Clinical Guideline

Adrenarche

Management of children presenting with signs of early onset pubic hair/body odour/acne

Includes guidance for the distinction between adrenarche, precocious puberty and other abnormalities of secondary sexual development

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NOTE
This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient’s case notes at the time the relevant decision is taken.
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Purpose of this document
- To guide evaluation of a child presenting with features suggestive of adrenarche.
- To guide the distinction between adrenarche, precocious puberty and other abnormalities of secondary sexual development.

Who should use this document
General practitioners, paediatricians and paediatric endocrinologists.

Patients to whom this document applies
*Children presenting with pubic hair growth, axillary hair, body odour and acne before the expected age of puberty.*

Definition of adrenarche
Adrenarche is the gradual increase in adrenal androgen secretion after approximately the age of 6 years in girls and 7 years in boys. It occurs independently from the gonadotrophin-dependent activation of the gonads in central puberty.

Clinical features
Adrenarche results in the development of pubic hair, axillary hair, body odour and acne. (It does not result in the enlargement of the breasts, penis or testes).

Biochemical findings
At the time of adrenarche, there is maturation of the adrenal glands, with increased production of dehydroepiandrosterone sulphate (DHEAS) relative to cortisol. The serum concentration of DHEAS can be used as a marker for the presence of adrenarche, with serum testosterone and androstenedione levels being near the upper limit of the normal range. However, the diagnosis can be made on clinical features without further investigations (see next page).

Clinical significance
*Adrenarche is a normal variant of pubertal development.* It is important to distinguish this from precocious puberty and virilising conditions such as androgen secreting tumours and Congenital Adrenal hyperplasia. Adrenarche itself does not require treatment*.

*There has been previous concern that adrenarche may be associated with the development of insulin resistance, polycystic ovarian syndrome and metabolic syndrome, but this does not alter management or follow-up.*
Primary or secondary care

**Child presents with the following Clinical features:**
- Pubic/axillary hair
- Body odour
- Acne

**Age**
- Girl < 8 years, Boy < 9 years?
  - NO
  - No action required if no other concerning features. Reassure and provide adrenarche information leaflet

- YES
  - Review in 3-4 months:
    - Height velocity > 90th centile or height increasing across centiles
    - Reassess for breast or testicular development or virilisation

**Signs of central puberty?**
- YES
  - Breast development
  - Testicular volume ≥ 4 ml
  - On examination or reported by parents.
  - (Refer onwards if unable to assess)

- NO
  - Signs of virilisation?
    - YES
      - Clitoromegaly
      - Penile enlargement
      - On examination or reported by parents.
      - (Refer onwards if unable to assess)
    - NO
      - Review in 3-4 months:
        - NO
          - Reassure that consistent with adrenarche and discharge
        - YES
          - Reassure and provide adrenarche information leaflet

**SECONDARY CARE**

- Refer to Secondary Care. Investigations to exclude central precocious puberty:
  - Bone age
  - Baseline LH and FSH
  - Oestradiol/testosterone
  - Consider GnRH test

- Result interpretation:
  - See page 3
  - Discuss results with tertiary Endocrinologist

- Refer to Endocrinologist

Initial investigations for androgen secreting tumour and congenital adrenal hyperplasia:
- Bone age
- 17 hydroxypregesterone
- Testosterone
- Androstenedione
- DHEAS
- Cortisol, ACTH
- LH&FSH
- Oestradiol
- Consider urine steroid profile if virilisation
## Interpretation of clinical findings and investigation results

<table>
<thead>
<tr>
<th>Condition</th>
<th>Breast/testicular development</th>
<th>Clitoral/penile growth</th>
<th>Linear growth acceleration</th>
<th>Bone Age</th>
<th>Androgens</th>
<th>Gonadotrophins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premature adrenarche</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent, or slight initial acceleration</td>
<td>Up to 2 years advanced on chronological age</td>
<td>Early pubertal, DHEAS may be moderately elevated</td>
<td>Prepubertal</td>
</tr>
<tr>
<td>Precocious puberty</td>
<td>Stage 2+ breast development ≥ 4ml testicular volume</td>
<td>Absent or early</td>
<td>Progressive accelerated</td>
<td>Progressive accelerated</td>
<td>May be normal or elevated for age</td>
<td>Oestradiol may be elevated</td>
</tr>
<tr>
<td>Congenital adrenal hyperplasia</td>
<td>Absent</td>
<td>Enlargement</td>
<td>Moderately to markedly accelerated</td>
<td>Moderately or markedly advanced for age and pubertal stage</td>
<td>Moderately to markedly elevated</td>
<td></td>
</tr>
<tr>
<td>Virilising tumours</td>
<td>Absent</td>
<td>Marked and progressive enlargement</td>
<td>Markedly accelerated</td>
<td>Markedly and progressively advanced</td>
<td>Markedly elevated</td>
<td></td>
</tr>
<tr>
<td>Iatrogenic</td>
<td>Absent</td>
<td>Marked and progressive enlargement</td>
<td>Markedly accelerated</td>
<td>Markedly and progressively advanced</td>
<td>Markedly elevated testosterone</td>
<td></td>
</tr>
</tbody>
</table>
References