Etiology of severe short stature: Single center experience

Juho Kärkinen, BM, Päivi J. Miettinen, MD, PhD, Taneli Raivio, MD, PhD[1,2] and Matti Hero, MD, PhD[1]
[1]Faculty of Medicine/Physiology, University of Helsinki, Helsinki, Finland
[2]*New Children's Hospital, Pediatric Research Center, Helsinki University Hospital (HUH), Helsinki, Finland*
[3]*Stem Cells and Metabolism Research Program, Faculty of Medicine, University of Helsinki, Helsinki, Finland*

Introduction

- Severe short stature (*i.e.* height less than -3 SDS), at the age of > 3 years, warrants diagnostic evaluation in specialized health care. In the absence of apparent underlying cause, targeted and eventually untargeted genetic studies have been proposed (1).
- Etiology of severe short stature is poorly characterized and no reports from population level exist.
- We describe the underlying etiology of severe short stature in children over 3 years of age in a tertiary center that serves as the primary referral center for the region's well-child and school primary health care.

Patients and methods

- We reviewed hospital district growth database that included data from more than 120 000 children and identified those who fulfilled the following inclusion criteria:
  - 2 or more height measurements ≤ -3 SDS after the age of 3 years
  - Place of residence in the Helsinki and Uusimaa Central Hospital (HUCH) district (1.22 million residents, 23% of the Finnish population)
  - born 1990 or later.
- The patients were classified into diagnostic groups using a modified version of the European Society for Pediatric Endocrinology short stature classification (2).
- A total of 821 subjects fulfilled our inclusion criteria. Of them 785 (96%) had been investigated for short stature and comprised the study population.

Results

- A pathological cause for short stature (*i.e.* condition other than ISS) was diagnosed with equal frequency in girls and boys (n=286 [76%] vs. n=289 [71%], P=NS)(Figure 1).
- Sex differences were evident in favor of girls in the frequency of syndromic causes (28 vs. 13 %, P < 0.0001) and in favor of boys in GHD (16 vs. 8 %, P < 0.001) respectively.
- The proportion of patients with skeletal dysplasias (P <0.0001) and syndromes (P <0.0001) increased, whereas GHD (P <0.01) and ISS (P <0.0001) decreased, with increasing severity of short stature (Figure 2).
- Sitting height/height SDS was increased in ISS (0.5 SDS), GHD (0.9 SDS), SGA (1.2 SDS), and skeletal dysplasia (3.6 SDS median) groups (P<0.01)(Figure 3).

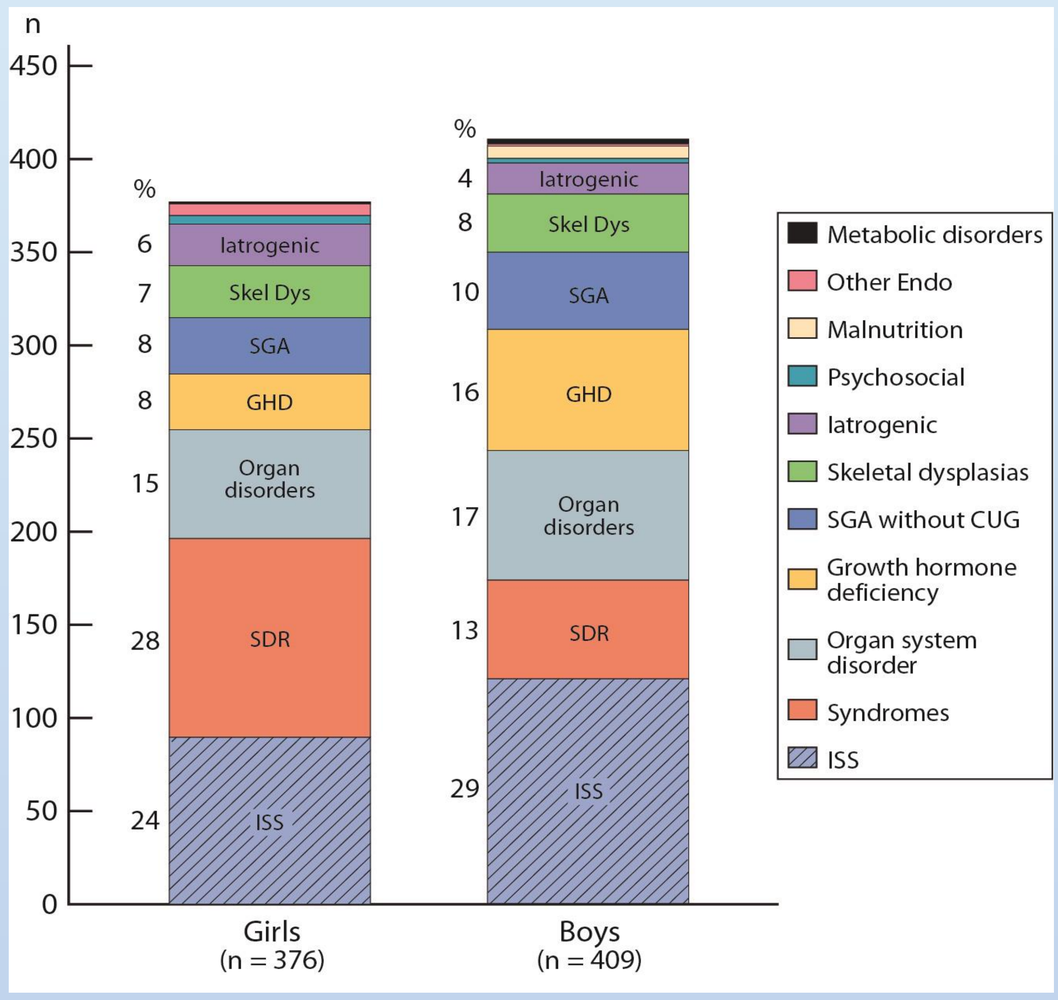

Figure 1. Underlying causes of severe short stature.

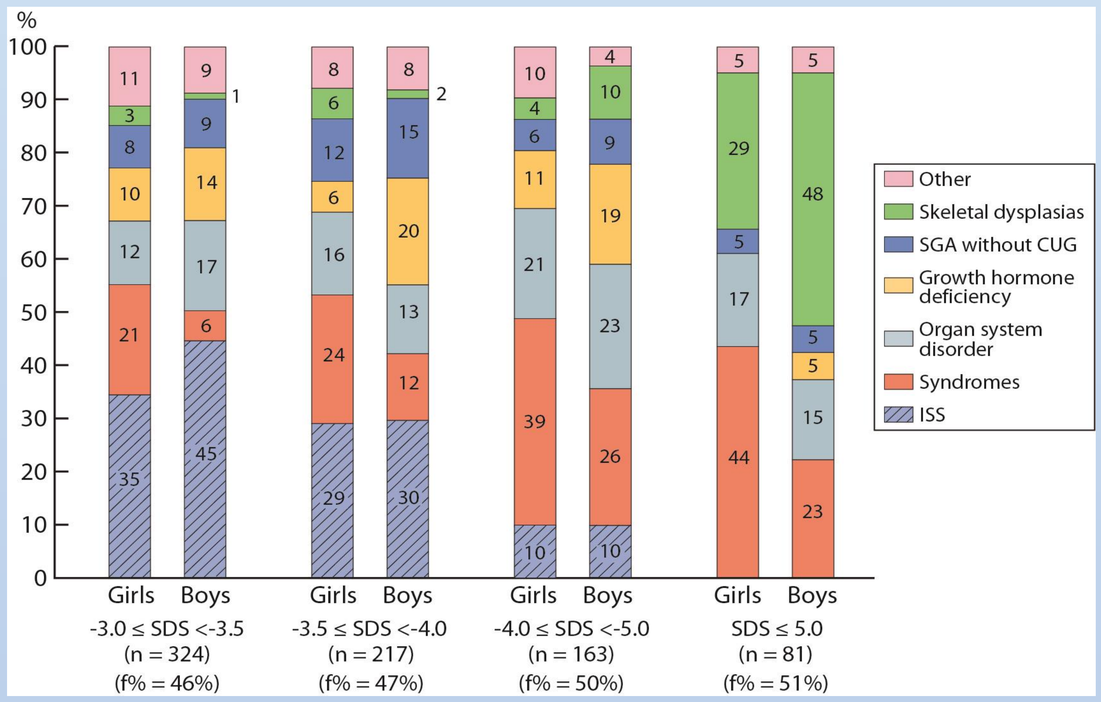

Figure 2. Distribution of underlying causes according to severity of short stature (lowest height SDS after the age of 3 years).

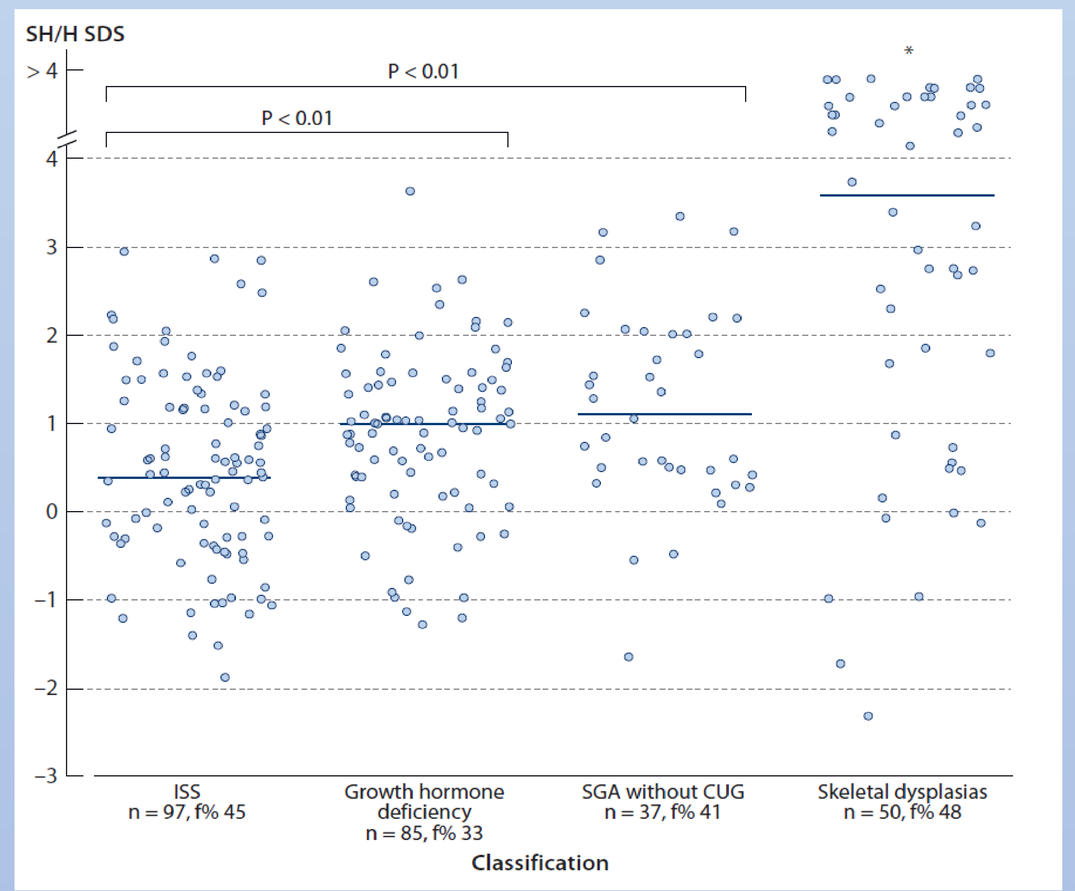

Figure 3. Sitting height/height SDS in ISS, GHD, SGA without catch-up growth, and skeletal dysplasia groups. F%, female percentage.

Conclusions

- In contrast to previous studies, severe short stature affected girls and boys equally.
- Pathological causes for severe short stature were found in more than two-thirds in both sexes.
- Unexplained cause was extremely rare in those with height < -4 SDS.
- Increased sitting height/height ratio suggests that growth plate-related pathology contributes to growth failure in some patients with GHD or SGA.
- Our results reflect the spectrum of growth disorders at the population level, as HUCH catchment area's well-child care is well adhered to and employs Finnish growth screening rules.

References

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58ESPE P1-088
Growth and syndromes (to include Turner syndrome)
Matti Hero
Poster presented at: ESPE 2019 VIENNA
PosterSessionOnline.com