

Menarche and its relation to pubertal growth spurt

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Introduction

Both timing of menarche and growth patterns have changed with time (secular changes), highlighting the need of updated knowledge on this topic. Questions how growth is related to menarche are common in pediatric and pediatric endocrine outpatient clinics. Using the QEPS growth model makes it possible to conduct detailed analyses of pubertal growth.

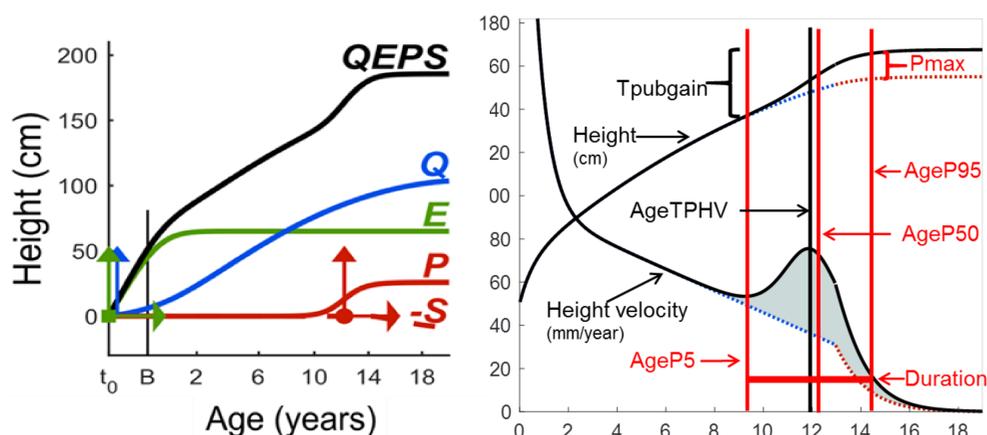


Fig.1 QEPS growth model (left), with pubertal growth functions (right).

Objective

To investigate the relationship between the timing of menarche and pubertal growth. Specifically, the aim is to analyse when menarche occurs related to the pubertal growth spurt and how the pubertal height gain is related to the timing of menarche.

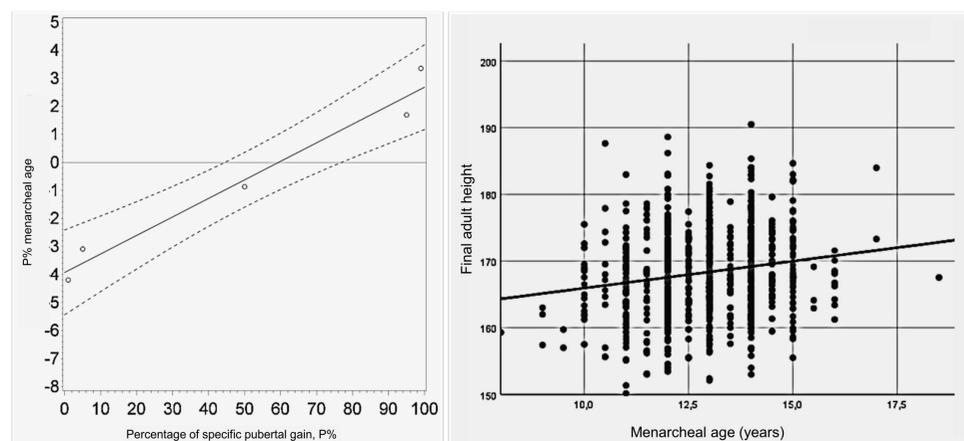


Fig.2 Specific pubertal height gain in relation to menarche (left). Mean percentage of specific pubertal gain at timing of menarche is around 60%. Graph to the right showing final adult height in relation to menarcheal age.

Method

Pubertal growth was analysed and related to the timing of menarche in a longitudinally followed population, GrowUp1990Gothenburg cohort (community-based setting). The analysed study group included 865 females. Analyses of the growth patterns were done with the QEPS growth model. Information of the timing of menarche for each study subject were related to individual growth functions of the QEPS model. The timing of menarche (age) was related both to the percentage of specific pubertal gain attached (P%), to the total pubertal height gain (TgainP5-P95) and to adult height.

Conclusion

- In a cohort of healthy Swedish girls with longitudinal growth data born in the 1990s, menarche occurred when around 60% of specific pubertal height gain was achieved.
- The later the age of menarche, the less the pubertal height gain and the taller the adult height.
- There is a broad variation in pubertal growth, where age at menarche is one important indicator for different pubertal growth patterns in girls.

Results

Menarche occurred in the mean at the time when around 60% of the specific pubertal gain was reached. Mean menarche age was 12.85 yrs with SD of 1.58 yrs. There was a negative linear correlation between the timing of menarche and total pubertal height gain; mean 28.7, 26.7 and 25.2 cm for girls with early (8-11.9 yrs), average (12-14.9 yrs) and late menarche (15-17 yrs), respectively. The difference in height gain was due to more Q-function growth in girls with early menarche. In relation to adult height, there was a linear correlation between adult height and age of menarche. Taller final height was associated with higher age at menarche.

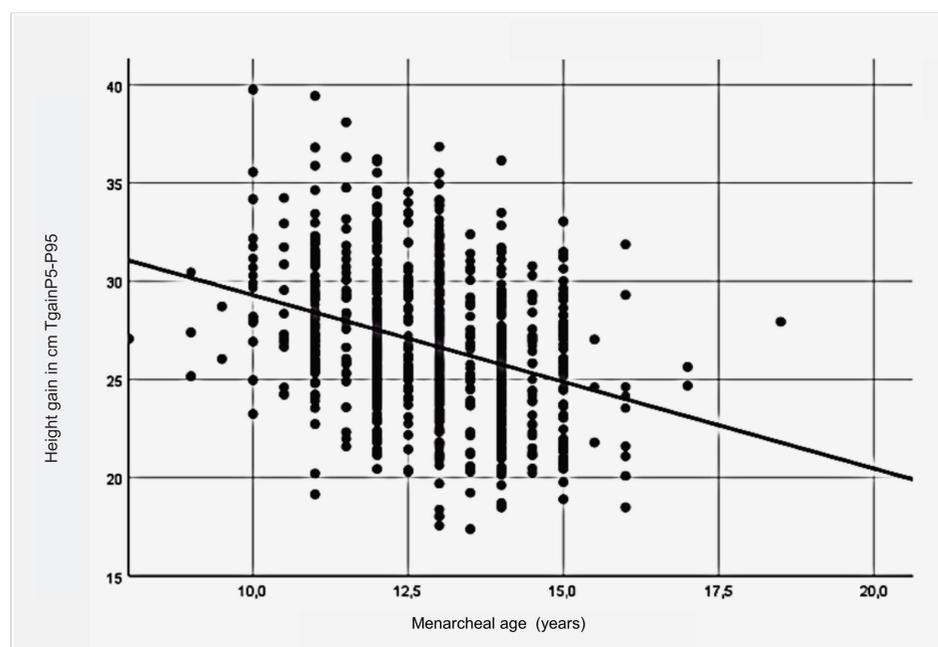


Fig.3 Menarche age is related to total pubertal height gain. Later menarcheal age results in less pubertal height gain (TgainP5-P95)

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