

Growth in children with pulmonary arterial hypertension: a longitudinal multi-registry study

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Introduction: For an adequate interpretation of growth measurements in the clinical management of children with pulmonary arterial hypertension (PAH), there is a need for a description of growth in a large contemporary cohort. This study aimed to describe growth and its associated determinants in children with PAH.

Methods: A global longitudinal study of height and body mass index (BMI) in reference to WHO growth standards was conducted by pooling four contemporary prospective paediatric PAH registries representing 53 centres in 19 countries. Main outcome measures were median height-/BMI-for-age percentiles, percentage of patients below the 5th growth percentile and longitudinal deviation of height-/BMI-for-age Z-scores (HFAZ/BMIFAZ) from WHO standards. Determinants of growth were identified using linear mixed effects models.

Results: 601 children were followed for a median (IQR) of 2.9 (1.5-4.4) years and the total number of height and weight measurements was 4726 and 4932. Baseline median (IQR) height-for-age and BMI-for-age percentiles were 26 (4-54) and 41 (12-79). The number (%) of patients below the 5th percentile was 164 (27%) for height and 103 (17%) for BMI. Mean (95% confidence interval) HFAZ and BMIFAZ were significantly lower than the reference: -0.81 (-0.93 to -0.69); $p < 0.0001$ and -0.12 (-0.25 to -0.01); $p = 0.0466$. Figure 1 depicts means of HFAZ according to subgroups of age and aetiology. Although in individual patients increases and decreases occurred over time, in the total cohort there was no significant increase or decrease in HFAZ ($p = 0.5711$) or BMIFAZ ($p = 0.4776$) before taking account of covariates. Multivariable linear mixed effects modelling revealed that age, aetiology, ex-prematurity, WHO functional class, Trisomy-21, and time since diagnosis were associated with HFAZ, whereas age, ethnicity, and Trisomy-21 were associated with BMIFAZ. A favourable WHO functional class course was independently associated with increases in HFAZ ($p = 0.0070$).

Conclusions: PAH is associated with impaired growth. The degree of impairment is independently associated with aetiology and comorbidities, but also with disease severity and duration. As a favourable clinical course is associated with catch-up growth, height-for-age can serve as an additional and globally available clinical parameter to monitor the child's clinical condition in the management of paediatric PAH.

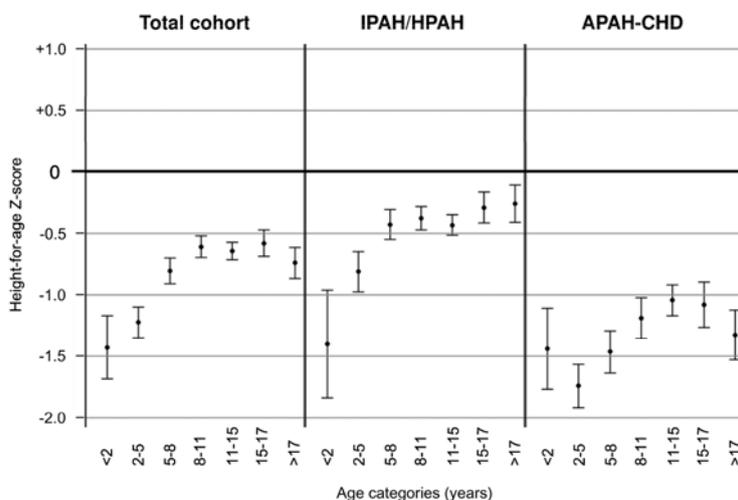


Figure 1. Mean height-for-age Z-scores within incremental age categories. Error bars represent 95% confidence intervals. IPAH = idiopathic pulmonary arterial hypertension, HPAH = hereditary pulmonary arterial hypertension, APAH-CHD = congenital heart disease associated pulmonary arterial hypertension.