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Depression symptoms and body dissatisfaction association among polycystic ovary syndrome women☆,☆☆

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ABSTRACT

Objective: One publication reported that lower body satisfaction and lower education were independent predictors of depression in polycystic ovary syndrome (PCOS) in women. This study replicates that analysis using different instruments, and adds androgen levels to the model.
Methods: Cross-sectional analysis of questionnaires (Quick Inventory of Depressive Symptomatology-Self-Report, Body Esteem Scale) and serum androgens from a community cohort with (n=94) and without (n=96) PCOS, matched by BMI category. Non-parametric tests, Spearman correlations, and negative binomial regression models were analyzed.
Results: Depression symptoms were common (40–60% in lean, overweight and obese BMI categories) in the PCOS cohort, albeit generally of mild severity. The PCOS women had similar depression symptom severity ($P>.20$) and similar body dissatisfaction ($P\geq.25$) as the regularly cycling women in total and stratified by BMI category. In both the PCOS and non-PCOS cohorts, depression symptom severity was positively correlated with dissatisfaction with physical appearance and physical conditioning ($P<.02$). Body dissatisfaction (especially perception of physical conditioning) was strongly associated with more severe depression symptoms in non-obese PCOS women (BMI<30, $P<.04$) before and after controlling for age, testosterone and free testosterone. In contrast, for obese women with PCOS, depression was unrelated to body dissatisfaction after controlling for age.
Conclusions: Among non-obese PCOS women, their subjective body image was strongly associated with the severity of their depression symptoms. Most of the obese PCOS cohort had low body satisfaction and depression symptoms, therefore individual differences in the body dissatisfaction scores were not helpful in identifying depression symptom severity. Neither testosterone nor free testosterone was associated with depression symptom severity in PCOS women after controlling for body dissatisfaction and age.

Introduction

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder of reproductive age women [1]. Approximately 6.5% of women of reproductive age have PCOS [2,3], which is characterized by irregular or absent menstrual periods and hyperandrogenic manifestations such as acne and hirsutism [4]. The prevalence of depression and depression symptoms is significant in women with PCOS (29% [5] to 50% [6] in small cohorts). In one recent report, women with PCOS were found to have a 3.8 times higher lifetime incidence of depressive episodes (per clinical interviews) than age-, but not BMI-, matched women [7].

An association between elevated testosterone levels and depression has been reported among non-PCOS premenopausal women [8,9] and women undergoing the menopausal transition [10], although reports of no association exist among postmenopausal women [11] and African-American women aged 49–65[12]. Free testosterone has been reported to have an inverse association with depression symptoms in elderly women [13] and in women with anorexia nervosa [14]. Lower serum dehydroepiandrosterone sulfate (DHEAS) has been linked with increased depression symptoms in African-American women aged 49–65 [12]. Several studies of women with PCOS (with modest sample sizes) have failed to find an association between depression and serum levels of DHEAS [6], sex hormone binding globulin (SHBG) [6,15,16], and testosterone [6,15–18]. In contrast, a study by Weiner et al. [15] did find a curvilinear relationship between free testosterone and the depression scores among PCOS women (depression scores were lower for women with

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very high or very low free testosterone). The solitary publication on a possible relationship between excess androgens and body dissatisfaction within the PCOS population reported that lower body satisfaction was associated with hyperandrogenism (free androgen index>4.5) before and after adjustment for psychological measures (self-esteem and negative appearance scales, P<.03, no comparison group) [19].

PCOS women have lower body satisfaction compared with controls [15,20,21]. One publication reported that lower body satisfaction, lower satisfaction with appearance, and lower education were independent predictors of depression in PCOS women after controlling for age and body mass index (BMI) [20]. Two other studies collected body satisfaction and depression data in PCOS women [15,21], but did not analyze the relationship between those parameters. Among females who received medical care at a centralized facility [22] and individuals in a weight loss facility [23], body image dissatisfaction mediated the association between obesity and depression.

The goals of this report are to quantify among women with PCOS the relationship between depression symptom severity and body dissatisfaction, and to determine if the inclusion of androgen levels improves the ability to predict depression symptom severity. Our a priori hypothesis was that there was a positive association between depression symptom severity and body dissatisfaction based on one prior report [20]; there was no initial expectation for the addition of androgens to the model.

Methods

This study was approved by the University of Virginia's Internal Review Board. The population studied consisted of n=94 untreated women diagnosed with PCOS and a comparison sample of n=96 women with regular menses. This publication is a cross-sectional analysis of baseline data.

PCOS cohort enrollment criteria

Inclusion criteria were: a) a diagnosis of PCOS, as confirmed through the study using the NICHD criteria of oligomenorrheic and non-diabetic, with self-reported hirsutism and/or acne and/or elevated free testosterone (>6.8 pg/mL) [24], b) aged 18 to 43 years, c) weight of 250 lb (113 kg) or less, and d) at least one menses in the past six months but no more than eight periods in the most recent 12 months without hormonal intervention. Free testosterone was calculated from testosterone and sex hormone blinding globulin levels [25–27], and an elevated level was defined as ">6.8 pg/mL" for females [28]. Exclusion criteria were: a) use of metformin or hormonal contraceptives in the 60 days prior to enrollment, b) currently pregnant or breastfeeding during the prior 30 days, and c) bleeding/coagulation conditions that would contraindicate a blood draw. Women were recruited from the community, as described elsewhere [29].

Data on the PCOS symptoms (menstrual pattern, hirsutism, and acne) were self-reported. Androgens were assayed on fasting blood samples. After eligibility confirmation, self-administered questionnaires were implemented (demographic/reproductive history, the Body Esteem Scale (BES) [30], and the Quick Inventory of Depressive Symptoms (QIDS-SR16) [31]). Height and weight were measured (for calculating BMI) by trained nurses.

Comparison cohort

Anonymous waiting room surveys (BES and the QIDS-SR16) were implemented at three university OB/GYN and Family Medicine clinics (80% of the sample), and the university cafeterias (20% of the sample) in the fall 2009/winter 2010 (exempt IRB study). This convenience cohort was selected due to resource limitations, and these women were not compensated for completing the surveys. Of the women who agreed to participate, 96 respondents were healthy female volunteers who had never been diagnosed with PCOS, had regular menses, and were aged 18 to 44 years, not currently pregnant, and not within three months of delivery. Women self-reported their weight and height in ranges (4 weight categories, 3 height categories) designed to distinguish obese, overweight and lean BMI levels, as it was known upfront that the results would be analyzed in those three BMI categories based on preliminary data analyses. This cohort served as a reference population for the depression and body satisfaction scores.

Questionnaires

Body dissatisfaction was measured using the validated Body Esteem Scale [30], which is composed of 35 items and contains factorially-derived measures of both male and female body satisfaction. Respondents rate each of the 35 items (body parts and functions) on a 5 point Likert scale with responses ranging from 1 ("have strong negative feelings") to 5 ("have strong positive feelings"). The range of valid total scores is 35–175, with a lower score indicating greater body dissatisfaction. This tool consists of three subscales: sexual attractiveness, weight concern, and physical condition. The sexual attractiveness subscale assesses body parts whose appearance can generally be changed through cosmetics, but not exercise. The weight concern subscale addresses physical appearance items that can be altered through exercise or dietary habits, rather than cosmetics. The physical condition subscale addresses such items as stamina and agility, and generally consists of characteristics that are not readily visible to others. The scale has a high test–retest reliability [32]. Missing data (8 blanks, or 0.3% of the PCOS dataset) were imputed using the average score of the corresponding subscale, as suggested by the BES author [personal communication].

Depression symptoms were measured with the Quick Inventory of Depressive Symptomatology-Self Report 16 [31], which covers the nine symptomatic domains that are used to assess depressive episodes or major depressive disorders as described by the DSM-IV criterion. The individual self-reports the severity and frequency of symptoms over the last 7 days using a score of 0–3. The total scores range between 0 and 27, with higher scores reflecting more severe depression symptoms (0–5 no symptoms, 6–10 mild symptoms, 11–15 moderate symptoms, 16–20 severe symptoms, and 21–27 very severe symptoms). The internal consistency (Cronbach's alpha) was 0.86, and the QIDS-SR16 scores are strongly correlated with both the Inventory of Depressive Symptomatology tool and the Hamilton Rating Scale of Depression [31].

Serum assays (PCOS cohort only)

Total testosterone, DHEAS, and SHBG were directly measured using standard chemiluminescent enzyme-linked immunoassays on the Immulite 2000 instrument. The analytical sensitivity of testosterone was 15 mg/dL with a coefficient of variation (cv) of 13.0% among high-normal female levels (mean 86.1 ng/dL). For DHEAS, the analytical sensitivity was 3 ug/dL with a cv=9.8% at mean DHEAS levels of 1.63. For SHBG, the analytical sensitivity was 0.02 nmol/L, with a cv=5.2% at a mean range of 21–63 nmol/L. Free testosterone was mathematically derived [25–28], which is an estimation technique that was critically evaluated and supported relative to direct measures of free testosterone [25]. All assays were performed in the UVa General Clinical Research Center Core Lab. All biological samples represent follicular phase or anovulatory cycle values.

Statistical analyses

The BES subscale scores, the QID-SR16 scores, and demographic factors were compared between the PCOS and non-PCOS cohorts