Attention-Deficit Hyperactivity Disorder is Associated with Relatively Short Stature Among Adolescents

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Introduction

Attention-deficit hyperactivity disorder (ADHD) is one of the most common chronic health conditions among children and adolescents. It has been associated with a wide range of impairments, which can significantly affect a child's social interactions, achievements and well-being. One concern about ADHD and the possible impact of pharmacological treatment is the effect on a child's growth.

This study aimed to estimate the association between ADHD and growth status among adolescents, controlling for potential confounders.

Methods

Participants in the Israeli Youth Health and Nutrition Survey (2015–2016), a cross-sectional school-based study, completed self-administered questionnaires, including a food frequency questionnaire, and underwent anthropometric measurements. Height z-score < −0.7 (<25th percentile) was defined as relatively short stature (RSS), and body mass index (BMI) z-score ≥1 as overweight. Multivariable logistic regression analyses assessed the relation between ADHD and RSS, controlling for demographics, BMI, lifestyle factors, dietary patterns and nutrient intakes.

Results

Of 4173 participants (11–18 years, 50.2% males), 654 self-reported ever being diagnosed with ADHD.

Controlling for potential confounders, ADHD was significantly associated with RSS. Stimulant-treated ADHD adolescents (n=252) had similar anthropometrics and lifestyles as those not treated with stimulants.

Conclusions

ADHD was associated with RSS. Height deficit may be intrinsic to ADHD or its pharmacotherapy, rather than a consequence of lifestyle alone.

Growth monitoring and appropriate clinical evaluation and intervention are important to ensure that ADHD adolescents can attain their genetic height potential.

Demographic and Lifestyle Characteristics, and Dietary Intake of Study Participants

Variable	ADHD (N=654)	Non-ADHD (N=3519)
Age, years	15.4 ± 1.5*	15.1 ± 1.6
Male sex	353 (54.1)*	1654 (49.3)
Low socioeconomic status	227 (34.1)*	1427 (38.2)
Physical activity (≥1h/d)	233 (38.7)*	1085 (34.9)
Sleep duration (≥8h/d)	351 (57.1)	2018 (60.0)
Fast food (≥2servings/week)	226 (34.7)	1219 (33.4)
Vegetarians	28 (4.4)	122 (3.8)
Energy, kcal/d	2107 (1512, 2850)	2112 (1550, 2870)
Protein, % energy	12.2 (11.0, 14.0)*	11.9 (10.5, 13.5)
Carbohydrates, % energy	53.6 (49.1, 57.7)*	54.6 (50.5, 58.7)
Sugar, % energy	22.7 (18.6, 27.4)*	23.4 (18.9, 28.5)
Fat, % energy	31.8 (28.8, 34.3)*	31.2 (28.2, 34.0)
Dietary Fiber, g/1000 kcal	10.5 (8.2, 13.2)*	11.1 (9.1, 13.7)
Sodium, g/1000 Kcal	1.40 (1.24, 1.57)*	1.36 (1.20, 1.54)

Note: Calculated with the application of the survey's sample weights. Data are mean ± SD, n (%) or median (25th, 75th). *p<0.05. Similar pubertal status and intakes of saturated fats and α-linolenic acid were observed.

Anthropometric Data of Study Participants

Variable	ADHD (N=654)	Non-ADHD (N=3519)
Height z-score	−0.11 ± 1.06	−0.05 ± 1.01
RSS	190 (29.1)*	898 (25.7)
BMI z-score	0.43 ± 1.20	0.44 ± 1.12
Overweight	202 (30.9)	1087 (30.6)

Note: Calculated with the application of the survey's sample weights. Data are mean ± SD or n (%) . *p<0.05

Associations Between ADHD and RSS [Multivariable models*]

Outcome: RSS	ADHD versus Non-ADHD OR (95%CI)
Model A	1.25 (1.03, 1.50)
Model B	1.27 (1.04, 1.55)
Model C	1.27 (1.03, 1.58)
Model D	1.28 (1.03, 1.60)

*Model A adjusted for demographics and BMI; Model B: Model A variables + lifestyle factors; Model C: Model A + Dietary intakes variables; Model D: Model A+B+C variables.