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Increased risk of disordered eating in polycystic ovary syndrome

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Objective: To determine the prevalence of eating disorders (EDs) in women with polycystic ovary syndrome (PCOS) and the effects of EDs on health-related quality of life.
Design: Cross-sectional study.
Setting: University practice.
Patient(s): Women with PCOS (Rotterdam criteria; n = 148) and controls seen for routine gynecologic care (n = 106) from 2015 to 2016.
Intervention(s): Eating Disorder Examination-Questionnaire (EDE-Q), Night Eating Questionnaire (NEQ), Hospital Anxiety and Depression Scale, and Health-Related Quality of Life Questionnaire (PCOSQ).
Main Outcome Measure(s): EDE-Q and NEQ scores, prevalence of bulimia nervosa (BN), binge eating disorder (BED), and night eating syndrome (NES).
Result(s): Women with PCOS were at an increased risk for overall abnormal EDE-Q scores compared with controls (12.16% vs. 2.83%; odds ratio [OR], 4.75; 95% confidence interval [CI], 1.36, 16.58). Clinically significant elevated scores were noted for shape and weight concern. In unadjusted analysis, body mass index (OR, 1.06; 95% CI, 1.01, 1.11), elevated depression score (OR, 5.43; 95% CI, 1.85, 15.88), and elevated anxiety score (OR, 6.60; 95% CI, 2.45, 17.76) were associated with an abnormal EDE-Q global score. In the multivariable model, PCOS was associated with abnormal EDE-Q global score (adjusted OR, 4.67; 95% CI, 1.16, 18.80). Elevated EDE-Q scores inversely correlated with PCOSQ scores (r = −0.57). The prevalence of BN was 6.1%, of BED was 17.6%, and of NES was 12.9% in women with PCOS, with no differences compared with controls.
Conclusion(s): Women with PCOS, especially those with concurrent anxiety symptoms but independent of obesity, have a significantly increased risk of abnormal EDE-Q scores. Our findings suggest the need for routine screening for ED in this population. (Fertil Steril® 2016;■:■–■. ©2016 by American Society for Reproductive Medicine.)
Key Words: Polycystic ovary syndrome, eating disorder, anxiety, depression

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Polycystic ovary syndrome (PCOS) is the most common endocrine disorder affecting reproductive-age women (1). Its classic features include oligomenorrhea, hyperandrogenism, and polycystic appearing ovaries on ultrasound (2). PCOS is also associated with increased risks of obesity, insulin resistance and type II diabetes mellitus, and possibly cardiovascular disease (3). In addition to these well-recognized risks, women with PCOS are more likely to be affected by psychiatric disorders including depression and anxiety (4–7). Some studies have proposed that increased weight and poor body image may contribute to the increased risk of mood disorders among women with PCOS (7, 8).

Body image disturbances are also central to eating disorders (EDs) (9, 10), which include anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), and otherwise specified feeding and EDs, such as night eating syndrome (NES) (11). Patients with an ED tend to have large discrepancies between ideal and perceived body weight and shape, and their self-perception is significantly distorted (12, 13). BED is the most common ED, with a lifetime prevalence of 2% in the general population (14) and up to 20% among adults seeking help in weight loss clinics (15). BED is associated with diabetes mellitus, obesity, and hypertension, making this disease especially relevant for women with PCOS who are already at risk for similar sequelae (3, 16). Two other major EDs described in the *Diagnostic*

and Statistical Manual of Mental Disorders, fifth edition (DSM-5), are BN, with a lifetime prevalence of 1.5% in the United States, and AN, with a lifetime prevalence of 0.9% [17]. An estimated 1.5% of the general population has NES [18]. There is an independent relationship between ED and anxiety and depression [17]. For example, up to 50% of individuals with a lifetime diagnosis of BN and 32% with BED have also experienced major depression, and close to 12% of those with BN or BED also have generalized anxiety disorder [17]. Because of these shared comorbidities and the high prevalence of both depressive and anxiety symptoms in PCOS, the presence of ED needs to be investigated among patients with PCOS.

The existing literature, although limited, suggests that EDs are common in the PCOS population [7,19–22]. One study reported a high prevalence of 21% for the diagnosis of any ED based on clinical interview [19]. However, there is a notable paucity of studies that compare ED prevalence in women with PCOS to that in well-defined controls, apply contemporary diagnostic criteria to identify the PCOS population, use validated screening tools and diagnostic standards to evaluate for all EDs, and examine the influence of concurrent depression or anxiety. The aims of the present study were to determine the prevalence of disordered eating among women with PCOS as compared with controls, identify risk factors for this comorbidity, and characterize the effect of disordered eating on health-related quality of life.

METHODS
Subjects

We conducted a cross-sectional study of women ages 18–50 year old between August 2015 and August 2016. The PCOS group comprised women seeking management of PCOS at the Penn PCOS Center. Their diagnosis was made by the Rotterdam criteria [2] and confirmed by chart review. All consecutive women on the days of recruitment were approached for participation irrespective of the reason for the visit. The control participants were patients presenting for general gynecologic care at the University of Pennsylvania Health System. All women presenting for routine care were approached for participation and were excluded if they had menstrual irregularity or hirsutism. Pregnancy was an exclusion criterion for both groups. The University of Pennsylvania Institutional Review Board approved this study.

Surveys

All participants were asked to complete the following surveys: the Eating Disorder Examination-Questionnaire (EDE-Q) [23], Night Eating Questionnaire (NEQ) [24], and the Hospital Anxiety and Depression Scale (HADS) [25]. The PCOS group also completed the PCOS Health-Related Quality of Life Questionnaire (PCOSQ) [26], and the control participants answered questions on demographic information including psychiatric history, menstrual history, presence of hirsutism, and obstetric history. All surveys were administered during participants' routine clinic visits, and all participants signed an informed consent form.

Scoring for the questionnaires followed each tool's standard scoring system. For the EDE-Q, a global score or subscale score of 4 or higher is considered clinically significant [23]. The four subscales are restraint, shape concern, weight concern, and eating concern. A score of 25 or higher on the NEQ is considered suggestive of NES [24]. On the HADS, a score of 11 or higher indicates clinically significant anxiety or depressive symptoms [25]. A diagnosis of AN was made by restriction of intake resulting in significantly low body weight (the DSM-4 cutoff of body mass index [BMI] < 17.5 was used for purposes of analysis, as the DSM-5 does not offer a discrete number) and disturbances in perception of weight. In addition, the section of the EDE-Q querying the frequency of binge episodes and inappropriate compensatory behaviors was used to evaluate for full BN and BED diagnostic criteria per the DSM-5. BN was diagnosed by recurrent binge episodes and compensatory behaviors such as vomiting or laxative use at least once a week; BED was diagnosed if there were recurrent binge episodes occurring at least once per week, but no compensatory behaviors. Notably, the DSM-5 criteria require the presence of such behaviors over the last 3 months, while the EDE-Q assesses only the last 28 days. Reported frequencies were considered representative of the last 3 months for the purposes of fulfilling diagnostic criteria. The diagnosis of NES was based on the proposed research diagnostic criteria [27], as the description in the DSM-5 is not fully enumerated. These included ingestion of more than 25% of daily intake after dinner (NEQ item 5) or nocturnal eating two or more times per week (NEQ items 9 and 12).

Statistical Analysis

We performed a priori sample size calculations, powered to our primary outcome of an abnormal global EDE-Q score (≥ 4). No studies have reported the prevalence of disordered eating in women with PCOS using this as their outcome. However, one study showed an odds ratio (OR) of 6.03 for any ED diagnosed using the Mini International Neuropsychiatric Interview [28] in women with PCOS compared with controls [19]. Using data from this study, we assumed a prevalence of ED in the control population of approximately 4%, a type 1 error rate of 5%, 80% power, and an enrollment ratio of 2:1 between those with PCOS and controls. Under these assumptions, we estimated that we would need approximately 201 total participants to detect a more conservative fivefold increase in the rate of ED between the PCOS and control groups.

Descriptive statistics were performed using Fisher's exact or χ^2-tests for categorical variables and Student's *t*-tests for continuous variables. Multivariable logistic regression was performed to control for confounders. Although age was not associated with abnormal EDE-Q global or subscale scores in the current study, we included it in our final model because prevalence of individual ED has been shown to vary by age [17]. Our groups differed in race and marital status, and there are limited data on how race and marital status affect ED risk [29]. Both race and marital status were not found to be associated with either EDE-Q or specific ED diagnoses and were not included in our final model. Pearson correlation was