Long Term Therapy With Methylphenidate Induces Modest Effects on Growth in ADHD Children

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INTRODUCTION

ADHD (Attention Deficit Hyperactivity Disorder) is a disorder that affects children and adolescents in their daily life. Although stimulants are the most effective medication for Attention Deficit Hyperactivity Disorder (ADHD), poor growth is a common concern, especially with children already on the lower growth percentiles. Studies providing longitudinal data indicate a reduction in both height and weight gain; these effects are usually minimal, but there is substantial variability with some children completely unaffected, whereas others show significant growth suppression [5].

OBJECTIVES

To evaluate whether long-term immediate release methylphenidate (IR-MPH) therapy (one or two years) interferes with the growth of ADHD children and to assess whether growth retardation is related to the length of the treatment or to the daily dose.

METHODS

Data including growth parameters were collected from 89 ADHD aged 6 to 14, enrolled on the Italian National Register for ADHD, at the Centre for Pharmacological Therapies in Child and Adolescent Neuropsychiatry (AOU Cagliari).

All patient were on IR-MPH and with a minimum follow-up of 12 months. 65 were Drug Naïve (DN), 24 were already on MPH since 1-3 years prior to enrollment in the Registry (prev-MPH).

Growth parameters were recorded at each follow-up visit (baseline and after 6, 12, 18, 24 months):
- Weight in Kg and its percentile based on age
- Height in cm and its percentile based on age
- BMI (Body Mass Index, kg/m²) and its percentile based on age

In order to standardize the growth parameters on the basis of age and to allow a comparison at different times, Height z-score and BMI z-score were calculated. Z-score is obtained by subtracting the sample mean from our measured value, and dividing the result by the standard deviation of the sample: z = (x – μ) / σ, where x = mean of the distribution and σ = standard deviation of the distribution. For the purposes of this study the following formula has been used:

\[ z = \left( \frac{X - X_{ave}}{SD_{X}} \right) \times 100 \]

where X = specific measure of height or BMI, M = median, S = generalized coefficient of variation and L = power in the Box-Cox transformation. M, S, and L were obtained from appropriate tables given in Centers for Disease Control and Prevention Growth Chart guidelines.

We also calculated growth velocity SDS, height deficit and BMI deficit, after 12 and 24 months:
- Standard Deviation Score of growth velocity defined as: (child’s growth velocity – Mean of growth velocity by sex and age) / Standard Deviation of growth velocity.

- Height deficit (cm): Height measured at follow-up – expected height (derived from correlation coefficient between baseline z-score and follow-up z-score).

- BMI deficit (kg/m²): follow-up BMI/expected BMI (derived from correlation coefficient between baseline BMI z-score and follow-up BMI z-score).

STATISTICAL ANALYSIS

Categorical data were analyzed using contingency tables (χ²), continuous variables were compared by one-way ANOVA. Repeated measures ANOVA was performed for height and BMI z-scores at baseline, 6, 12, 18, 24 month follow-up and for height velocity SDS at 12 and 24 months.

RESULTS

Sample Characteristics

Drug Naive and prev-MPH Characteristics

Basal auxologic Parameters in total sample

Fig. 4: Height z-score in Drug Naïve and pres-MPH during 24 m follow-up

Fig. 5: Pre/die dose in Drug Naïve and in pre-MPH patients

Fig. 6: Growth velocity SDS (n=51)

CONCLUSIONS

The findings of the present study suggest that the effects of MPH on growth are relatively small and unlikely to be of clinical concern for this population. Expected and actual deficit in growth should be considered in the context of the benefits the patient receives from the medication. More research is needed to better elucidate the mechanism of growth suppression and to implement specific treatment strategies for ADHD children.