



Can Body Weight Reduction in Obese Children Improve Attention Deficit Hyperactivity Disorder Symptoms in the Short Term? Clinical and Research Implications

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Dear editor:

The risk of obesity in children with attention deficit hyperactivity disorder (ADHD) is higher than in healthy controls (1). Binge eating does not explain the relationship between obesity and ADHD in adulthood (2). Obesity prevention programs in children with ADHD should take into consideration factors such as gender and medication use (1). Previous studies have suggested that treatment of ADHD symptoms (such as impulsivity) may reduce weight in children with both ADHD and obesity (3). Herein, we provide evidence supporting a new hypothesis on this subject, with clinical implications for treatment of children with ADHD and obesity, as well as implications for future research. Individuals with ADHD are heavier than controls (4). The prevalence of overweight and obesity among adults with ADHD is higher than that among those without ADHD (33.9% and 29.4%, respectively) (5). Children and adolescents with ADHD who are not using medication have a 1.5 times greater

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risk of being overweight than children and adolescents without ADHD (6). The risk of ADHD in obese adolescents is higher than in control groups (7, 8). It has been suggested that the high prevalence of ADHD in obese individuals is related to an imbalance in the dopaminergic reward system (9, 10). Ghrelin is a peptide hormone primarily secreted by the stomach. It is thought to be a regulator of energy balance with a significant role in obesity. Low ghrelin levels are associated with obesity (11). In children, a substantial reduction of overweight, either by increasing energy expenditure or by decreasing energy intake, is accompanied with a progressive increase in the serum level of ghrelin (12). This increased ghrelin level is associated with the state of negative energy balance during weight loss, and it returns to basal levels with the stabilization of energy balance and weight gain (12). Ghrelin targets dopamine projections from the ventral tegmental area (VTA) to the nucleus accumbens (NA). It triggers increased dopamine neuronal activity in the VTA, leading to increased dopamine turnover in the NA (13). Hyperactivity and inattentiveness in ADHD is reported to be associated with a hypodopaminergic state (14). The excitation of VTA dopaminergic neurons causes an increase in dopamine release in the NA, which in turn inhibits locomotion (15). The hyperactivity and attention

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deficits are thus related to a decrease in dopamine in the NA (16). Since reducing overweight increases ghrelin levels (12), it can in turn increase dopamine levels in the VTA and NA (13). Considering that methylphenidate, a drug used in ADHD treatment, increases dopamine levels in the NA and thus can lead to a decrease in locomotion (15, 16), it is possible that decreasing the weight of children with ADHD and obesity may help to improve their ADHD symptoms in the short term.

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