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. Herein, we evaluated the effect of obesity on pubertal milestones and aimed to identify potential underlying mechanisms regarding hormonal changes.

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 study 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.

2. Material and Methods

<table>
<thead>
<tr>
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<th>Lean observations/subjects</th>
<th>Obese observations/subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>4,840 / 2,582</td>
<td>1,665 / 1,047</td>
</tr>
<tr>
<td>Boys</td>
<td>5,315 / 2,654</td>
<td>1,510 / 1,016</td>
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<tr>
<td>Total</td>
<td>10,155 / 5,236</td>
<td>3,175 / 2,063</td>
</tr>
</tbody>
</table>

Thelarche 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 > 3 ml), pubarche or voice change could be detected.

3. Results

3.1 Pubertal milestones

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.

3.2 Gonadotropins and sex steroids

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.

4. Conclusion

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

References