



## Case Report

# Acne Vulgaris with Polycystic Ovarian Syndrome: A Case Report

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### Abstract

*Acne vulgaris is a common chronic skin condition of pilosebaceous units that can be presented with non-inflammatory lesions, inflammatory lesions or mixture of both. This affects a large portion of teenagers and young adults (aged 15-40 years). About 85% of adolescents experience it. It is a polymorphic disorder (comedons, papules, pustules, nodules, cysts and sometimes scarring). Besides, Polycystic Ovarian Syndrome (PCOS) is a heterogeneous disorder of hormonal imbalance that occurs when ovaries produce unusual hormones during reproductive age. Clinically it is manifested by acne, oligomenorrhoea, subfertility and hirsutism. The presence of hyper-androgenism and metabolic problems may lead to the development of this condition. In this case study, a female aged 22 years presented with papules, pustules, some nodules in face and irregular menstrual cycle with no history of receiving any hormonal treatment. Clinical data including age, weight, height, BMI, menstrual history and androgenic sign (hirsutism, alopecia, acanthosis nigricans) were recorded with hormonal assay. A pelvic ultrasonogram was also done.*

**Keywords:** Acne Vulgaris, PCOS, Management.

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### Introduction

Acne vulgaris is a prevalent and persistent skin condition typically linked to the period of adolescence. Polycystic Ovarian Syndrome (PCOS) is the prevailing endocrine condition among the women of reproductive age. Female diagnosed with PCOS commonly experience more severe Acne compared to others<sup>1-3</sup>.

Pathophysiology of acne vulgaris includes an abnormal process where follicular epidermal hyperproliferation occurs that leads to formation of keratinous plugs. Excess sebum is produced due to androgenic stimulation. Sebum is entrapped in keratin plugs at the lower portion of the follicles. Here Propionibacterium acnes (P. acnes) are attached to lipid rich follicles that cause breakdown of TG into FFA. Combination of sebum, keratin and P. acne release pro-inflammatory mediators that form papules, pustules and nodulocystic acne<sup>4-5</sup>.

About the pathophysiology of PCOS, it is a heterogeneous reproductive dysfunction and metabolic disorder characterized by i) hyper-androgenism (↑testosterone, ↓SHBG), ii) Hormonal imbalance (↑LH: FSH ratio and ↓FSH secretion), iii) insulin resistance (↑insulin levels and ↓glucose tolerance) and iv) chronic low-grade inflammation. Three main factors used to diagnose PCOS are hyper-androgenism (clinical and/or biochemical),

Ovarian morphology (polycystic ovaries) and oligo-and/or anovulation. A range of environmental factors including geography, diet, nutrition, socio-economic status and environmental pollutants are contributing to the development, occurrence and management of PCOS<sup>6-9</sup>.

### Case Presentation

Our patient was a 22-year-old unmarried female presented with complaints of having papules, pustules and some nodule all over her forehead and cheeks that were painful when touched. She also stated that she had done facial and chemical peeling several times. She also gave history for irregular menstrual cycles since one year and had no history of receiving any hormonal treatment. She likes to eat junk food and food that contains high glycemic index. She has been having a sedentary lifestyle and gaining weight slowly for the last year. On examination her abdomen was soft and non-tender with no palpable lump was detected. Her weight- 69.3 kg, height- 162 cm and BMI- was 26.4 kg/m<sup>2</sup>. She was advised for CBC, Hormonal assay, Blood glucose, Renal function test, liver function test, lipid profile and USG of Pelvic organ.

**Laboratory investigations finding:** LH (Luteinizing hormone) - 9.88 IU/ L, FSH (Follicular stimulating hormone) - 2.49 IU/L, TSH (Thyroid

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stimulating hormones) - 2.9 mIU/L, Prolactin - 5.5 ng/mL, Estradiol - 215 pg/mL, Testosterone - 3.5 nmol/L, OGTT (Oral glucose tolerance test) - Fasting 5.2 mmol/L and 2 hours after 75 gm glucose 7.2 mmol/L. Other investigations like CBC (Complete blood count), RFT (Renal function test), LFT (liver function test) and fasting lipid profile were within normal limit. The USG of Pelvic organ showed right ovary is 5.65×2.23×3.02 cm in size about 19.90 cc in volume, left ovary is 5.70×1.98×3.10 cm in size about 18.29 cc in volume with presence of multiple cysts in both the ovaries measuring 2-9 mm in diameter.

**Diagnosis and Management:** Clinically and from investigation reports, she was diagnosed with a case of acne vulgaris with PCOS. After diagnosis she was treated with the following combined therapy:

- Oral medications: OCP, Anti-androgens (Spironolactone), Metformin and Isotretinoin.
- Topical agents: Clindamycin and Benzoyl peroxide combination.
- Advice: To use a mild/ soft cleaning agent on the face to keep the face clean and oil free, change the lifestyle, do regular exercise & decrease weight, avoid the use of random cosmetics, use a good sun protection agent, eat enough fruit and vegetables and drink plenty of water daily.

She was treated for 3 months with the above medications and advice. Follow up was given every month with LFTs and lipid profile reports. After 3 months her outcome was satisfactory.



**Figure-1: Patient's initial condition before the treatment of acne vulgaris**



**Figure-2: Patient's improved condition after 3 months treatment of acne vulgaris**

## Discussion

Acne vulgaris, a prevalent skin condition affecting hair follicles and sebaceous glands, is predominantly observed in teenagers. The site of involvement is usually face and trunk, but rarely buttocks. The clinical features of acne consist of comedones, papules, pustules and nodulocystic. Acne vulgaris can be categorized as mild, moderate and severe<sup>10</sup>. PCOS is a hyperandrogenic anovulation or Stein-Leventhal syndrome due to hormonal disorder or imbalance where presence of multiple small cyst (size 2-9 mm and number 8-12) on the outer edges with enlarged ovaries. This condition produces abnormal amounts of androgen, LH and FSH. Clinically can be presented with irregular menstrual cycles, obesity, acne, hirsutism and psychological distress<sup>11-15</sup>. In this study 22 years unmarried female patient was diagnosed as acne vulgaris (moderate category) with PCOS which was confirmed by clinical history, physical examination and investigations. Genetic predisposition, sun exposure, oil-based skin, hormonal imbalance, inflammation increased sebum production and follicular hyperkeratosis result in the development of microcomedones and changes in follicular milieu in intensive growth of *P. acnes*, medications-lithium, glucocorticoids, anabolic steroids and stress are considered as a risk factor for *A. vulgaris*<sup>16</sup>.

The management of acne vulgaris can be divided into two phases 1) induction therapy by using oral and topical agents to induce acne remission 2) maintenance therapy mainly by topical agents to prevent recurrence of acne lesions. Oral anti-androgens (spironolactone), metformin and isotretinoin, topical-clindamycin and benzoyl peroxide combination. There is some other treatment options that are also available such as physical therapy that includes laser, phototherapy, chemical peeling and comedone extraction<sup>17</sup>.

Anti-androgens (spironolactone) are chemical substances that decrease the impact of androgens on the body by inhibit the androgen receptor. It also inhibits the activity of the enzyme 5-alpha reductase and stimulates the liver to produce more sex hormone-binding globulin (SHBG)<sup>18</sup>. Metformin increases cellular response to insulin; thus, its correct insulin resistance and hyperinsulinemia decrease development of androgens in the ovaries and adrenal glands<sup>9</sup>. Isotretinoin inhibits seborrhea, decreases *P. acnes* growth, regulating the generation of micro-blackheads, reducing the development of lesions and existing comedones which influences comedogenesis and anti-inflammatory effects that normalize epithelial exfoliation<sup>19</sup>.

Clindamycin is a broad-spectrum antibacterial that functions by irreversibly binding to the 50S subunit of the bacterial ribosome. This inhibits bacterial

protein synthesis and may produce bactericidal or bacteriostatic effects. Benzoyl peroxide (BPO) is widely used as a topical drug for acne vulgaris and has keratolytic/comedolytic, anti-inflammatory effects and antimicrobial activity. BPO is rapidly degraded to benzoic acid to generate free radicals, and it is thought to cause damage to the bacterial cell walls<sup>20</sup>. OCP decreases secretion of LH and FSH from the pituitary gland by negative feedback mechanism. This prevents ovarian hyperstimulation and decreases androgen production that controls PCOS. It also stimulates the liver to produce SHBG and inhibits the enzyme 5-alpha reductase as a result reduces the production of potent androgens in the skin. These have a beneficial impact on the skin and diminish acne<sup>21,22</sup>.

The mode of treatment for PCOS are i) lifestyle interventions including diet and exercise targeted in achieving significant weight loss, ii) medical by hormonal therapy (OCP), gonadotrophin therapy and insulin sensitizing agents (metformin) iii) surgical by laparoscopic ovarian drilling. Oophorectomy and ovarian wedge resection are rarely done<sup>23,24</sup>. For this patient oral and topical agents were given for acne vulgaris and for medical managements were used for PCOS. Satisfactory outcomes were observed for the patient which is shown in figure-1 and 2.

### Conclusion

All female patients with acne vulgaris should be screened for PCOS by history, examination and investigations. The patient's womanhood may be challenged by acne, hirsutism, obesity and sub-fertility brought by the disease. In addition to medical treatment, support from family and friends, good nutrition, physical activity, disease ownership and personal advocacy can enable thriving despite the disease. Successful treatment for acne vulgaris with PCOS may improve the quality of life of the patient.

### Conflict of Interest

The authors declared that they have no conflicts of interest.

### References

- Deswal R, Narwal V, Dang A, Pundir CS. The Prevalence of Polycystic Ovary Syndrome: A Brief Systematic Review. *J Hum Reprod Sci.* 2020; 13 (4): 261-71. doi: 10.4103/jhrs.JHRS\_95\_18.
- Bellver J, Rodríguez-Tabernero L, Robles A, Muñoz E, Martínez F, Landeras J, et al. Polycystic ovary syndrome throughout a woman's life. *J Assist Reprod Genet.* 2018; 35 (1): 25-39. doi: 10.1007/s10815-017-1047-7.
- Allahbadia GN, Merchant R. Polycystic ovary syndrome and impact on health. *Middle East Fertil Soc J.* 2011; 16 (1): 19-37.
- Andrea L, Zaenglein, Emmy M. Graber & Diane M. Acne Variants and Acneiform Eruptions. In: Sewon Kang, Masayuki Amagai, Anna L. Bruckner, et al., Editors. *Fitzpatrick's Dermatology in General Medicine*, 9th ed. USA: McGraw-Hill Education; 2019. pp 1391-412.
- Simpson NB, Cunliffe WJ. Disorder of the sebaceous glands. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. *Rook's Textbook of Dermatology*, 7th ed. London: Blackwell Science; 2004. pp 43.1- 43.74.
- Kamangar F, Shinkai K. Acne in the adult female patient: a practical approach. *Int J Dermatol.* 2012; 51 (10): 1162-74. doi: 10.1111/j.1365-4632.2012.05519.x.
- Thiboutot D. Acne: hormonal concepts and therapy. *Clin Dermatol.* 2004; 22 (5): 419-28. doi: 10.1016/j.clindermatol.2004.03.010.
- Wang R, Mol BW. The Rotterdam criteria for polycystic ovary syndrome: evidence-based criteria? *Hum Reprod.* 2017; 32 (2): 261-4. doi: 10.1093/humrep/dew287.
- Balen AH. Polycystic ovary syndrome and secondary amenorrhoea. In: Edmonds DK, editor. *Dewhurst's Textbook of Obstetrics & Gynaecology.* 7th ed. USA: Blackwell; 2007. pp 377-97.
- Zaenglien AL, Graber EM, Thiboutot DM, Strauss JS. Acne vulgaris and acne form eruptions. In: Wolff K, Goldsmith LA, Katz SI, et al., editors. *Fitzpatrick's Dermatology in General Medicine.* 7th ed. USA: McGraw Hill; 2008. pp 690-730.
- Kollmann M, Martins WP, Raine-Fenning N. Terms and thresholds for the ultrasound evaluation of the ovaries in women with hyperandrogenic anovulation. *Hum Reprod Update.* 2014; 20 (3): 463-4. doi: 10.1093/humupd/dmu005.
- Rasquin LI, Anastasopoulou C, Mayrin JV. Polycystic Ovarian Disease. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK459251>. [Accessed on January 10, 2024]
- Polycystic ovary syndrome (PCOS): condition information [Internet]. Available at: <http://www.nichd.nih.gov/.2013-05-23>. [Accessed on January 10, 2024]
- What are the symptoms of PCOS? [Internet]. Available at: <http://www.nichd.nih.gov/.2013-05-23>. [Accessed on January 10, 2024]
- Timpanapong P, Rojanasakul A. Hormonal profiles and prevalence of polycystic ovary syndrome in women with acne. *J Dermatol.*

- 1997; 24 (4): 223-9. doi: 10.1111/j.1346-8138.1997.tb02778.x.
16. Knor T. The pathogenesis of acne. *Acta Dermatovenerol Croat.* 2005; 13 (1): 44-9.
  17. Oon HH, Wong SN, Aw DCW, Cheong WK, Goh CL, Tan HH. Acne Management Guidelines by the Dermatological Society of Singapore. *J Clin Aesthet Dermatol.* 2019; 12 (7): 34-50.
  18. De Jesus S, Gianos E, McNally ST, Scantlebury DC and Rosen SE. Chapter 25-Sex hormones and their impact on cardiovascular health. In: Aggarwal NR and MJ Wood, editors. *Sex Differences in Cardiac Diseases.* Amsterdam: Elsevier; 2021. pp. 539-65.
  19. Zeng X, Xie YJ, Liu YT, Long SL, Mo ZC. Polycystic ovarian syndrome: Correlation between hyperandrogenism, insulin resistance and obesity. *Clin Chim Acta.* 2020; 502: 214-21. doi: 10.1016/j.cca.2019.11.003.
  20. Ranosz K, Malara B. Opinions of clients of cosmetology salons regarding the impact of wearing protective masks on the condition of the skin. *Aesth Cosmetol Med.* 2021; 10 (5): 217-23.
  21. Okamoto K, Kanayama S, Ikeda F, Fujikawa K, Fujiwara S, Nozawa N, et al. Broad spectrum in vitro microbicidal activity of benzoyl peroxide against microorganisms related to cutaneous diseases. *J Dermatol.* 2021; 48 (4): 551-5. doi: 10.1111/1346-8138.15739.
  22. Vrbíková J, Cibula D. Combined oral contraceptives in the treatment of polycystic ovary syndrome. *Hum Reprod Update.* 2005; 11 (3): 277-91. doi: 10.1093/humupd/dmi005.
  23. Rapisarda A, Brescia R, Sapia F, Valenti G, Sarpietro G, Di Gregorio L, et al. Combined oral contraceptive in adolescent and young adult women: Current evidence and future perspectives. *Curr Women's Health Rev.* 2019; 15 (2): 109-18. doi: 10.2174/1573404814666180914162053.
  24. Pathmanathan S, Ranathunga I, Somasundaram NP. A Case of Successful Treatment with Unilateral Oophorectomy in a Patient with Resistant Polycystic Ovary Syndrome. *Case Rep Endocrinol.* 2020; 2020: 8893000. doi: 10.1155/2020/8893000.

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