Manifestaciones Cutáneas del Síndrome de Ovario Poliquístico: Interacciones Endocrino-Metabólicas y Estrategias Terapéuticas Integrales para el Acné y el Hirsutismo

Cutaneous Manifestations of Polycystic Ovary Syndrome: Endocrine–Metabolic Interactions and Comprehensive Therapeutic Strategies for Acne and Hirsutism

Fabio Camilo Jaramillo Contreras
Universidad Autónoma de Bucaramanga.
fjaramillo323@unab.edu.co
https://orcid.org/0009-0001-9037-6575

Vania Rocio Ochoa Estrada
Universidad de San Carlos de Guatemala
Vrocio.ochoa@gmail.com
https://orcid.org/0009-0006-4086-629X

Mireya Paola Almeida Alvarado
Universidad católica del Ecuador
mireyalmeida94@gmail.com
https://orcid.org/0000-0001-9353-8421

María José Peñafiel Aguirre
Universidad de Cuenca
mariapenafiel17@gmail.com
https://orcid.org/0009-0008-1843-5340

Katherine Paola Hidalgo Chuquimarca
Independiente
katheh.2906@gmail.com
https://orcid.org/0009-0008-2026-806X

Francisco Javier Coronel Peralta
Universidad de Cuenca
fcoromed@outlook.com
https://orcid.org/0009-0007-0178-968X

Erika Romina Cuenca Riascos
Independiente
romycr_1998@hotmail.com
https://orcid.org/0009-0000-2194-2337

Javier Emanuel Camacho-Patiño.
Independiente
jav.camacho.p@gmail.com
https://orcid.org/0009-0001-6427-3484

Recibido: 25-Oct-2026 | **Aceptado:** 25-Oct-2026 | **Publicado:** 30-Oct-2026

***Autor de correspondencia:** fjaramillo323@unab.edu.co

Cómo citar este artículo: Jaramillo Contreras, F. C., Almeida Alvarado, M. P., Hidalgo Chuquimarca, K. P., Cuenca Riascos, E. R., Ochoa Estrada, V. R., Peñafiel Aguirre, M. J., Coronel Peralta, F. J., & Camacho-Patiño, J. E. (2026). Cutaneous Manifestations of Polycystic Ovary Syndrome: Endocrine–Metabolic Interactions and Comprehensive Therapeutic Strategies for Acne and Hirsutism. México. *Revista IECCMEXICO*, 5(2, Tomo II) 979-1009. Quality Consulting Instituto de Educación Capacitación y Certificación de México. https://ieccmexico.com/publishing

Copyright (c) 2026 Jaramillo Contreras, F. C., Almeida Alvarado, M. P., Hidalgo Chuquimarca, K. P., Cuenca Riascos, E. R., Ochoa Estrada, V. R., Peñafiel Aguirre, M. J., Coronel Peralta, F. J., & Camacho-Patiño, J. E.; Este es un artículo de acceso abierto distribuido bajo los términos de la Attribution 4.0 International (CC BY) Revista IECCMEXICO, México / Vol. 5, N. 2 / pp. 979-1009/ Julio-Diciembre, 2026 / E-ISSN: 3061-8045, P-ISSN: 3061-8517. Artículo de Investigación.

RESUMEN

El síndrome de ovario poliquístico (SOP) es un trastorno endocrino y metabólico heterogéneo, frecuentemente asociado con manifestaciones dermatológicas que pueden preceder al reconocimiento de alteraciones reproductivas o metabólicas. El hiperandrogenismo y la

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO
Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

resistencia a la insulina desempeñan funciones importantes en el desarrollo de acné, hirsutismo, alopecia de patrón femenino y acantosis nigricans, aunque su expresión clínica varía según la sensibilidad periférica a los andrógenos, la predisposición genética y las características metabólicas individuales. Esta revisión narrativa tuvo como objetivo analizar las relaciones fisiopatológicas entre las alteraciones hormonales y metabólicas y las manifestaciones cutáneas del SOP, con especial atención a los aspectos diagnósticos y las estrategias terapéuticas integrales para el acné y el hirsutismo. Se examinó evidencia procedente de guías clínicas internacionales, revisiones sistemáticas, metaanálisis e investigaciones clínicas relevantes, incorporando estudios de poblaciones latinoamericanas. Los hallazgos de la literatura indican que el hirsutismo presenta una asociación más consistente con el hiperandrogenismo bioquímico, mientras que el acné involucra mecanismos inflamatorios, foliculares y microbianos adicionales que limitan su especificidad como indicador de exceso androgénico. La resistencia a la insulina contribuye al incremento de la biodisponibilidad de andrógenos mediante hiperinsulinemia compensatoria y disminución de las concentraciones de globulina transportadora de hormonas sexuales, mientras que la acantosis nigricans puede indicar alteraciones metabólicas asociadas. La evidencia terapéutica muestra una efectividad variable de los anticonceptivos hormonales combinados, medicamentos antiandrogénicos, agentes sensibilizadores a la insulina y tratamientos dermatológicos convencionales, respaldando la selección individualizada de intervenciones según la presentación clínica, el riesgo metabólico y las preferencias reproductivas. Las diferencias en los criterios diagnósticos, las poblaciones estudiadas y los instrumentos de evaluación limitan las comparaciones directas entre investigaciones. Los hallazgos destacan la importancia de la colaboración multidisciplinaria y de adaptar las recomendaciones internacionales a los contextos sanitarios latinoamericanos. En conjunto, las manifestaciones dermatológicas del SOP deben abordarse como componentes de un trastorno endocrino-metabólico sistémico que requiere evaluación integral, tratamiento personalizado y nuevas investigaciones en poblaciones diversas.

PALABRAS CLAVE

síndrome de ovario poliquístico, hiperandrogenismo, resistencia a la insulina, acné vulgar, hirsutismo, manifestaciones dermatológicas, exceso de andrógenos, disfunción metabólica, trastornos endocrinos, manejo multidisciplinario

ABSTRACT

Polycystic ovary syndrome (PCOS) is a heterogeneous endocrine and metabolic disorder frequently associated with dermatological manifestations that may precede the recognition of reproductive or metabolic abnormalities. Hyperandrogenism and insulin resistance play important roles in the development of acne, hirsutism, female pattern hair loss, and acanthosis nigricans, although their clinical expression varies according to peripheral androgen sensitivity, genetic susceptibility, and metabolic characteristics. This narrative review aimed to analyze the pathophysiological relationships between hormonal and metabolic disturbances and cutaneous manifestations of PCOS, emphasizing diagnostic considerations and comprehensive therapeutic strategies for acne and hirsutism. International clinical guidelines, systematic reviews, meta-analyses, and relevant clinical investigations were examined, incorporating evidence from Latin American populations. The reviewed findings indicate that hirsutism exhibits a more consistent association with biochemical hyperandrogenism, whereas acne involves additional inflammatory, follicular, and microbial mechanisms that limit its specificity as an indicator of androgen excess. Insulin resistance contributes to increased androgen bioavailability through compensatory hyperinsulinemia and reduced sex hormone-binding globulin concentrations, while acanthosis nigricans may indicate associated metabolic dysfunction. Therapeutic evidence demonstrates variable effectiveness among combined oral contraceptives, antiandrogenic medications, insulin-sensitizing agents, and conventional dermatological interventions, supporting individualized treatment selection according to clinical presentation, metabolic risk, and reproductive preferences. Differences in diagnostic criteria, study populations, and outcome assessment methods limit direct comparisons across investigations. The findings emphasize the importance of multidisciplinary collaboration and the adaptation of international recommendations to Latin American healthcare contexts. Overall, dermatological manifestations of PCOS should be approached as components of a systemic endocrine-metabolic disorder, requiring integrated assessment, personalized management, and further research involving diverse populations.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO
Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

KEYWORDS

polycystic ovary syndrome, hyperandrogenism, insulin resistance, acne vulgaris, hirsutism, dermatological manifestations, androgen excess, metabolic dysfunction, endocrine disorders, multidisciplinary management

INTRODUCCIÓN

Polycystic ovary syndrome (PCOS) represents one of the most prevalent and clinically heterogeneous endocrine disorders affecting women of reproductive age. Its significance extends beyond reproductive dysfunction, encompassing a complex interaction of hormonal, metabolic, dermatological, and psychological abnormalities that may persist throughout different stages of life. Although menstrual irregularities, ovulatory dysfunction, and infertility have traditionally occupied a central position in the clinical characterization of PCOS, cutaneous manifestations frequently constitute the earliest recognizable signs of underlying endocrine disturbances. Acne, hirsutism, female pattern hair loss, seborrhea, and acanthosis nigricans are particularly relevant because they may precede the identification of menstrual or metabolic abnormalities, prompting affected individuals to seek dermatological consultation before receiving a definitive endocrine diagnosis. Consequently, the skin should not be considered merely a secondary target of hormonal alterations but rather an accessible clinical indicator of the systemic processes involved in PCOS (Housman & Reynolds, 2014; Schmidt & Shinkai, 2015; Teede et al., 2023).

The clinical importance of these manifestations becomes especially evident when considering the considerable variability in PCOS presentation. Women with similar biochemical androgen concentrations may exhibit substantially different degrees of acne, terminal hair growth, or scalp hair thinning, suggesting that circulating hormone levels alone cannot adequately explain the dermatological phenotype. Differences in peripheral androgen metabolism, cutaneous receptor sensitivity, genetic susceptibility, inflammatory responses, and local enzymatic activity contribute to the diversity of clinical findings. Furthermore, metabolic abnormalities, particularly insulin resistance and compensatory hyperinsulinemia, may intensify androgenic activity and influence the expression of cutaneous symptoms. This multifactorial background complicates diagnostic assessment and reinforces the need to integrate dermatological observations with reproductive and metabolic evaluation rather than interpreting isolated skin findings independently of the broader endocrine context (Schmidt & Shinkai, 2015; Spritzer et al., 2016; Teede et al., 2023).

Hyperandrogenism is a major pathophysiological component of PCOS and constitutes a fundamental connection between ovarian dysfunction and dermatological abnormalities. Increased androgen production, frequently involving the ovarian theca cells, is influenced by altered gonadotropin signaling and the metabolic effects of insulin. At the peripheral level, androgen-responsive structures, including pilosebaceous units and hair follicles, undergo changes in cellular activity that produce characteristic clinical manifestations. Elevated androgen availability may stimulate sebaceous secretion, favoring the development or persistence of acne, while simultaneously promoting the transformation of fine vellus hair into coarse terminal hair in androgen-dependent regions. In genetically susceptible scalp follicles, androgen exposure may contribute to progressive follicular miniaturization and reduced hair density. Nevertheless, the intensity of these manifestations depends on local tissue responsiveness and cannot be predicted exclusively by biochemical measurements, illustrating the importance of examining both systemic and peripheral determinants of hyperandrogenism (Spritzer et al., 2016; Schmidt & Shinkai, 2015).

Acne is among the most frequently encountered dermatological complaints associated with PCOS, particularly among adolescents and young adult women. Its pathogenesis involves follicular hyperkeratinization, increased sebaceous activity, microbial interactions involving *Cutibacterium acnes*, and inflammatory mechanisms that collectively promote the development of comedonal and inflammatory lesions. In the context of PCOS, androgen excess may amplify sebaceous gland activity and contribute to persistent or recurrent acne, although the presence of acne does not necessarily establish biochemical hyperandrogenism or confirm PCOS. This distinction is clinically important because acne is common among individuals without endocrine disorders, and its diagnostic relevance depends on associated findings such as menstrual dysfunction, hirsutism, or other indicators of androgen excess. Persistent inflammatory lesions, adult-onset acne, and inadequate responses to conventional treatments may justify further consideration of

endocrine factors when supported by the overall clinical presentation (Housman & Reynolds, 2014; Chanyachailert et al., 2021; Reynolds et al., 2024).

The relationship between acne and PCOS also presents therapeutic challenges. Conventional dermatological management commonly includes topical retinoids, benzoyl peroxide, selected antimicrobial treatments, and systemic therapies according to disease severity. However, these interventions primarily address local mechanisms involved in acne development and may not fully control symptoms when persistent androgenic stimulation contributes to disease activity. Hormonal treatments, particularly combined oral contraceptives and selected antiandrogenic agents, may provide additional benefits for appropriately selected patients. Their use requires individualized evaluation of reproductive intentions, contraindications, cardiovascular risk factors, treatment tolerance, and the need for effective contraception with potentially teratogenic antiandrogenic medications. Current evidence therefore supports an approach in which therapeutic selection is based not only on acne severity but also on its endocrine context and the clinical characteristics of each patient (Buzney et al., 2014; Reynolds et al., 2024; Alesi et al., 2023).

Hirsutism constitutes another major dermatological expression of PCOS and is particularly informative because of its association with androgen-mediated stimulation of terminal hair growth. It is characterized by excessive terminal hair development in androgen-sensitive anatomical regions, including the upper lip, chin, chest, abdomen, and back. Unlike generalized hypertrichosis, hirsutism reflects a specific pattern of hair distribution that may indicate increased androgen production or enhanced follicular responsiveness. Its clinical assessment is influenced by differences in hair pigmentation, ethnic background, cosmetic hair-removal practices, and individual sensitivity to androgen exposure. The modified Ferriman–Gallwey scoring system remains an important instrument for standardizing clinical evaluation, although interpretation requires consideration of population-specific characteristics and the limitations introduced by previous cosmetic treatment (Martin et al., 2018; Spritzer et al., 2016).

The management of hirsutism is frequently complicated by the slow biological response of hair follicles to hormonal intervention. Whereas improvements in some biochemical variables may occur within relatively short treatment periods, meaningful changes in terminal hair growth often require several months of sustained therapy. This discrepancy may contribute to dissatisfaction, treatment discontinuation, and unrealistic expectations regarding therapeutic outcomes. Pharmacological treatment with combined oral contraceptives, antiandrogens, or selected combinations may reduce androgenic stimulation, while laser-based procedures, photoepilation, and electrolysis can provide complementary cosmetic improvement. Consequently, effective management requires an understanding of both endocrine pathophysiology and follicular biology, with treatment plans addressing symptom severity, patient preferences, reproductive safety, and the anticipated duration of therapeutic response (Martin et al., 2018; Barrionuevo et al., 2018; Alesi et al., 2023).

Beyond androgen excess, insulin resistance represents a central mechanism connecting metabolic dysfunction with dermatological manifestations in many women with PCOS. Impaired insulin sensitivity promotes compensatory hyperinsulinemia, which can enhance ovarian androgen production and reduce hepatic synthesis of sex hormone-binding globulin, thereby increasing the bioavailable fraction of circulating androgens. These changes may intensify androgen-dependent cutaneous abnormalities despite considerable variation in total testosterone concentrations. Importantly, insulin resistance is not restricted to women with obesity; metabolic dysfunction may also occur in individuals with lower body mass index, although adiposity and visceral fat accumulation can aggravate the metabolic phenotype. Recognizing these relationships is essential because a dermatological presentation dominated by acne or hirsutism may coexist with glucose intolerance, dyslipidemia, or other metabolic risk factors that require independent clinical assessment (Teede et al., 2023; Spritzer et al., 2021; Di Lorenzo et al., 2023).

Acanthosis nigricans provides a particularly illustrative example of the relationship between cutaneous findings and metabolic alterations. Characterized by hyperpigmented, velvety thickening of the skin, especially in intertriginous regions such as the neck and axillae, this manifestation is commonly associated with hyperinsulinemia and may raise suspicion of clinically significant insulin resistance. Although acanthosis nigricans is not specific to PCOS and may occur in other metabolic or endocrine conditions, its identification can prompt broader assessment of cardiometabolic risk. Similarly, skin changes associated with obesity, chronic low-grade inflammation, and metabolic dysfunction may coexist with hyperandrogenic manifestations, creating overlapping clinical patterns that complicate diagnostic interpretation. These observations emphasize the value of integrating dermatological examination into a

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO
Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

comprehensive endocrine assessment rather than restricting evaluation to ovarian morphology or menstrual history (Housman & Reynolds, 2014; Schmidt & Shinkai, 2015; Teede et al., 2023).

The contribution of insulin resistance to cutaneous disease also raises important questions regarding the effectiveness of metabolic interventions for dermatological outcomes. Lifestyle modification, including nutritional strategies, physical activity, and sustainable behavioral changes, remains an important component of PCOS management because of its potential benefits for general metabolic health and long-term risk reduction. Pharmacological insulin sensitizers, particularly metformin, may improve selected metabolic and biochemical parameters, although their effects on dermatological manifestations are not uniform. A systematic review and meta-analysis by Yen et al. (2021) examined metformin therapy for acne in patients with PCOS, providing evidence relevant to the possible relationship between metabolic treatment and cutaneous improvement. Nevertheless, the available literature does not justify assuming that every reduction in insulin resistance will produce a proportional or clinically meaningful improvement in acne or hirsutism. Treatment decisions must therefore distinguish established metabolic indications from dermatological outcomes that remain less predictable (Yen et al., 2021; Melin et al., 2024; Teede et al., 2023).

The management of PCOS-associated dermatological manifestations has progressively shifted from isolated symptom suppression toward individualized strategies addressing hormonal abnormalities, metabolic health, and patient-centered outcomes. Combined oral contraceptives are commonly considered for menstrual irregularities and hyperandrogenic symptoms in patients who do not seek pregnancy and have no relevant contraindications. Their clinical effects involve suppression of ovarian androgen production and increased concentrations of sex hormone-binding globulin, which reduce circulating free androgen availability. Antiandrogenic medications may provide additional improvement in persistent hirsutism or acne under appropriate clinical circumstances. In contrast, metformin is generally considered primarily for its metabolic effects, particularly in patients with relevant cardiometabolic risk, rather than as a universal first-line treatment for isolated cutaneous manifestations. These distinctions are supported by systematic reviews comparing hormonal treatments, insulin sensitizers, and combined therapeutic approaches, which demonstrate the importance of selecting interventions according to the primary clinical outcome rather than assuming equivalent efficacy across reproductive, metabolic, and dermatological domains (Amiri et al., 2018; Luque-Ramírez et al., 2018; Forslund et al., 2023; Melin et al., 2024).

Recent clinical guidelines have reinforced the need for individualized assessment and shared decision-making in PCOS. The 2023 International Evidence-based Guideline for the Assessment and Management of Polycystic Ovary Syndrome emphasizes standardized diagnostic evaluation, recognition of metabolic and psychological comorbidities, and treatment selection according to symptoms and reproductive goals. Its recommendations also highlight the importance of avoiding unnecessary diagnostic testing and recognizing that the clinical significance of individual hyperandrogenic manifestations differs according to age, presentation, and associated findings. From a dermatological perspective, these principles support a structured assessment that combines lesion morphology, distribution of terminal hair, menstrual and reproductive history, biochemical evaluation when indicated, and screening for relevant metabolic abnormalities. Such an approach may reduce diagnostic fragmentation and unnecessary treatment escalation while improving communication among dermatologists, gynecologists, endocrinologists, and primary care professionals (Teede et al., 2023).

Despite substantial advances in the understanding of PCOS, important uncertainties remain concerning the correspondence between biochemical hyperandrogenism and the severity of dermatological manifestations. Acne may occur without measurable androgen excess, while significant hirsutism can be observed in patients with modest biochemical abnormalities. Conversely, some women with elevated androgen concentrations show relatively limited cutaneous symptoms. These differences suggest that conventional circulating biomarkers capture only part of the biological processes responsible for clinical expression. Local steroid metabolism, androgen receptor responsiveness, follicular characteristics, and interactions between metabolic and inflammatory pathways may contribute to the observed discrepancies. Accordingly, research focused exclusively on serum androgen concentrations may underestimate the importance of tissue-specific mechanisms and patient-related determinants of disease severity (Schmidt & Shinkai, 2015; Spritzer et al., 2016).

Another relevant limitation involves the interpretation of dermatological findings across different populations. The clinical expression of hirsutism is influenced by ancestry-related differences in terminal hair distribution and follicular

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO
Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

sensitivity, while acne severity may be affected by environmental exposures, inflammatory susceptibility, and access to dermatological care. Likewise, obesity prevalence, insulin resistance, and cardiometabolic risk may differ across geographical settings and socioeconomic environments. Therefore, applying a single clinical threshold or therapeutic model without considering population characteristics may introduce diagnostic inaccuracies or reduce treatment acceptability. Although international recommendations provide an essential framework, their implementation requires contextual interpretation that accounts for local epidemiology, healthcare resources, and cultural characteristics (Martin et al., 2018; Engmann et al., 2017; Teede et al., 2023).

These considerations are particularly relevant in Latin America, where differences in healthcare accessibility, socioeconomic conditions, population ancestry, and availability of specialized services may influence both the identification and management of PCOS. Regional evidence remains important for evaluating the applicability of diagnostic criteria and therapeutic recommendations originally developed through studies that may not adequately represent all Latin American populations. A systematic review and meta-analysis conducted by Spritzer et al. (2021) identified an unfavorable metabolic profile among Brazilian women with PCOS compared with women without the syndrome, including abnormalities in anthropometric, glycemic, and cardiovascular parameters. Although these findings do not establish a direct relationship between metabolic abnormalities and dermatological severity, they demonstrate the importance of evaluating metabolic health alongside clinical symptoms and highlight the need for integrated approaches in regional healthcare settings.

Additional regional evidence has contributed to a broader understanding of PCOS management. The consensus developed by the Latin American Association of Gynecological Endocrinology evaluated the applicability of international evidence-based recommendations to Latin American healthcare systems. Through a structured expert consensus process, the participating specialists examined diagnostic and therapeutic recommendations while considering barriers related to treatment costs, service availability, and clinical implementation. This regional initiative reflects the necessity of adapting scientific recommendations to environments with heterogeneous healthcare infrastructure and varying access to laboratory testing, pharmacological therapies, and specialized consultations. In the context of dermatological manifestations, such differences may influence the availability of hormonal evaluation, laser hair removal, topical therapies, and long-term multidisciplinary follow-up (Spritzer et al., 2025).

The incorporation of Latin American evidence is also relevant because cutaneous manifestations may have different clinical and social consequences depending on cultural expectations and access to treatment. Visible acne, facial terminal hair growth, and scalp hair thinning can generate substantial concern regarding physical appearance and may influence psychological well-being, interpersonal relationships, and healthcare-seeking behavior. Although the severity of a cutaneous manifestation does not necessarily correspond to the magnitude of the underlying endocrine abnormality, its perceived burden may strongly influence treatment priorities. Patients with relatively mild biochemical disturbances may experience considerable distress associated with persistent facial acne or unwanted hair growth, whereas individuals with more pronounced metabolic abnormalities may report fewer concerns about visible symptoms. These discrepancies reinforce the importance of incorporating patient-reported outcomes into therapeutic assessment and avoiding treatment models based exclusively on laboratory normalization (Housman & Reynolds, 2014; Buzney et al., 2014; Teede et al., 2023).

The psychological dimension of dermatological involvement constitutes an additional justification for comprehensive investigation. Acne and hirsutism may affect body image, self-esteem, and social confidence, particularly when symptoms persist despite repeated therapeutic attempts. The chronic and recurrent nature of these manifestations can contribute to frustration and reduced adherence, while concerns related to femininity, appearance, and reproductive health may intensify the subjective experience of PCOS. Importantly, psychological consequences cannot be explained solely by objective dermatological severity, as individual perceptions, previous experiences, social expectations, and associated endocrine symptoms may modify their impact. Current international recommendations recognize the relevance of psychological assessment in PCOS, supporting a broader definition of therapeutic success that includes quality of life, symptom satisfaction, and long-term well-being in addition to measurable clinical improvement (Teede et al., 2023).

The intersection between reproductive care and dermatological treatment introduces further complexity. Many pharmacological interventions used for androgen-related skin disorders require consideration of pregnancy intentions,

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

contraceptive requirements, and individual contraindications. Treatments that improve hirsutism or acne may not be appropriate for patients actively seeking conception, while metabolic interventions may remain clinically relevant regardless of dermatological severity. Moreover, the response to treatment is influenced by baseline androgenic activity, duration of symptoms, degree of insulin resistance, treatment adherence, and the simultaneous use of cosmetic or topical interventions. These considerations demonstrate why isolated therapeutic algorithms may provide incomplete guidance for patients with overlapping reproductive, metabolic, and dermatological concerns (Martin et al., 2018; Barrionuevo et al., 2018; Alesi et al., 2023).

Previous investigations have evaluated individual components of this clinical relationship, yet the available evidence is frequently distributed across different medical specialties. Dermatological studies commonly emphasize lesion characteristics, topical interventions, and antiandrogenic treatments, whereas endocrinological research focuses on hormonal regulation, insulin resistance, and metabolic complications. Gynecological investigations, in turn, often prioritize ovulatory dysfunction, reproductive outcomes, and hormonal contraceptive strategies. Although each perspective provides valuable information, the separation of these domains may complicate the translation of research findings into coordinated clinical practice. Reviews directed toward dermatologists have outlined the manifestations and treatment of PCOS-associated skin disease, while more recent systematic reviews have compared the efficacy of hormonal and metabolic treatments. Nevertheless, the integration of cutaneous findings with the broader endocrine and metabolic phenotype remains an important area for clinical synthesis (Housman & Reynolds, 2014; Buzney et al., 2014; Luque-Ramírez et al., 2018; Melin et al., 2024).

This fragmented evidence also complicates the evaluation of treatment effectiveness. Studies may employ different definitions of clinical hyperandrogenism, different scoring systems for hirsutism, heterogeneous acne severity classifications, and variable durations of follow-up. The use of different hormonal formulations, antiandrogenic agents, and metabolic interventions further limits direct comparison across studies. In addition, improvements in biochemical variables do not necessarily correspond to equivalent changes in visible dermatological symptoms, and short observation periods may fail to capture the slower response of terminal hair growth. These methodological differences underline the importance of critically distinguishing biochemical efficacy, clinical dermatological improvement, metabolic benefit, and patient-perceived outcomes when interpreting therapeutic evidence (Amiri et al., 2018; Barrionuevo et al., 2018; Forslund et al., 2023).

From a pathophysiological perspective, the interaction between androgen excess and insulin resistance provides a coherent framework for understanding many of these findings. Hyperinsulinemia may increase free androgen availability, while androgen-related changes in adipose tissue and metabolic regulation may contribute to an unfavorable metabolic environment. However, the relationship is neither uniform nor sufficient to explain every clinical phenotype. Some patients demonstrate predominantly hyperandrogenic dermatological manifestations with limited detectable metabolic dysfunction, whereas others exhibit substantial insulin resistance without severe acne or hirsutism. This heterogeneity suggests that PCOS-associated skin disease should be conceptualized as the product of interacting biological pathways rather than the direct consequence of a single hormonal abnormality. Such a framework may help explain differences in treatment response and identify opportunities for more individualized management strategies (Spritzer et al., 2016; Spritzer et al., 2021; Di Lorenzo et al., 2023).

The growing emphasis on comprehensive and personalized care makes a renewed examination of this subject particularly relevant. Improvements in understanding androgen metabolism, increasing recognition of metabolic comorbidities, and the availability of evidence-based therapeutic recommendations have created opportunities to refine clinical assessment. At the same time, persistent disparities in healthcare access, limited representation of certain populations in clinical research, and inconsistencies in dermatological outcome assessment continue to challenge the implementation of standardized care. Within Latin America, these difficulties may be amplified by differences in access to specialized endocrine services and dermatological treatments, further emphasizing the need for evidence synthesis that combines internationally established recommendations with regional clinical considerations (Teede et al., 2023; Spritzer et al., 2025).

Against this background, the central research question guiding the present review is: **How do hyperandrogenism and insulin resistance contribute to the development and clinical expression of dermatological manifestations in women with polycystic ovary syndrome, and which integrated diagnostic and therapeutic strategies offer the**

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

most appropriate management of acne and hirsutism? This question arises from the recognition that cutaneous manifestations reflect the interaction of hormonal, metabolic, and tissue-specific mechanisms and that their successful management requires more than the isolated correction of a single clinical abnormality. The review is guided by the working proposition that a comprehensive approach incorporating dermatological assessment, endocrine characterization, metabolic risk evaluation, and individualized treatment selection provides a more clinically coherent framework than symptom-directed management alone.

To address this question, the present study is designed as a narrative review of the scientific literature, integrating evidence from international clinical practice guidelines, systematic reviews, meta-analyses, and relevant clinical investigations. The analytical framework prioritizes studies addressing the pathophysiology of hyperandrogenism, mechanisms of insulin resistance, dermatological manifestations, diagnostic approaches, and the comparative effectiveness of hormonal, metabolic, dermatological, and cosmetic interventions. Particular attention is given to the relationship between systemic endocrine abnormalities and peripheral cutaneous responses, as well as to the applicability of international recommendations in Latin American populations. The narrative design is intended to facilitate a critical integration of evidence across related medical disciplines rather than to generate pooled effect estimates or establish causal associations beyond those supported by the original studies.

The primary objective of this review is to examine the dermatological manifestations of PCOS through an integrated endocrine, metabolic, and clinical perspective, with particular emphasis on acne and hirsutism. Secondary objectives include analyzing the mechanisms linking androgen excess and insulin resistance to cutaneous abnormalities, describing the diagnostic relevance and limitations of the most common dermatological findings, comparing available therapeutic approaches according to their clinical indications and documented outcomes, and identifying research gaps relevant to individualized care. Additionally, the review seeks to highlight considerations specific to Latin American populations, including the applicability of international evidence, differences in metabolic risk, and barriers to multidisciplinary management.

Ultimately, understanding dermatological manifestations as part of the broader clinical spectrum of PCOS may improve early recognition of the syndrome, support appropriate metabolic and reproductive assessment, and facilitate coordinated therapeutic decisions. By examining the relationship between hormonal disturbances, insulin resistance, cutaneous physiology, and treatment response, this review aims to provide a comprehensive scientific foundation for clinical practice and future investigation. The integration of dermatological, gynecological, and endocrinological perspectives is particularly important for addressing the heterogeneous needs of affected patients and advancing a model of care that considers not only visible symptoms but also their underlying mechanisms, associated health risks, and impact on quality of life.

DESARROLLO

Pathophysiological Relationship Between Hyperandrogenism, Insulin Resistance, and Dermatological Manifestations of Polycystic Ovary Syndrome

Polycystic ovary syndrome (PCOS) is a heterogeneous endocrine disorder in which reproductive dysfunction, metabolic abnormalities, and dermatological manifestations interact through complex physiological mechanisms. Although its clinical presentation varies considerably among affected women, hyperandrogenism and insulin resistance constitute two major components influencing disease expression. The relationship between these mechanisms is particularly relevant in dermatology because the skin and its appendages respond directly to changes in androgen availability, peripheral hormone metabolism, and metabolic signaling. Understanding these interactions is essential for distinguishing cutaneous manifestations associated with PCOS from common dermatological conditions with similar clinical features (Teede et al., 2023; Schmidt & Shinkai, 2015).

1. Hyperandrogenism and Its Effects on Cutaneous Structures

Hyperandrogenism is a defining clinical or biochemical feature of many PCOS phenotypes and results primarily from increased androgen production, frequently involving ovarian theca cell dysfunction. Altered gonadotropin activity,

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

particularly increased luteinizing hormone stimulation in some patients, may contribute to excessive ovarian androgen synthesis. Simultaneously, hyperinsulinemia can amplify androgen production and decrease hepatic synthesis of sex hormone-binding globulin, increasing the circulating fraction of biologically available testosterone. These endocrine alterations establish conditions that favor androgen-dependent changes in sebaceous glands and hair follicles (Spritzer et al., 2016; Teede et al., 2023).

The cutaneous effects of androgens depend not only on circulating hormone concentrations but also on local enzymatic activity and receptor sensitivity. Testosterone can be converted into dihydrotestosterone through the action of 5α-reductase, an enzyme expressed in androgen-responsive tissues. Dihydrotestosterone has greater affinity for androgen receptors and can intensify biological responses in susceptible pilosebaceous units. Consequently, patients with comparable biochemical androgen concentrations may develop substantially different degrees of acne, hirsutism, or hair loss. This variability indicates that serum androgen measurements cannot independently predict dermatological severity and should be interpreted alongside clinical findings (Schmidt & Shinkai, 2015; Housman & Reynolds, 2014).

From a clinical perspective, recognizing hyperandrogenism requires careful evaluation of the distribution, progression, and severity of cutaneous abnormalities. Rapidly progressive hirsutism, virilization, or unusually severe androgenic changes warrant assessment for alternative causes of androgen excess rather than automatic attribution to PCOS. Differential diagnoses include nonclassic congenital adrenal hyperplasia, androgen-secreting tumors, and selected endocrine disorders. A structured diagnostic approach therefore reduces the risk of misclassification and supports timely identification of conditions requiring different management strategies (Martin et al., 2018; Teede et al., 2023).

2. Insulin Resistance as a Metabolic Amplifier of Dermatological Abnormalities

Insulin resistance plays a central role in the metabolic characteristics of PCOS and may contribute to the persistence of hyperandrogenic skin manifestations. Reduced insulin sensitivity in peripheral tissues promotes compensatory hyperinsulinemia, which influences ovarian steroidogenesis and hepatic production of sex hormone-binding globulin. As a result, insulin resistance may increase androgen bioavailability and indirectly exacerbate acne and hirsutism. Nevertheless, not all women with PCOS exhibit measurable insulin resistance, and its clinical expression varies according to adiposity, genetic background, metabolic characteristics, and other individual factors (Di Lorenzo et al., 2023; Spritzer et al., 2021).

Importantly, insulin resistance should not be interpreted solely as a consequence of obesity. Although excess adiposity may aggravate metabolic dysfunction, insulin resistance can also occur in women with PCOS who have a body mass index within the conventional reference range. This observation has important diagnostic implications because the absence of obesity does not exclude metabolic abnormalities. Accordingly, metabolic assessment should consider individual risk factors, clinical findings, and evidence-based recommendations rather than relying exclusively on anthropometric measurements (Teede et al., 2023).

Acanthosis nigricans is among the most recognizable dermatological findings associated with hyperinsulinemia. It typically presents as hyperpigmented, thickened, velvety plaques in intertriginous regions, particularly the posterior neck, axillae, and inguinal folds. Its development is associated with proliferative effects of elevated insulin concentrations on epidermal and dermal structures. However, acanthosis nigricans is neither specific to PCOS nor a sufficient diagnostic indicator of insulin resistance. Its presence should instead encourage consideration of the patient's broader metabolic profile and potential need for additional evaluation (Housman & Reynolds, 2014; Teede et al., 2023).

The metabolic implications of PCOS extend beyond dermatological symptoms. Women with the syndrome may experience impaired glucose tolerance, dyslipidemia, and additional cardiometabolic risk factors, making early identification clinically relevant. Evidence from Brazilian populations has demonstrated differences in metabolic characteristics between women with PCOS and comparison groups, reinforcing the need for regionally informed assessment. However, these metabolic associations do not establish that insulin resistance directly determines the severity of individual dermatological manifestations (Spritzer et al., 2021).

3. Acne as a Dermatological Expression of PCOS

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

Acne associated with PCOS results from the interaction of androgen-mediated sebaceous stimulation, follicular hyperkeratinization, microbial activity, and inflammatory responses. Androgens promote sebum production, creating conditions that may favor follicular obstruction and inflammatory lesion formation. Nevertheless, acne is not specific to PCOS, and its presence alone is insufficient to establish a diagnosis of endocrine dysfunction. Persistent acne accompanied by hirsutism, menstrual irregularities, or other signs of androgen excess may increase clinical suspicion and justify a more comprehensive hormonal assessment (Housman & Reynolds, 2014; Chanyachailert et al., 2021).

The clinical presentation may include inflammatory papules, pustules, comedones, and nodular lesions, with severity varying considerably among affected women. Although acne involving the lower face and mandibular region has frequently been associated with hormonal influences, lesion distribution alone cannot reliably distinguish endocrine-related acne from other forms of the disease. Furthermore, persistent inflammatory activity may lead to scarring and post-inflammatory hyperpigmentation, particularly in patients with darker skin phototypes. These complications reinforce the importance of appropriate early treatment and regular evaluation of therapeutic response (Reynolds et al., 2024).

Management generally combines conventional dermatological therapies with hormonal treatment when clinically indicated. Topical retinoids, benzoyl peroxide, and selected systemic medications remain important options, while combined oral contraceptives and spironolactone may be beneficial in appropriately selected patients. Insulin-sensitizing treatments have also been investigated, although their effects on acne are less consistent than their established metabolic benefits. Consequently, therapeutic strategies should consider acne severity, endocrine findings, reproductive goals, contraindications, and patient preferences (Buzney et al., 2014; Yen et al., 2021; Reynolds et al., 2024).

4. Hirsutism and Androgen-Dependent Hair Follicle Activity

Hirsutism is characterized by excessive terminal hair growth in androgen-dependent areas and represents one of the most clinically informative manifestations of hyperandrogenism. Its development is associated with increased androgen exposure and follicular sensitivity, particularly involving the conversion of testosterone into dihydrotestosterone. However, variations in genetic background, hair follicle density, and peripheral androgen metabolism contribute to differences in clinical severity among women with similar hormonal profiles (Spritzer et al., 2016; Martin et al., 2018).

Clinical assessment commonly incorporates the modified Ferriman–Gallwey scoring system, which evaluates terminal hair growth in selected anatomical regions. Interpretation must account for ethnic differences, cosmetic hair-removal practices, and the patient's perception of symptom severity. These considerations are particularly relevant in multicultural populations because a universal scoring threshold may not adequately represent physiological differences in hair distribution (Martin et al., 2018).

Treatment aims to reduce androgenic stimulation while addressing established terminal hair growth. Combined oral contraceptives are commonly used as initial pharmacological therapy in eligible patients, while antiandrogens may be considered when improvement remains insufficient. Because follicular responses occur gradually, treatment effectiveness generally requires evaluation over several months. Laser hair reduction and electrolysis may complement pharmacological approaches, particularly when visible hair growth causes substantial psychological or cosmetic concern (Barrionuevo et al., 2018; Alesi et al., 2023).

5. Comprehensive Therapeutic Management and Multidisciplinary Care

The management of dermatological manifestations associated with PCOS requires integration of endocrine, metabolic, dermatological, and reproductive considerations. Treating acne or hirsutism without evaluating associated hormonal disturbances may provide symptomatic relief but overlook clinically significant comorbidities. Conversely, focusing exclusively on biochemical normalization may fail to address persistent cutaneous symptoms and their psychological consequences. An individualized strategy should therefore combine assessment of clinical manifestations with appropriate metabolic screening and selection of treatment according to the patient's principal concerns (Teede et al., 2023).

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

Combined oral contraceptives can improve hirsutism and menstrual irregularities in eligible patients, whereas antiandrogenic agents offer additional options for persistent symptoms. Their prescription requires consideration of contraindications and reproductive safety, particularly the need for effective contraception when using antiandrogens that may affect fetal development. Metformin may be appropriate for metabolic indications, including selected patients with increased cardiometabolic risk, but should not be considered interchangeable with hormonal therapy for the treatment of hirsutism. These distinctions have been reinforced by systematic reviews comparing oral contraceptives, insulin sensitizers, and antiandrogenic interventions (Luque-Ramírez et al., 2018; Forslund et al., 2023; Melin et al., 2024).

Lifestyle interventions represent an additional component of comprehensive management, particularly in patients with metabolic abnormalities. Nutritional counseling, physical activity, and sustainable behavioral modifications may contribute to improved metabolic health and long-term risk reduction. However, clinical recommendations should avoid assuming that weight reduction is necessary for every patient or that metabolic improvement will invariably resolve dermatological symptoms. The therapeutic approach must remain sensitive to differences in body composition, individual metabolic risk, treatment accessibility, and psychological well-being (Di Lorenzo et al., 2023; Teede et al., 2023).

Finally, the international applicability of these strategies requires consideration of regional healthcare conditions. Evidence from Latin America demonstrates the importance of contextualizing recommendations according to population characteristics, access to specialized services, and available treatment resources. The regional consensus developed by Spritzer et al. (2025) highlights the relevance of adapting evidence-based PCOS management to Latin American clinical settings. Integrating these considerations with international recommendations may support more equitable and coordinated care while identifying areas requiring additional research.

OBJETIVO GENERAL Y OBJETIVOS ESPECÍFICOS

General Objective

To critically analyze the relationship between hyperandrogenism, insulin resistance, and the dermatological manifestations of polycystic ovary syndrome (PCOS), with particular emphasis on acne and hirsutism, through an integrative assessment of international scientific evidence and Latin American clinical perspectives. This review aims to evaluate the underlying pathophysiological mechanisms, diagnostic considerations, and available therapeutic strategies to establish a comprehensive framework that supports individualized, multidisciplinary, and evidence-based patient management.

Specific Objectives

1. Cognitive Domain: Knowledge, Understanding, Analysis, and Evaluation

1.1. Identify and describe the principal dermatological manifestations associated with PCOS, including acne, hirsutism, female pattern hair loss, seborrhea, and acanthosis nigricans, emphasizing their clinical characteristics, underlying mechanisms, and diagnostic relevance.

1.2. Explain and analyze the pathophysiological interactions between ovarian hyperandrogenism, peripheral androgen metabolism, insulin resistance, and compensatory hyperinsulinemia, determining their contributions to the development and persistence of dermatological abnormalities.

1.3. Differentiate and classify the clinical manifestations of hyperandrogenism according to their presentation, severity, and associated endocrine characteristics, identifying features that warrant investigation for alternative causes of androgen excess.

1.4. Compare and critically evaluate the effectiveness, limitations, contraindications, and clinical indications of hormonal treatments, antiandrogenic medications, insulin-sensitizing agents, topical dermatological therapies, and hair-removal procedures in women with PCOS.

1.5. Synthesize and interpret findings from international guidelines, systematic reviews, meta-analyses, and Latin American clinical literature to identify evidence-supported management strategies, inconsistencies in reported outcomes, and priorities for future research.

2. Psychomotor Domain: Clinical Skills and Practical Application

2.1. Apply standardized clinical assessment principles to the evaluation of dermatological manifestations associated with PCOS, including acne severity classification, recognition of androgen-dependent hair growth patterns, and identification of cutaneous signs suggestive of metabolic dysfunction.

2.2. Demonstrate, through proposed clinical assessment procedures, the appropriate use of the modified Ferriman–Gallwey scoring system for hirsutism and the systematic documentation of relevant dermatological findings.

2.3. Organize and construct evidence-based diagnostic pathways integrating dermatological examination, reproductive history, biochemical evaluation when indicated, and metabolic risk assessment.

2.4. Design individualized therapeutic algorithms that integrate dermatological, hormonal, metabolic, and cosmetic interventions according to clinical presentation, reproductive goals, contraindications, and treatment availability.

These psychomotor objectives describe the practical competencies that the review seeks to support. Direct assessment of clinical skill performance is outside the scope of the narrative review.

3. Affective Domain: Professional Attitudes, Values, and Patient-Centered Care

3.1. Recognize and value the psychological and social consequences of persistent acne, hirsutism, and other visible manifestations of PCOS, including their potential effects on body image, self-esteem, interpersonal relationships, and quality of life.

3.2. Promote respectful, empathetic, and non-stigmatizing clinical communication, acknowledging individual differences in symptom perception, cultural background, treatment expectations, and reproductive preferences.

3.3. Integrate principles of shared decision-making into the selection of therapeutic strategies, emphasizing patient autonomy, informed consent, reproductive safety, and long-term treatment adherence.

3.4. Advocate for multidisciplinary collaboration among dermatology, gynecology, endocrinology, nutrition, and psychological support services when clinically indicated, recognizing the importance of comprehensive care.

3.5. Critically appreciate the relevance of regional healthcare disparities, particularly within Latin America, and the need to adapt international evidence-based recommendations to different socioeconomic and healthcare environments.

OBJETO DE ESTUDIO

The object of study of this narrative review is the relationship between hyperandrogenism, insulin resistance, and the development of dermatological manifestations in women with polycystic ovary syndrome (PCOS), with particular emphasis on acne and hirsutism. The investigation focuses on the endocrine and metabolic mechanisms responsible for cutaneous alterations, their clinical expression, diagnostic relevance, and response to available therapeutic interventions. These manifestations are examined as components of a systemic endocrine disorder rather than as isolated dermatological conditions, allowing the integration of reproductive, metabolic, and cutaneous perspectives (Housman & Reynolds, 2014; Teede et al., 2023).

Study Population

The population of interest comprises adolescent and adult women diagnosed with PCOS according to internationally recognized diagnostic criteria, considering age-specific recommendations and differences in clinical presentation. Particular attention is directed toward women of reproductive age presenting with acne, hirsutism, or other signs of androgen excess, regardless of body mass index or the presence of established metabolic complications.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO
Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

The review considers evidence from international populations while incorporating studies conducted in Latin America, particularly those addressing metabolic characteristics, clinical heterogeneity, and regional applicability of therapeutic recommendations. This geographical perspective is relevant because genetic background, environmental factors, socioeconomic conditions, and access to specialized healthcare may influence diagnostic practices and treatment outcomes (Spritzer et al., 2021; Spritzer et al., 2025).

Main Variables and Dimensions of Analysis

The study examines three interconnected dimensions.

The endocrine dimension includes biochemical and clinical hyperandrogenism, androgen bioavailability, sex hormone-binding globulin concentrations, peripheral androgen metabolism, and differences in follicular sensitivity.

The metabolic dimension encompasses insulin resistance, compensatory hyperinsulinemia, obesity-related metabolic abnormalities, glucose intolerance, and associated cardiometabolic risk factors.

The dermatological dimension includes acne severity and persistence, hirsutism distribution and intensity, female pattern hair loss, seborrhea, and acanthosis nigricans. Particular consideration is given to the clinical assessment of acne and hirsutism, their psychological consequences, and their response to dermatological, hormonal, and metabolic treatments (Martin et al., 2018; Reynolds et al., 2024).

These dimensions are analyzed in relation to therapeutic effectiveness, clinical decision-making, and opportunities for multidisciplinary management.

Scope and Delimitation

The review focuses primarily on the pathophysiology, clinical evaluation, and management of acne and hirsutism associated with PCOS. Other dermatological manifestations are considered when they contribute to understanding androgen excess or metabolic dysfunction.

The investigation includes evidence from clinical practice guidelines, systematic reviews, meta-analyses, and relevant clinical studies. Particular attention is given to the applicability of international recommendations within Latin American healthcare settings.

Conditions capable of producing similar dermatological abnormalities, including nonclassic congenital adrenal hyperplasia, androgen-secreting tumors, and other endocrine disorders, are addressed principally as differential diagnoses rather than as independent subjects of investigation.

As a narrative literature review, this study does not involve direct patient recruitment, clinical interventions, biological sample collection, or the generation of original patient-level data. Its analytical focus is the synthesis and critical interpretation of previously published scientific evidence.

Ultimately, the object of study is defined by the interaction between endocrine dysfunction, metabolic abnormalities, and cutaneous manifestations in PCOS, with the purpose of identifying clinically relevant relationships that may support earlier recognition, individualized therapeutic decisions, and comprehensive patient care.

METODOLOGÍA

Study Design and Research Approach

This study is structured as a narrative literature review with a descriptive, analytical, and integrative approach, designed to examine the relationship between hyperandrogenism, insulin resistance, and dermatological manifestations of polycystic ovary syndrome (PCOS). The methodological framework follows the principles of the scientific method, incorporating problem identification, formulation of the research question, systematic identification of relevant literature, critical evaluation of evidence, and synthesis of findings.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

A narrative review was selected because of the multidimensional nature of PCOS, which requires integrating endocrinological, metabolic, dermatological, and gynecological perspectives. Unlike a systematic review focused on a narrowly defined intervention or outcome, this approach allows the examination of different clinical mechanisms, diagnostic considerations, and therapeutic strategies. Nevertheless, a structured search and selection protocol is proposed to enhance methodological transparency, reproducibility, and scientific consistency.

Sources of Information and Search Strategy

The literature search is designed to identify peer-reviewed scientific publications indexed in **PubMed/MEDLINE, Scopus, and Web of Science**, prioritizing clinical practice guidelines, systematic reviews, meta-analyses, and observational or interventional studies relevant to PCOS-associated dermatological manifestations.

The search strategy incorporates Medical Subject Headings (MeSH) and free-text terms associated with the principal variables of investigation. The following Boolean search expression is proposed as the primary strategy for PubMed/MEDLINE:

("Polycystic Ovary Syndrome"MeSH OR "polycystic ovary syndrome"Title/Abstract OR PCOSTitle/Abstract) AND ("Hyperandrogenism"MeSH OR "Insulin Resistance"MeSH OR "Acne Vulgaris"MeSH OR "Hirsutism"MeSH OR hyperandrogenismTitle/Abstract OR "insulin resistance"Title/Abstract OR acneTitle/Abstract OR hirsutismTitle/Abstract)

[Copy search strategy]

Equivalent search expressions should be adapted to the indexing conventions of Scopus and Web of Science. Additional searches should address hormonal treatments, antiandrogenic medications, metformin, clinical guidelines, and Latin American populations. Reference lists of relevant reviews and guidelines may also be examined to identify additional eligible publications.

The proposed search period extends from January 2014 to October 2026, allowing the incorporation of foundational research and contemporary clinical recommendations. Earlier studies may be considered when they provide essential historical or mechanistic information not adequately represented in more recent publications.

Eligibility Criteria

Study selection is guided by predefined inclusion and exclusion criteria intended to maintain relevance and consistency.

Inclusion criteria:

1. Peer-reviewed publications addressing PCOS and its endocrine, metabolic, or dermatological manifestations.
2. Studies involving adolescent or adult female populations, with appropriate differentiation of age-specific diagnostic criteria.
3. Research examining hyperandrogenism, insulin resistance, acne, hirsutism, or related cutaneous findings.
4. Clinical practice guidelines, systematic reviews, meta-analyses, randomized controlled trials, and relevant observational studies.
5. Publications in English, Spanish, or Portuguese, supporting the incorporation of Latin American scientific contributions.
6. Studies providing sufficient methodological and clinical information to support critical interpretation.

Exclusion criteria:

1. Publications unrelated to PCOS or without substantial relevance to the variables under investigation.
2. Studies focused exclusively on unrelated dermatological or endocrine diseases.

3. Conference abstracts without adequate methodological information, duplicate publications, and articles lacking accessible essential data.

4. Non-peer-reviewed opinion pieces or publications presenting unsupported clinical conclusions.

Study Selection and Evidence Extraction

The selection procedure consists of sequential evaluation of titles, abstracts, and full texts. Duplicate records should first be removed, followed by preliminary screening according to the eligibility criteria. Potentially relevant publications should then undergo full-text assessment to determine their contribution to the research objectives.

Information extracted from eligible studies should include author, publication year, geographical context, study design, population characteristics, principal endocrine or metabolic variables, dermatological outcomes, therapeutic interventions, and main findings.

The extracted information should be organized into an evidence matrix to facilitate comparisons across studies and identify agreements, discrepancies, and limitations in the available literature. Particular attention should be given to differences in diagnostic criteria, clinical measurement instruments, study populations, and follow-up periods.

Critical Appraisal and Data Synthesis

The methodological quality of selected publications should be evaluated according to study design. Systematic reviews may be appraised using AMSTAR 2, randomized trials using the Cochrane risk-of-bias framework, and observational studies using appropriate Joanna Briggs Institute critical appraisal tools. Clinical practice guidelines should be assessed for methodological transparency, consistency, and applicability.

Because of the expected heterogeneity in populations, clinical outcomes, and therapeutic interventions, findings will be synthesized narratively rather than combined through a new quantitative meta-analysis.

The synthesis is organized around five analytical categories: mechanisms of hyperandrogenism, metabolic contributions of insulin resistance, clinical characteristics of acne and hirsutism, effectiveness of therapeutic interventions, and implications for multidisciplinary care.

When evaluating therapeutic evidence, priority should be given to clinically meaningful outcomes and the distinction between biochemical improvement, visible dermatological response, and patient-reported benefits. Contradictory findings should be examined in relation to differences in study design, population characteristics, and clinical assessment methods (Alesi et al., 2023; Melin et al., 2024).

Regional and Ethical Considerations

An international perspective is incorporated through the analysis of evidence from different geographical regions, complemented by research and clinical recommendations relevant to Latin America. Special consideration is given to Brazilian metabolic studies and the regional consensus developed by the Latin American Association of Gynecological Endocrinology (Spritzer et al., 2021; Spritzer et al., 2025).

As this investigation is based exclusively on previously published scientific literature, it does not require direct recruitment of participants, collection of identifiable patient information, or experimental interventions. Ethical considerations primarily involve accurate attribution of sources, faithful representation of research findings, and transparent acknowledgment of limitations.

Methodological Reproducibility

To support reproducibility, the definitive research record should document the exact search date, databases consulted, complete search expressions, number of retrieved records, duplicate removal procedures, eligibility decisions, and final included publications. Changes to the search strategy or selection criteria should also be recorded.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO
Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

The methodology provides a structured framework for examining the available literature while recognizing that a narrative synthesis cannot establish causality independently of the underlying studies or eliminate all potential selection bias.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

FASES DEL DESARROLLO

Phase 1. Identification and Delimitation of the Research Problem

The first phase consisted of defining the clinical problem underlying the investigation: the complex relationship between hormonal and metabolic disturbances and the development of dermatological manifestations in women with PCOS. Although acne and hirsutism are frequently recognized as manifestations of androgen excess, their clinical severity does not consistently correspond to circulating androgen concentrations. Furthermore, metabolic abnormalities such as insulin resistance may contribute to androgen bioavailability without producing uniform dermatological responses among affected patients (Housman & Reynolds, 2014; Schmidt & Shinkai, 2015).

This discrepancy represents an important clinical challenge because dermatological symptoms may be managed independently of the endocrine and metabolic abnormalities contributing to their development. The research problem was therefore delimited to the mechanisms connecting hyperandrogenism and insulin resistance with acne and hirsutism, including their diagnostic implications and available therapeutic approaches.

The investigation also considers the need to integrate international evidence with Latin American clinical perspectives, particularly regarding differences in metabolic risk, healthcare accessibility, and implementation of treatment recommendations (Spritzer et al., 2021; Spritzer et al., 2025).

Phase 2. Formulation of the Research Question and Working Hypothesis

The second phase involved establishing a research question capable of integrating the principal biological mechanisms and clinical implications addressed in the review.

The central research question was formulated as follows: How do hyperandrogenism and insulin resistance influence the development and severity of acne and hirsutism in women with PCOS, and which integrated diagnostic and therapeutic strategies are supported by the available scientific evidence?

Based on existing pathophysiological models, the working hypothesis proposes that hyperandrogenism and insulin resistance interact through ovarian steroidogenesis, androgen bioavailability, and peripheral tissue responsiveness, contributing to the heterogeneous expression of dermatological manifestations. Furthermore, individualized management strategies incorporating dermatological, endocrine, and metabolic assessment may address a broader range of clinical needs than approaches limited to isolated symptom treatment.

Because the investigation is a narrative review, this hypothesis serves as a framework for evaluating published evidence rather than as a proposition subjected to direct experimental testing. Its interpretation depends on the methodological quality, consistency, and clinical relevance of the studies considered (Teede et al., 2023; Spritzer et al., 2016).

Phase 3. Identification and Selection of Scientific Literature

The third phase establishes the procedure for identifying scientific evidence relevant to the research objectives. The literature search protocol prioritizes PubMed/MEDLINE, Scopus, and Web of Science, incorporating controlled vocabulary and free-text terms related to PCOS, hyperandrogenism, insulin resistance, acne, hirsutism, and therapeutic management.

Search expressions are constructed using Boolean operators to identify publications examining the endocrine mechanisms, dermatological characteristics, and treatment outcomes associated with PCOS. Additional terms addressing Latin American populations are incorporated to identify regional evidence and evaluate the geographical applicability of international recommendations.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

The proposed eligibility assessment follows three sequential steps. First, potentially relevant publications are identified through database searches and reference examination. Second, titles and abstracts are screened according to predefined inclusion and exclusion criteria. Third, the full texts of potentially eligible studies are evaluated for relevance, methodological characteristics, and contribution to the research objectives.

Priority is assigned to contemporary clinical practice guidelines, systematic reviews, meta-analyses, and clinical investigations. Foundational studies may also be considered when necessary to explain established physiological mechanisms.

To ensure methodological transparency, the definitive study record must include database-specific search dates, retrieved records, duplicate removal procedures, exclusion decisions, and the final number of included publications. These numerical outcomes must be reported from the actual search records rather than estimated.

Phase 4. Organization and Classification of the Evidence

The fourth phase involves the systematic organization of selected publications into an analytical framework aligned with the research objectives. An evidence extraction matrix is proposed to document the characteristics of each study, including authorship, year of publication, geographical setting, study design, population, principal variables, clinical outcomes, and methodological limitations.

The available evidence is organized into five thematic categories.

The first category addresses **hyperandrogenism and peripheral androgen activity**, including ovarian androgen production, sex hormone-binding globulin concentrations, androgen receptor responsiveness, and the effects of testosterone and dihydrotestosterone on cutaneous structures.

The second examines **insulin resistance and metabolic dysfunction**, focusing on compensatory hyperinsulinemia, altered androgen bioavailability, glucose metabolism, and the relationship between metabolic abnormalities and dermatological findings.

The third evaluates **clinical dermatological manifestations**, emphasizing acne, hirsutism, female pattern hair loss, and acanthosis nigricans, together with the limitations of available assessment instruments.

The fourth focuses on **therapeutic strategies**, including combined oral contraceptives, antiandrogens, insulin-sensitizing medications, conventional acne therapies, lifestyle interventions, and procedures directed toward excessive terminal hair growth.

The fifth considers **regional applicability and multidisciplinary management**, incorporating international recommendations and Latin American evidence concerning clinical characteristics, healthcare accessibility, and treatment implementation.

This classification permits the identification of relationships between biological mechanisms and clinical manifestations while facilitating comparisons among studies addressing different aspects of PCOS (Martin et al., 2018; Alesi et al., 2023; Melin et al., 2024).

Phase 5. Critical Analysis and Interpretation of Findings

The fifth phase focuses on assessing the scientific consistency and clinical relevance of the selected evidence. Findings are examined according to study design, methodological quality, population characteristics, diagnostic criteria, and outcome assessment.

Particular attention is directed toward determining whether reported associations between insulin resistance, hyperandrogenism, and dermatological manifestations are supported by consistent clinical findings. Differences between biochemical androgen concentrations and visible dermatological severity are interpreted in relation to peripheral hormone metabolism, follicular sensitivity, and clinical heterogeneity.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

Therapeutic evidence is analyzed by distinguishing hormonal, metabolic, and dermatological outcomes. Improvements in insulin sensitivity, for example, are not automatically interpreted as evidence of equivalent improvement in acne or hirsutism. Similarly, reductions in circulating androgen concentrations are evaluated separately from clinically meaningful changes in terminal hair growth or inflammatory acne lesions.

Comparative evidence involving combined oral contraceptives, antiandrogens, and insulin-sensitizing medications provides a foundation for identifying therapeutic benefits and limitations. Systematic reviews have demonstrated that treatment effectiveness varies according to the intervention and the outcome assessed, reinforcing the importance of individualized clinical decision-making (Luque-Ramírez et al., 2018; Barrionuevo et al., 2018; Forslund et al., 2023).

Contradictory findings are considered in relation to differences in sample characteristics, follow-up duration, outcome definitions, and methodological limitations. This phase does not involve the generation of new statistical estimates; instead, it emphasizes qualitative interpretation of previously published evidence.

Phase 6. Integration of Evidence and Development of Clinical Implications

The final phase consists of integrating the findings into a comprehensive clinical framework connecting dermatological manifestations with endocrine and metabolic abnormalities in PCOS.

The synthesis considers acne and hirsutism as potential indicators of androgen-related dysfunction while recognizing that neither manifestation independently establishes the diagnosis of PCOS. Clinical assessment should therefore incorporate relevant reproductive history, evaluation for other causes of androgen excess, and appropriate metabolic risk assessment.

Therapeutic implications are organized according to the predominant clinical presentation. Dermatological treatments may address local mechanisms contributing to acne, whereas hormonal interventions may be appropriate for selected patients with persistent hyperandrogenic symptoms. Metabolic strategies are considered according to individual cardiometabolic characteristics rather than being assumed to provide uniform dermatological benefits.

The evidence is also interpreted within the context of Latin American healthcare systems, where variations in access to laboratory investigations, medications, dermatological procedures, and specialist consultations may influence treatment selection. The integration of regional recommendations supports a more context-sensitive approach to multidisciplinary management (Spritzer et al., 2025).

Finally, the synthesis identifies priorities for future investigation, including standardized dermatological outcome measures, improved characterization of peripheral androgen sensitivity, long-term evaluation of combined therapeutic strategies, and greater representation of Latin American populations in clinical research.

RESULTADOS Y DISCUSIÓN

Figure 1.

Pathophysiological interactions between hyperandrogenism, insulin resistance, and cutaneous manifestations in polycystic ovary syndrome

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

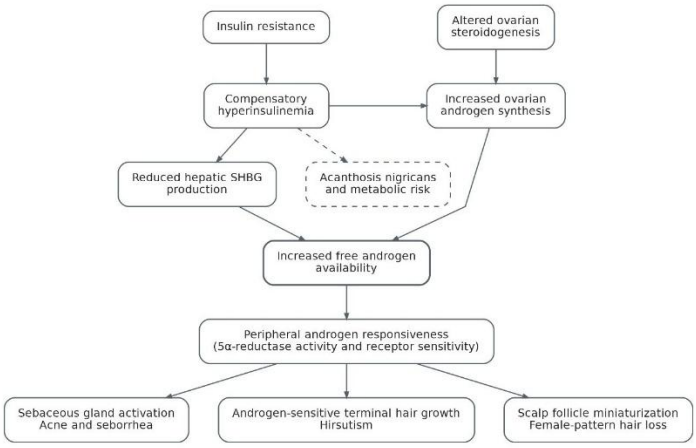


Figure 1 summarizes the principal biological pathways identified in the literature linking endocrine and metabolic dysfunction with the dermatological phenotype of polycystic ovary syndrome (PCOS). The reviewed evidence consistently shows that PCOS does not result from a single isolated abnormality, but from the interaction of genetic susceptibility, environmental influences, neuroendocrine dysregulation, androgen excess, and insulin resistance. Within this framework, insulin resistance occupies a central position because it contributes to compensatory hyperinsulinemia, which in turn influences ovarian steroidogenesis and modifies androgen availability. These processes collectively shape the development of acne, hirsutism, and other androgen-related cutaneous findings (Teede et al., 2023; Spritzer et al., 2016).

The first section of the figure illustrates the progression from genetic and environmental influences toward insulin resistance. This representation reflects the current understanding that PCOS arises through multifactorial mechanisms rather than a single causative pathway. Genetic predisposition may influence ovarian steroidogenic activity, insulin signaling, and androgen responsiveness, whereas environmental contributors such as adiposity, dietary patterns, and sedentary behavior may accentuate metabolic dysfunction. The evidence reviewed indicates that insulin resistance is highly prevalent in women with PCOS, although its severity varies across phenotypes and is not limited to those with obesity. This variability helps explain why patients with apparently similar reproductive symptoms may exhibit different metabolic and dermatological profiles (Di Lorenzo et al., 2023; Teede et al., 2023).

The figure then highlights compensatory hyperinsulinemia as a key metabolic consequence of reduced insulin sensitivity. Published evidence shows that hyperinsulinemia contributes to increased ovarian androgen production by acting synergistically with luteinizing hormone and by stimulating steroidogenic activity in ovarian theca cells. At the same time, elevated insulin concentrations suppress hepatic synthesis of sex hormone-binding globulin, thereby increasing the circulating fraction of free and biologically active androgens. These two pathways—increased androgen production and reduced binding capacity—converge to amplify androgen exposure at the tissue level. This mechanism is consistently described as one of the most important links between metabolic dysfunction and clinical hyperandrogenism in PCOS (Spritzer et al., 2016; Teede et al., 2023).

A second endocrine pathway represented in the figure involves neuroendocrine dysfunction and altered ovarian steroidogenesis. This component reflects the evidence showing that abnormalities in hypothalamic-pituitary-ovarian regulation may contribute independently to excess androgen production. Although this process is not identical in all phenotypes, the literature supports the existence of abnormal ovarian steroidogenic responses in many women with PCOS. The figure therefore places ovarian androgen production at the intersection of endocrine and metabolic influences, emphasizing that androgen excess in PCOS is rarely the consequence of only one isolated factor (Housman & Reynolds, 2014; Teede et al., 2023).

The central result illustrated by the figure is the increase in free androgen availability. This is a major finding in the reviewed literature because the clinical expression of hyperandrogenism depends not only on total serum androgen concentrations, but also on the proportion of hormones that remain biologically active and accessible to peripheral tissues. Increased free androgen availability enhances stimulation of androgen-responsive cutaneous structures,

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

especially the pilosebaceous unit and hair follicle. This is why clinical manifestations may occur even when total androgen levels are only mildly elevated or when biochemical abnormalities do not appear strikingly severe. The figure captures this transition from systemic endocrine disturbance to local cutaneous exposure, which is essential for understanding the dermatological phenotype of PCOS (Schmidt & Shinkai, 2015; Spritzer et al., 2016).

The lower section of the figure depicts peripheral cutaneous sensitivity, including 5α-reductase activity and androgen receptor responsiveness. This component is especially important because the severity of acne or hirsutism does not consistently correlate with serum androgen concentrations. The literature indicates that local conversion of testosterone to dihydrotestosterone and variability in receptor sensitivity strongly influence tissue response. As a result, two patients with comparable biochemical findings may have markedly different dermatological manifestations. This observation is repeatedly emphasized in dermatological and endocrinological studies and helps explain the heterogeneity of cutaneous presentations in PCOS (Schmidt & Shinkai, 2015; Housman & Reynolds, 2014).

At the cutaneous level, the figure separates sebaceous gland stimulation from hair follicle response. This distinction reflects the fact that different structures respond in different ways to androgenic stimulation. Increased sebaceous activity is closely related to acne and seborrhea, whereas follicular responsiveness is associated with terminal hair growth in androgen-dependent areas and with hair miniaturization in the scalp. The literature supports acne and hirsutism as the most clinically relevant dermatological manifestations in PCOS, while seborrhea and female pattern hair loss appear as related expressions of the same pathophysiological environment. Their inclusion in the figure is consistent with published descriptions of the androgen-responsive skin phenotype (Buzney et al., 2014; Reynolds et al., 2024).

The figure also includes acanthosis nigricans and metabolic risk as parallel consequences of hyperinsulinemia. This reflects the evidence showing that insulin resistance in PCOS is not only a biochemical abnormality but also a clinically relevant metabolic feature that may coexist with visible cutaneous signs. Acanthosis nigricans is frequently recognized as a marker associated with hyperinsulinemia, while broader metabolic risk includes abnormalities in glucose metabolism, lipid profile, and long-term cardiometabolic health. In the reviewed literature, these findings are important because they position dermatological examination as a possible entry point for identifying patients who may require broader endocrine and metabolic evaluation (Spritzer et al., 2021; Teede et al., 2023).

Figure 2.

Comparative Prevalence of Dermatological Manifestations in Women With and Without Polycystic Ovary Syndrome

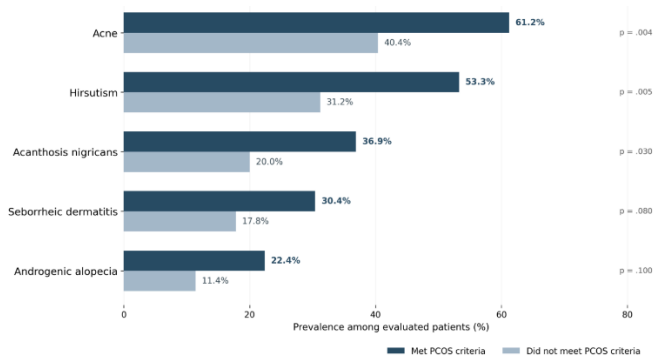


Figure 2 presents the comparative prevalence of five dermatological manifestations among women who met the diagnostic criteria for polycystic ovary syndrome (PCOS) and women evaluated for suspected PCOS who did not fulfill those criteria. The data were obtained from the observational study conducted by Schmidt et al. (2016), which investigated the relationship between cutaneous abnormalities and systemic endocrine characteristics. The graphical representation includes acne, hirsutism, acanthosis nigricans, seborrheic dermatitis, and androgenic alopecia, providing a comparative assessment of their frequency across the two clinical groups.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

Acne was the most frequently documented manifestation among women meeting PCOS criteria, affecting 61.2% of evaluated participants, compared with 40.4% of women who did not meet the diagnostic criteria. This difference of 20.8 percentage points was statistically significant ($p = 0.004$). The findings demonstrate a greater frequency of acne in the PCOS group, although its considerable prevalence among women without confirmed PCOS indicates that acne is not exclusive to endocrine dysfunction. These results are consistent with the broader dermatological literature, which identifies acne as an important but nonspecific manifestation of hyperandrogenism (Schmidt et al., 2016; Housman & Reynolds, 2014; Chanyachailert et al., 2021).

Hirsutism represented the second most frequent cutaneous abnormality in the PCOS group, with a prevalence of 53.3%, compared with 31.2% in women without confirmed PCOS. The absolute difference of 22.1 percentage points was the largest observed among the five manifestations, and the comparison was statistically significant ($p = 0.005$). This finding indicates a substantial difference in androgen-dependent terminal hair growth between the evaluated groups. The observed association is consistent with the established relationship between hirsutism and androgen activity, although clinical severity remains influenced by genetic susceptibility, follicular responsiveness, and ethnic differences in hair distribution (Schmidt et al., 2016; Martin et al., 2018; Spritzer et al., 2016).

Acanthosis nigricans was identified in 36.9% of women meeting PCOS criteria, compared with 20.0% of those who did not. The difference of 16.9 percentage points was statistically significant ($p = 0.03$). This manifestation displayed a lower prevalence than acne and hirsutism but remained more frequent in the PCOS group. The finding is compatible with the recognized relationship between acanthosis nigricans and metabolic abnormalities associated with hyperinsulinemia. However, the comparison describes differences in observed prevalence and does not independently establish insulin resistance as the direct cause of each documented lesion (Schmidt et al., 2016; Teede et al., 2023).

Seborrheic dermatitis was observed in 30.4% of women meeting PCOS criteria and 17.8% of those without confirmed PCOS, corresponding to an absolute difference of 12.6 percentage points. Although its frequency was numerically higher in the PCOS group, the difference did not reach conventional statistical significance ($p = 0.08$). Accordingly, these results establish a descriptive difference between the evaluated groups without providing sufficient statistical evidence to conclude that their prevalence differs in the underlying populations. Seborrheic dermatitis also has a multifactorial pathogenesis and should not be interpreted as a direct or specific indicator of biochemical hyperandrogenism (Schmidt et al., 2016).

Androgenic alopecia exhibited the lowest prevalence among the five conditions represented, affecting 22.4% of women who met PCOS criteria and 11.4% of women who did not. The absolute difference was 11.0 percentage points, and the comparison was not statistically significant ($p = 0.10$). This finding indicates that the numerical difference observed in the study was insufficient to establish a statistically significant group association. Previous research has likewise documented variability in the prevalence of androgenic alopecia among women with PCOS and has identified differences between visible hair loss and biochemical androgen excess, supporting the interpretation of this manifestation as a heterogeneous clinical feature (Schmidt et al., 2016; Schmidt & Shinkai, 2015).

When the five manifestations are compared collectively, the figure demonstrates that every condition was numerically more frequent among women fulfilling PCOS criteria. However, statistical significance was documented only for acne, hirsutism, and acanthosis nigricans. This distinction is important because the numerical magnitude of a difference does not, by itself, establish the statistical reliability of an association. The observed pattern also demonstrates that dermatological manifestations do not occur with equal frequency and that individual cutaneous abnormalities differ in their association with the diagnostic classification of PCOS.

Additional population-based observations from clinical cohorts have reported substantial variation in the relative frequency of acne and hirsutism. In a study involving 146 Jordanian women with PCOS, acne was documented in 75.3% and hirsutism in 59.6%, whereas seborrhea and androgenetic alopecia were identified in 43.2% and 42.5%, respectively. These findings illustrate differences in the distribution of dermatological manifestations across clinical populations, although methodological and demographic variations prevent direct equivalence between independent studies.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

The comparative findings should also be interpreted in relation to the study population. Women in the reference investigation were evaluated for suspected PCOS, and the comparison group consisted of patients who did not fulfill the diagnostic criteria rather than an independently recruited sample of healthy women. Furthermore, the number of participants evaluated differed across individual manifestations. Therefore, the percentages should not be interpreted as universal population prevalence estimates, and the differences shown in the figure should not be considered causal effects attributable exclusively to PCOS (Schmidt et al., 2016).

Figure 3.

Association Between Biochemical Hyperandrogenism and Dermatological Manifestations in Women With Polycystic Ovary Syndrome

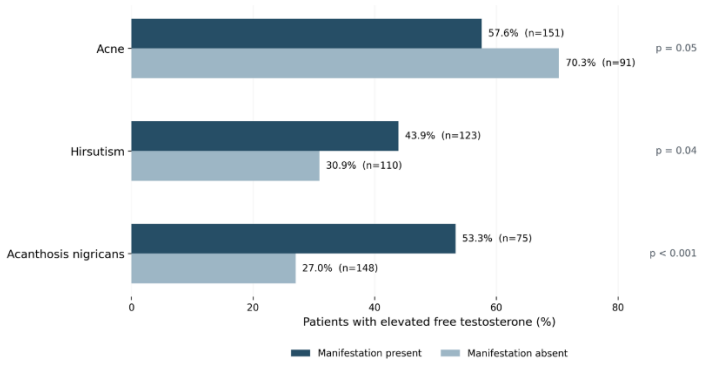


Figure 3 presents the relationship between biochemical hyperandrogenism and three dermatological manifestations among women diagnosed with polycystic ovary syndrome (PCOS). The analysis compares the proportion of patients with elevated free testosterone concentrations according to the presence or absence of acne, hirsutism, and acanthosis nigricans. Data were obtained from the observational investigation conducted by Schmidt et al. (2016), which evaluated cutaneous findings alongside hormonal and metabolic parameters in women undergoing assessment for PCOS. The results demonstrate important differences in the association between individual dermatological manifestations and biochemical androgen excess.

Among women with PCOS and acne, elevated free testosterone was identified in 57.6% of patients (87 of 151), compared with 70.3% (64 of 91) among those without acne. This represents a difference of 12.7 percentage points, with a reported p-value of 0.05. The direction of this association is particularly relevant because elevated free testosterone was not more frequent among women presenting with acne. These findings demonstrate that the presence of acne does not necessarily correspond to higher circulating concentrations of free testosterone, even within a population diagnosed with PCOS. The observed pattern is compatible with the recognized heterogeneity of acne pathogenesis, in which sebaceous gland responsiveness, follicular keratinization, microbial interactions, and inflammatory mechanisms contribute to clinical expression independently of the magnitude of measurable systemic androgen excess (Schmidt et al., 2016; Housman & Reynolds, 2014; Reynolds et al., 2024).

In contrast, hirsutism demonstrated a positive association with elevated free testosterone concentrations. Among women presenting with hirsutism, 43.9% (54 of 123) exhibited elevated free testosterone, compared with 30.9% (34 of 110) among those without hirsutism. The absolute difference was 13.0 percentage points and reached statistical significance ($p = 0.04$). This result identifies a higher frequency of biochemical hyperandrogenism among women with excessive terminal hair growth in androgen-dependent anatomical regions. The findings are consistent with the recognized contribution of androgen availability to follicular stimulation, although the incomplete correspondence between biochemical abnormalities and clinical hirsutism indicates that peripheral follicular responsiveness remains an additional determinant of the phenotype (Schmidt et al., 2016; Spritzer et al., 2016; Martin et al., 2018).

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

Acanthosis nigricans demonstrated the largest difference in elevated free testosterone prevalence between the compared groups. Elevated free testosterone was identified in 53.3% (40 of 75) of women with acanthosis nigricans, compared with 27.0% (40 of 148) of women without this manifestation. This corresponds to an absolute difference of 26.3 percentage points, with a statistically significant association ($p < 0.001$). The observed association indicates that biochemical hyperandrogenism was more frequent among women presenting with this cutaneous finding, despite acanthosis nigricans not being considered a direct androgen-dependent manifestation. The result is consistent with the coexistence of endocrine and metabolic abnormalities within the PCOS phenotype, particularly the interaction between hyperinsulinemia, androgen production, and hormonal bioavailability (Schmidt et al., 2016; Teede et al., 2023).

The metabolic findings reported in the same investigation provide additional quantitative information regarding these associations. Women with PCOS and hirsutism exhibited a mean homeostatic model assessment of insulin resistance (HOMA-IR) value of 4.18, compared with 3.38 among women without hirsutism ($p = 0.002$). A larger difference was observed according to the presence of acanthosis nigricans, with mean HOMA-IR values of 7.13 among affected women and 2.05 among those without this manifestation ($p < 0.001$). These results document higher mean indices of insulin resistance in the groups presenting with hirsutism and acanthosis nigricans. In contrast, the corresponding comparison for acne did not demonstrate a statistically significant difference in HOMA-IR, despite variation in the reported mean values (Schmidt et al., 2016).

The relationship between insulin sensitivity and hirsutism has also been examined in independent clinical populations. In a study involving 130 women with PCOS, investigators reported that hirsute participants exhibited lower insulin sensitivity than non-hirsute participants despite the absence of a statistically significant difference in body mass index. Within the hirsute subgroup, the Ferriman–Gallwey score demonstrated a positive correlation with HOMA-IR (Spearman's $\rho = 0.33$; $p = 0.005$) and a negative correlation with the Matsuda insulin sensitivity index ($\rho = -0.34$; $p = 0.003$). These findings provide additional evidence of an association between the degree of insulin resistance and the clinical severity of terminal hair growth, although their observational design does not establish a direct causal relationship.

An important distinction emerging from the figure is the difference between biochemical hyperandrogenism and clinical dermatological expression. Although elevated free testosterone was more frequent among women with hirsutism and acanthosis nigricans, a substantial proportion of women with these manifestations did not exhibit elevated free testosterone according to the measurements and reference thresholds used in the original investigation. Similarly, elevated free testosterone was documented among women without the corresponding cutaneous symptoms. These observations demonstrate incomplete agreement between biochemical classification and clinical presentation, consistent with interindividual differences in androgen receptor sensitivity, peripheral hormone metabolism, and local cutaneous responses (Schmidt & Shinkai, 2015; Spritzer et al., 2016).

The results also identify a distinction between acne and the other two manifestations. Acne demonstrated no positive relationship with elevated free testosterone in the analyzed PCOS cohort, whereas hirsutism and acanthosis nigricans exhibited statistically significant positive associations. This difference is consistent with the multifactorial nature of acne, which involves androgenic stimulation but is not determined exclusively by systemic androgen concentrations. The comparative pattern reinforces the importance of distinguishing dermatological findings according to their underlying biological characteristics rather than assuming that all manifestations associated with PCOS reflect the same degree of biochemical hyperandrogenism (Schmidt et al., 2016; Chanyachailert et al., 2021).

Several methodological characteristics must be considered when interpreting these findings. The original investigation was observational, and the number of participants with available laboratory information differed according to the dermatological manifestation evaluated. Consequently, the percentages presented in Figure 3 correspond to condition-specific subgroups rather than a single identical denominator for every comparison. Furthermore, the analysis reflects associations observed in a clinically evaluated population and should not be interpreted as demonstrating that elevated free testosterone directly causes each cutaneous finding. The reported p-values describe comparisons within the original study and do not represent the results of a new pooled statistical analysis.

Collectively, Figure 3 demonstrates that the relationship between endocrine abnormalities and dermatological manifestations in PCOS varies substantially according to the clinical characteristic examined. Hirsutism and acanthosis

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

nigricans were associated with higher frequencies of elevated free testosterone, while acne did not demonstrate the same pattern. Complementary metabolic findings revealed higher HOMA-IR values among women with hirsutism and acanthosis nigricans, indicating that these manifestations coexist with distinct endocrine and metabolic profiles. These observations provide quantitative evidence for the heterogeneity of cutaneous expression in PCOS and establish a basis for the subsequent comparison of therapeutic interventions.

Figure 4.

Comparative Effectiveness of Therapeutic Interventions for Acne and Hirsutism in Polycystic Ovary Syndrome

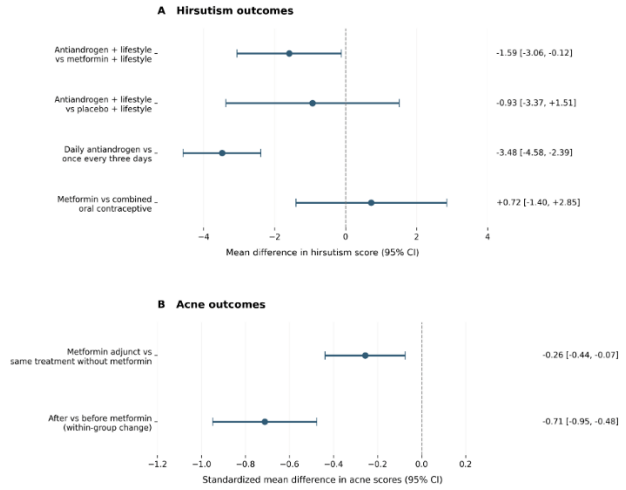


Figure 4 presents the comparative effects of pharmacological interventions on two major dermatological manifestations of polycystic ovary syndrome (PCOS): hirsutism and acne. The graphical analysis incorporates effect estimates and 95% confidence intervals extracted from three published systematic reviews and meta-analyses. The upper panel examines changes in hirsutism severity associated with antiandrogenic agents, metformin, and combined oral contraceptives, while the lower panel presents the effects of metformin on acne severity. The results are displayed separately because hirsutism outcomes were reported primarily as mean differences in clinical scores, whereas acne outcomes were expressed as standardized mean differences. Accordingly, the figure represents published treatment comparisons rather than a new pooled meta-analysis (Alesi et al., 2023; Melin et al., 2024; Yen et al., 2021).

The first comparison demonstrates that antiandrogenic treatment combined with lifestyle interventions was associated with greater improvement in hirsutism than metformin combined with lifestyle interventions. Alesi et al. (2023) reported a weighted mean difference of −1.59 points (95% CI: −3.06 to −0.12; p = 0.03), indicating a statistically significant difference favoring the antiandrogenic intervention. However, substantial heterogeneity was observed across the included studies (I^2 = 74%), demonstrating variability in the magnitude of the reported effects. This finding provides quantitative evidence that the two pharmacological approaches may differ in their effects on clinical hair growth despite both being used in the management of PCOS-related abnormalities.

When antiandrogens combined with lifestyle interventions were compared with placebo combined with lifestyle interventions, the pooled weighted mean difference was −0.93 points (95% CI: −3.37 to 1.51; p = 0.45). Unlike the previous comparison, the confidence interval crossed the null value, and the difference was not statistically significant. Considerable heterogeneity was also reported (I^2 = 76%), reflecting variability across the contributing trials. The contrast between these two findings demonstrates that the estimated effectiveness of antiandrogenic treatment differed according to the comparator and the characteristics of the included studies. Consequently, the results do not establish consistent superiority of antiandrogenic therapy across all evaluated treatment comparisons (Alesi et al., 2023).

A separate analysis examined differences associated with antiandrogen dosing schedules. Daily administration was associated with a greater reduction in hirsutism scores than administration once every three days, with a weighted mean difference of −3.48 points (95% CI: −4.58 to −2.39; p < 0.0001). This comparison demonstrated the largest

absolute effect estimate among the hirsutism outcomes represented in the figure, with low reported heterogeneity (I^2 = 1%). Nevertheless, this estimate corresponds to a specific dosing comparison and should not be interpreted as demonstrating that daily antiandrogen therapy is universally superior to other medication classes. Its interpretation is restricted to the interventions and treatment schedules assessed in the contributing randomized trials (Alesi et al., 2023).

The comparison between metformin and combined oral contraceptives was obtained from the systematic review and meta-analysis conducted by Melin et al. (2024), which included 36 randomized controlled trials investigating hormonal and metabolic treatments for PCOS. For hirsutism, the overall pooled mean difference between metformin and combined oral contraceptives was 0.72 points (95% CI: −1.40 to 2.85). The confidence interval included zero, indicating that the analysis did not identify a statistically significant difference in clinical hirsutism outcomes. This estimate was based on six trials involving 247 participants in the relevant comparison and was assessed as having very low certainty of evidence.

Although the overall hirsutism comparison did not establish superiority between metformin and combined oral contraceptives, biochemical outcomes differed. Melin et al. (2024) reported that metformin was less effective than combined oral contraceptives in reducing the free androgen index, with a mean difference of 7.08 (95% CI: 4.81 to 9.36), and total testosterone concentrations, with a mean difference of 0.48 nmol/L (95% CI: 0.32 to 0.64). Combined oral contraceptives were also associated with higher sex hormone-binding globulin concentrations. These findings document differences between biochemical androgen-related outcomes and clinically measured hirsutism severity, demonstrating that improvement in hormonal variables did not consistently correspond to a statistically distinguishable difference in terminal hair growth across the analyzed trials (Melin et al., 2024).

The second panel focuses on acne outcomes associated with metformin therapy. Yen et al. (2021) conducted a systematic review and meta-analysis that included 51 studies involving 2,405 patients with PCOS. When metformin was used as an adjunct to an existing treatment, the pooled standardized mean difference in acne scores was −0.256 (95% CI: −0.439 to −0.074), compared with the same treatment without metformin. The confidence interval excluded zero, indicating a statistically significant difference favoring the adjunctive metformin group. The magnitude of this standardized effect was relatively small, although its clinical interpretation depends on the acne severity instruments and treatment protocols used in the contributing studies.

A separate analysis from the same meta-analysis examined changes in acne scores before and after metformin treatment. The pooled standardized mean difference was −0.712 (95% CI: −0.949 to −0.476), demonstrating lower acne severity scores following treatment in the analyzed studies. This result reflects a within-group comparison rather than an exclusively randomized comparison against an untreated control group. Consequently, the estimated change cannot be attributed entirely to metformin without considering other possible influences, including concurrent treatments, natural changes in acne severity, and differences in observation periods (Yen et al., 2021).

The comparison of the two acne estimates illustrates an important methodological distinction. The adjunctive-treatment analysis evaluates the additional effect associated with incorporating metformin into an existing therapeutic regimen, whereas the before-and-after analysis measures changes observed over time among patients receiving metformin. Although both analyses reported lower acne scores, they differ in their comparison structures and capacity to isolate treatment effects. Their numerical estimates should therefore not be interpreted as directly interchangeable measures of therapeutic effectiveness.

An additional finding concerns the variability in outcome measurement across the reviewed investigations. Hirsutism studies generally employed clinical scoring systems, including the Ferriman–Gallwey scale, whereas acne studies used different lesion-based or severity-based instruments. Differences in treatment duration, pharmacological dosing, patient characteristics, and baseline disease severity further contributed to heterogeneity. In particular, the systematic review by Yen et al. (2021) identified variation in acne assessment scales, metformin doses, and treatment durations as limitations affecting the comparability of results.

Across the studies represented in Figure 4, statistically significant differences were observed for antiandrogens versus metformin in hirsutism, daily versus less frequent antiandrogen administration, and the metformin-associated acne

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO
Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

comparisons. In contrast, antiandrogens versus placebo and metformin versus combined oral contraceptives did not demonstrate statistically significant differences in the selected hirsutism outcomes. These findings describe differences within specific comparisons rather than establishing a universal ranking of all available treatments.

The confidence intervals provide additional information regarding the precision and consistency of the reported estimates. Comparisons with intervals entirely below zero demonstrated statistically significant reductions in symptom scores, whereas intervals crossing zero did not exclude the possibility of no difference. The considerable heterogeneity reported in selected antiandrogen analyses and the low certainty of evidence in some hormonal comparisons limit the strength of conclusions that can be drawn from individual effect estimates.

DISCUSIÓN

The findings of this narrative review demonstrate that dermatological manifestations of polycystic ovary syndrome (PCOS) arise from a complex interaction between hyperandrogenism, insulin resistance, peripheral androgen sensitivity, and individual metabolic characteristics. Although acne and hirsutism are frequently considered clinical indicators of androgen excess, the available evidence indicates that their expression does not consistently correspond to the magnitude of biochemical abnormalities. This heterogeneity represents a central challenge in understanding the dermatological phenotype of PCOS and reinforces the importance of integrating endocrine, metabolic, and cutaneous findings within a comprehensive clinical assessment (Housman & Reynolds, 2014; Schmidt & Shinkai, 2015; Teede et al., 2023).

One of the principal findings concerns the relationship between androgen excess and the severity of cutaneous manifestations. The pathophysiological mechanisms summarized in Figure 1 demonstrate that increased ovarian androgen production, reduced sex hormone-binding globulin concentrations, and peripheral androgen metabolism collectively contribute to the stimulation of sebaceous glands and hair follicles. However, the observed variability in dermatological expression suggests that circulating androgen concentrations alone cannot adequately explain the clinical phenotype. Local 5α-reductase activity, androgen receptor responsiveness, genetic susceptibility, and inflammatory processes may modify the response of cutaneous structures to systemic hormonal changes. These observations are consistent with previous investigations emphasizing the importance of tissue-specific androgen sensitivity in women presenting with acne or hirsutism (Schmidt & Shinkai, 2015; Spritzer et al., 2016).

The comparative prevalence of dermatological manifestations, presented in Figure 2, further supports this heterogeneity. Acne and hirsutism were the most frequently documented findings among women meeting PCOS diagnostic criteria, while acanthosis nigricans demonstrated an additional association with the syndrome. However, the presence of acne among women without confirmed PCOS illustrates the limited diagnostic specificity of isolated cutaneous symptoms. This distinction is particularly relevant because persistent acne may encourage suspicion of an underlying endocrine disorder without necessarily indicating biochemical hyperandrogenism. Consequently, dermatological findings should be interpreted alongside menstrual history, reproductive characteristics, additional signs of androgen excess, and relevant metabolic risk factors rather than being used independently to establish a diagnosis (Housman & Reynolds, 2014; Chanyachailert et al., 2021; Teede et al., 2023).

The relationship between biochemical hyperandrogenism and dermatological abnormalities was further illustrated by Figure 3. Hirsutism demonstrated a positive association with elevated free testosterone, whereas acne did not follow the same pattern. This difference suggests that the biological processes responsible for excessive terminal hair growth may correspond more closely to systemic androgen availability than those involved in acne development. Acne is characterized by a broader pathophysiological network involving sebaceous secretion, follicular keratinization, microbial activity, and inflammation. Therefore, although androgen signaling contributes to acne pathogenesis, its clinical severity cannot be interpreted as a direct reflection of circulating testosterone concentrations. This observation is consistent with dermatological evidence describing acne as a multifactorial disease with substantial variability in endocrine associations (Schmidt & Shinkai, 2015; Reynolds et al., 2024).

Hirsutism, in contrast, appears to provide a more clinically informative manifestation of androgen activity in selected patients with PCOS. Nevertheless, the association between elevated free testosterone and hirsutism remains

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO
Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

incomplete, demonstrating that peripheral follicular responsiveness is an additional determinant of terminal hair growth. The interpretation of hirsutism severity is further complicated by ethnic differences, cosmetic hair-removal practices, and variability in clinical scoring thresholds. The modified Ferriman–Gallwey scale offers a standardized assessment method, but its application requires consideration of population characteristics. These limitations reinforce the importance of combining clinical evaluation with appropriate biochemical investigation when indicated (Martin et al., 2018; Spritzer et al., 2016).

Another important finding concerns the contribution of insulin resistance to the dermatological phenotype of PCOS. The relationship between compensatory hyperinsulinemia, increased ovarian androgen production, and reduced sex hormone-binding globulin provides a plausible biological connection between metabolic dysfunction and cutaneous hyperandrogenism. However, the available evidence does not support a uniform relationship between insulin resistance and the severity of every dermatological manifestation. The associations observed for hirsutism and acanthosis nigricans appear more consistent than those reported for acne, suggesting that distinct cutaneous conditions may respond differently to metabolic abnormalities. This interpretation is supported by clinical investigations examining insulin sensitivity and dermatological outcomes, as well as by the international recommendations emphasizing metabolic assessment independently of symptom severity (Teede et al., 2023; Spritzer et al., 2021).

Acanthosis nigricans deserves particular consideration because of its relationship with hyperinsulinemia and its potential relevance during clinical examination. Although the manifestation is not specific to PCOS, its presence may identify patients in whom metabolic abnormalities warrant additional investigation. The findings presented in Figure 3 demonstrate an association between acanthosis nigricans and elevated free testosterone, reflecting the coexistence of endocrine and metabolic alterations. Nevertheless, this relationship should not be interpreted as evidence that androgen excess directly causes acanthosis nigricans. Instead, both findings may arise within a broader metabolic environment characterized by insulin resistance and compensatory hormonal changes. This distinction is important for avoiding causal interpretations that exceed the observational evidence (Housman & Reynolds, 2014; Teede et al., 2023).

The therapeutic findings summarized in Figure 4 highlight the importance of differentiating hormonal, metabolic, and dermatological treatment outcomes. Antiandrogenic interventions demonstrated beneficial effects on hirsutism in selected comparisons, whereas metformin showed evidence of improvement in acne severity. However, the magnitude and statistical significance of these effects varied according to treatment combinations, comparator interventions, and study characteristics. These differences indicate that no single pharmacological approach can be considered equally effective for every manifestation of PCOS. Treatment selection should therefore be guided by the predominant clinical problem, reproductive intentions, metabolic characteristics, contraindications, and expected therapeutic outcomes (Alesi et al., 2023; Melin et al., 2024; Yen et al., 2021).

The comparison between antiandrogens and metformin is especially relevant because these interventions target different components of PCOS pathophysiology. Antiandrogenic medications primarily reduce androgen-mediated effects, while metformin acts predominantly through metabolic mechanisms related to insulin sensitivity and glucose regulation. The greater reduction in hirsutism scores observed with antiandrogenic treatment in selected trials is consistent with the direct involvement of androgen signaling in terminal hair growth. Nevertheless, the considerable heterogeneity and uncertainty identified in the systematic reviews limit broad generalization. Moreover, antiandrogenic medications require appropriate reproductive safety considerations, particularly effective contraception when pregnancy is possible (Alesi et al., 2023; Martin et al., 2018).

Combined oral contraceptives remain relevant in the management of hyperandrogenic manifestations, particularly when menstrual irregularities coexist with acne or hirsutism. Their effects on ovarian androgen production and sex hormone-binding globulin concentrations provide a physiological explanation for their clinical benefits. However, comparisons with metformin have demonstrated that improvements in biochemical androgen parameters do not necessarily produce statistically distinguishable changes in hirsutism scores over the observed treatment periods. This discrepancy may reflect differences in follicular response times, baseline symptom severity, treatment duration, and measurement instruments. Accordingly, biochemical improvement and visible dermatological response should be considered separate but complementary dimensions of therapeutic effectiveness (Amiri et al., 2018; Forslund et al., 2023; Melin et al., 2024).

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

The findings concerning metformin and acne also require cautious interpretation. Although the meta-analysis conducted by Yen et al. (2021) identified improvements in acne scores, the included investigations varied in treatment duration, metformin dosing, concomitant interventions, and outcome assessment. Furthermore, before-and-after comparisons cannot fully distinguish pharmacological effects from natural disease fluctuations or other contributing factors. Consequently, the observed improvements should not be interpreted as evidence supporting metformin as a universal first-line treatment for acne. Instead, its potential dermatological benefits should be considered within its broader metabolic indications and alongside established acne therapies (Yen et al., 2021; Reynolds et al., 2024; Teede et al., 2023).

An additional consideration is the relationship between clinical outcomes and psychological well-being. Acne, hirsutism, and female pattern hair loss may produce substantial distress even when their objective severity is relatively limited. Visible dermatological manifestations can influence body image, self-esteem, interpersonal relationships, and satisfaction with treatment. The chronic nature of PCOS may further complicate these experiences because symptom improvement often requires prolonged management and repeated therapeutic adjustments. Consequently, a comprehensive assessment should incorporate patient-reported concerns and quality-of-life measures alongside dermatological and biochemical outcomes. Such an approach is consistent with current recommendations emphasizing shared decision-making and recognition of psychological comorbidities in PCOS (Buzney et al., 2014; Teede et al., 2023).

From an international perspective, the interpretation of dermatological manifestations requires recognition of differences among populations. Genetic background, ethnic variation in hair growth, metabolic characteristics, and environmental influences may affect the frequency and clinical expression of acne and hirsutism. These factors complicate direct comparisons between studies conducted in different regions, particularly when diagnostic thresholds, measurement instruments, and recruitment settings are not standardized. Consequently, findings derived from specialized clinical populations cannot necessarily be extrapolated to the general population of women with PCOS (Engmann et al., 2017; Martin et al., 2018).

The Latin American context represents an important component of this discussion. Research involving Brazilian women with PCOS has demonstrated a relevant burden of metabolic abnormalities, reinforcing the importance of considering cardiometabolic health alongside dermatological symptoms. Furthermore, the consensus developed by the Latin American Association of Gynecological Endocrinology emphasizes the need to contextualize international recommendations according to regional healthcare conditions. Differences in access to hormonal testing, dermatological procedures, medications, and multidisciplinary services may influence both diagnosis and treatment continuity. Nevertheless, the available regional literature remains insufficient to establish whether all observed international dermatological associations are reproduced with comparable magnitude across Latin American populations (Spritzer et al., 2021; Spritzer et al., 2025).

Several methodological limitations should be acknowledged. First, the narrative design permits the integration of evidence from multiple disciplines but is more susceptible to selection bias than a fully conducted systematic review. Second, the included publications differ considerably in population characteristics, diagnostic criteria, dermatological assessment tools, and treatment duration. Third, several reported associations originate from observational studies and therefore cannot establish causal relationships. Fourth, some therapeutic estimates are derived from studies with substantial heterogeneity or low certainty of evidence. Finally, because the quantitative figures incorporate findings from separate investigations, their estimates should not be interpreted as components of a newly performed meta-analysis or as directly comparable measures across incompatible clinical outcomes.

These limitations identify several priorities for future research. Prospective studies incorporating standardized dermatological severity instruments, reliable androgen measurements, and comprehensive metabolic evaluation could clarify the temporal relationship between endocrine abnormalities and cutaneous manifestations. Additional randomized trials with longer follow-up periods are needed to compare combined hormonal, metabolic, and dermatological treatment strategies using clinically meaningful outcomes. Greater representation of Latin American populations would also improve understanding of regional differences in metabolic phenotypes, therapeutic accessibility, and patient-reported outcomes.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO

Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

CONCLUSIÓN

The findings of this narrative review demonstrate that dermatological manifestations of polycystic ovary syndrome (PCOS) result from complex interactions between hyperandrogenism, insulin resistance, peripheral androgen metabolism, and individual tissue sensitivity. Acne and hirsutism represent two of the most clinically relevant cutaneous manifestations, although their severity and distribution vary considerably among affected women. The available evidence indicates that biochemical androgen concentrations do not consistently correlate with dermatological severity, emphasizing the heterogeneous nature of PCOS and the limitations of relying exclusively on hormonal measurements for clinical assessment.

Hyperandrogenism plays a fundamental role in stimulating sebaceous gland activity and androgen-dependent hair growth, while insulin resistance contributes to increased androgen bioavailability through compensatory hyperinsulinemia and reduced sex hormone-binding globulin concentrations. Nevertheless, these mechanisms do not affect all cutaneous structures uniformly. Hirsutism demonstrates a more consistent association with androgen excess, whereas acne involves additional inflammatory, follicular, and microbial mechanisms. Furthermore, acanthosis nigricans represents a relevant clinical finding associated with metabolic dysfunction, reinforcing the importance of considering dermatological signs within the broader endocrine and metabolic context of PCOS.

The therapeutic evidence highlights the importance of individualized treatment strategies. Combined oral contraceptives and antiandrogenic medications may improve hyperandrogenic manifestations in appropriately selected patients, while metformin primarily addresses metabolic abnormalities and may provide additional benefits for certain dermatological outcomes. However, differences in treatment response, study methodology, and evidence certainty prevent the identification of a universally superior therapeutic approach. Comprehensive management should therefore integrate dermatological severity, metabolic characteristics, reproductive intentions, contraindications, and patient preferences to optimize clinical outcomes.

From an international perspective, the available literature supports multidisciplinary collaboration among dermatology, gynecology, endocrinology, and other relevant specialties. The inclusion of Latin American evidence further emphasizes the importance of adapting clinical recommendations to regional population characteristics, healthcare accessibility, and available therapeutic resources. Nevertheless, additional research involving diverse populations remains necessary to clarify differences in dermatological expression, metabolic associations, and long-term treatment effectiveness.

This review also identifies important limitations in the current scientific evidence, including variability in diagnostic criteria, dermatological assessment instruments, study populations, and follow-up periods. Future investigations should prioritize standardized clinical measurements, prospective evaluation of endocrine and metabolic relationships, and comparative studies examining combined therapeutic interventions. Greater representation of Latin American populations and the incorporation of patient-reported outcomes would contribute to a more comprehensive understanding of the clinical and psychosocial burden associated with PCOS.

In conclusion, **acne and hirsutism should be recognized as clinically relevant manifestations within the systemic spectrum of PCOS rather than as isolated dermatological conditions**. Their assessment provides an opportunity to identify associated endocrine and metabolic abnormalities, while their management requires consideration of both underlying biological mechanisms and individual patient needs. An integrated, evidence-based, and patient-centered approach represents the most appropriate framework for addressing the dermatological manifestations of PCOS and improving the coordination of long-term clinical care.

REFERENCIAS

- Alesi, S., Forslund, M., Melin, J., Romualdi, D., Peña, A., Tay, C. T., Witchel, S. F., Teede, H., & Mousa, A. (2023). Efficacy and safety of anti-androgens in the management of polycystic ovary syndrome: A systematic review and meta-analysis of randomised controlled trials. *EClinicalMedicine, 63*, 102162. DOI 10.1016/j.eclinm.2023.102162.

- Amiri, M., Kabir, A., Nahidi, F., Shekofteh, M., & Ramezani Tehrani, F. (2018). Effects of combined oral contraceptives on the clinical and biochemical parameters of hyperandrogenism in patients with polycystic ovary syndrome: A systematic review and meta-analysis. *The European Journal of Contraception & Reproductive Health Care, 23*(1), 64–77. DOI 10.1080/13625187.2018.1435779.
- Barrionuevo, P., Nabhan, M., Altayar, O., Wang, Z., Erwin, P. J., Asi, N., Martin, K. A., & Murad, M. H. (2018). Treatment options for hirsutism: A systematic review and network meta-analysis. *The Journal of Clinical Endocrinology & Metabolism, 103*(4), 1258–1264. DOI 10.1210/jc.2017-02052.
- Buzney, E., Sheu, J., Buzney, C., & Reynolds, R. V. (2014). Polycystic ovary syndrome: A review for dermatologists: Part II. Treatment. *Journal of the American Academy of Dermatology, 71*(5), 859.e1–859.e15. DOI 10.1016/j.jaad.2014.05.009.
- Chanyachailert, P., Chularojanamontri, L., Chantrapanichkul, P., Tuchinda, P., Wongwananuruk, T., Sardod, P., & Kulthanan, K. (2021). Adult female acne: Clinical characteristics and factors significantly associated with polycystic ovary syndrome. *Australasian Journal of Dermatology, 62*(4), e532–e538. DOI 10.1111/ajd.13700.
- Di Lorenzo, M., Cacciapuoti, N., Lonardo, M. S., Nasti, G., Gautiero, C., Belfiore, A., Guida, B., & Chiurazzi, M. (2023). Pathophysiology and nutritional approaches in polycystic ovary syndrome (PCOS): A comprehensive review. *Current Nutrition Reports, 12*(3), 527–544. DOI 10.1007/s13668-023-00479-8.
- Engmann, L., Jin, S., Sun, F., Legro, R. S., Polotsky, A. J., Hansen, K. R., Coutifaris, C., Diamond, M. P., Eisenberg, E., Zhang, H., & Santoro, N. (2017). Racial and ethnic differences in the polycystic ovary syndrome metabolic phenotype. *American Journal of Obstetrics and Gynecology, 216*(5), 493.e1–493.e13. DOI 10.1016/j.ajog.2017.01.003.
- Forslund, M., Melin, J., Alesi, S., Piltonen, T., Romualdi, D., Tay, C. T., Witchel, S., Pena, A., Mousa, A., & Teede, H. (2023). Different kinds of oral contraceptive pills in polycystic ovary syndrome: A systematic review and meta-analysis. *European Journal of Endocrinology, 189*(1), S1–S16. DOI 10.1093/ejendo/lvad082.
- Housman, E., & Reynolds, R. V. (2014). Polycystic ovary syndrome: A review for dermatologists: Part I. Diagnosis and manifestations. *Journal of the American Academy of Dermatology, 71*(5), 847.e1–847.e10. DOI 10.1016/j.jaad.2014.05.007.
- Luque-Ramírez, M., Nattero-Chávez, L., Ortiz Flores, A. E., & Escobar-Morreale, H. F. (2018). Combined oral contraceptives and/or antiandrogens versus insulin sensitizers for polycystic ovary syndrome: A systematic review and meta-analysis. *Human Reproduction Update, 24*(2), 225–241. DOI 10.1093/humupd/dmx039.
- Magkou, S., Sali, E., Paschou, I. A., Dimopoulou, S. M., Tagka, A., Chasapi, V., Vryonidou, A., & Paschou, S. A. (2026). Skin manifestations of hyperandrogenism: An update. *Hormones*. Advance online publication. DOI 10.1007/s42000-026-00785-0.
- Martin, K. A., Anderson, R. R., Chang, R. J., Ehrmann, D. A., Lobo, R. A., Murad, M. H., Pugeat, M. M., & Rosenfield, R. L. (2018). Evaluation and treatment of hirsutism in premenopausal women: An Endocrine Society clinical practice guideline. *The Journal of Clinical Endocrinology & Metabolism, 103*(4), 1233–1257. DOI 10.1210/jc.2018-00241.
- Melin, J., Forslund, M., Alesi, S., Piltonen, T., Romualdi, D., Spritzer, P. M., Tay, C. T., Pena, A., Witchel, S. F., Mousa, A., & Teede, H. (2024). Metformin and combined oral contraceptive pills in the management of polycystic ovary syndrome: A systematic review and meta-analysis. *The Journal of Clinical Endocrinology & Metabolism, 109*(2), e817–e836. DOI 10.1210/clinem/dgad465.
- Reynolds, R. V., Yeung, H., Cheng, C. E., Cook-Bolden, F., Desai, S. R., Druby, K. M., Freeman, E. E., Keri, J. E., Stein Gold, L. F., Tan, J. K. L., Tollefson, M. M., Weiss, J. S., Wu, P. A., Zaenglein, A. L., Han, J. M., & Barbieri, J. S. (2024). Guidelines of care for the management of acne vulgaris. *Journal of the American Academy of Dermatology, 90*(5), 1006.e1–1006.e30. DOI 10.1016/j.jaad.2023.12.017.
- Schmidt, T. H., & Shinkai, K. (2015). Evidence-based approach to cutaneous hyperandrogenism in women. *Journal of the American Academy of Dermatology, 73*(4), 672–690. DOI 10.1016/j.jaad.2015.05.026.
- Spritzer, P. M., Barone, C. R., & Oliveira, F. B. (2016). Hirsutism in polycystic ovary syndrome: Pathophysiology and management. *Current Pharmaceutical Design, 22*(36), 5603–5613. DOI 10.2174/1381612822666160720151243.
- Spritzer, P. M., Ramos, R. B., Marchesan, L. B., de Oliveira, M., & Carmina, E. (2021). Metabolic profile of women with PCOS in Brazil: A systematic review and meta-analysis. *Diabetology & Metabolic Syndrome, 13*(1), 18. DOI 10.1186/s13098-021-00636-5.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO
Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review

- Spritzer, P. M., Salazar Santos, G. G., Munevar Vega, M. L., Chedraui, P., Pilnik, S., Camero Lascano, A., Belardo, A., Elizalde Cremonte, A., Vivas Ramírez, A., Rosas Balán, A., Barragán, A. M., Gómez Quintero, A. M., Camargo Rodríguez, C. A., Buitrago, D. A., Barón Castañeda, G., Rossi, G., de La Parra, I., Montes Suárez, I. D., Michel Vergara, J. A., … Manzur, A. (2025). Evaluation of the evidence-based practices for the management of PCOS in the Latin America context: The consensus of the Latin American Association of Gynecological Endocrinology (ALEG). *Gynecological Endocrinology, 41*(1), 2456578. DOI 10.1080/09513590.2025.2456578.
- Teede, H. J., Tay, C. T., Laven, J. E. J., Dokras, A., Moran, L. J., Piltonen, T., Costello, M. F., Boivin, J., Redman, L. M., Boyle, J. A., Norman, R. J., Mousa, A., & Joham, A. E. (2023). Recommendations from the 2023 International Evidence-based Guideline for the Assessment and Management of Polycystic Ovary Syndrome. *The Journal of Clinical Endocrinology & Metabolism, 108*(10), 2447–2469. DOI 10.1210/clinem/dgad463.
- Yen, H., Chang, Y. T., Yee, F. J., & Huang, Y. C. (2021). Metformin therapy for acne in patients with polycystic ovary syndrome: A systematic review and meta-analysis. *American Journal of Clinical Dermatology, 22*(1), 11–23. DOI 10.1007/s40257-020-00565-5.

Edición 5, Año 3, Número 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
Revista IECCMEXICO
Edition 5, Year 3, Number 2, 2026
E-ISSN: 3061-8045, P-ISSN: 3061-8517
IECCMEXICO Review