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Dermatological manifestations of polycystic ovary syndrome: A literature review

As manifestações dermatológicas da síndrome do ovário policístico: Uma revisão bibliográfica

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Joana de Carvalho Souza[1], Débora Sarmento Oliveira Barral[2], Mariana Pena Piacenza Moraes[3], Marco Túlio Andrade Silva[4].

ABSTRACT

Objective: To identify and understand the pathophysiology of dermatological clinical manifestations in patients with Polycystic Ovarian Syndrome. Literature Review: Polycystic ovary syndrome (PCOS) is highly common among women of reproductive age. Although it has a low known etiology, the diagnosis is made through the association of the various clinical manifestations of the disease and the use of the Rotterdam criteria – at least two between hyperandrogenism, multiple ovarian cysts and irregularity of the menstrual cycle. Symptoms are diversified into dermatological, systemic, gynecological, and reproductive. Regarding the dermatological picture, the occurrence of hirsutism, acne vulgaris, *acanthosis nigricans*, seborrheic dermatitis, androgenetic alopecia and, in more severe cases, virilization are evidenced. Patientswith PCOS often have a reduced quality of life due to its complications, including difficulty conceiving, gestational complications, and even infertility. For better management of this syndrome, a multidisciplinary approach is required, involving various areas of medicine consistent with the patient's complaints, and a clinical control approach to circulating androgen levels.

Keywords: PCOS, Dermatological manifestations, Dermatology, Gynecology.

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is one of the most common metabolic syndromes and is the leading cause of hyperandrogenism among women during menacme (MOURA, 2011).

As for the clinical picture, this condition is typically manifested by cosmetic changes, such as hirsutism, acne, seborrhea, androgenetic alopecia, and by systemic changes, such as obesity and hyperinsulinemia (KEEN, 2017).

The pathophysiology is not entirely known, but there is some information that PCOS results from an interaction between lifestyle habits, endocrinological pattern and genetic factors.

1 E-mail: souzajoana@gmail.com
2 E-mail: deborasarmentooliveira@hotmail.com
3 E-mail: marippm2003@gmail.com
4 E-mail: mtuliodermato@gmail.com

This phenotype accentuates the ovarian synthesis of androgens and leads to a condition of gonadal dysfunction, justifying the existing chronic anovulation and the possible obstetric consequences - early abortion and infertility (GAINDER, 2019).

In addition to the systemic manifestations, an important problem of PCOS is the negative effect on women's self-esteem related to the dermatological picture of the disease, reiterating the importance of knowledge about the mechanisms involved and their possible treatments (MOURA, 2011).

ETIOLOGY

In PCOS, the existence of a complex multigenic disorder is recognized in addition to abnormalities in the hypothalamic-pituitary axis, steroidogenesis, and insulin resistance, in addition to the involvement of environmental, genetic, and metabolic factors (GAINDER, 2019).

The endocrine factors associated with PCOS are related to the increased production of androgens, especially testosterone and 4-androstenedione, by theca cells, in addition to a hypersecretion of LH and a decrease in FSH secretion, causing an endocrinological imbalance (IBÁÑEZ L, et al., 2017). However, it is observed that these changes in LH levels may be a secondary event to PCOS, and not a primary one. (LOWESTEIN, 2006).

An abnormal steroidogenesis, whether of adrenal or ovarian origin, is classified as a primary disorder. Hypersecretion of circulating testosterone and DHEA are present in most women with PCOS (JU, 2017).

In addition to having a synergistic action with LH in the ovarian stroma and theca cells, insulin has a modulating function in the synthesis of SHBG, which is responsible for the serum transport of sex hormones. However, in a case of hyperinsulinemia and high testosterone concentration, SHBG levels are reduced, justifying the important role of this pancreatic hormone in polycystic ovary syndrome (FEBRASGO, 2019).

DIAGNOSIS

The diagnosis of the syndrome is made using the Rotterdam criterion, which was established in 2003 by the *European Society for Human Reproduction and Embryology* and the *American Society for Reproductive Medicine*. The condition of polycystic ovaries is determined by at least two manifestations related to the condition: hyperandrogenism, irregularity in the menstrual cycle, and the presence of ovarian microcysts proven by imaging. In addition, it is important to emphasize that, if the condition is diagnosed during adolescence, PCOS should be

diagnosed eight years after the initial diagnosis, because during the first years after menarche, anovulatory menstrual cycles and oligomenorrhea occur, evidencing a certain immaturity of the hypothalamic-pituitary-gonadal axis (PINHEIRO; HAWK; ANDRADE, 2022).

However, it is worth noting that early recognition is crucial to implement control measures and minimize symptoms (TAVARES; BARROS, 2019; RIBEIRO et al., 2022). Therefore, because it presents a complex interaction between body systems and hormones, a differential diagnosis should be established, with the main hypotheses being: hypothyroidism, Cushing's syndrome, congenital adrenal hyperplasia, and hyperprolactinemia.

CLINICAL MANIFESTATIONS

In general, the dermatological manifestations of hyperandrogenism are clinically expressed through hirsutism, acne, seborrhea, alopecia, and signs of virilization.

HIRSUTISM

Hirsutism manifests itself through the presence of dark and coarse terminal hairs distributed in a male pattern, and can be caused by both polycystic ovary syndrome and the use of medications, and even idiopathically. About 70 to 80% of hirsutism cases are linked to PCOS, most often starting in late adolescence. The areas most commonly affected by hirsutism in women with PCOS include the upper lip, chin, ribs, chest, and linea alba of the lower abdomen (FEBRASGO, 2023).

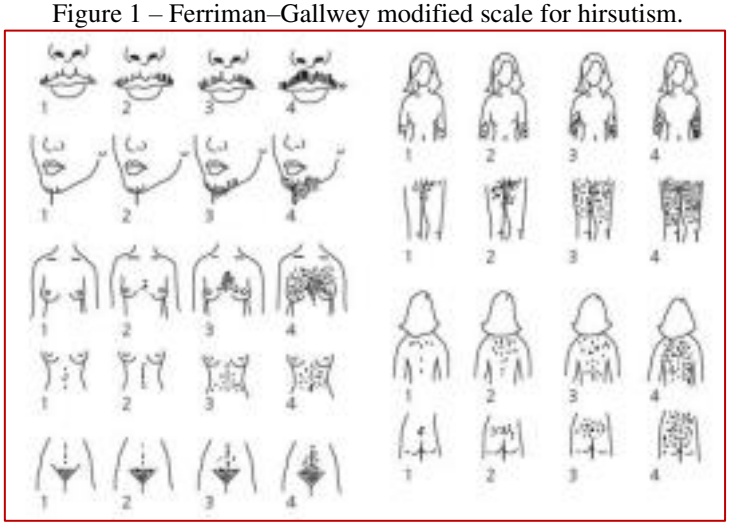
This change occurs through increased activity of the enzyme 5α-reductase in the hair follicles, which converts testosterone into dihydrotestosterone (DHT). Both determine changes in the hair and its cycle, transforming the *vellus hair* into more expressed and pigmented hairs distributed throughout the face, neck, chest and pubic region, which are areas classified as androgen-sensitive (MOURA et al, 2011).

Another disorder related to hair growth and easily confused with hirsutism is hypertrichosis. While in hirsutism there is an increase in terminal hair in the androgen-dependent areas, in hypertrichosis there is excess hair throughout the body and in non-androgen-dependent areas such as forearms and calves. The differentiation of the two disorders is made precisely with the determination of excess hair and its distribution (FEBRASGO, 2023).

The Ferriman-Gallwey scoring system, developed in 1961 and modified in 1981, aims to quantify the degree of hirsutism. Under the modified system, abnormal hair distribution is scored on a scale of 0 to 4 and is assessed in nine areas of the body. The higher the number on

the numerical scale, the greater the hair density of the area. This system is reputed to be inconvenient and used infrequently in the clinical setting, but it can be useful for tracking treatment response. Hirsutism can also be more broadly classified as mild, moderate, or severe (Hoffman et al, 2013).

Figure 1 – Ferriman–Gallwey modified scale for hirsutism.



ACNE VULGAR

One of the most common dermatological manifestations of hyperandrogenism is acne. This manifestation occurs from the interaction of four factors: excess sebum production, blockage of follicular opening, proliferation of *commensal Propionibacterium acnes*, and inflammation (PINHEIRO; HAWK; ANDRADE, 2022).

Androgens have great notoriety in the etiopathogenesis of acne. As in acne vulgaris, androgen levels are within the normal range, it is believed that, in these cases, there is a greater sensitivity of androgen receptors in acne patients compared to the normal population, increasing local conversion (MOURA et al, 2011).

In cases of women with PCOS, the excess of androgen stimulates the androgen receptors in the pilosebaceous unit, increasing the production of sebum, thus causing inflammation and forming the comedo which, together with the colonization of the follicle by *Propionibacterium acnes,* results in the appearance of papules, pustules, cysts and scars (HOFFMAN et al, 2013).

Clinically, acne can be classified as comedogenic (grade I), when inflammatory lesions involve open and closed comedones, with seborrhea present; papulopustular (grade II), being inflammatory and non-inflammatory; nodulocystic (grade III), with lesions of firm consistency, inflammatory, painful and with a diameter greater than 10 mm; acne conglobata (grade IV), which characterizes the severe form of nodular acne; and acne fulminans (grade V), an

exacerbated atopic variation, essentially male, accompanied by general symptoms such as fever, malaise, fatigue, myalgia, arthralgia, leukocytosis, and increased erythrocyte sedimentation rate, which may present osteolytic lesions. In addition, acne can be classified according to its severity, as mild, moderate or severe (PINHEIRO; HAWK; ANDRADE, 2022).

ANDROGENETIC ALOPECIA

Androgenetic alopecia, another dermatological manifestation of PCOS, can occur diffusely, but is commonly more evident in the frontal and parietal regions, and is determined by hair loss and miniaturization of the hair in the central region of the scalp (MOURA et al, 2011).

Its pathogenesis is linked to increases in DHT levels, caused by the excess activity of 5α-reductase in the hair follicle, which consequence is a prolongation of the anagen phase in the hair cycle (MOURA et al, 2011).

Most patients with androgenetic alopecia have preserved endocrine function, so the diagnosis should exclude other possible causes of hair loss in women, such as alopecia areata and telogen effluvium. Some complementary exams such as hair density, hematological and biochemical evaluations are great allies in these situations (MOURA et al, 2011).

ACANTOSE NIGRICANS

Acanthosis nigricans is a dermatological condition characterized by thick, velvety, grayish-brown plaques that are located in flexion areas, such as the back of the neck, armpits, fold below the sinuses, and inguinal region (Panidis, 1995).

This cutaneous manifestation is often related to hyperinsulinemia, which occurs through the excessive binding of serum insulin to IGF-1 receptors in peripheral tissues, causing the proliferation of keratinocytes and fibroblasts. Acanthosis nigricans can present in both benign and malignant forms, with benign being the form in which it presents in polycystic ovary syndrome, along with other reasons such as idiopathic, hereditary, drug-induced, and those caused by other endocrine diseases (MOURA et al, 2011).

SEBORRÉIC DERMATITIS

Seborrheic dermatitis is a chronic-recurrent erythematous-scaly disease that usually affects anatomical sites with a greater number of sebaceous glands, such as the face, ears and scalp, with a prevalence of 29% in patients with polycystic ovary syndrome. This alteration is characterized as a chronic inflammation resulting from the hypersecretion of the sebaceous

glands in response to androgenic stimuli, which act by increasing follicular keratosis and sebum production (MERAN; SAEED, 2018).

When looking for the causal factor, one must take into account not only hyperandrogenism, but also genetic, climatic and immune system factors. Thus, serology, clinical, and radiological tests are used to relate seborrheic dermatitis to PCOS (FERREIRA et al., 2020).

VIRILIZATION

Signs of virilization, such as extreme hirsutism, male musculature pattern, breast reduction, deepening of the voice, and clitoromegaly may be present in PCOS, but are not typical of this syndrome, often associated with adrenal tumors or use of exogenous androgens (HOFFMAN et al, 2013).

TREATMENT

PCOS treatment is mainly aimed at educating the patient associated with lifestyle interventions and medications for symptomatological treatment, which is individualized, considering the complaint brought by the patient, social and clinical history (ALVES MLS, et al., 2022).

In general, the first therapeutic management consists of lifestyle changes, with diet adaptation and physical activity, especially in obese patients (BERNI TR, et al., 2018). It is worth noting that the loss of approximately 7% of weight associated with lifestyle changes can normalize ovarian function in patients with polycystic ovary syndrome.

Physical activity is recommended, requiring about 150 minutes of moderate to vigorous physical activity per week. This practice should be encouraged for the prevention of weight gain and health maintenance in patients with PCOS (SILVA IST, et al., 2020).

Drug treatment in PCOS aims to suppress the exacerbated androgen production, stimulated by LH elevation and facilitated by insulin resistance, and to correct its consequences. In addition, it regulates the menstrual cycle and reduces the risks of developing endocrine-metabolic comorbidities (PEREIRA JM, et al., 2015).

Combined oral contraceptives, made up of estrogen and progesterone, are the treatment of choice for PCOS patients who do not wish to become pregnant. They work by decreasing the production of adrenal androgens, elevating hepatic production of SHBG, and reducing the

concentration of free androgen. In addition, they suppress LH secretion, which results in lower ovarian androgen production (FEBRASGO, 2018).

The combination of these factors has a positive impact on the consequences of PCOS, with a reduction in serum androgen levels and regularization of menstrual flow. In addition, low-sugar, low-carbohydrate diets have implications for insulin resistance, metabolic syndrome, and their consequences (BESSA *et al.,* 2022; PENA *et al.,* 2022; RIBEIRO *et al.,* 2022).

FINAL THOUGHTS

Polycystic ovary syndrome is a multifactorial and highly complex disease that mainly affects women of childbearing age, with important repercussions on quality of life, whether due to systemic, functional or dermatological manifestations. Changes in hormone levels cause irregular menstrual cycles, reproductive difficulties, weight gain, acne and hirsutism.

The dermatological alterations intertwined with other diseases caused by this pathology and the severity of the clinical manifestations lead to a decrease in well-being and an increase in the incidence of psychiatric dysfunctions among patients with this syndrome. (FERREIRA et al., 2020).

This review points to the importance of multidisciplinary care among gynecologists, endocrinologists and professionals to address mental health. In addition to promoting a better quality of life and reducing life complications in these patients, through an adequate diagnosis and management of the condition.

REFERENCES

BARROS, A. B. *et al.* Acne vulgar: aspectos gerais e atualizações no protocolo de tratamento. BWS Journal, v. 3, p. 1-13, out. 2020.

BESSA, P. R. *et al.* Manejo da Síndrome do Ovário Policístico (SOP) em Adolescentes. Research, Society and Development, v. 11, n. 15, p. 166- 171, nov. 2022.

CARMINA, E. *et al.* Female Adult Acne and Androgen Excess: A Reprt From the Multidisciplinary Androgen Excess and PCOS Committee. Journal of the Endocrine Society, v. 6. P. 1-11, 2022

ESSAH, P.A. *et al.* Dermatology of androgen-related disorders. Clinics in Dermatolgy, v.34, p. 289-298, 2006.

FENG, J. *et al.* Prevalence of dermatologic manifestations and metabolic biomarkers in women with polycystic ovary syndrome in north China. J Cosmet Dermatol., p. 1-7, 2017.

FERREIRA, I. F. *et al*. Impactos biológicos e sociais na vida das mulheres com Síndrome dos Ovários Policísticos. Revista Eletrônica Acervo Científico, v. 14, p. e4692, nov. 2020.

GAINDER S.; SHARMA, B. Update on management of polycystic ovarian syndrome for dermatologists. Indian Dermatol Online J 2019; 10:97-105.

. HOFFMAN, B. L. *et al.* Ginecologia de Williams. 2. ed. Porto Alegre: Artmed, 2013.

IBÁÑEZ, L. et al. An International Consortium Update: Pathophysiology, Diagnosis, and Treatment of Polycystic Ovarian Syndrome in Adolescence.

JU, Q. *et al.* Sex hormones and acne. Clinics in Dermatology, v. 35, p. 130-137, 2017.

KEEN, M.A; SHAH I.H; SHEIKH, G. Cutaneous manifestations of polycystic ovary syndrome: A cross-sectional clinical study. Indian Dermatol Online J 2017; 8: 104-10.

LOWENSTEIN, E.J. Diagnosis and management of the dermatologic manifestations of the polycystic ovary syndrome. Dermatologic Therapy, v 19. P. 210-233, 2006.

MERAN, A. D.; SAEED, M. Y. Efficacy and safety of low dose oral isotretinoin in comparison with oral itraconazole in the treatment of seborrheic dermatitis among patients attending Erbil dermatology teaching center in Erbil City. Zanco Journal of Medical Sciences, v. 22, p. 420- 426, 2018.

MOURA, H. H. G. *et al.* Polycystic ovary syrndrome: a dermatologic approach. Anais Brasileiros de Dermatologia, v. 86, n. 1, p. 111-119, 2011.

PASCH, L. *et al*. Clinician vs Self-ratings of Hirsutism in Patients With Polycystic Ovarian Syndrome Associations With Quality of Life and Depression. JAMA Dermatology, v. 152, n. 7, p. 783-788, 2016.

PASSOS, E.P. *et al.* Rotinas em ginecologia. 7. ed. Porto Alegre: Artmed, 2017.

PENA, V. C. *et al.* Uma análise sobre as características da síndrome dos ovários policísticos: uma revisão de literatura. Revista Eletrônica Acervo Médico, v. 4, p. 1-7, 2022.

PINHEIRO, E. M. L. N.; FALCÃO, E. S. N.; ANDRADE, K. M. B. Análise do perfil dos pacientes com acne vulgar atendidos no consultório de dermatologia. Investigação, Sociedade e Desenvolvimento, v. 11, n. 1, p. 1-7, 2023.

RIBEIRO, C. B. *et al*. Fatores de risco e possibilidades terapêuticas para a Síndrome dos Ovários Policísticos. Revista Eletrônica Acervo Médico, v.12, p. e9883, jul. 2022.

Síndrome dos ovários policísticos. 3a ed. São Paulo: Federação Brasileira das Associações de Ginecologia e Obstetrícia (FEBRASGO); 2023. p. 4-7.

TAVARES, A.; BARROS, R. C. R. The prevalence of metabolic syndrome in the different phenotypes of polycystic ovarian syndrome. Revista Brasileira de Ginecologia e Obstetrícia, v. 41, p. 37-43, 2019.