

# Phenotypic comparison of Caucasian and Asian women with polycystic ovary syndrome: a cross-sectional study

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**Objective:** To determine whether manifestations of polycystic ovary syndrome (PCOS), particularly androgen excess, differ between Caucasian and Asian women in the San Francisco Bay Area.

**Design:** Cross-sectional study.

**Setting:** Multidisciplinary PCOS clinic at a tertiary academic center.

**Patient(s):** 121 Caucasian and 28 Asian women, aged 18–44, examined between 2006 and 2011 with PCOS verified by a reproductive endocrinologist and dermatologist according to the Rotterdam criteria.

**Intervention(s):** Transvaginal ultrasounds, comprehensive dermatologic exams, and serum testing.

**Main Outcome Measure(s):** Hirsutism defined as a modified Ferriman-Gallwey (mFG) score  $\geq 8$ , acne, androgenic alopecia, and biochemical hyperandrogenism.

**Result(s):** Caucasian and Asian women had a similar prevalence of all measures of androgen excess. Both groups had similar total mFG scores and site-specific mFG scores, except Asian women had a lower site-specific mFG score for the chest. Although Asian women were more likely to use laser hair removal, the results were unchanged when the women with a history of laser hair removal were excluded.

**Conclusion(s):** Caucasian and Asian women with PCOS living in the same geographic region had a similar prevalence of hirsutism as well as other markers for androgen excess. Further studies are necessary to evaluate the need for ethnic-specific mFG scores in women with PCOS. (Fertil Steril® 2013;100:214–8. ©2013 by American Society for Reproductive Medicine.)

**Key Words:** Ethnicity, hirsutism, polycystic ovary syndrome

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**P**olycystic ovary syndrome (PCOS) is a heterogeneous endocrine disorder marked by anovulation, androgen excess, and polycystic ovaries (1–3). Phenotypic differences for PCOS have been reported in women of diverse ethnic groups (4–8); however, ethnicity and its impact on the phenotypic presentation of PCOS is not accounted for in the diagnostic criteria for PCOS. Hirsutism is defined by the presence of excessive terminal

hair in androgen-sensitive areas of the female body. The modified Ferriman-Gallwey (mFG) scores of the 11 body areas (upper lip, chin, chest, upper and lower back, upper and lower abdomen, arm, forearm, thigh, and lower leg) originally proposed by Ferriman and Gallwey, excluding the lower legs and forearms (9). Traditionally a mFG score  $\geq 8$  has been used to define hirsutism based on a Caucasian population (9). Whether this criterion is

appropriate for all ethnicities is a question that has yet to be resolved.

Studies in the literature suggest that the appropriate mFG score to define hirsutism in Asian women, excluding those from the Indian subcontinent, is less than 8. In a large population-based study in China of 3,000 women, mFG  $\geq 5$  was found to be associated with PCOS symptomatology (10). In Thailand, among women seeking preventative gynecologic care, the 97.5th percentile for mFG score was  $\geq 3$  (11). However, among women in the United States a cross-sectional study of 170 Caucasian and 20 Asian women with PCOS in Boston showed a similar prevalence of hirsutism defined by mFG score  $\geq 9$  and mean mFG score (6). The aim of

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TABLE 1

## Baseline characteristics of polycystic ovary syndrome study participants.

Characteristic	No. of observations	Caucasian (n = 121)	Asian (n = 28)	P value
Age, y	149	28.0 ± 5.4	29.6 ± 5.9	.15
Body mass index, kg/m	144	30.4 ± 8.1	30.1 ± 7.4	.85
Waist circumference, cm	128	92 ± 22	89 ± 16	.52
Oligomenorrhea, n (%)	143	100 (87.0)	28 (100)	.04
Antral follicle count ≥ 12 <sup>a</sup>	149	103 (85.1)	23 (82.1)	.69
Ovarian volume ≥ 10 mL <sup>b</sup>	149	54 (44.6)	14 (50.0)	.61
Fasting glucose, mg/dL	142	88 ± 12	86 ± 11	.34
2-hour glucose, mg/dL	136	108 ± 33	103 ± 34	.43
Fasting insulin, μIU/mL	119	14 ± 15	14 ± 27	.94
Total cholesterol, mg/dL	141	191 ± 43	192 ± 58	.96
HDL-cholesterol, mg/dL	137	57 ± 18	59 ± 18	.62
LDL-cholesterol, mg/dL	137	110 ± 32	105 ± 35	.54
Triglycerides, mg/dL	127	102 ± 55	142 ± 261	.46
Current medication use, n (%) <sup>c</sup>				
Oral contraceptive pills	148	27 (22.3)	4 (14.8)	.45
Metformin		15 (12.4)	3 (11.1)	1.0
Spironolactone		8 (6.6)	0	.35
Prior laser hair removal, n (%)	140	16 (13.9)	8 (32.0)	.03

<sup>a</sup> Dichotomous observation with at least one ovary with ≥12 antral follicles.

<sup>b</sup> Dichotomous observation with at least one ovary with volume ≥10 mL.

<sup>c</sup> Based on clinic instructions, patients discontinued oral contraceptive pills and spironolactone at least 1 month before the assessment.

Wang. Caucasian and Asian women with PCOS. *Fertil Steril* 2013.

this study was to determine whether clinical manifestations of androgen excess, in particular hirsutism, differ between Caucasian and Asian women presenting to a multidisciplinary PCOS clinic in San Francisco.

## MATERIALS AND METHODS

This was a cross-sectional study in which participants were consecutively recruited from a monthly multidisciplinary PCOS clinic at the University of California at San Francisco (UCSF) over 5 years (2006–2011). This clinic was targeted toward women who were not seeking fertility treatment. Approval was obtained from the UCSF Committee on Human Research. Participants were included if they self-identified as Asian or Caucasian and fulfilled the PCOS diagnosis by Rotterdam criteria, with two out of three of the following: oligo-ovulation, clinical and/or biochemical hyperandrogenism, and the presence of 12 or more antral follicles per ovary and/or ovarian volume >10 mL (1). Participants were excluded if they reported a mixed ethnic background (e.g., Asian-Caucasian or Caucasian-African American). We also excluded women who specifically identified themselves as South Asian (n = 4). Studies have reported that South Asian women may have a higher mean mFG score, with one study of 47 South Asian women with PCOS reporting a mean mFG score as high as 18 (7).

Participants presented for a one-time visit in which they completed a self-administered questionnaire and underwent anthropometric measurements and a transvaginal ultrasound to determine ovarian morphology. The patients were evaluated by a dermatologist at the same visit to determine their total mFG score and to assess for the presence of other cutaneous manifestations of hyperandrogenism, including acne and androgenic alopecia. Serum androgen results, but not menstrual history or ovarian morphology, were available

to the dermatologist. Site-specific mFG scores were available for a subset of the study group.

Serum total testosterone, free testosterone, dehydroepiandrosterone-sulfate (DHEA-S), and androstenedione were obtained at commercial laboratories based on individual insurance plans. In general, two commercial laboratories were used. Because of the difference in assays used, we chose not to report continuous measures of serum androgens, but rather to look at whether values were elevated based on the specific reference range of each laboratory. Congenital adrenal hyperplasia was ruled out with a normal 17-hydroxyprogesterone level. Metabolic testing included a 75 gram 2-hour oral glucose tolerance test and fasting lipids. Participants were asked to discontinue oral contraceptives pills or spironolactone at least 1 month before the clinic visit, and to refrain from waxing, shaving, or plucking for at least 1 week before the clinic visit. This time frame was determined based on realistic expectations of the patient population. We did not want to require a longer time frame off medications and treatments, which may have been prohibitive for patients wishing to be evaluated in the clinic.

We examined four dichotomous markers of androgen excess: hirsutism defined as mFG score ≥ 8, acne, androgenic alopecia, and elevated serum androgens. Participants were defined as having elevated serum androgens if they had any value for total testosterone, free testosterone, DHEA-S, or androstenedione greater than the reference range of the specific laboratory.

Statistical analyses were performed using the *t* test, chi-square test, and Fisher's exact test as appropriate. The number of observations included for each variable of interest is shown in Tables 1–3.

## RESULTS

Of the 336 women seen at the multidisciplinary PCOS clinic from 2006 to 2011, there were 237 women who fulfilled the

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