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CLINICAL & BASIC RESEARCH

Disparity among Endocrinologists and Gynaecologists in the Diagnosis of Polycystic Ovarian Syndrome

*Hana Alzamil,[1] Khawlah Aloraini,[2] Reem AlAgeel,[2] Aya Ghanim,[2] Ruba Alsaaran,[2] Nora Alsomali,[2] Reem Albahlal,[2] Lulu Alnuaim[3]

التباين بين أطباء النساء والولادة وأطباء الغدد الصماء في تشخيص متلازمة تكيس المبايض المتعدد

هناء الزامل، خولة العريني، ريم العقيل، آية غانم، ربى السعران، نورة الصومالي، ريم البهلال، لولو النعيم

ABSTRACT: ***Objectives:*** This study aimed to compare endocrinologists' versus gynaecologists' approaches in using the Rotterdam criteria to diagnose polycystic ovarian syndrome (PCOS). ***Methods:*** This cross-sectional study was conducted at Physiology Department, King Saud University, Riyadh, Saudi Arabia, between December 2017 and April 2018. A validated self-administered questionnaire in English was used to obtain information from endocrinologists and gynaecologists regarding their approaches to diagnosing PCOS. Each group's diagnostic use of the Rotterdam criteria, association between years of experience and clinical decision-making, clinical features leading to diagnosis and considerations in the diagnosis of biochemical parameters that define hyperandrogenism were evaluated. ***Results:*** A total of 132 physicians were included in this study (response rate: 27%); 77 (58.3%) were endocrinologists and 55 (41.7%) were gynaecologists. Most of the respondents (79.5%) had ≤20 years of experience. A statistically significant difference was detected between the endocrinologists and gynaecologists (98.7% versus 81.8%; $P = 0.001$) in their consideration of hyperandrogenism in the diagnosis. The gynaecologists relied more on ovarian morphology than the endocrinologists did (76.4% versus 45.5%, $P < 0.0001$). Physicians with more experience used ovarian ultrasonography more compared to those with less experience ($P = 0.006$). ***Conclusion:*** There was disparity in the diagnostic approaches of endocrinologists, who rely more on androgen levels for diagnosis of PCOS versus gynaecologists, who more frequently use an ovarian morphology assessment. Increased years of experience increased the rate of ultrasonography use for PCOS diagnosis in both groups.

Keywords: Polycystic Ovary Syndrome; Gynecology; Endocrinology; Diagnosis; Hyperandrogenism; Hirsutism; Healthcare Disparities; Saudi Arabia.

الملخص: الهدف: هدفت هذه الدراسة إلى مقارنة أسلوب أطباء الغدد الصماء بأطباء النساء والولادة في استخدامهم معايير روتردام عند تشخيص متلازمة تكيس المبايض المتعدد. **الطريقة:** تم عقد هذه الدراسة المستعرضة في قسم وظائف الأعضاء في جامعة الملك سعود في الرياض-المملكة العربية السعودية ما بين ديسمبر 2017 وحتى أبريل 2018. وقد تم عمل استبيان موزع ذاتياً باللغة الإنجليزية لجمع البيانات من كلا التخصصين عن طرق تشخيصهم لمتلازمة تكيس المبايض المتعدد. قيمت الأسئلة مقدار الاستخدام لمعايير روتردام، العلاقة بين سنين الخبرة والقرارات الإكلينيكية، الصفات السريرية الموجهة في التشخيص والنتائج المختبرية الظاهرة عند ارتفاع هرمونات الذكورة. **النتائج:** تم الحصول على عينة من 132 طبيباً (مقدار استجابة: 27%)، منهم 77 (58.3%) أطباء غدد صماء و 55 (41.7%) أطباء نساء وولادة. كان أغلب المستجيبين (79.5%) ذوي خبرة ≤20 سنة. تم إيجاد فرق معتبر احصائياً بين أطباء الغدد وأطباء النساء والولادة (98.7% مقابل 81.8%؛ القيمة الاحتمالية $P = 0.001$) في اعتمادهم على فرط الأندروجينات عند التشخيص. اعتمد أطباء النساء والولادة بصورة أكبر على مورفولوجيا المبيض مقارنة بأطباء الغدد الصماء (76.4% مقابل 45.5%، القيمة الاحتمالية $P < 0.0001$). بالإضافة إلى أن الأطباء ذوي الخبرة الأطول طلبوا التصوير السونوغرافي أكثر مقارنة بذوي الخبرة الأقل (القيمة الاحتمالية $P = 0.006$). **الخلاصة:** هناك اختلاف في أساليب التشخيص عند أطباء الغدد الصماء الذين يعتمدون على الهرمونات الأندروجينية، مقارنة بأطباء النساء والولادة الذين يميلون أكثر لتقييم شكل المبايض. زاد عدد سنوات الخبرة من معدل طلب الأشعة الصوتية في كلا التخصصين لتشخيص متلازمة تكيس المبايض المتعدد.

الكلمات المفتاحية: متلازمة تكيس المبايض المتعدد؛ طب النساء والولادة ؛ طب الغدد الصماء؛ تشخيص؛ فرط الأندروجينات؛ زيادة الشعر؛ فوارق في الرعاية الصحية؛ العربية السعودية.

Advances in Knowledge

- *This study sheds light on aspects of diagnosis that might affect polycystic ovarian syndrome (PCOS) prevalence estimations and considerations of its impact in the Middle East.*
- *Certain aspects of the use of ultrasonography findings and biochemical features of PCOS require further empirical attention.*
- *This report is the first from the Middle East to demonstrate disparities between gynaecologists and endocrinologists in the use of*

Departments of [1]Physiology, [2]Medicine and [3]Obstetrics & Gynecology, King Saud University, Riyadh, Saudi Arabia
**Corresponding Author's e-mail: hanazamil@yahoo.com*

Rotterdam criteria to diagnose PCOS.

Application to Patient Care

- *This study highlights the importance of reinforcing the Rotterdam criteria to improve PCOS clinical outcomes and patient safety by decreasing diagnostic errors, preventing management delays and utilising resources properly.*
- *Using the Rotterdam criteria consistently and collaborating across specialities may decrease the financial burden on health institutions and patients in regard to PCOS in Saudi Arabia.*

Polycystic ovarian syndrome (PCOS), the most common endocrine disorder in women of reproductive age, presents with heterogeneous manifestations and a wide spectrum of severity.[1] Among all specialty society guidelines, PCOS diagnosis is made when two of the following three criteria are met: clinical and/or biochemical signs of hyperandrogenism, chronic oligomenorrhea/anovulation and morphological changes of the ovaries on ultrasound.[2] According to these criteria, PCOS can be classified into four phenotypes labelled A–D. Patients who experience phenotypes A and B are known to have classic PCOS. Women with phenotype A meet three criteria (oligomenorrhoea, hyperandrogenism and polycystic ovaries [PCO]), while those with phenotype B feature hyperandrogenism and menstrual irregularities. Patients with ovulatory PCOS (phenotype C) have normal ovulation but elevated androgen levels and PCO. Non-hyperandrogenic PCOS (phenotype D) is the syndrome's mildest form; women with this phenotype lack hormonal disturbances and the syndrome presents as menstrual irregularity with PCOS morphology.[3]

Associations have been made between PCOS and dyslipidaemia, obesity, hyperinsulinemia, and hyperglycaemia.[4] Patients with hyperandrogenism experience irregular menstrual cycles, chronic anovulation, infertility, acne, seborrhoea and male pattern baldness. These distressing symptoms may cause psychological problems and depression and lead to marital and social instability.[4]

PCOS is a significant global public health issue with reproductive, metabolic and psychological features. Unfortunately, it is underdiagnosed and poorly managed, and patients often lack the collaborative efforts of a multidisciplinary team to tackle discrepancies in PCOS's diagnosis and management.[1] A previous study reported frustration among patients with PCOS due to delayed diagnosis, wherein 33.6% of women waited >2 years and had the involvement of three or more health professionals before diagnosis.[5] A recent cross-sectional study using an online questionnaire found that women with PCOS experienced greater distrust of their primary care physicians' opinions than women without PCOS.[6] Surprisingly, a recent large-scale survey conducted in North America of PCOS patient dissatisfaction with diagnosis and treatment reported that a large proportion of physicians were unaware of the syndrome's diagnostic criteria. The same survey showed differences in screening practices as well as discrepancies in the management of PCOS across specialties.[7]

A recent systematic review and meta-analysis investigated the prevalence of PCOS among different ethnic groups and found variations by ethnicity and across different diagnostic criteria.[8] This finding affirms the need for specific guidelines for each ethnic group to avoid under- or overdiagnosis. In addition, the study found a 16% prevalence of PCOS diagnosed using the Rotterdam criteria in Turkey and Iran.[8] The prevalence of PCOS in Saudi Arabia has not yet been determined; however, a study conducted at Taibah University, Medina, Saudi Arabia, reported that 53.7% of students with menstrual irregularities, acne and hirsutism had PCO.[9] More importantly, it is unknown whether physicians of different specialties in Saudi Arabia consistently use the Rotterdam criteria to diagnose PCOS or follow different methods, which might lead to significant delays in diagnosis or an underdiagnosis of the disease. Therefore, this study aimed to compare the approaches of endocrinologists with those of gynaecologists using the Rotterdam criteria to diagnose PCOS and explore whether these differences affect the diagnostic process. Furthermore, this study aimed to identify the clinical features used to make a diagnosis with the biochemical values used to define hyperandrogenism.

Methods

This cross-sectional study was conducted from December 2017 to April 2018 at Physiology Department, King Saud University, Riyadh, Saudi Arabia, and included endocrinologists and gynaecologists who encounter PCOS patients in clinical practice.

A standardised English questionnaire from the European Society of Endocrinology PCOS Special Interest Group on the diagnosis and management of PCOS was used.[10] The authors granted permission to use the questionnaire but only the section pertaining

Table 1: Characteristics of physicians according to specialty at different institutions in Riyadh (N = 132)

Variable	Specialty, n (%)	
	Endocrinology (n = 77)	Gynaecology (n = 55)
Gender		
Male	43 (55.8)	18 (32.7)
Female	34 (44.2)	37 (67.2)
Job title		
Resident	0 (0)	16 (29.1)
Registrar	1 (1.3)	3 (5.4)
Fellow	16 (20.8)	9 (16.4)
Consultant	60 (77.9)	27 (49)
Experience in years		
≤20	68 (88.3)	37 (67.3)
>20	9 (11.7)	18 (32.7)
Familiar with the Rotterdam criteria		
Yes	70 (90.9)	47 (85.5)
No	7 (9.1)	8 (14.5)

to diagnostics was used. The questionnaire consisted of 16 questions that aimed to understand physicians' approaches to PCOS diagnosis using the Rotterdam criteria. The questionnaire was self-administered and distributed via e-mail to endocrinologists, gynaecologists and members of the Saudi Society of Endocrinology and Metabolism. The initial response rate was low; hence, paper-based questionnaires were distributed to participants at the 5th International Conference of Endocrinology and Diabetes in Riyadh and during clinical meetings of both specialties at King Khalid University Hospital in Riyadh. The questionnaires were collected using convenience sampling due to time limitations.

The sample size was estimated to be 64 physicians from each specialty using the two proportions formula. Data were analysed using Statistical Package for the Social Sciences (SPSS), Version 21.0 (IBM Corp., Armonk, New York, USA). Descriptive statistics (i.e. frequencies, percentages, means and standard deviation) were used to describe categorical and quantitative variables. A chi-square test was used to compare answers between specialties. A *P* value of ≤0.05 was considered statistically significant.

This study was approved by the Ethical Committee of the Institutional Review Board of the College of Medicine, King Saud University (E-18-3476). All participants signed a consent form prior to being included in this study and it was explained that participation was voluntary and that they could withdraw from the study at any time.

Results

A total of 132 respondents were included in this study (response rate: 27%), of which 77 (58.3%) were endocrinologists and 55 (41.7%) were gynaecologists. In total, 87 respondents (65.9%) were consultants, 25 (18.9%) were fellows, 16 (12.1%) were residents and four (3%) were registrars. A total of 117 (88.6%) respondents were familiar with the Rotterdam criteria. Most participants (79.5%) had less than 20 years of clinical experience [Table 1].

A statistically significant difference was found between endocrinologists and gynaecologists in the use of hyperandrogenism for diagnosing PCOS; almost all endocrinologists (98.7%) used hyperandrogenism always, while significantly fewer gynaecologists (81.8%; *P* = 0.001) relied on this parameter for their diagnoses [Table 2].

No significant difference was found in physicians' years of experience in relation to their approach to the Rotterdam criteria except in their use of ultrasonography to determine polycystic ovarian

Table 2: Comparison of approaches to polycystic ovarian syndrome diagnosis between endocrinologists and gynaecologists at different institutions in Riyadh

Criteria used	Frequency*	Specialty, n(%)		*P* value
		Endocrinology (n = 77)	Gynaecology (n = 55)	
Hyperandrogenism (clinical/biochemical)	Always	76 (98.7)	45 (81.8)	0.001
	Sometimes or never	1 (1.3)	10 (18.2)	
Oligomenorrhea/amenorrhoea	Always	66 (85.7)	42 (76.4)	0.17
	Sometimes or never	11 (14.3)	13 (23.6)	
Polycystic ovarian morphology	Always	35 (45.5)	42 (76.4)	<0.0001
	Sometimes or never	42 (54.5)	13 (23.6)	

**The "sometimes" and "never" categories were combined due to small counts.*

Table 3: Comparison of approaches to PCOS diagnostic criteria in relation to seniority

Criteria used	Frequency*	Experience in years, n (%)		*P* value
		≤20 (n = 105)	>20 (n = 27)	
Hyperandrogenism (Clinical/ biochemical)	Always	97 (92.4)	24 (88.9)	0.558
	Sometimes or never	8 (7.6)	3 (11.1)	
Oligomenorrhea/amenorrhoea	Always	86 (81.9)	22 (81.5)	0.959
	Sometimes or never	19 (18.1)	5 (18.5)	
Polycystic ovarian morphology	Always	55 (52.4)	22 (81.5)	0.006
	Sometimes or never	50 (47.6)	5 (18.5)	

**The "sometimes" and "never" categories were combined due to small counts.*

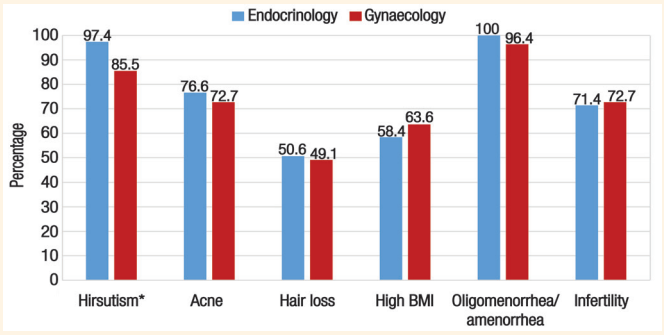

Figure 1: Percentage of gynaecologists and endocrinologists using clinical features for polycystic ovarian syndrome diagnosis
*BMI = body mass index. *P <0.01.*

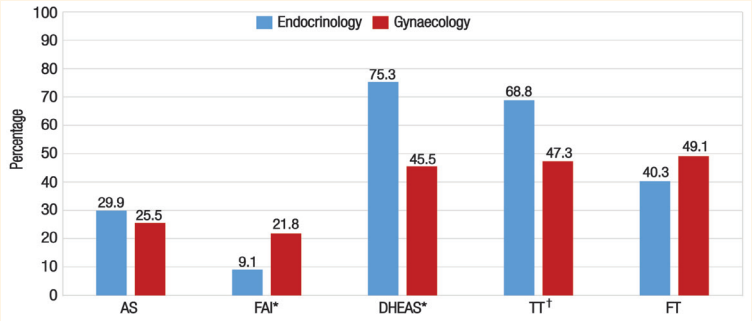

Figure 2: Percentage of gynaecologists and endocrinologists using biochemical parameters as clinical features for polycystic ovarian syndrome diagnosis
*AS = androstendione; FAI = free androgen index; DHEAS = dehydroepiandrosterone sulfate; TT = total testosterone; FT = free testosterone. *P <0.05. †P <0.0001.*

morphology to diagnose PCOS (*P* = 0.006). In this area, physicians with greater experience were more likely to consider ovarian morphology [Table 3].

In the two specialities, the percentage of professionals using clinical features for diagnosing PCOS was comparable. Endocrinologists and gynaecologists reported menstrual disturbances (100% and 96.4%, respectively) and hirsutism (97.4% and 85.5%, respectively) as the main complaints directing physicians toward the clinical diagnosis of PCOS. Furthermore, most endocrinologists and gynaecologists considered acne (76.6% and 72.7%, respectively) and infertility (71.4% and 72.7%, respectively) as important features, while an elevated body mass index (BMI; 58.4% and 63.6%, respectively) and hair loss (50.6% and 49.1%, respectively) were the least considered features [Figure 1].

Endocrinologists investigated androgen hormone levels more often than gynaecologists as evidenced by increased orders of dehydroepiandrosterone sulfate (DHEAS; 75.3% versus 45.5%) and total testosterone (TT; 68.8% versus 47.3%) levels [Figure 2].

Discussion

Although several international studies have compared approaches taken by different medical professionals to diagnose PCOS, to the best of the authors' knowledge there are no studies examining this in the Middle East.[1,10–12] One of the main findings of the current study was the disparity in the diagnostic approach to PCOS between endocrinologists and gynaecologists in Saudi Arabia. It was observed that hyperandrogenism coupled with oligomenorrhea/amenorrhoea was the key criteria guiding endocrinologists to a diagnosis. This finding is consistent with the findings of European and Australian studies in which endocrinologists considered androgen excess and menstrual disturbances as essential criteria for diagnosing PCOS.[10,11] Conversely, less than half of the endocrinologists (45.5%) who participated in this study considered using ultrasonography to diagnose PCOS, which is similar to the practice of Australian endocrinologists.[11] Almost two-thirds of European endocrinologists used ovarian ultrasonography to diagnose PCOS in collaboration with gynaecologists.[10] This finding may reflect the possibility that specialists typically use practice-specific diagnostic criteria to diagnose PCOS as was suggested by a previous European survey.[10]

In the current study, the majority of gynaecologists gave each criterion—hyperandrogenism, menstrual irregularities and ovarian ultrasonography—equal importance. This finding is in contrast with Australian gynaecologists, who reportedly relied heavily on ovarian morphology to make their diagnoses, and German gynaecologists, who also considered PCO and androgen excess as the two most important criteria for establishing their diagnoses.[11,12] This difference might be explained by the difference in timing between this study and previous studies that were conducted before the spread of awareness of the diagnostic criteria for PCOS. Another reason for this contrast may be differences in the teaching programmes and practices applied in each country. An online questionnaire-based study recently investigated the practices of European, North American and other continents' physicians, and found that both European physicians and physicians of other continents were more likely to use the Rotterdam criteria than American physicians.[13]

The current study demonstrated that physicians from both specialities with more years of experience were more likely to use ultrasonography to diagnose PCOS. This finding may be due to the fact that two-thirds of participants who had more than 20 years of experience were gynaecologists. The international evidence-based guidelines recently stated that ovarian ultrasonography is not necessary for a PCOS diagnosis in the presence of irregular menstrual cycles and hyperandrogenism.[14] Variations in the approach to diagnosis could lead to underdiagnosis, misdiagnosis or a delay in the initiation of appropriate management, resulting in serious yet preventable complications.[15] Currently, consistent care that considers evidence-based guidelines across all features of PCOS is lacking, which indicates the need to educate physicians and improve the diagnosis of and holistic care for patients with PCOS.[5]

This study's participants were asked about the most important clinical and biochemical features of PCOS. Clinically, both specialties agreed that menstrual disturbances and hirsutism were its two fundamental features, followed by acne, infertility, elevated BMI and hair loss. In line with the researchers' observations, the European survey reported that the majority of their participants reported hyperandrogenism and menstrual disturbances when diagnosing PCOS.[10] Similar to German gynaecologists, more than 60% of this study's participating gynaecologists specified a high BMI as an important criterion for a PCOS diagnosis.[12] The high prevalence of obesity among Saudi women might be the reason that our participants believe that menstrual irregularities and hirsutism are more specific to PCOS than obesity.[16] With regard to alopecia, it is difficult to clinically assess hair loss due to its subjective nature.

Furthermore, the biochemical parameters most commonly requested by endocrinologists were DHEAS and TT, while gynaecologists paid more attention to free testosterone (FT) in addition to TT and DHEAS. This finding might be due to endocrinologists usually managing a variety of adrenal disorders and that they prefer to exclude other causes of hyperandrogenism. As recommended by the international evidence-based guidelines, FT and the free androgen index should be used to confirm a PCOS diagnosis. If FT or TT are not elevated, it may be helpful to measure DHEAS as well as androstenedione, even though both have limited additional value for establishing the diagnosis of PCOS.[14] This finding raises concerns about the accuracy of routine investigations and how they can hinder the early detection of PCOS and delay its management, consequently increasing complications and comorbidities.

Previous research has indicated that patients with PCOS are confused due to healthcare providers' struggles to make a diagnosis with controversial recommendations.[17] One of the most debated

criteria is the use of ovarian ultrasonography, which is more closely related to fertility than metabolic outcomes, and its importance is perceived differently among specialties according to patients' presenting complaints.[18] Moreover, the diurnal variation in testosterone levels, the effects of sex hormone-binding globulin on TT and the variability of assay methods all play a role in hindering diagnostic accuracy.[19]

These findings cannot be generalised to Saudi Arabia's physician population because of the study's small sample size, low response rate and limited resources that prompted a convenience sampling method. However, this study is the first in the Middle East to address this topic and its findings may provide useful information to serve as a starting point for future PCOS studies in the region. In cases of suspected PCOS, it is recommended to use the new diagnostic guidelines; however, further studies are necessary to investigate the various dimensions of PCOS, such as its prevalence, epigenetics and management modalities. These recommendations should help improve the care of and prevent complications in patients with PCOS.

Conclusion

Endocrinologists and gynaecologists in Saudi Arabia use different diagnostic approaches to PCOS. The current findings indicate the importance of addressing the health concerns of patients with PCOS and establishing a consistent diagnostic and management plan. Such plans should be discussed thoroughly with each patient. Furthermore, healthcare teams should be educated about recent guidelines for managing PCOS and, when appropriate, refer patients to other specialists for diagnosis and management.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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