

Pubertal milestones and related hormonal changes among children with obesity

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1. Background and Objective

Obesity is known to affect pubertal timing. However, existing data are still controversial, observing either delayed, accelerated or no effect on the pubertal onset, especially among boys^{1,2}. Herein, we evaluated the effect of obesity on pubertal milestones and aimed to identify potential underlying mechanisms regarding hormonal changes.

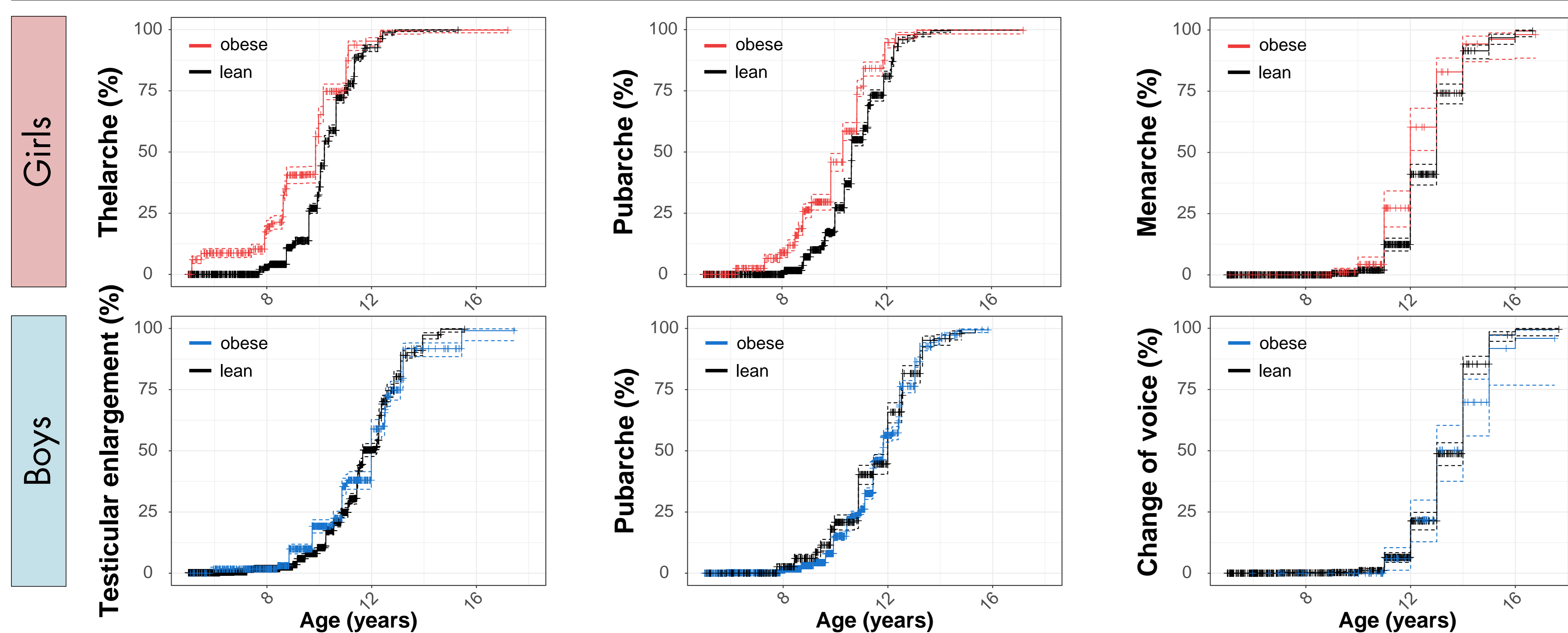
2. Material and Methods

Data are derived from lean (BMI SDS < 1.28) and obese (BMI SDS > 1.88) children aged 5 to 18 years from the LIFE CHILD study³ or from cohorts of the Center for Pediatric Research Leipzig. The onset of the respective pubertal milestones was analyzed by event-time-analysis models, encompassing interval-censored, right- and left-censored data.

	Lean observations/subjects	Obese observations/subjects
Girls	4,840 / 2,582	1,665 / 1,047
Boys	5,315 / 2,654	1,510 / 1,016
Total	10,155 / 5,236	3,175 / 2,063

3. Results

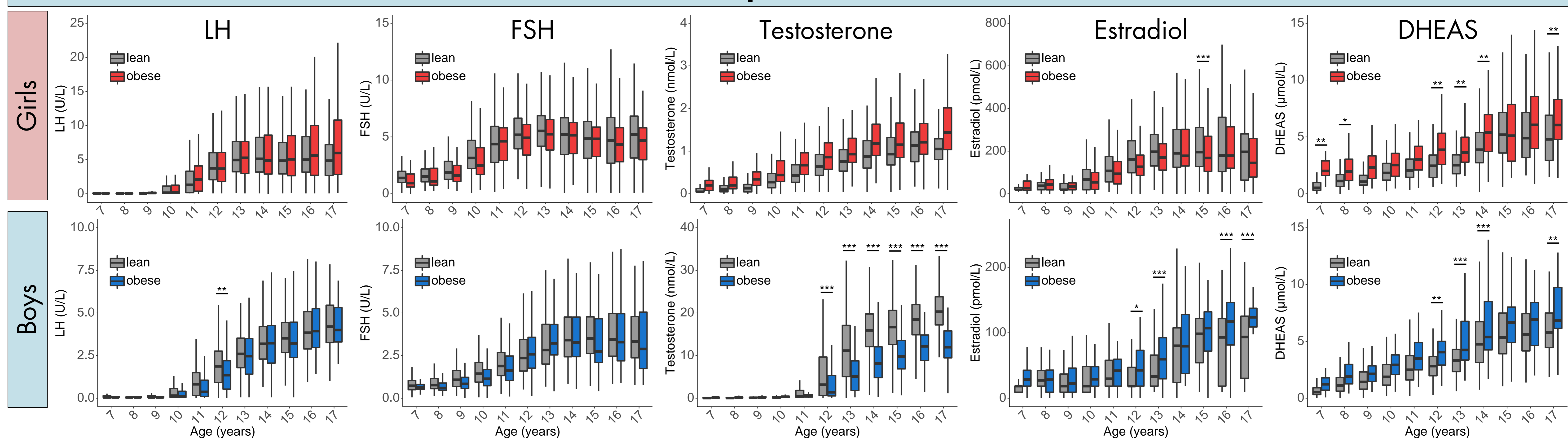
3.1 Pubertal milestones



Theelarche and pubarche were significantly accelerated among *girls* with obesity compared with lean *girls* (median onset thelarche: 9.9 years vs. 10.2 years, pubarche: 10.3 years vs. 10.7 years). Furthermore, obesity reduced the average age of menarche by approx. 6 months (12.1 (±1.3) years vs. 12.7 (±1.2) years).

Among *boys*, no significant effect of obesity on testicular enlargement (testicular volume > 3ml), pubarche or voice change could be detected.

3.2 Gonadotropins and sex steroids



Among *girls*, no link between accelerated thelarche or menarche and blood hormone levels could be detected, as gonadotropins and estradiol did not show any significant difference during early adolescence. However, higher DHEAS levels among *girls* with

obesity may provide an explanation for accelerated pubarche. Of note, estradiol and DHEAS levels were higher among *boys* with obesity compared with lean *boys* and testosterone levels were lower.

4. Conclusion

Pubertal milestones were accelerated among *girls* with obesity when compared with lean peers. No clear association of BMI and pubertal onset could be detected for *boys*. Earlier pubarche among *girls* with obesity was paralleled by higher DHEAS levels.

Those findings should be considered, when distinguishing between physiological and pathological patterns of pubertal development among children with obesity.

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LEIPZIG

IFB Adiposity Diseases

ESPE European Society for Paediatric Endocrinology



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