Assessing new terminal body and facial hair growth during pregnancy: toward developing a simplified visual scoring system for hirsutism

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Objective: To study the distribution and progression of terminal hair growth in pregnant women and to determine the feasibility of a simplified scoring system for assessing hirsutism.
Design: Prospective follow-up observational study.
Setting: Academic hospital.
Patient(s): A total of 115 pregnant women (discovery cohort) and 1,159 women with polycystic ovary syndrome (PCOS) (validation cohort).
Intervention(s): Facial and body terminal hair growth assessed by modified Ferriman and Gallwey score system (mFG score), and total testosterone (TT) level detected by liquid chromatography with tandem mass spectrometry.
Main Outcome Measure(s): Degree of facial and body terminal hair growth.
Result(s): The serum TT level and mFG score increased as pregnancy progressed. Both the prospective study and receiver operating characteristics curve indicated that the body areas with the greatest contribution to hirsutism (defined as an mFG score ≥ 5) with new terminal hair growth were the upper lip, lower back, lower abdomen, and thigh. A simplified mFG scoring system (sFG) was developed, and a cutoff value of ≥ 3 was defined as hirsutism. Pregnant hirsute women were distinguished from nonhirsute women with an accuracy of 95.2%, sensitivity of 96.8%, and specificity of 94.3% for detecting hirsutism. This was further validated in the PCOS population with a sensitivity, specificity, and positive predictive value of 97.6%, 96.4%, and 96.4%, respectively.
Conclusion(s): This study suggests that the upper lip, lower back, lower abdomen, and thigh may be an effective simplified combination of the mFG system for the evaluation of excess hair growth in Chinese women.
Clinical Trial Registration Number: ChiCTR-OCH-14005012. (Fertil Steril® 2016;105: 494–500. ©2016 by American Society for Reproductive Medicine.)
Key Words: Androgen excess, hair growth, hirsutism, modified Ferriman-Gallwey score, polycystic ovary syndrome, pregnancy

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Androgen-related disorders, including polycystic ovary syndrome (PCOS) and nonclassic adrenal hyperplasia, are among the most common endocrine disorders in women of reproductive age, and they affect approximately 10% of this population worldwide (1–3). The most common sign of hyperandrogenism is hirsutism, which is defined as the development of male-like terminal hair growth in women (4–6). For the purpose of visually determining the

degree of body/facial terminal hair growth and the presence of hirsutism, the most widely used method is the scoring proposed by Ferriman and Gallwey in 1961 that assesses 11 body areas (7). This method was later modified (the mFG score) to include only nine body areas (upper lip, chin, chest, upper abdomen, lower abdomen, upper back, lower back, upper arms, and thighs) (8).

Using the mFG hair scoring system, various studies have identified cutoff values for defining hirsutism in different populations. For example, Knochenhauer et al. (9) examined 369 consecutive reproductive-aged women (174 white and 195 black, aged 18–45 years) at the time of their pre-employment physical examinations in the United States. This study suggested that an mFG score ≥ 6, the 95th percentile value, defines hirsutism. However, in a larger study including 633 unselected white and black women in the United States who also were undergoing a pre-employment physical examination, two nearly distinct clusters that occurred above and below an mFG value of 2; the bulk of the scores ≤ 2 were found when the cutoff value was defined by the principal component and univariate analyses (10).

Similar studies have been performed in populations of Asian women. A score of 3 or more has been suggested to be abnormal in Thai women, although this study used self-evaluation instead of visual scoring by health-care professionals (11). The study by Kim et al. (12) examined 1,010 Korean women in pre-employment physical examinations and found that an mFG score of ≥ 6 could be considered the cutoff value for defining hirsutism. In an epidemiologic study of 2,899 women aged 20 to 45 years who were randomly selected from the general population of the southern People's Republic of China, an mFG score cutoff value of 5 was determined as defining hirsutism (13).

Despite its value in the clinical and research arenas, the mFG scoring system has some limitations, particularly when performing large epidemiologic studies. For example, the assessment of nine body areas, as in the mFG score, generally requires that the patient disrobe. Consequently, a number of investigators have attempted to develop simpler methods for assessing excess terminal hair growth that may be applicable both in the research area and in the clinical setting. The assessment of three body areas for hair growth, such as the chin, upper abdomen, and lower abdomen (14), or the upper lip, lower abdomen, and thigh (15, 16), have been suggested by various researchers as simpler predictors of hirsutism. Notably, these studies were cross sectional in nature, assessing hair growth at only one point in time.

Owing to the hormonal changes of gestation, new body/facial terminal hair growth can be observed in women during pregnancy (17, 18). In the present study, we assessed new terminal body/facial hair growth longitudinally during pregnancy using the mFG scoring system with the purpose of developing a simplified method of assessing new terminal hair growth in women that may be applicable to the study of hyperandrogenic patients, notably women with PCOS.

MATERIALS AND METHODS

Study Populations

The discovery population comprised pregnant women evaluated prospectively and longitudinally. Women with repeated spontaneous abortions of unknown etiology (19) were recruited between July 10, 2014, and December 10, 2014, from the outpatient clinics of Sun Yat-sen Memorial Hospital, Sun Yat-sen University, Guangzhou, People's Republic of China. The women were screened for possible causes of repeated spontaneous abortion, including chromosomal, anatomic, endocrinologic, metabolic, and immune factors. Only those without specific abnormalities accounting for their repeated spontaneous abortions were included in the study (20). Those who had prior diabetes, androgen excess, self-assessed excess hair growth, hirsutism (mFG ≥ 5), irregular menses, thyroid dysfunction, or liver or renal diseases were excluded from the study.

At the time of initial enrollment, the women were interviewed, completed a standard entry form (Supplemental Appendix, available online), and were assessed for the degree of terminal body and facial hair growth using the mFG scoring system, as determined by one of four gynecologists who had been trained in using the same system. A serum sample was also obtained for total testosterone (TT).

The women were then assessed at periodic intervals during pregnancy, including between the 5th and the 9th weeks, the 10th and the 14th weeks, the 15th and the 20th weeks, the 21st and the 24th weeks, and the 25th and the 28th weeks of gestation. Terminal body and facial hair growth were assessed at each interval using the mFG score system, and the serum TT levels were measured. Additionally, the women were asked to observe and record the body position of any new emerging hair growth after their enrollment in the study (Supplemental Appendix). The women were also asked not to shave, pluck, or use other means of reducing hair growth during pregnancy.

The validation cohort comprised a total of 1,159 women aged 18 to 41 years with PCOS who were recruited from the same data set as previously reported (in which 827 cases were included) (21) at Sun Yat-sen Memorial Hospital from January 2004 to December 2014. Patients presenting with oligomenorrhea/amenorrhea, dramatic weight gain, excess facial or body hair, acne, recurrent pregnancy loss, and infertility were systematically evaluated under the same standardized protocol for the presence of PCOS. We diagnosed PCOS according to the Rotterdam 2003 criteria (22). In all patients, mimicking or other androgen excess disorders were excluded, including androgen-secreting neoplasms, adrenal hyperplasia, iatrogenic androgen excess, thyroid dysfunction, and hyperprolactinemia, as previously described elsewhere (21). Those who had shaved, plucked, or used other means of reducing hair growth before the examination were excluded. For the accuracy of TT measurements, only the newly collected serum of PCOS patients with complete records from July 10, 2014, to December 10, 2014, were included in the TT level measurement by liquid chromatography with tandem mass spectrometry (LC-MS/MS).