



Sweet Foods and *Stasis* Constitution of Chinese Medicine in Patients with Polycystic Ovary Syndrome

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Background: Numerous patients with polycystic ovary syndrome (PCOS) receive integrative treatment of Western and traditional Chinese medicine in Taiwan. **Aim:** The aim of this study was to survey the body constitutions of Chinese medicine in patients with PCOS and the correlation with their lifestyles, dietary habits, and mental health. **Methods:** A cross-sectional questionnaire survey was conducted among Taiwanese gynecological outpatients at a medical center from November 2015 to December 2017. The questionnaire included assessments of Chinese body constitutions, depression status, and various lifestyle factors, such as the frequency of staying up late and dietary preferences. **Results:** In total, 90 outpatients diagnosed with PCOS by the gynecologists completed the questionnaires. They exhibited higher scores of Chinese medicine body constitutions, including *Yang-Xu* (陽虛), *Yin-Xu* (陰虛), and *Stasis* (血瘀) (all $P < 0.001$) compared with 90 female outpatients without ovary problems. Multivariate logistic regression analyses showed sweet food preference (odds ratio OR 4.131, 95% confidence interval CI 1.674–10.192; $P = 0.002$), and *Stasis* (OR 1.118, 95% CI 1.018–1.228; $P = 0.019$) were positively associated with PCOS after adjusting confounders of age, body mass index (BMI), and current smoking habit. **Conclusion:** *Stasis* body constitution of Chinese medicine was observed in Taiwanese outpatients with PCOS. BMI and lifestyle modifications, including food preference, should be considered for whole-person health care in these patients.

Key words: Polycystic ovary syndrome, Chinese body constitution, depression, dietary preference, lifestyle

INTRODUCTION

Polycystic ovary syndrome (PCOS) is the most common cause of female infertility. Its incidence is approximately 6%–10%,¹ and the three major characteristics of PCOS are oligo-ovulation and/or anovulation, clinical and/or biochemical signs of hyperandrogenism, and polycystic ovaries.² The etiology of PCOS remains unclear, and multiple studies have discussed socioeconomic status and unhealthy behaviors, including smoking, poor dietary habits, and lack of exercise.³ First, the sleep-wake cycle is related to the adjustment of the endocrine system. With the effects of hormones, sleep and PCOS may have a more complicated, mutual influential relationship.⁴ Regarding diet, numerous studies have explored the influence of diet on PCOS; however, the results were inconsistent.⁵ In addition, individuals with PCOS tend to have mental health problems. Incidences of anxiety, depression,

and low self-awareness are higher as well.⁶ Some researchers argue that more research on causal relations between mental illness and PCOS is required.

According to the Taiwan National Health Insurance Program database, approximately 89.2% of patients with PCOS received traditional Chinese medicine (TCM) treatments, including herbal medicine and acupuncture in Taiwan.⁷ In addition, herbal medicine can simultaneously treat reproductive and metabolic defects and statistically significant improvement in promoting menstrual regularity.^{8–10} Thus, pathophysiology and treatments in TCM theories of PCOS warrant study.

In daily routines, TCM theories value the correspondence between people and the Qi of nature, for example, waking up with sunrise and resting with sunset. Regarding diet, apart from

Received: June 16, 2024; Revised: December 11, 2024;

Accepted: February 11, 2025; Published: April 11, 2025

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How to cite this article: Lin CJ, Lai CH, Huang YC, Lin SJ, Tsai YN, Yu MH. Sweet foods and *Stasis* constitution of Chinese medicine in patients with polycystic ovary syndrome. J Med Sci 2025;45:53-9.

the nutrition research of modern medicine, TCM emphasizes the flavors of food. Flavors are categorized into sour, bitter, sweet, spicy, and salty, and eating meals with different flavors influences the functions of Qi, blood, and viscera. For mental health, TCM considers emotion to be an essential factor in pathogenesis. In TCM theories, unhealthy lifestyles associated with daily routines, dietary habits, and mental health influence the functions of viscera, Qi, and blood. They cause deviations in body constitutions and result in diseases and thus are prominent pathogenic factors.

This study aimed to investigate the deviations of body constitutions and the daily routines, dietary habits, and mental health of patients with PCOS from TCM perspectives, to propose the lifestyle modification guidance for these patients.

MATERIALS AND METHODS

Ethical approval

The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of Tri-Service General Hospital (TSGHIRB-2-104-05-029), clinicaltrials.gov identifier: NCT04425083. All methods were carried out in accordance with relevant guidelines and regulations. Written informed consent was obtained from each participant prior to questionnaire completion.

Participants

A cross-sectional study that conducted at the outpatient department of Chinese Medicine and the Departments of Obstetrics and Gynecology, Tri-Service General Hospital, Taiwan, from November 2015 to December 2017. Female patients, over 20 years old, diagnosed with PCOS, were included as they presented two or more revised 2003 Rotterdam criteria of PCOS: (1) oligo-ovulation or anovulation (the menstrual cycle is longer than 42 days), (2) clinical and/or biochemical signs of hyperandrogenism, and (3) polycystic ovaries, that is, the presence of 12 or more follicles measuring 2–9 mm in diameter in each ovary and/or increased ovarian volume (10 mL) and the exclusion of other etiologies (e.g., congenital adrenal hyperplasia, androgen-secreting tumors, Cushing's syndrome) (Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group, 2004).^{2,11} The exclusion criteria included the presence of thyroid dysfunction or hyperprolactinemia, being diagnosed mental illness, or taking psychiatric medication, pregnancy, taking contraceptives, breastfeeding, having a severe disease in the previous 6 months, or taking Chinese medicine in the past 1 month. The non-PCOS group comprised women who

had regular menstrual cycles and self-reported that they did not have polycystic ovaries according to recent ultrasonic examinations.

Data collection

Basic participant information

Participant information included age, height, weight, body mass index (BMI), abdominal obesity (waist circumference), waist–hip circumference ratio, menarche age, irregular menstrual time, work schedule (day, evening, or night shift), average sleep duration,¹² frequency of staying up late (sleeping after midnight), smoking, drinking, exercise, and dietary habits,¹³ dietary flavor preference (sour, bitter, sweet, spicy, and salty), and self-evaluation of stress and health. Traditional Chinese medicine body constitution

TCM Body Constitution

The TCM body constitution questionnaire (BCQ) has been used to measure body constitution deviations.^{14–17} The instrument consists of three subscales. The *Yang-Xu* and *Yin-Xu* constitution subscales each include 19 questions, and the *Stasis* constitution subscale has 16 questions. Some questions are shared across the three measures, making the questionnaire consist of 44 questions in total, scored on a Likert 5-point scale (from 1, “*Never happens*,” to 5, “*Always happens*”). A higher score implied a greater deviation from the constitution. When the *Yang-Xu* constitution score is ≥ 30.5 , the respondent is diagnosed as *Yang-Xu*. When the *Yin-Xu* constitution score is ≥ 29.5 , the respondent is diagnosed as *Yin-Xu*. For the phlegm *Stasis* constitution, the standard is ≥ 26.5 points. The instrument has favorable factorial validity. Cronbach's α of each subscale is 0.85–0.88, and Cronbach's α of the overall BCQ reaches 0.90.

Anxiety and depression

The Beck Anxiety Inventory (BAI) is a self-completed questionnaire with 21 items. The questions ask respondents whether they have experienced some common symptoms of anxiety in the previous week, including numbness or tingling, feeling hot, being unable to relax, and fear of the worst happening. The respondents report on a 4-point Likert scale that ranges from 0 (*Not at all*) to 3 (*Severely – it bothered me a lot*). The higher the total score is, the more severe the anxiety symptoms are. A total score of 0–7 implies minimal anxiety, 8–15 is mild anxiety, 16–25 represents moderate anxiety, and 26–63 is severe anxiety.

The Beck Depression Inventory-second Edition (BDI-II) measures the depression levels of teenagers and adults through 21 questions. It consists of questions representative of the symptoms and attitudes of depression, such as feeling sad, losing interest, decreased appetite, and feeling tired. For

each item, respondents select the option that best describes how they felt over the previous 2 weeks. Every question has anchors arranged according to severity, and the score ranges from 0 to 3 points. The higher the total score is, the more severe the depression symptoms are. A total score of 0–13 points is in the normal range, 14–19 implies mild depression, 20–28 moderate depression, and 29–63 severe depression.

Statistical analysis

Between with PCOS and without PCOS groups, the differences in the demographic characteristics, lifestyle factors, and Chinese body constitution were explored by Student's *t*-test and Chi-square test. The demographic data, anxiety and depression scores, and constitution scores are continuous variables presented as means $\pm$ standard deviations and analyzed with Student's *t*-test between with PCOS and without PCOS group if the data meet the normal distribution. For the continuous variables, the Shapiro–Wilk *w*-test was used to examine whether the data were normally distributed. Otherwise, nonparametric test was used to compare the difference between with PCOS and without PCOS groups. Daily routines, dietary habits and preferences, and exercise are categorical variables presented as frequencies and analyzed using Chi-square.

Multivariate logistic regression analysis was performed using to assess the determinants of lifestyle factors of frequency of staying up and dietary preferences with PCOS while adjusting confounders of age, BMI, and current smoking behavior. The exponential of the beta coefficient (β) was computed as odds ratio (OR) which was presented along with the 95% confidence interval (95% CI), with a significance level of 0.05 ($P < 0.05$).

RESULTS

In total, 90 participants with PCOS and 90 non-PCOS

Table 1: Demographic data

	With PCOS (<i>n</i> =90)	Without PCOS (<i>n</i> =90)	<i>P</i>
Age (year)	29.1 $\pm$ 6.5	31.1 $\pm$ 6.4	0.038
Height (cm)	160.1 $\pm$ 5.2	160.6 $\pm$ 5.5	0.530
Weight (kg)	64.4 $\pm$ 14.5	55.9 $\pm$ 12.4	<0.001
BMI (kg/m ²)	25.10 $\pm$ 5.4	21.61 $\pm$ 4.5	<0.001
Waist (cm)	82.2 $\pm$ 14.9	71.34 $\pm$ 11.22	<0.001
Waist-to-hip ratio (%)	0.82 $\pm$ 0.08	0.79 $\pm$ 0.08	0.010
Menarche (year)	12.7 $\pm$ 1.5	12.9 $\pm$ 1.4	0.277
Duration irregular menstruation (year)	8.3 $\pm$ 8.0		

Data are presented as mean $\pm$ SD. PCOS=Polycystic ovary syndrome; BMI=Body mass index; SD=Standard deviation

completed the questionnaire [Table 1]. The PCOS participants had significantly higher weight ($P < 0.001$), BMI ($P < 0.001$),

Table 2: Lifestyle, dietary habits and preferences

	With PCOS (<i>n</i> =90)	Without PCOS (<i>n</i> =90)	<i>P</i>
Work schedule			
Day shift	58 (64.4)	60 (66.7)	0.199
Evening shift	5 (5.6)	1 (1.1)	
Night shift	3 (3.3)	0	
Not fixed	19 (21.1)	24 (26.7)	
Unemployed	4 (4.4)	5 (5.6)	
Sleep time (h)	6.70 $\pm$ 1.01	6.65 $\pm$ 0.95	0.723
staying up late (sleeping after midnight)			
Often	44 (48.9)	30 (33.3)	0.013
Sometimes	38 (42.2)	39 (43.3)	
No	8 (8.9)	21 (23.3)	
Smoking			
<1 pack per day	0	1 (1.1)	0.014
Sometimes	7 (7.8)	0	
No	83 (92.2)	89 (98.9)	
Drinking			
Sometimes	31 (34.4)	34 (37.8)	0.756
No	59 (65.6)	56 (62.2)	
Exercise			
Often	18 (20.0)	10 (11.1)	0.204
Sometimes	52 (57.8)	61 (67.8)	
No	20 (22.2)	19 (21.1)	
Diet			
Nonvegetarian	88 (97.8)	87 (96.7)	1.000
Vegetarian	2 (2.22)	3 (3.3)	
Flavor preference			
Sour (yes)	24 (26.7)	11 (12.2)	0.023
Sweet (yes)	35 (38.9)	15 (16.7)	0.001
Salty (yes)	32 (35.6)	18 (20.0)	0.030
Bitter (yes)	3 (3.3)	0	0.246
Spicy (yes)	29 (32.2)	21 (23.3)	0.244
Fried foods			
Often	16 (17.8)	4 (4.4)	0.008
Sometimes	68 (75.6)	83 (92.2)	
No	6 (6.7)	3 (3.3)	
Icy foods			
Often	27 (30.0)	21 (23.3)	0.103
Sometimes	61 (67.8)	61 (67.8)	
No	2 (2.2)	8 (8.9)	

Data are presented as mean $\pm$ SD or *n* (%). PCOS=Polycystic ovary syndrome; SD=Standard deviation

waist circumference ($P < 0.001$), and waist–hip ratio ($P = 0.010$) and were significantly younger ($P = 0.038$) than those without PCOS. No significant difference was identified for height ($P = 0.530$) or age at menarche ($P = 0.277$).

As shown in Table 2, the two groups exhibited no significant lifestyle differences, such as work schedule, sleep hours, smoking, alcohol consumption, and exercise habit (all $P > 0.05$), except staying up late more frequently in patients with PCOS ($P = 0.013$). In addition, most participants in both groups were nonvegetarians. Preferences of sour ($P = 0.023$), sweet ($P = 0.001$), salty ($P = 0.030$) flavors, and fried foods ($P = 0.008$) were significantly higher in PCOS patients.

Table 3 presents the Chinese body constitution and mental status score. Patients with PCOS had significantly higher scores of *Yang-Xu* ($P < 0.001$), *Yin-Xu* ($P < 0.001$), and *Stasis* ($P < 0.001$), anxiety ($P < 0.001$) and depression ($P = 0.001$).

Table 4 demonstrates that *Stasis* constitution was the strongest predictor of PCOS (OR 1.082, 95% CI 1.004–1.167; $P = 0.004$). However, the OR was borderline significant after adjusting confounders of age, BMI, and current smoking habit (OR 1.085, 95% CI 0.998–1.179; $P = 0.056$).

In Table 5, the predictive factors with significant differences ($P < 0.05$) were used to construct a logistic regression model. Sweet food preference (OR 4.131, 95% CI 1.674–10.192; $P = 0.002$) and *Stasis* (OR 1.118, 95% CI 1.018–1.228; $P = 0.019$) were positively associated with PCOS after adjusting confounders of age, BMI, and current smoking habit.

DISCUSSION

The major findings

This is the first study to investigate the TCM body constitutions of patients with PCOS using a rigorous method. Our findings revealed that patients with PCOS had deviations in the TCM constitution, namely the *Yin-Xu*, *Yang-Xu*, and *Stasis* constitutions, compared with non-PCOS individuals. Of these three, the *Stasis* constitution generally exerted the strongest effect through multivariate logistic regression analyzed.

Dietary content and flavors

For diet, the participants with PCOS expressed preferences for sour, sweet, salty, and fried foods. On the other hand, numerous studies have discussed the influence of diet on PCOS, such as calories, dietary glycemic index, and fiber intake, the results are inconsistent.¹³ Most of the studies analyzed dietary records of one to several days. The participants had to recall intake content. Such records are easily influenced by memory, and omissions and errors occur. In addition, they may not represent long-term dietary patterns. This study investigated the dietary preferences of patients with PCOS, including

Table 3: Chinese body constitution and mental health status

Score	PCOS	Non-PCOS	<i>P</i>
<i>Yang-Xu</i> score	34.54±9.90	28.83±7.28	<0.001
<i>Yin-Xu</i> score	33.92±9.25	28.98±7.60	<0.001
<i>Stasis</i> score	31.08±10.26	24.47±7.40	<0.001
Self-reported stress	5.28±2.32	4.37±1.84	0.004
Self-reported health score	68.30±13.39	75.36±12.82	<0.001
BAI	9.06±7.32	4.78±5.47	<0.001
BDI	9.26±6.21	5.92±6.85	0.001

Data are presented as mean±SD. PCOS=Polycystic ovary syndrome; BAI=Beck anxiety inventory; BDI=Beck depression inventory

Table 4: Multivariate analysis of predictive factors for polycystic ovary syndrome

Variable	OR	95% CI	<i>P</i>
Model 1			
<i>Yang-Xu</i> score	1.022	0.947–1.104	0.570
<i>Yin-Xu</i> score	0.987	0.918–1.062	0.729
<i>Stasis</i> score	1.082	1.004–1.167	0.040
Model 2			
<i>Yang-Xu</i> score	1.033	0.951–1.123	0.434
<i>Yin-Xu</i> score	0.970	0.895–1.051	0.459
<i>Stasis</i> score	1.085	0.998–1.179	0.056

Multivariate logistic regression analysis was performed using the “enter” method. Model 2=Adjusted for age, BMI, and current smoking habit. 95% CI=95% confidence interval, OR=Odds ratio

Table 5: Multivariate analysis of predictive factors for polycystic ovary syndrome

Variable	OR	95% CI	<i>P</i>
BMI (kg/m ²)	1.121	1.025–1.207	0.010
Staying up late (yes/no)	1.792	0.584–5.495	0.308
Sour food (yes/no)	1.358	0.502–3.677	0.546
Sweet food (yes/no)	4.131	1.674–10.192	0.002
Salty food (yes/no)	1.060	0.442–2.538	0.896
Fried food (yes/no)	1.236	0.476–3.207	0.308
Stress	1.122	0.927–1.357	0.663
BAI	1.059	0.442–2.538	0.177
BDI	0.988	0.925–1.056	0.726
<i>Yang-Xu</i> score	1.001	0.917–1.093	0.981
<i>Yin-Xu</i> score	0.935	0.854–1.023	0.144
<i>Stasis</i> score	1.118	1.018–1.228	0.019

Multivariate logistic regression analysis was performed using the “enter” method. Adjusted for age, smoking habit. CI=Confidence interval; OR=Odds ratio; BAI=Beck anxiety inventory; BDI=Beck depression inventory; BMI=Body mass index

flavors and eating habits. Thus, they may better represent dietary habits.

In TCM theories, flavors are divided into sour, bitter, sweet, spicy, and salty. Food influences the circulation of Qi, so a long-term inclination to eat food with a certain flavor deviates the body constitution. The results indicate that compared with the non-PCOS participants, those with PCOS preferred food with sour, sweet, and salty flavors, particularly sweet food. They also reported a fondness for fried food, resulting in Qi stagnation and thus phlegm *Stasis*. Therefore, the results signify that the preferences of flavors of patients with PCOS deviate the body constitution to the *Stasis* constitution.

Anxiety and depression

Numerous studies have reported that PCOS is associated with an increased risk of anxiety and depression¹⁸ However, the relationship between PCOS and psychiatric disorders is unclear. In our study, as in other research, people with PCOS had significantly higher BAI and BDI scores. In TCM theories, psychological and physiological states influence each other. The emotions are affected by stress, depression, and anxiety cause Qi stagnation. Qi stagnation then causes phlegm *Stasis* and thus the *Stasis* constitution. More research is needed to assess the association between the onset of depression/anxiety and time of PCOS diagnosis to evaluate causal relationships among depressive and anxiety symptoms and PCOS.¹⁹

Traditional Chinese medicine body constitutions

Few studies have discussed deviations of TCM body constitutions among people with PCOS. Some scholars have reported that the majority of patients with PCOS have *Kidney-Yang* deficiency and *Spleen-Yang* deficiency.²⁰ Others have used patterns corresponding to the effectiveness of TCM treatments on PCOS.²¹ However, the constitution patterns of patients with PCOS were only simulated from the scholars' clinical experience and not analyzed using scientific methods. This study used the BCQ for an analysis of TCM body constitutions with favorable reliability and validity, and it has been used to assess the risk of coronary artery disease and evaluate the constitutions and health-related quality of life of patients with diabetes.^{22,23}

Traditional Chinese medicine concept of polycystic ovary syndrome

In TCM, lifestyle, diet, and mental health influence the operation of Qi and blood. Stress, depression, anxiety, and stay up late cause Qi stagnation. Eating excess sour, sweet, and salty foods also cause Qi stagnation. Eating sweet and fried food forms phlegm easily, and phlegm obstructs the flow of Qi. Overall, negative emotions, stay up late and excessively sour, sweet, salty, and fried diets cause the pathogenesis of Qi stagnation and phlegm obstruction. While Qi pushes forward

blood flow, Qi stagnation and phlegm obstruction further cause blood *Stasis*, forming *Stasis* constitution. The formation of the *Stasis* constitution obstructs blood flow and eventually results in oligomenorrhea, the main symptom of PCOS.

One study used the Taiwan National Health Insurance Program database to analyze the TCM use of people with PCOS in 1997–2010.⁷ The most common herbal formula was Jia-Wei-Xiao-Yao-San, which consists of 10 herbs and is often used to treat infertility, premenstrual tension, menopause, anxiety, and depression.^{24,25} Another formula often used to treat PCOS is Gui-Zhi-Fu-Ling-Wan, which was first documented in the *Treatise on Febrile and Miscellaneous Diseases* by Zhang Zhongjing in the late Eastern Han dynasty (200–205 CE). It is a formula to treat tumor in the abdomen, and its function is to improve blood *Stasis*.²⁶ Among single herbs, the most used is Xiang-Fu (*Cyperus rotundus* L.). It is a common Chinese herb used with gynecological diseases, and it has the effect of regulating Qi. Other common Chinese single herbs are Yi-Mu-Cao (*Leonurus artemisia* [Lour.] S. Y. Hu), Yan-Hu-Suo (*Corydalis yanhusuo* W. T. Wang), and Dan-Shen (*Salvia miltiorrhiza* Bge.). They are commonly used for the improvement of blood *Stasis*. Therefore, the formulas and single herbs most used by Taiwanese TCM physicians to treat PCOS mostly involve Qi regulation and blood *Stasis* improvement. In another study, standardized and individualized multiherb Chinese herbal medicines (CHMs) were used to treat individuals with PCOS.¹⁰ Standardized prescription includes 14 CHMs commonly used to treat PCOS, and they have the functions of regulating Qi for liver stagnation, tonifying the kidney yang, and nourishing and moving the blood. The results indicated that patients with PCOS experienced improvement in menstrual cycle. Consequently, the core pathogenesis of PCOS is the *Stasis* caused by Qi stagnation, which supports the results of the present study.

In preliminary clinical applications, 28 patients made lifestyle changes alongside TCM treatments and many experienced improvements in menstrual cycles. One patient conceived after discontinuing contraception for 1 month, and another conceived naturally within 3 months. These findings suggest that lifestyle modifications play an important role in managing PCOS, highlighting the need to maintain balance in Qi and blood flow through sustained lifestyle changes. Of course, further rigorous studies are needed to confirm these results.

Limitations

In this study, we acknowledge several limitations. The observational nature of the study means that causal relationships cannot be definitively established. In addition, the study was limited to Taiwanese gynecological outpatients,

and the sample size was relatively small, which may introduce selection bias and limit the generalizability of the results. Furthermore, diet and lifestyle habits vary across different cultures and ethnic groups, which could further affect the applicability of these findings. Accordingly, future research should focus on real-world studies or randomized controlled trials to assess the effects of Chinese medicine and lifestyle modifications on PCOS and determine whether these findings are applicable to populations outside of Taiwan. Such studies could provide stronger evidence to confirm the effectiveness of the lifestyle and dietary recommendations proposed in this study for managing PCOS.

CONCLUSION

This is the first study that analyzed the TCM body constitutions of patients with PCOS by employing rigorous methods. The body constitutions of the participants with PCOS were *Yang-Xu*, *Yin-Xu*, and *Stasis*, with *Stasis* being the most prominent. For daily routines, the participants with PCOS had the habit of staying up late. For diet, the participants with PCOS expressed preferences for sour, sweet, salty, and fried foods. For mental health, identical to other studies, tendencies of depression and anxiety were more likely than in the non-PCOS participants. Among the identified factors, the core pathogenesis of PCOS is most related to the preference of eating sweet foods and the *Stasis* constitution. According to these findings, lifestyle modification plan includes going to sleep earlier, restoring normal circadian rhythms and making the *Yin* and *Yang* of the body respond to the natural rhythm, keeping the *Yin-Yang* balance, eating less sour, sweet, salty, and fried foods, and maintaining good mental health.

Acknowledgments

We gratefully acknowledge the contributions of Chien-Hsiun Chen, Institute of Biomedical Sciences, Academia Sinica, Taiwan; Cheng-Chang Chang, Yu-Chi Wang, Chi-Kang Lin, Gwo-Jang Wu, and Fung-Wei Chang, Department of Obstetrics and Gynecology, Tri-Service General Hospital, National Defense Medical Center; and Li-Hsiang Wang, Chander Clinic, Taipei, Taiwan.

Data availability statement

The data that support the findings of this study are available from the corresponding author, CJL, upon reasonable request.

Financial support and sponsorship

This work was supported by the Tri-Service General Hospital, Taiwan (TSGH-C105-025 and TSGH-C108-023).

Conflicts of interest

There are no conflicts of interest.

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