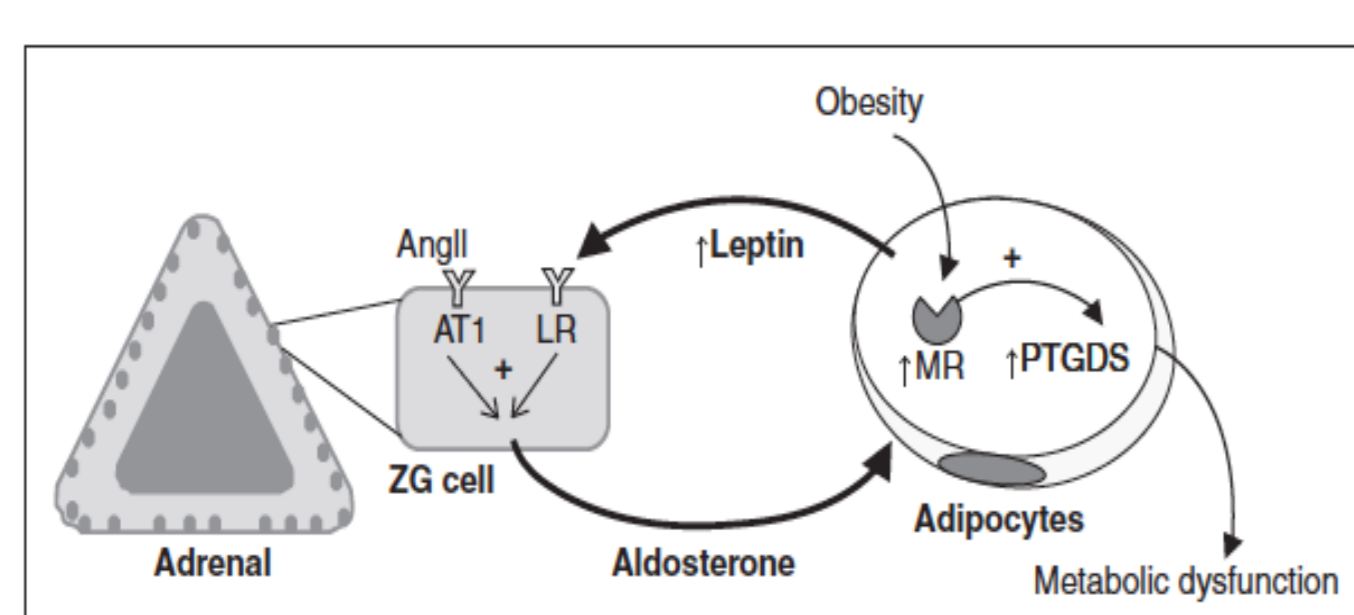


FIGURE 1. Interaction between adipocytes and aldosterone production in zona glomerulosa cells. Ang, angiotensin; AT1, angiotensin II type I receptor; LR, leptin receptor; MR, mineralocorticoid receptor; PTGDS, prostaglandin D synthase; ZG, zona glomerulosa.

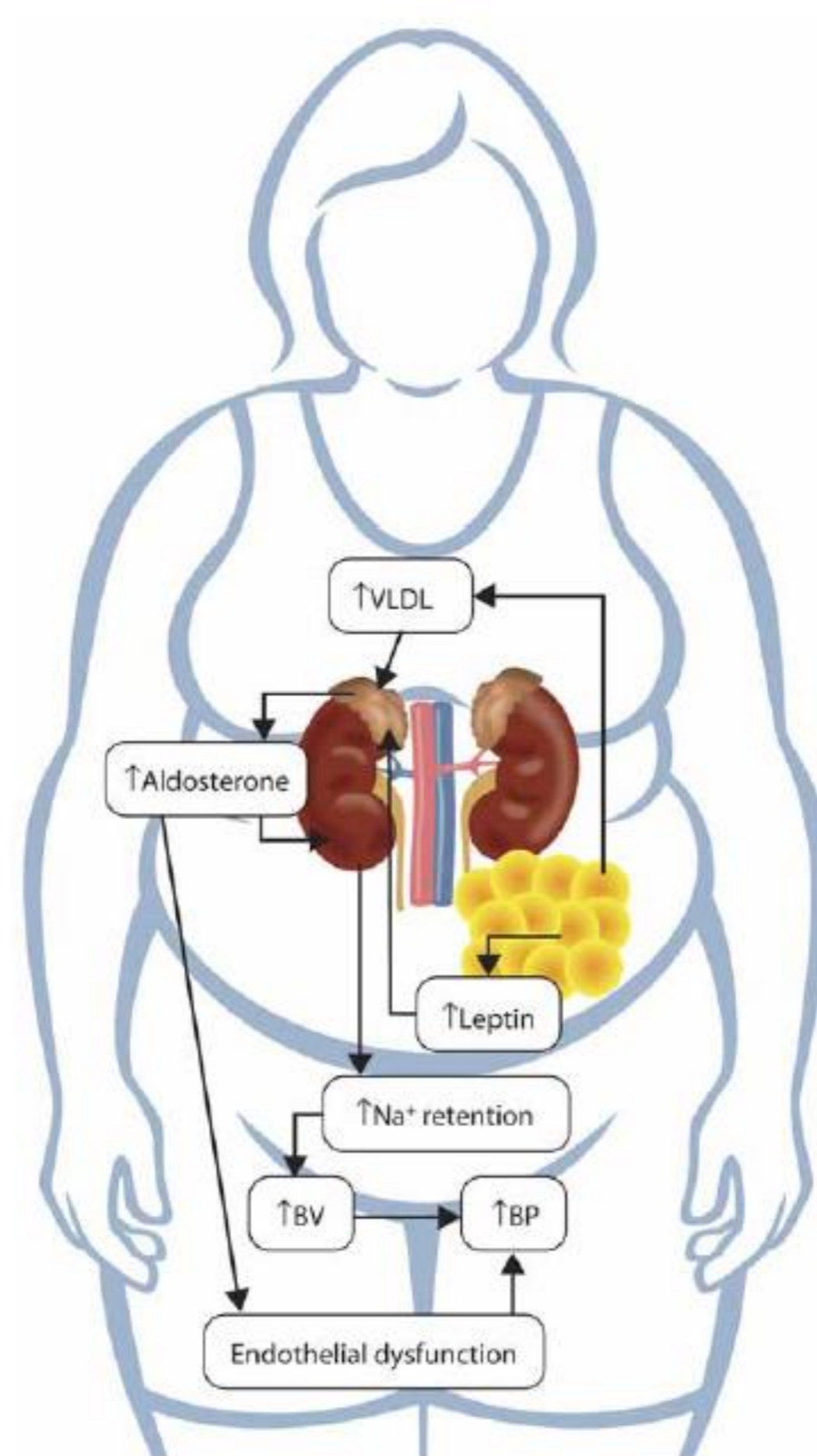


Figure 1
Obesity increases blood pressure. Excess fat deposits (including those surrounding the adrenal glands) of obese individuals secrete large amounts of leptin. The data of Belin de Chantemelle and coworkers indicate that this adipose-derived leptin can stimulate zona glomerulosa cells of the adrenal gland to produce aldosterone. Aldosterone, in turn, causes the kidney to retain salt and water, raising blood volume and pressure. Aldosterone can also produce endothelial dysfunction and cardiac fibrosis. Obesity also results in dyslipidemia, including increased serum levels of VLDL; this lipoprotein has also been shown to induce aldosterone production. Other mechanisms (not illustrated) that potentially underlie obesity-associated hypertension include increased levels of proinflammatory cytokines, hypersecretion of various adipokines and/or excessive activity of the sympathetic nervous or renin-angiotensin II-aldosterone systems.

Focused Review

D. XIE AND W. B. BOLLAG

Leptin, obesity, hypertension and aldosterone

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F7-F11

Obesity, hypertension and aldosterone: is leptin the link?

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Objective:

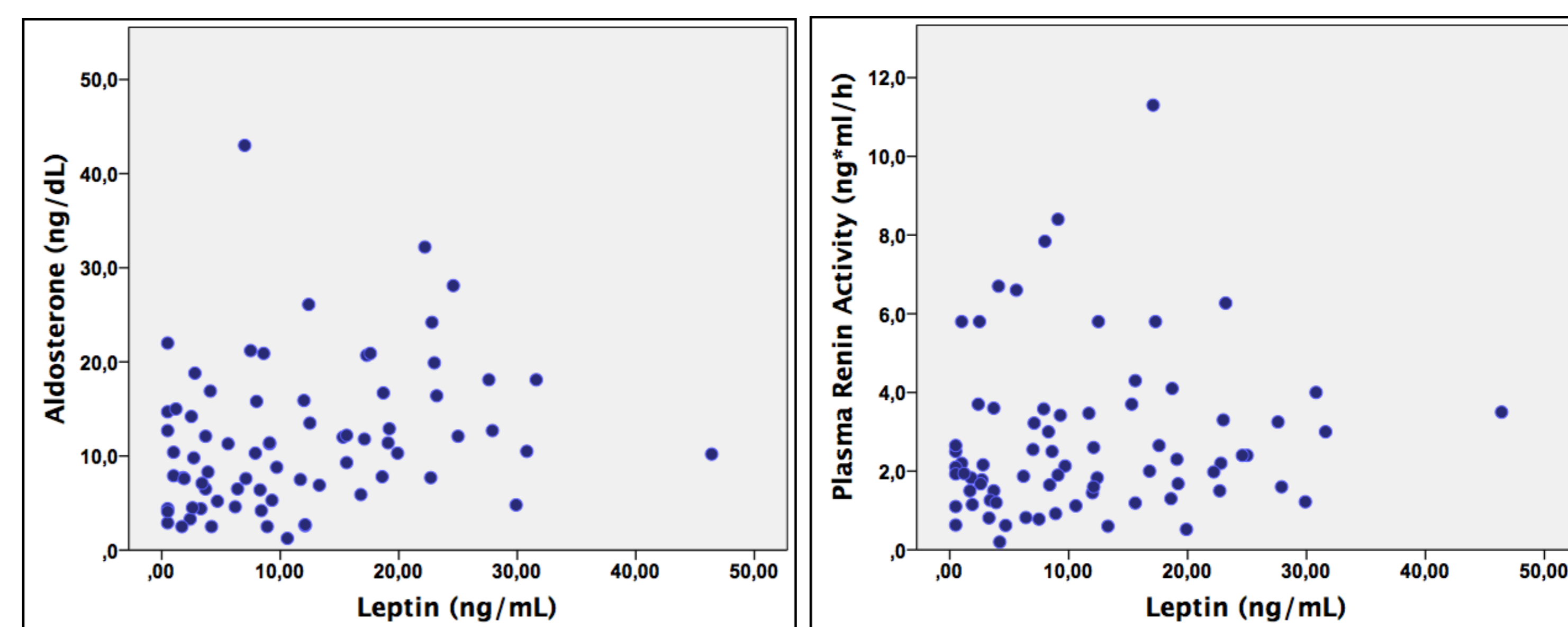
To analyze if there is association between leptin with serum aldosterone (SA), as well as with blood pressure (BP), plasma renin activity (PRA), trans-tubular potassium gradient (TTKG), fractional excretion of sodium (FENa) and 24h-Na/K urine ratio.

Design, subject and methods

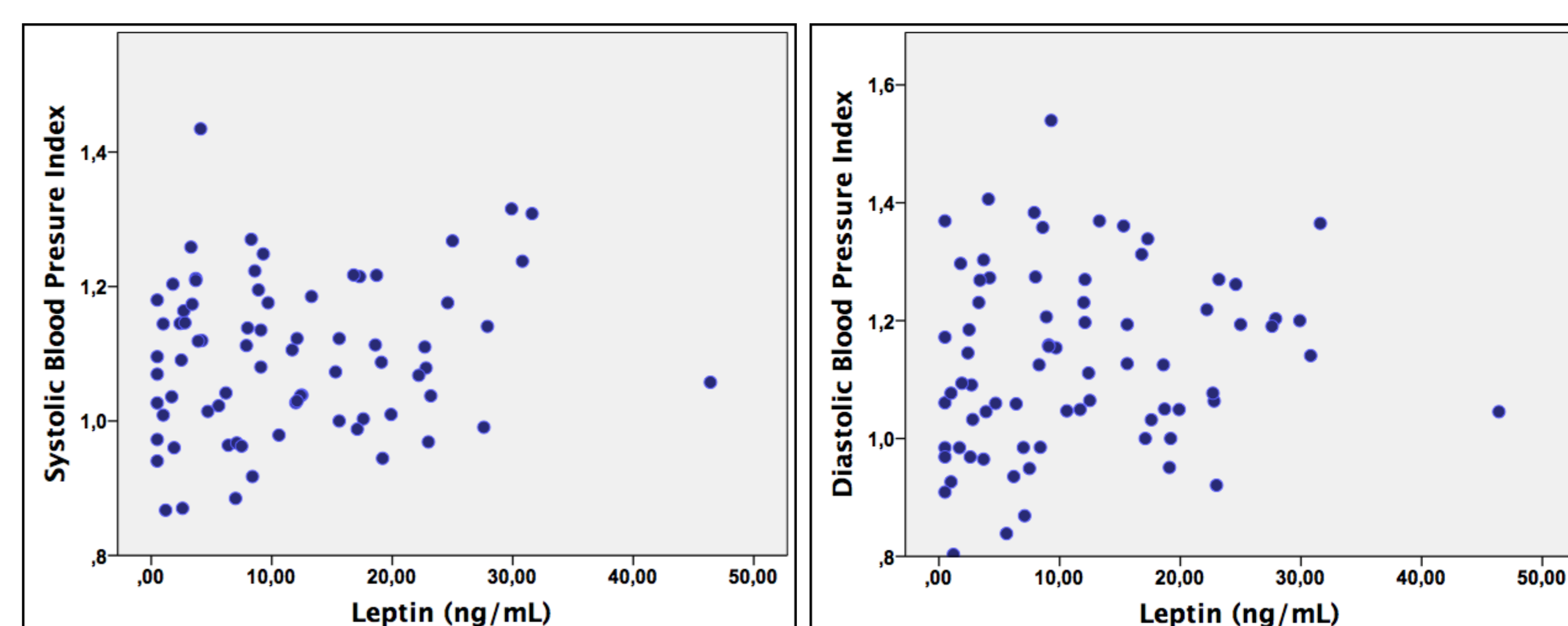
- Design: Cross sectional study.
- Subject and methods: We studied 79 subjects between 6.1 and 18 years old (mean, 13.2 years; 42 females); 37 were normal weight, 18 were overweight, and 24 were obese.
- After overnight fasting: anthropometric parameters, SA, PRA, plasma and 24-h-urine electrolytes were measured and TTKG, FENa and 24h-Na/K urine ratio were calculated.
- For variables without normal distribution Spearman correlation was used, and log transformation was calculated previously to partial correlation analyses.

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Results:



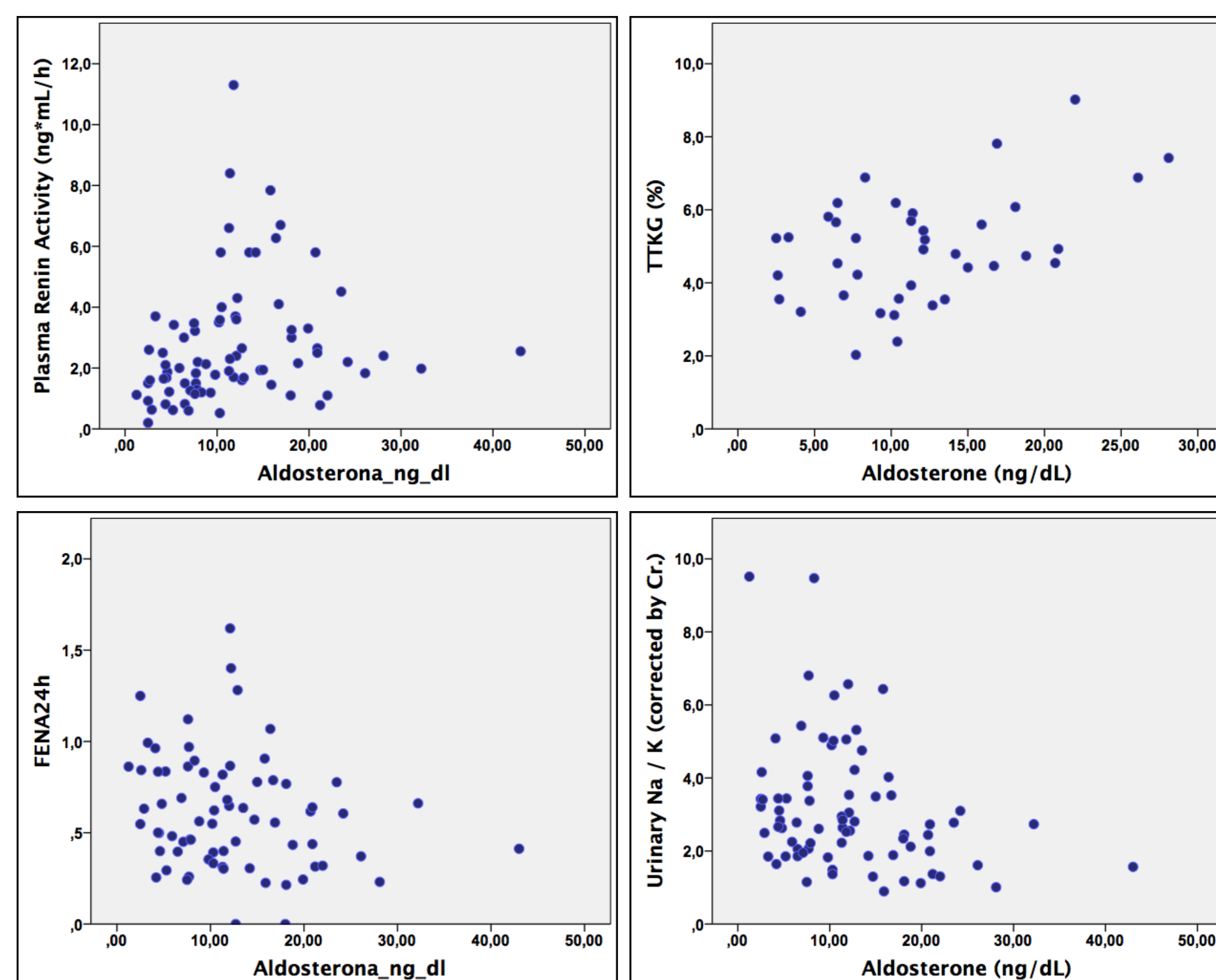
Leptin was directly associated with serum aldosterone (Rho=0.275; P= 0.016). However, none association was detected with plasma renin activity in this group (P= 0.197)



None association was found between leptin with systolic and diastolic blood pressure (P= 0.657 and P= 0.869, respectively)

Moreover, after controlling by age, body mass index z-score (BMI-z), log10 PRA and log10 24h-Na/K urine ratio, the association between log10 leptin and log10 SA increase (Partial correlation= 0.367; P=0.002).

In other hand, serum aldosterone was associated with PRA (Rho=0.400; P<0.001) and TTKG (Rho=0.330; P= 0.037); and negative associated with FENa (Rho= -0.246; P=0.035) and 24h-Na/K urine ratio (Rho= -0.276; P= 0.014).



Conclusion

In paediatric subjects, leptin was associated with serum aldosterone. This association was independently of the effect of age, BMI-z, PRA and blood pressure. Our clinical results agree with the recently described effect between of leptin upon aldosterone secretion in human adrenal cells lines and in animal models.