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Relationship between hormonal biochemical markers and imaging findings in the diagnosis of polyendocrine metabolic ovarian syndrome: an integrative review

Relação entre marcadores bioquímicos hormonais e achados de imagem no diagnóstico da síndrome ovariana metabólica poliendócrina: uma revisão integrativa

Relación entre marcadores bioquímicos hormonales y hallazgos imagenológicos en el diagnóstico del síndrome de ovario metabólico poliendocrino: una revisión integrativa

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Abstract:
INTRODUCTION: Polyendocrine Metabolic Ovarian Syndrome (PMOS), previously called Polycystic Ovary Syndrome (PCOS), is a multifactorial endocrine condition that involves metabolic, hormonal and reproductive changes. OBJECTIVE: To analyze the relationship between hormonal biochemical markers and imaging findings in the diagnostic investigation of PMOS. METHODOLOGY: This is an integrative literature review, carried out in the PubMed, LILACS and ScienceDirect databases, covering publications between 2021 and 2026. Structured descriptors in Portuguese and English were used, combined by the Boolean operators AND and OR. The process of identification, selection, eligibility and inclusion of studies was systematized using the PRISMA flowchart, resulting in the inclusion of 17 articles for analysis. RESULTS: Studies have demonstrated an association between serum levels of anti-Müllerian hormone (AMH), antral follicle count and ovarian volume. However, the agreement between elevated AMH and ultrasound changes was only 27.3%, highlighting limitations in the isolated use of these parameters. Furthermore, mass spectrometry identified differences in the classification of hyperandrogenism in 15.8% of patients evaluated compared to conventional immunoassays. Three-dimensional ultrasound has also demonstrated potential in monitoring ovarian morphological changes after metabolic interventions. FINAL CONSIDERATIONS: The integration between hormonal markers and imaging methods represents a relevant strategy for the investigation of PMOS. However, methodological variability and the lack of standardization of exams reinforce the need for joint interpretation of results, aiming for greater diagnostic accuracy.

Keywords:
Polycystic Ovary Syndrome; Hyperandrogenism; Anti-Müllerian Hormone; Imaging diagnosis.

Resumo:
INTRODUÇÃO: A Síndrome Ovariana Metabólica Poliendócrina (SOMP), anteriormente denominada Síndrome dos Ovários Policísticos (SOP), é uma condição endócrina multifatorial que envolve alterações metabólicas, hormonais e reprodutivas. OBJETIVO: Analisar a relação entre marcadores bioquímicos hormonais e achados de imagem na investigação diagnóstica da SOMP. METODOLOGIA: Trata-se de uma revisão integrativa da literatura, realizada nas bases de dados PubMed, LILACS e ScienceDirect, contemplando publicações entre 2021 e 2026. Foram utilizados descritores estruturados em português e inglês, combinados pelos operadores booleanos AND e OR. O processo de identificação, seleção, elegibilidade e inclusão dos estudos foi sistematizado por meio do fluxograma PRISMA, resultando na inclusão de 17 artigos para análise. RESULTADOS: Os estudos demonstraram associação entre os níveis séricos do hormônio antimülleriano (AMH), a contagem de folículos antrais e o volume ovariano. Entretanto, a concordância entre AMH elevado e alterações ultrassonográficas foi de apenas 27,3%, evidenciando limitações na utilização isolada desses parâmetros. Além disso, a espectrometria de massas identificou diferenças na classificação do hiperandrogenismo em 15,8% das pacientes avaliadas em comparação aos imunoensaios convencionais. A ultrassonografia tridimensional também demonstrou potencial no acompanhamento das alterações morfológicas ovarianas após intervenções metabólicas. CONSIDERAÇÕES FINAIS: A integração entre marcadores hormonais e métodos de imagem representa uma estratégia relevante para a investigação da SOMP. Contudo, a

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variabilidade metodológica e a ausência de padronização dos exames reforçam a necessidade de interpretação conjunta dos resultados, visando maior precisão diagnóstica.

Palavras-chave:
Síndrome dos Ovários Policísticos; Hiperandrogenismo; Hormônio Antimülleriano; Diagnóstico por imagem.

Resumen:
INTRODUCCIÓN: El Síndrome de Ovario Metabólico Poliendocrino (SOMP), anteriormente llamado Síndrome de Ovario Poliquístico (SOP), es una condición endocrina multifactorial que involucra cambios metabólicos, hormonales y reproductivos. OBJETIVO: Analizar la relación entre marcadores bioquímicos hormonales y hallazgos imagenológicos en la investigación diagnóstica de SOMP. METODOLOGÍA: Se trata de una revisión integradora de la literatura, realizada en las bases de datos PubMed, LILACS y ScienceDirect, abarcando publicaciones entre 2021 y 2026. Se utilizaron descriptores estructurados en portugués e inglés, combinados por los operadores booleanos AND y OR. El proceso de identificación, selección, elegibilidad e inclusión de estudios se sistematizó mediante el diagrama de flujo PRISMA, resultando en la inclusión de 17 artículos para análisis. RESULTADOS: Los estudios han demostrado una asociación entre los niveles séricos de la hormona antimülleriana (AMH), el recuento de folículos antrales y el volumen ovárico. Sin embargo, la concordancia entre la AMH elevada y los cambios ecográficos fue solo del 27,3%, lo que pone de relieve las limitaciones en el uso aislado de estos parámetros. Además, la espectrometría de masas identificó diferencias en la clasificación del hiperandrogenismo en el 15,8% de los pacientes evaluados en comparación con los inmunoensayos convencionales. La ecografía tridimensional también ha demostrado potencial en el seguimiento de los cambios morfológicos ováricos después de intervenciones metabólicas. CONSIDERACIONES FINALES: La integración entre marcadores hormonales y métodos de imagen representa una estrategia relevante para la investigación de SOMP. Sin embargo, la variabilidad metodológica y la falta de estandarización de los exámenes refuerzan la necesidad de interpretación conjunta de los resultados, buscando una mayor precisión diagnóstica.

Palabras clave:
Síndrome de Ovario Poliquístico; Hiperandrogenismo; Hormona Antimülleriana; Diagnóstico por imágenes.

1 Introduction

Recent studies propose the transition of the term Polycystic Ovary Syndrome (PCOS) to Polyendocrine Metabolic Ovarian Syndrome (PMOS), due to the multisystemic nature of the condition that involves metabolic, neuroendocrine and reproductive dysfunctions and is not limited to ovarian involvement (Teede et al., 2026). In this article, PMOS (formerly PCOS) is adopted.

PMOS is recognized as the most prevalent endocrinopathy among women of reproductive age, with a global prevalence estimated between 5% and 18%, being a multifactorial disorder whose repercussions go beyond the reproductive sphere and also affect metabolic and psychological aspects, being associated with anovulatory infertility, insulin resistance, type 2 diabetes, subclinical cardiovascular diseases, neuropsychological disorders and endometrial cancer (Gomez et al., 2022).

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Clinically, the syndrome manifests itself heterogeneously with menstrual irregularity, hirsutism, acne and obesity, being classified into four main phenotypes according to the Rotterdam Criteria, each associated with different degrees of metabolic and cardiovascular risk (Alves et al., 2022).

The diagnosis of PMOS is currently guided by the criteria established in the Rotterdam consensus and incorporated into the recommendations of the 2023 Evidence-Based International Guideline for the evaluation and control of the syndrome. This guideline requires the presence of at least two of three criteria: ovulatory dysfunction, clinical or biochemical hyperandrogenism, and polycystic ovarian morphology. As this is a diagnosis of exclusion, it is necessary to rule out mimicking diseases using a laboratory panel that includes total testosterone, prolactin, gonadotropins and anti-Müllerian hormone (AMH), the latter being an important surrogate marker of ovarian morphology when ultrasound presents limitations (das Chagas; Filipini, 2025; Rodrigues Dias et al., 2026).

Given the lack of diagnostic standardization and the variability between available methods, especially due to the operator's dependence on two-dimensional ultrasound and the difficulty in differentiating transient physiological changes from pathological findings in adolescence, it is relevant to investigate the integration between hormonal biochemical markers and imaging findings in the diagnosis of PMOS, in order to enable earlier identification and a more systematic approach (Di Michele et al., 2025).

Based on the above, the present study aims to analyze the relationship between hormonal biochemical markers and imaging findings in the diagnosis of PMOS in women of reproductive age. Specifically, it is proposed to identify the main hormonal markers used in the diagnosis of PMOS and describe the main findings in imaging methods found in patients.

2 Methodology

The present study was an integrative literature review, whose chosen approach was exploratory, descriptive and qualitative research. The bibliographic survey was carried out with structured searches in the National Library of Medicine (PubMed), Latin American Caribbean Literature in Health Sciences (LILACS) and ScienceDirect databases, in Portuguese and English, selecting articles published in the period between 2021 and 2026, as well as references related to classic articles.

For the search strategy, descriptors in Health Sciences (DeCS) and Medical Subject Headings (MeSH) were used, including the terms: "Polycystic ovary syndrome", "Hyperandrogenism", "Anti-Mullerian Hormone" and "Diagnostic Imaging", combined using the Boolean operators AND and OR. The following structured searches were carried out: "Polycystic ovary syndrome [title] OR Hyperandrogenism AND Anti-Mullerian Hormone AND Diagnostic Imaging".

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In the article selection stage, the Bardin method was used, which consisted of three stages: pre-analysis, exploration of the material and treatment of results, where through this analysis necessary data for the development of work was provided. The objective was to filter articles that fit the theme by previously reading the titles and summaries of articles found in the databases, adopting the following inclusion criteria: original and review articles including systematic and integrative reviews, meta-analyses, published between 2021 and 2026, in Portuguese or English, with full text available, that addressed the diagnosis, classification or pathophysiology of PMOS in women, including hormonal markers, imaging methods or diagnostic criteria. Exclusion criteria include: duplicate studies, incomplete articles, works that do not directly address the proposed topic or that specifically deal with studies in animal models or in vitro, studies carried out exclusively with postmenopausal or pre-pubertal women and studies focused on other causes of hyperandrogenism.

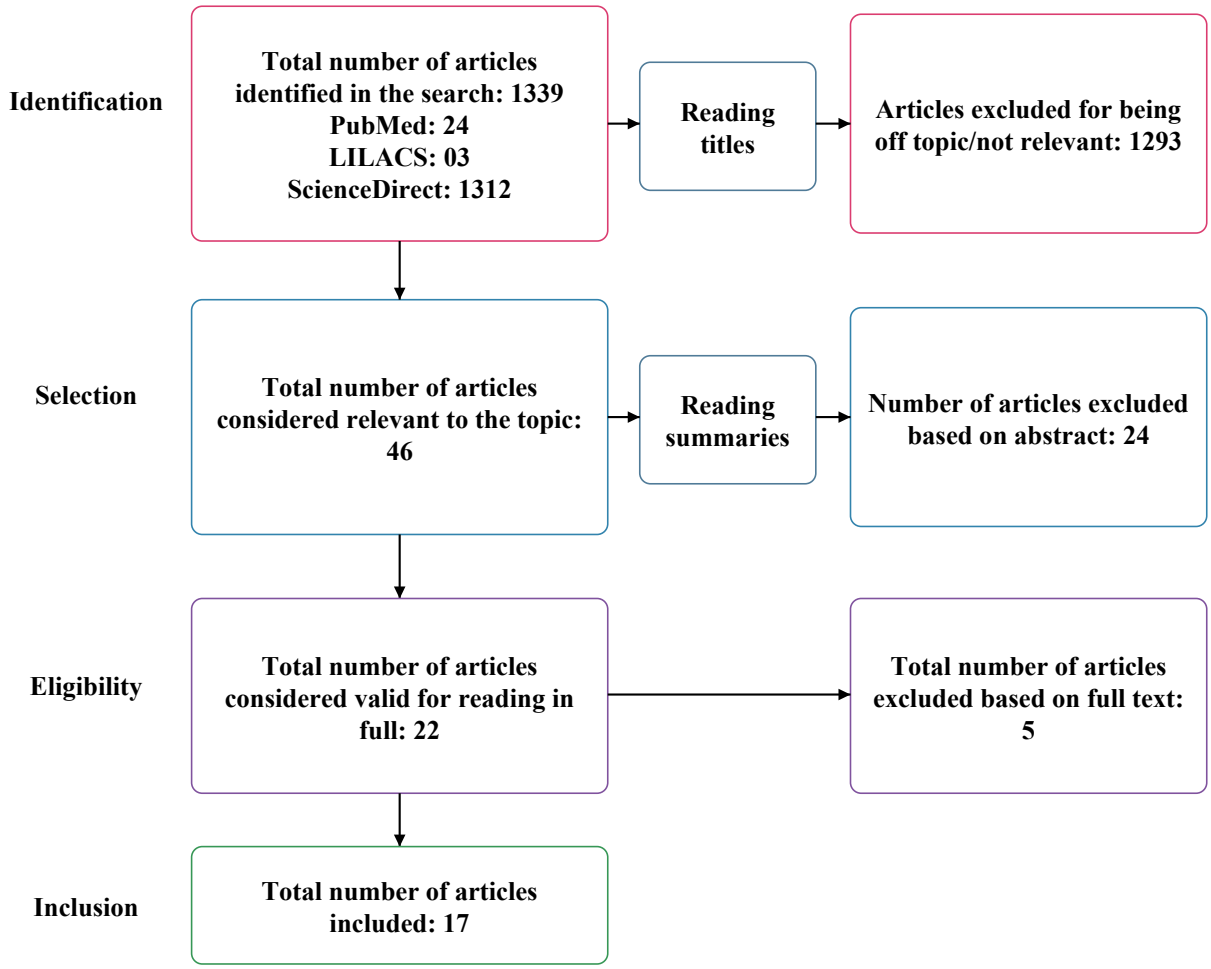
3 Results

The search in the PubMed, LILACS and ScienceDirect databases resulted in the identification of 1,339 articles. After reading the titles and applying the inclusion and exclusion criteria, 1,322 articles were excluded, leaving 17 articles considered relevant to the analysis corpus (figure 1).

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Figure 1: Flowchart of articles for review, 2026.



Source: own authorship

Among the 17 articles selected for review in chronological order from oldest to most recent, 8 addressed biochemical and hormonal markers in the diagnosis, nomenclature and pathophysiology of PMOS, and 9 focused on the role of imaging methods, ultrasound, clinical phenotyping and computational tools applied to the diagnosis of the syndrome. Information regarding the title, authors, year of publication, objectives and main results were organized in two tables. Table 1 presents research focused on biochemical and hormonal markers, while Table 2 provides studies focusing on imaging and integrated diagnostic methods.

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Table 1 – Characteristics of the selected scientific articles on hormonal biochemical markers, pathophysiology and nomenclature in PMOS, according to title, authors, year of publication, objectives and results.

Title	**Authors**	**Year**	**Objectives**	**Results**
Anti-Müllerian Hormone in Pathogenesis, Diagnosis and Treatment of PCOS	Rudnicka et al.	2021	It seeks to clarify the role of AMH in the pathophysiology and pathogenesis of the disease, in addition to evaluating its usefulness and application in the monitoring and treatment of patients.	AMH is increased in PCOS and has great potential as a diagnostic marker, but should not be used alone to establish the diagnosis due to the lack of standardization of methods and a universal cutoff point.
Biomarkers in Polycystic Ovary Syndrome	Huffman et al.	2023	Review potential and established biomarkers associated with reproductive and metabolic (non-reproductive) aspects of PCOS.	The review identified several potential biomarkers for PCOS related to reproductive and metabolic aspects, including AMH, gonadotropins, steroids, insulin, lipids, inflammatory markers, oxidative stress, and non-coding RNAs.
Analyzing the Challenges, Consequences, and Possible Treatments for Polycystic Ovary Syndrome	Zaib et al.	2023	Synthesize the causes, endocrine-metabolic and psychological complications of PCOS, as well as evaluate the therapeutic options available to control symptoms.	PCOS has a multifactorial etiology, involving genetic, hormonal and lifestyle factors, associated with metabolic, cardiovascular and psychological complications. As there is no specific cure, treatment is aimed at controlling symptoms.
A review on critical appraisal and pathogenesis of polycystic ovarian syndrome	Hajam et al.	2024	Critical review of the literature to summarize the molecular, genetic, hormonal and environmental factors involved in the pathogenesis of PCOS, pointing out gaps in knowledge and the need for methodological standardization.	The pathogenesis of PCOS is multifactorial, involving molecular, genetic, hormonal and environmental factors. Changes in cell signaling, hormonal dysregulation, insulin resistance and the influence of endocrine disruptors were highlighted.
Influence of state-of-the-art laboratory techniques on the phenotyping of women with polycystic ovary syndrome in the clinical setting	Luque-Ramírez et al.	2025	To evaluate the impact of using liquid chromatography coupled to tandem mass spectrometry (LC-MS/MS) and anti-Müllerian hormone (AMH) measurement on the diagnosis and phenotyping of PCOS in routine clinical practice.	There was low agreement between immunoassays and LC-MS/MS in identifying hyperandrogenemia. The LC-MS/MS technique changed the PCOS phenotype in 15.8% of patients. The agreement observed between the ultrasound finding and elevated AMH was only 27.3%.

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Title	Authors	Year	Objectives	Results
Structural and hormonal changes in the ovaries of women with polycystic ovary syndrome and healthy controls: a 13-year prospective study in an unselected population	Sonu et al.	2025	To investigate ovarian structural and hormonal changes over 13 years in women with PCOS compared to healthy controls in an unselected population.	Women with PCOS had higher ovarian volume and antral follicle count. After 13 years, there was a reduction in AMH, AFC and testosterone, but AMH and androgen levels remained higher than those in the control group.
Anti-Müllerian Hormone in Polycystic Ovary Syndrome: Towards a Specific Diagnostic Threshold in the Tunisian Population	Chiboub et al.	2026	Define a specific cutoff point (threshold) for anti-Müllerian hormone (AMH) capable of diagnosing and predicting Polycystic Ovary Syndrome (PCOS/PMOS) in the Tunisian population.	Women with PCOS had significantly higher serum AMH levels than controls. AMH showed a strong correlation with antral follicle count and ovarian volume in addition to correlation with testosterone.
Polyendocrine metabolic ovarian syndrome, the new name for polycystic ovarian syndrome: a multistep global consensus process	Teede et al.	2026	Present the multi-step global consensus process for changing the name of PCOS to (SOMP/PMOS), aiming to increase scientific accuracy and reduce the stigma of the condition.	The study established, through a global consensus based on Delphi methodology and the participation of 56 organizations and 14,360 individuals, the new nomenclature (SOMP/PMOS) to replace the old PCOS, eliminating the imprecise mention of "cysts" and prioritizing scientific precision over the multisystemic pathophysiology of the condition.

Source: own authorship, 2026.

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Table 2 – Characteristics of the selected scientific articles on imaging methods and diagnostic tools in PMOS, according to title, authors, year of publication, objectives and results.

Title	Authors	Year	Objectives	Results
Antimullerian hormone to determine polycystic ovarian morphology	Dietz de Loos et al.	2021	Determine a cutoff for the Elecsys AMH Plus immunoassay to identify polycystic ovarian morphology, one of the diagnostic criteria for polycystic ovary syndrome (PCOS)	In the validation cohort, the AMH level showed 88.6% sensitivity, 84.6% specificity and AUC of 93.6% for identifying polycystic ovarian morphology.
Application of a new ultrasound criterion for the diagnosis of polycystic ovary syndrome	Giménez-Peralta et al.	2022	Define which ultrasound criterion is the best indicator of the risk of developing endocrine-metabolic changes in women with PCOS, replacing the classic Rotterdam criterion.	The study proposed as an ultrasound criterion the presence of approximately 23 follicles in at least one ovary, presenting a better correlation with the other PCOS criteria. This finding was associated with higher levels of hirsutism, testosterone, FAI and insulin resistance.
Polycystic ovary syndrome v.2023: Simplified diagnostic criteria for an East Asian phenotype	Yong, Teoh and Huang.	2023	To propose a simplified diagnostic criteria for PCOS based on the presence of at least two of three main features, aiming to reduce diagnostic heterogeneity in the East Asian population.	A simplified criterion for the diagnosis of PCOS was proposed based on the presence of 2 of 3 features as a surrogate indicator of polycystic ovarian morphology and hyperandrogenism.
A systematic review and future research agenda on detection of polycystic ovary syndrome (PCOS) with computer-aided techniques	Suha SA, Islam MN	2023	Systematic literature review to analyze computational methods for automatic detection of PCOS, identifying their limitations and directing future research in the area.	The study demonstrated the increasing use of computational methods and artificial intelligence for the automatic detection of PCOS based on imaging exams and clinical data. The need to use deep learning and multimodal data to improve clinical assessment was highlighted.
Adolescents diagnosed with polycystic ovary syndrome under the Rotterdam criteria but not meeting the diagnosis under the updated guideline	Kim et al.	2024	To evaluate the clinical, hormonal and metabolic characteristics of adolescents diagnosed with PCOS according to the 2003 Rotterdam criteria, but who did not meet the criteria of the evidence-based international guideline.	Among 315 adolescents diagnosed using the Rotterdam criteria, 25.1% were reclassified as "at risk" under the updated guideline. Adolescents who met the current criteria had a worse metabolic profile and greater hirsutism.

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Title	Authors	Year	Objectives	Results
Intelligent detection for Polycystic Ovary Syndrome (PCOS): Taxonomy, datasets and detection tools	Li et al.	2025	Propose an unprecedented taxonomy of 108 characteristics for detecting PCOS and evaluate existing public databases and intelligent tools, identifying diagnostic limitations and directing future research.	108 characteristics were identified for detecting PCOS, but the 12 public databases evaluated included only 54% of them. Analysis of 42 smart tools revealed limitations in multimodal data integration, longitudinal analysis, and clinical validation.
Metabolic Mediation of the Association Between Hyperandrogenism and Paratubal Cysts in Polycystic Ovary Syndrome: A Structural Equation Modeling Approach	Baek et al.	2025	To investigate whether biochemical hyperandrogenism is associated with the presence of paratubal cysts in women with PCOS and whether BMI and insulin resistance mediate this association.	Paratubal cysts (PTCs) were identified by imaging in 2.77% of participants with PCOS. Women with PTCs had higher BMI, FAI, triglycerides and insulin resistance, demonstrating a direct association between HOMA-IR and the presence of PTCs.
Polyendocrine metabolic ovarian syndrome and aneuploidy in early reproduction: a systematic review and meta-analysis	Pegg et al.	2026	To systematically evaluate and perform a meta-analysis on the effects of SOMP/PMOS on aneuploidy rates in oocytes, pre-implantation embryos and pregnancy losses.	The meta-analysis found no significant difference in aneuploidy rates in pregnancy losses or preimplantation embryos between women with and without PMOS. In women under 38 years of age, there was a significant reduction in aneuploidies in preimplantation embryos.
Remission of polycystic ovary syndrome based on the recovery of ovarian morphology identified by three-dimensional ultrasonography: a retrospective study	Su et al.	2026	To investigate PCOS remission rates through three-dimensional (3D) ultrasound assessment of ovarian morphological normalization.	Among 468 participants, 11.75% achieved clinical remission from PCOS. After treatment, there was an improvement in the menstrual cycle and a reduction in BMI, testosterone, AMH, ovarian volume and number of follicles identified on 3D ultrasound.

Source: own authorship, 2026.

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4 Discussion

The consensus of Teede et al. (2026), with the participation of more than 14,000 individuals and 56 organizations, considers the previous term PCOS to be inaccurate because it unduly focuses on ovarian morphology as the central axis of the syndrome, since it encompasses metabolic manifestations (obesity, dysglycemia, type 2 diabetes, hypertension, dyslipidemia, steatotic liver disease associated with metabolic dysfunction, cardiovascular disease and sleep apnea) and reproductive (ovulatory disorders, irregular menstrual cycles, infertility, pregnancy complications and endometrial cancer).

It also encompasses psychological manifestations (depression, anxiety, poor quality of life and eating disorders) and dermatological manifestations (acne, alopecia and hirsutism). Body mass index (BMI) is generally higher in people with PMOS (new nomenclature) than in those without the condition, and contributes to its severity.

In general, PMOS has multisystemic impacts on health, as corroborated by Baek et al. (2025), who identified the presence of paratubal cysts (PTCs), which are benign adnexal lesions adjacent to the Fallopian tubes and ovaries, in 2.77% of patients with the condition, suggesting that high levels of androgens may favor the development of these cysts through metabolic pathways mediated by obesity and insulin resistance.

Regarding pathophysiology and insulin resistance, Hajam et al. (2024) describes the syndrome as resulting from the interaction between genetic susceptibility, neuroendocrine dysregulation, environmental stressors and lifestyle, with convergence towards insulin resistance and compensatory hyperinsulinemia. Zaib et al. (2023) also shows that this syndrome arises from the combination of genetic and epigenetic factors that alter metabolism, hormones and cellular function, highlights the link with intestinal dysbiosis, anxiety and depression, and advocates the use of genetic sequencing technologies and integrated treatments to take care of the patient's health in the long term.

In addition, Huffman et al. (2023) defends the inclusion of an expanded panel of exams in the PMOS assessment, highlighting that endocrine and metabolic dysfunctions do not act in isolation. In the neuroendocrine axis, the panel includes luteinizing hormone (LH) and follicle-stimulating hormone, in addition to AMH, which acts on gonadotropin-releasing neurons (GnRH) and modulates the release of LH. On the steroid and metabolic axis, it covers total testosterone, SHBG, the free androgen index (FAI), 11-oxygenated androgens associated with the severity of hirsutism, in addition to insulin, HOMA-IR, lipid profile (cholesterol and ceramides) and microRNAs, allowing early prediction of cardiovascular and metabolic risk. This integrated view reflects directly on the ovarian image, demonstrating that polycystic morphology is a dynamic state, and not a static anatomical lesion.

Regarding ovarian morphology, the findings of Giménez-Peralta et al. (2022) and Su et al. (2026) demonstrate that the threshold of approximately 23 follicles per ovary delimits the

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range in which metabolism is most affected, associated with an increase in HOMA-IR, the free androgen index and total testosterone.

Su et al. (2026) also suggests the reversibility of this change when subjecting patients to metabolic interventions (such as metformin, GLP-1 agonists, SGLT-2 inhibitors and thiazolidinediones), observing morphological and clinical remission in 11.75% of cases, with regression of the average follicular count from the pathological standard to the physiological level, accompanied by a drop in AMH, testosterone and BMI. To do this, it uses automated three-dimensional (3D) ultrasound, which made it possible to evaluate the count of antral follicles and the automated measurement of ovarian volume.

Hajam et al. (2024) points to magnetic resonance imaging (MRI) as a promising non-invasive technique that, combined with high-resolution ultrasound, would allow early detection and detailed structural characterization of ovarian morphological changes, positioning it as a future perspective for diagnosis. Suha and Islam (2023), in turn, mention MRI when reviewing the medical imaging modalities that have been integrated into computational algorithms to aid diagnosis, without treating it as a specific method for the syndrome.

As for hormonal markers, AMH is used as a biomarker of follicular mass, and its use as a possible substitute for ultrasound remains controversial. However, Chiboub et al. (2026), Dietz de Loos et al. (2021) and Yong, Teoh and Huang (2023) report high diagnostic accuracy and propose specific cutoff points in the range of 3.2 to 3.41 ng/mL, that is, threshold serum levels defined to differentiate, in clinical practice, normal from altered results.

Dietz de Loos et al. (2021), for example, determines the cutoff point for the Elecsys AMH Plus immunoassay and obtains, in the validation cohort, sensitivity of 88.6%, specificity of 84.6% and AUC of 93.6% for the identification of polycystic ovarian morphology, which is one of the three Rotterdam criteria, and not the complete diagnosis of the syndrome. Chiboub et al. (2026), in turn, seeks a specific cutoff point for the Tunisian population and finds significantly higher AMH in women with PMOS.

In clinical routine, Luque-Ramírez et al. (2025) observes an agreement of only 27.3% between the ultrasound finding and elevated AMH. Therefore, he argues that neither of the two methods can, in isolation, replace the other in follicular counting, since such a replacement would depend on data reconciliation that has not yet been carried out. Meanwhile, Rudnicka et al. (2021) maintains that AMH must integrate a broad diagnosis, associated with clinical evaluation, androgen measurements and imaging exams, highlighting that, with the future standardization of laboratory tests, AMH will be able to consolidate itself as a significantly more accurate and reliable diagnostic marker.

The integration between hormonal biochemical markers and imaging methods constitutes a relevant strategy for understanding the pathophysiological and morphological changes associated with PMOS. While laboratory tests make it possible to identify changes

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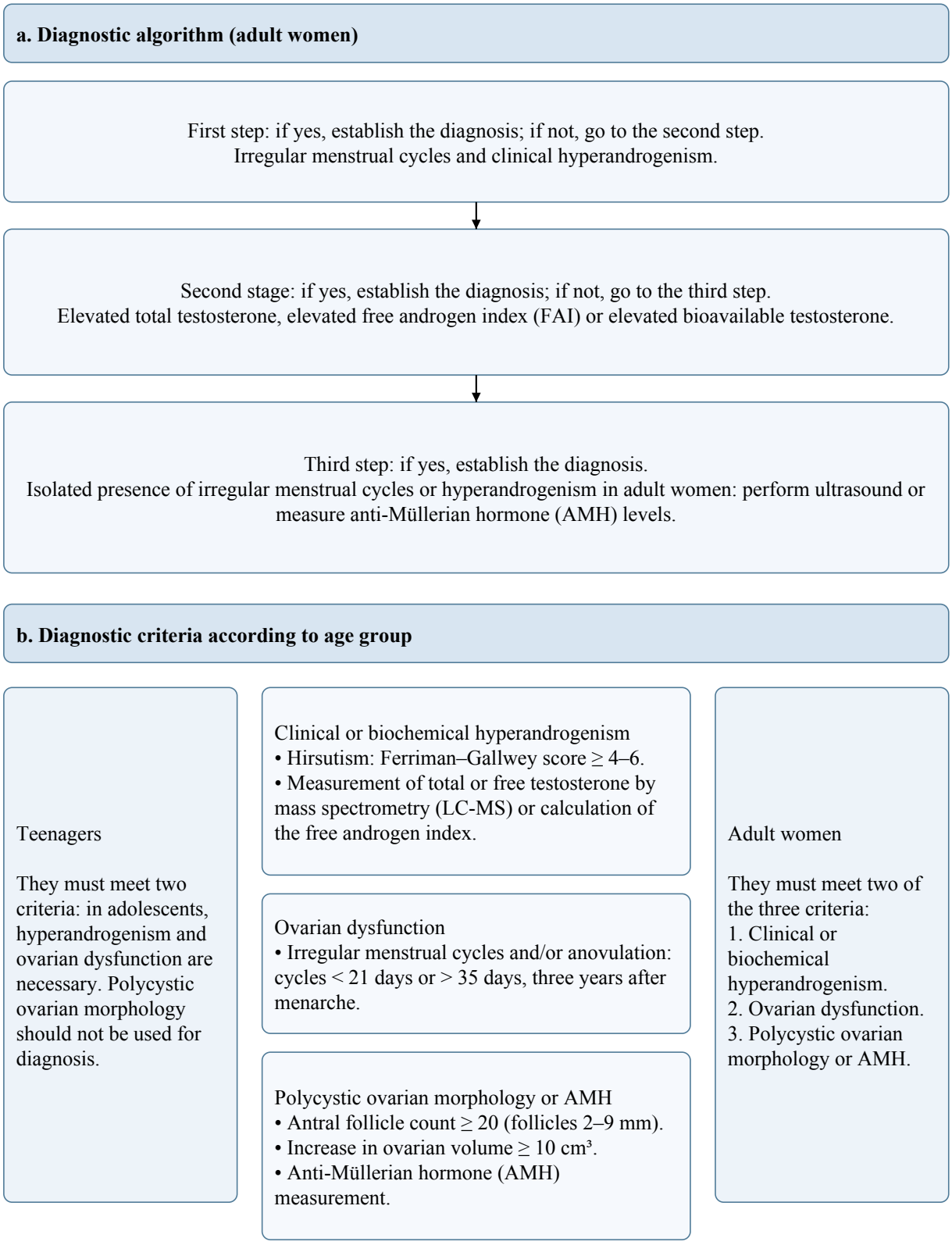
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related to hyperandrogenism and follicular activity, especially through the assessment of AMH and androgens, ultrasound makes it possible to characterize ovarian morphology by counting antral follicles, measuring ovarian volume and evaluating the stroma (Dietz de Loos et al., 2021; Yong, Teoh e Huang et al., 2023). In this way, the joint interpretation of this information, respecting the established diagnostic criteria and the particularities of each age group, contributes to a more comprehensive and individualized investigation of patients (Teede et al., 2023; Stener-Victorin et al., 2024). The application of these criteria is summarized in the diagnostic algorithm presented in Figure 2.

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Figure 2: PMOS diagnostic algorithm and evaluation criteria according to age group.



Source: Adapted from Stener-Victorin et al. (2024).

Sonu et al. (2025), in a 13-year follow-up, shows that AMH and testosterone naturally decrease with age in all women. However, in patients with PMOS, follicular reserve (follicle

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count and ovarian volume) and androgen levels remain continuously higher than in women without the syndrome throughout the entire period.

Consistently, Chiboub et al. (2026) finds a strong correlation between AMH and antral follicle count and ovarian volume, in addition to a correlation with testosterone. These findings show that the image follows the patient's hormonal and metabolic profile.

In contrast, Luque-Ramírez et al. (2025) questions the accuracy of common hormone tests. The author demonstrates that these tests perform poorly compared with mass spectrometry (LC-MS/MS), considered the gold standard. When applying this more reliable method, 15.8% of patients previously diagnosed with excess androgens actually had normal hormone levels, which highlights the risk of overdiagnosis resulting from methodological limitations.

In this sense, the expansion of the diagnostic panel advocated by Huffman et al. (2023) only adds value if each new marker is measured with adequate precision. Therefore, the correlation between markers and image is only reliable when the measurement is accurate. Furthermore, Kim et al. (2024) evaluates Korean adolescents already diagnosed using the Rotterdam criteria and finds that around a quarter of them (25.1% of 315) are reclassified as "at risk" when applying the updated guidelines, which require hyperandrogenism and ovulatory dysfunction, excluding ultrasound in the first years after menarche.

In this context, Yong, Teoh and Huang (2023) propose simplified diagnostic criteria for adult women of Asian origin, considering AMH as an alternative to ultrasound assessment of polycystic ovarian morphology, especially given the clinical particularities and limitations related to transvaginal ultrasound. This proposal finds partial support in the findings of Dietz de Loos et al. (2021), who demonstrated the ability of AMH to identify ovarian morphological changes, although its application is linked to the laboratory assay used.

However, Luque-Ramírez et al. (2025) showed low agreement between hormonal and ultrasound results in clinical practice, reinforcing that replacing one method with another requires caution. Therefore, AMH can be considered an alternative to ultrasound for defining polycystic ovarian morphology in adult women, according to specific criteria, but it should not be interpreted in isolation as a sufficient instrument to establish a complete diagnosis of the syndrome, which depends on the joint assessment of clinical, hormonal and ovulatory criteria.

Chiboub et al. (2026) and Yong, Teoh and Huang (2023) converge on the need for population adaptation, but differ on the strategy. The first defines an isolated AMH cutoff point, and the second proposes a composite criterion, in which AMH replaces ovarian morphology, which prevents direct comparison of their performances.

In this context, Suha and Islam (2023) discuss the use of artificial intelligence as a tool to support the diagnosis of PMOS, through the analysis of clinical, metabolic and ultrasound image data. However, the authors highlight limitations related to the use of reduced databases and the lack of properly validated systems for clinical application.

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Complementarily, Li et al. (2025) identifies similar limitations when analyzing intelligent tools aimed at diagnosing the syndrome. The authors noted that, although there are several tools available, there are still difficulties in integrating clinical, hormonal, genetic and imaging information, as well as limitations related to data processing and clinical validation.

Therefore, the two studies show that artificial intelligence has the potential to improve the diagnosis of PMOS, but its application still depends on the availability of comprehensive databases and systems capable of integrating different clinical and laboratory information.

Finally, regarding reproductive repercussions, the meta-analysis by Pegg et al. (2026) does not corroborate the hypothesis that PMOS induces chromosomal errors, since the rates of aneuploidy in pregnancy losses and in pre-implantation embryos do not differ between women with and without the syndrome, in addition to there being a reduction in the odds (odds ratios) of aneuploidy in embryos from women under 38 years of age, interpreted by the authors as temporary meiotic protection conferred by the preserved ovarian reserve.

5 Final considerations

Research indicates that there is a relationship between hormonal biochemical markers and imaging findings in PMOS investigation. The results of the review demonstrated different associations between hormonal parameters and ovarian characteristics, mainly in relation to AMH levels, antral follicle count and ovarian volume.

Among the 17 articles analyzed, AMH stood out as one of the main markers investigated, due to its association with the number of antral follicles and ovarian morphology. Studies that evaluated testosterone, LH, FSH and SDHEA were also identified, demonstrating the importance of hormonal investigation in identifying changes related to the syndrome. However, the results showed that the association between the methods does not mean that they have the same diagnostic identification capacity.

Differences between laboratory methods, ultrasound evaluation criteria and cutoff points used make it difficult to compare results between studies. The low agreement observed between elevated AMH levels and ultrasound findings demonstrates that these methods can present different results when evaluating the same patient. Therefore, it was not possible to establish a single hormonal parameter that would generally replace imaging methods.

Therefore, the results of this research are important for the area of □□Biomedicine, especially for Clinical Analysis, as they reinforce the importance of the quality of laboratory tests, the standardization of methods and the adequate interpretation of hormonal results in conjunction with imaging findings. In this context, biomedicine plays an important role in supporting diagnosis, contributing to the reliability of results and a more individualized investigation.

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To expand knowledge on the topic, new research is needed to establish more correct cutoff points for AMH, improve the standardization of laboratory methods and evaluate the agreement between hormonal markers and ultrasound findings by exploring the use of technologies such as Artificial Intelligence.

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