Abstract: A healthier lifestyle increases circulating pro-atrial natriuretic peptide concentrations in overweight children

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Topic(s): Obesity

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Background: Higher concentrations of atrial natriuretic peptides (ANP) are associated with a poor prognosis among patients with cardiovascular disease (CVD). Counter-intuitively, higher ANP concentrations in healthy populations are associated with an ideal American Heart Association Cardiovascular Health score, which includes high level of physical activity, normal body mass index (BMI), optimal levels of lipids, blood pressure (BP) and glucose. Along this line, overweight individuals have lower than expected ANP concentrations, and it has been proposed that this natriuretic handicap could play a role in overweight related disorders. The mechanism behind the natriuretic handicap is still not clear, but presence of insulin resistance with hyperinsulinemia has been implicated.

Purpose: We investigated whether an intensive lifestyle intervention with an intended weight loss, including an increased level of physical activity and a healthy diet, could increase plasma concentrations of mid-regional pro-ANP (MR-proANP), a stable marker of ANP secretion, in overweight children. In a mechanistic perspective, we investigated metabolic changes associated with increases in MR-proANP concentrations.

Methods: This study is an extension of the Odense Overweight Intervention Study (OOIS) which included 99 overweight children (11-13 years, 55% girls). The children were randomised to a Day Camp Intervention Arm (DCIA) and a Standard Intervention Arm (SIA) for 6 weeks. DCIA included 3 hours physical activity per day and a healthy diet according to Danish recommendations. SIA included 1 weekly fun-based physical activity session and 1 lifestyle education session. OOIS included measurements of anthropometry, body composition, lipids, BP, glucose and insulin. Linear regression analyses, expressed as unstandardized regression coefficients, were used to examine between-group differences in MR-proANP concentrations and to examine the associations between changes in MR-proANP and variables of interest. As we wanted to study physiological relationships, we pooled both arms to one group to increase power in the latter.

Results: At week 6, children in DCIA had lower BMI (-2.4kg/m²) and lower total body fat (-6.5%) but higher level of fitness (4.1 ml/O2/min/kg) compared to children in SIA. From baseline to week 6 DCIA increased MR-proANP concentrations (B (95% CI): 5.7 (1.2 to 10.2) pmol/l, P= 0.014) more than SIA. Of the variables studied, we found an inverse association between fall in insulin and increase in MR-proANP concentrations (B (95% CI): -0.52 (-1.02 to -0.02) pmol/l/mIU/ml,P= 0.041). None of the other associations between changes in variables reached statistical significance.

Conclusion: A healthier lifestyle, based on a healthy diet and a higher level of physical activity, increases MR-proANP among overweight children. In a mechanistic perspective, improved insulin sensitivity with lower insulin appears to be a factor that leads to higher MR-proANP.
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