Polycystic Ovary Syndrome in Adolescents

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KEYWORDS

• Polycystic ovary syndrome • Adolescent • Hyperandrogenism
• Metabolic syndrome • Irregular menses

KEY POINTS

- The diagnosis of polycystic ovary syndrome is difficult to make in adolescents, as many of the findings are normal/transitory in puberty.
- Strict criteria are indicated for the diagnosis in adolescents and should include hyperandrogenism and irregular menses in the adolescent who is at least 2 years postmenarche.
- Polycystic ovary morphology and insulin resistance are not part of the diagnostic criteria of polycystic ovary syndrome in adolescents.

INTRODUCTION/BACKGROUND

Polycystic ovary syndrome (PCOS) is a familial heterogeneous disorder of reproductive-aged women characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovary morphology. Despite intensive efforts by many investigators, the molecular basis of PCOS remains unclear. Available data indicate that PCOS is a complex trait modulated by genetic factors, intrauterine and environmental exposures, insulin resistance, pancreatic β cell function, steroidogenesis and steroid hormone metabolism, neuroendocrine influences, and adaptations to energy excess.

To investigate the cause of a disorder, a consistent definition should be used. This definition has been problematic for PCOS because multiple definitions exist (**Tables 1** and **2**). Over the last decade, the diagnostic criteria for PCOS have become broader and less rigid. Under the strictest criteria, the original 1990 National Institutes of Health (NIH) Consensus defined PCOS as hyperandrogenism and oligo-anovulation in the absence of other endocrinopathies.[1] In 2003, the Rotterdam

Disclosure Statement: The authors have nothing to disclose.

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Endocrinol Metab Clin N Am 45 (2016) 329–344
http://dx.doi.org/10.1016/j.ecl.2016.01.004 **endo.theclinics.com**
0889-8529/16/$ – see front matter

Table 1
Consensus criteria for diagnosis of PCOS

Criteria	NIH 1990 Classic	Rotterdam 2003	Androgen Excess-PCOS Society
Oligomenorrhea	+	+/–	+/–
Clinical or biochemical hyperandrogenism	+	+/–	+
Polycystic ovaries on ultrasound scan	+/–	+/–	+/–
Exclusion of other causes, ie, CAH	+	+	+

Consensus Conference expanded the diagnostic criteria to include at least 2 of the following features: (1) clinical or biochemical hyperandrogenism, (2) oligo-anovulation, and (3) polycystic ovary morphology (PCOM) in the absence of other endocrinopathies (see **Table 1**).[2] With expansion of the diagnostic criteria to include women with oligo-anovulation and PCOM, the incidence of PCOS when defined by the Rotterdam criteria doubled from 6% to 10% to 15%.[3,4] The Androgen Excess-PCOS Society defined PCOS as a hyperandrogenic disorder with oligo-anovulation and/or PCOM, again in the absence of other endocrinopathies.[5] In 2012 the NIH Evidence-Based Methodology Workshop on PCOS recommended use of the 2003 Rotterdam criteria with classification by specific phenotypes within the diagnosis (see **Table 2**).[6] Most recently, the Endocrine Society's Clinical Practice Guidelines suggested using the Rotterdam criteria for making the diagnosis in adults but stated that "establishing a diagnosis of PCOS is problematic in adolescents."[7] Although obesity and insulin resistance are common features, they are not included as diagnostic criteria. Thus, the incidence and the ability to study the etiology of this disorder are modified by the diagnostic criteria used. In the absence of longitudinal natural history studies, it is further unclear if an individual's phenotype changes over time.

The risks for infertility, impaired glucose tolerance, type 2 diabetes mellitus, dyslipidemia, endometrial cancer, and cardiovascular disease are reported to be increased in women with PCOS. Women with PCOS, as defined by the 1990 NIH criteria, seem to have the highest risk for insulin resistance and associated metabolic features.[8] However, data from the Study of Women's Health Across the Nation longitudinal study suggest that a history of androgen excess and menstrual irregularity do not lead to worsening of metabolic health after menopause.[9] Women with PCOS have increased risk factors for cardiovascular disease, but data are limited as to whether the number of cardiovascular events is truly higher.[10,11] Clarification of the factors involved in the pathogenesis of PCOS is important to characterize the natural history of PCOS and identify effective interventions.

Table 2
Phenotypes from NIH evidence-based methodology workshop on polycystic ovary

Criteria	Phenotype 1	Phenotype 2	Phenotype 3	Phenotype 4
Oligomenorrhea	+	+	–	+
Clinical or biochemical hyperandrogenism	+	+	+	–
Polycystic ovaries on ultrasound	+	–	+	+