

Managing Acne in Individuals with Polycystic Ovarian Syndrome

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ABSTRACT

Acne vulgaris is a prevalent, long-lasting skin condition that affects individuals aged 15 to 40. It appears to be a common ailment that occurs during adolescence. Nevertheless, it frequently impacts adults as well. Polycystic ovarian syndrome (PCOS) is a prevalent cause of acne vulgaris in adult women. The presence of hyperandrogenism and metabolic problems in this condition may lead to the development of comedones, papules, and nodules on the face, chest, and back. This article specifically examines the current therapies for acne that are linked to polycystic ovarian syndrome.

KEYWORDS: Acne, treatment, polycystic ovarian syndrome

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The study of the occurrence and distribution of acne and polycystic ovarian syndrome (PCOS)

Polycystic ovarian syndrome (PCOS) is the prevailing endocrine condition among women who are of reproductive age. Based on estimates, it impacts a range of 8 to 13% of individuals. Acne in adult women frequently serves as a first indication of polycystic ovarian syndrome. Nevertheless, it is important to note that not all women afflicted with this endocrine disease have acne. Acne is a prevalent and persistent skin condition. Typically linked to the period of adolescence. Subsequently, elevated quantities of adrenal androgens are accountable for its formation. Adolescent females diagnosed with PCOS commonly experience more severe acne compared to their classmates. Over half of them are affected by either the moderate or severe kind.³ Following the completion of adolescence, acne often continues to be a problem and can affect 10 to 34% of individuals¹⁻³.

The pathophysiology of acne and polycystic ovarian syndrome (PCOS)

Acne vulgaris is a persistent condition that affects the follicular unit. He has seborrhea, which is an abnormal process where the hair follicles produce excessive amounts of keratin, leading to the formation of biofilms and colonies of *P. acnes* bacteria. This, in turn, triggers the release of pro-inflammatory substances onto the skin⁴.

The initial phase of acne progression involves the creation of microcomedones. Consequently, due to excessive production of sebum and improper keratinization of the hair follicles,

they become larger. Consequently, the follicular units get blocked by the pathogenic *P. Acnes*, resulting in an activated inflammatory response. As a result, inflammatory lumps, bumps, pimples, and cysts are formed⁵.



Figure 1. microcomedones

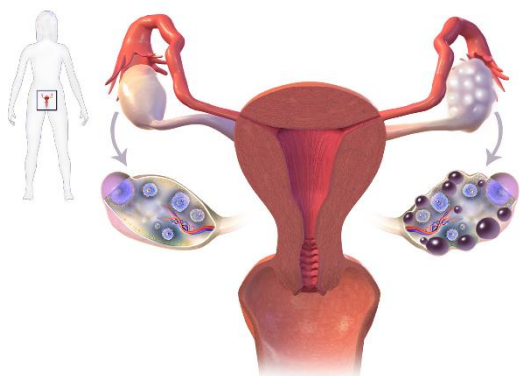
Adult women with polycystic ovarian syndrome frequently experience acne. It is linked to the presence of hyperandrogenism and increased insulin levels. Androgens have an impact on the hair follicles, leading to the development of acne in regions with a high concentration of sebaceous glands, such as the face, chest, and back. Polycystic ovarian syndrome is characterized by the overproduction of androgens, which originate from both the ovaries and the adrenal glands. The blood of 60-80% of these individuals shows increased amounts of androgens.⁶ The primary determinant is the concentration of unbound

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testosterone present in the bloodstream. Unlike testosterone that is attached to plasma proteins, it displays metabolic activity. Both the assessment of free testosterone and the estimation of its level using the concentration of total testosterone and sex hormone binding globulin (SHBG) are employed in diagnostics. Nevertheless, not all females diagnosed with polycystic ovarian syndrome and acne vulgaris have elevated levels of free testosterone in their bloodstream⁶.

Curiously, several women who possess elevated amounts of it may not have acne blemishes. Currently, it is hypothesized that the concentration of androgens in the skin has a more significant role in causing acne compared to the levels of androgens present in the bloodstream. Dihydrotestosterone (DHT) is the most potent androgen produced in the hair follicles by the action of 5- α -reductase on free testosterone. This enzyme exhibits two isoforms: isoform 1 is present in the sebaceous glands and the pubic area, whereas isoform 2 is mostly located in the hair follicles, genital skin, and scalp of adult individuals. The varying clinical presentation found in women with hyperandrogenism may be attributed to the differing activity levels of these isoenzymes in the hair follicles. Furthermore, the heightened activity of the 5- α -reductase enzyme is further triggered by an excess of insulin and insulin-like growth factor. Women with polycystic ovarian syndrome frequently have high levels⁷.

Diagnostic criteria for polycystic ovarian syndrome (PCOS)



Polycystic Ovary Syndrome

Figure 2. Polycystic ovary syndrome

Polycystic ovarian syndrome can be diagnosed when a woman fulfills at least two of the three Rotterdam criteria⁸:

Oligoovulation or anovulation refers to a condition when a woman experiences infrequent or absent ovulation.

Manifestations of excessive androgen levels in the body, known as hyperandrogenism or hyperandrogenemia,

Polycystic ovarian morphology is observed on ultrasound examination when there are at least 12 follicles with a diameter ranging from 2 to 9 mm, and the ovarian volume is greater than 10 ml.

To diagnose PCO syndrome, other potential causes of hyperandrogenism must be ruled out, such as hormonally active tumors, hypothyroidism, hyperprolactinemia,

congenital adrenal hyperplasia, Cushing's disease, and acromegaly.

Polycystic ovarian syndrome is characterized by irregular menstrual cycles, the presence of hyperandrogenism symptoms (such as acne, hirsutism, and androgenetic alopecia), and being overweight. The presence of insulin resistance in certain women is linked to a higher likelihood of acquiring type II diabetes. On the other hand, irregular menstrual cycles promote abnormal growth of the lining of the uterus, known as endometrial hyperplasia, which therefore raises the likelihood of developing endometrial cancer. Nevertheless, polycystic ovarian syndrome does not always conform to the usual pattern. Certain individuals with polycystic ovarian morphology and signs of hyperandrogenism are able to consistently experience regular menstrual cycles. Nevertheless, in certain cases, the presence of irregular menstruation and polycystic ovarian morphology does not always coincide with hyperandrogenism. Significantly, several people with polycystic ovary syndrome (PCOS) have a body weight within the normal range, despite the presence of insulin resistance in some cases⁹.

Treatment approaches for acne in polycystic ovarian syndrome

The primary objective of treating polycystic ovarian syndrome is to manage the frequency of menstrual cycles, decrease the levels and adverse impacts of androgens, and mitigate insulin resistance. Specific non-pharmacological interventions and pharmaceutical therapy can effectively decrease the symptoms of PCOS, such as acne¹⁰.

Nonpharmacological interventions

It is recommended that any woman who is diagnosed with polycystic ovarian syndrome should have a nutritional consultation. The primary objective of nutritional therapy is¹¹:

Weight loss in women having a body mass index (BMI) more than 25 kg/m².

Regulation of the lipid profile and glucose metabolism

Implementation of a consistent exercise routine according to individual capabilities.

The study showed that women with confirmed insulin resistance who followed a low glycemic index diet have a beneficial impact on reducing PCOS symptoms, such as acne. Furthermore, weight reduction plays a crucial function in women who are overweight or obese. Consequently, the levels of androgens and luteinizing hormone decrease, but tissue sensitivity to insulin rises. For many women, a modest weight loss of only 5% can help restore normal menstrual cycles and alleviate the symptoms of hyperandrogenism. According to the guidelines of the Endocrine Society, the recommended first treatment for obesity in adolescents and women with PCOS is exercise therapy along with dietary change. Recent studies on rodents have demonstrated that adopting a healthy lifestyle is linked to the restoration of normal levels of certain substances in the brain, including hypothalamic neuropeptides (cocaine and amphetamine

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regulated transcript (CART) and Kisspeptin), as well as sex hormone binding globulin (SHBG) in the blood plasma ¹².

Pharmacotherapy

The management of acne in individuals with PCOS involves the use of oral hormonal contraceptives, anti-androgens, metformin, and isotretinoin ¹³.

Oral contraceptive pill

Oral combined contraception (COC) refers to a method of birth control that involves the use of a combination of estrogen and progestogen hormones. When treating acne during PCOS, it is advisable to use medications that contain gestagens with low androgenic activity, such as norgestimate and desogestrel. Alternatively, medications that have an anti-androgenic impact, such as cyproterone acetate, chlormadinone, and drospirenone, can also be considered. The usual estrogen component is commonly ethinylestradiol ¹⁴.

Combined oral contraceptives (COCs) work by suppressing the secretion of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) from the pituitary gland, using a negative feedback mechanism. As a result, this prevents the ovaries from being stimulated and decreases the production of androgens by them. Furthermore, the presence of estrogen in combined oral contraceptives (COCs) stimulates the liver to produce sex hormone binding protein (SHBG), therefore reducing the concentration of active androgens in the bloodstream ¹⁵.

Conversely, the gestagen component inhibits the enzyme 5-alpha reductase, hence reducing the production of potent androgens in the skin. These exercises have a beneficial impact on the skin, diminishing acne blemishes ¹⁶.

Metformin

Polycystic ovary syndrome (PCOS) frequently occurs alongside insulin resistance and hyperinsulinemia. Excessive insulin levels promote the development of androgens in the ovaries and adrenal glands. Metformin, a medication that enhances cellular response to insulin, is utilized in the treatment of acne during PCOS due to this specific cause. Initiation of metformin therapy should commence with a conservative dosage of 250 mg, which can then be incrementally escalated to a maximum of 2 g. The objective of this action is to prevent the occurrence of adverse effects of the medication, such as flatulence and discomfort in the stomach region ¹⁷.

Androgen receptor antagonist treatment

Antiandrogens, such as spironolactone or flutamide, are chemical substances that diminish the impact of androgens on the body. Spironolactone has been utilized for more than three decades in the management of acne. The primary mode of action is to inhibit the androgen receptor. Furthermore, it inhibits the activity of the enzyme 5-alpha reductase and stimulates the liver to produce more sex hormone-binding globulin (SHBG). Women who are on spironolactone should be mindful of regularly monitoring their blood potassium levels. Women who are sexually active and capable of

producing children should utilize a reliable form of birth control, since spironolactone might cause birth defects in the developing baby ¹⁸.

Flutamide is an authorized pharmaceutical used specifically for the treatment of prostate cancer. Given its adverse effects, its efficacy in treating acne is restricted. These factors encompass the pseudoephedrine state, the potential for masculinization of male fetuses, and the possibility of deadly hepatitis ¹⁹.

Isotretinoin



Figure 3. Before and after isotretinoin treatment

Isotretinoin works by inhibiting seborrhea, reducing the growth of *Propionibacterium* acnes, regulating the generation of micro-blackheads, reducing the development of lesions and existing comedones, and normalizing epithelial exfoliation. Additionally, it exhibits anti-inflammatory effects. Sixteen Multiple studies have demonstrated the potential efficacy of isotretinoin in managing acne in individuals diagnosed with polycystic ovary syndrome (PCOS) ²⁰.

CONCLUSION

Hormone therapy, metformin, and isotretinoin are recommended for people with PCOS who have acne that does not respond to local treatment. In addition, hormone therapy can be used in conjunction with topical antibiotics, benzoyl peroxide, azelaic acid, and retinoids. Typically, a minimum of 3 months is required to observe substantial outcomes from the implemented treatment. Patients with a diagnosis of polycystic ovarian syndrome should be informed about the advantages of losing extra body weight, following a nutritious and well-balanced diet, and engaging in regular physical exercise.

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