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Overview of Polycystic Ovarian Disease (PCOD) and PCOS

Dr. Ajay Dubey[1*] & Roshni Sachdeva[2]

[*1]Professor, Department of Yoga, SAM Global University, Bhopal (M.P)

[2]Research Scholar, Department of Yoga, SAM Global University, Bhopal (M.P)

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Abstract: Polycystic Ovarian Disease (PCOD) is a complex endocrine and metabolic disorder affecting women during their reproductive years. It is associated with hormonal imbalance, ovarian dysfunction, irregular menstruation, impaired ovulation, and reproductive difficulties. The condition is influenced by various factors, including genetic susceptibility, insulin resistance, hyperandrogenism, environmental influences, and sedentary lifestyle habits. Excess androgen production and compensatory hyperinsulinemia contribute to disrupted follicular maturation and ovulatory dysfunction. Clinical manifestations include menstrual irregularities, acne, hirsutism, hair loss, obesity, infertility. PCOD is associated with metabolic disturbances such as dyslipidemia, impaired glucose tolerance, metabolic syndrome, and an increased risk of type 2 diabetes mellitus. Furthermore, visible physical symptoms and fertility-related concerns may adversely affect psychological well-being, contributing to anxiety, depression, reduced self-esteem, and diminished quality of life Management primarily emphasizes individualized treatment, including balanced nutrition, regular physical activity, stress management, adequate sleep, and pharmacological interventions when indicated. Early identification and continuous monitoring are essential to minimize complications and improve long-term health outcomes. This paper presents an overview of the etiology with PCOD/PCOS. It also highlights the importance of yogic lifestyle an integrated approach addressing hormonal regulation, metabolic health, reproductive functioning, and psychological well-being. “Yoga” is an age-old Indian practice that aims to balance the body, mind, and spirit. Practicing yoga regularly can restore balance and harmony within the whole body, including the reproductive system. Gonçalves et al. showed that women with endometriosis, who practice yoga, reported lower levels of chronic pelvic discomfort and improved quality of life. Greater awareness, patient education, and multidisciplinary care may support effective symptom management and improved quality of life among affected women.

Keywords: *Polycystic Ovarian Disease (PCOD), Polycystic Ovary Syndrome (PCOS), Yoga Therapy, Metabolic Health, Ovulatory Dysfunction.*

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Introduction

Epidemiology and Global Burden of Polycystic Ovarian Disease (PCOD)

Polycystic Ovarian Disease (PCOD) is among the most prevalent endocrine disorders affecting women of reproductive age worldwide. It represents a significant public health challenge because of its high prevalence, chronic nature, reproductive consequences, metabolic complications, and psychosocial impact. The disorder affects women across all ethnicities, socioeconomic groups, and geographical regions, although its prevalence varies depending on the diagnostic criteria used and the characteristics of the study population. Globally, PCOD is estimated to affect approximately 6–20% of women of reproductive age depending on the diagnostic criteria applied, such as the European Society of Human Reproduction and Embryology/American Society for Reproductive Medicine Rotterdam criteria, the National Institutes of Health criteria, or the Androgen Excess and PCOS Society criteria [Legro RS, et al. 2013].

Polycystic ovarian syndrome (PCOS) affects 5–20 % of reproductive- age women worldwide, and it is characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology (PCOM). It is associated with an increased risk of metabolic dysregulation, including insulin resistance (IR), type 2 diabetes mellitus (T2DM), cardiovascular disease (CVD), non-alcoholic fatty liver disease (NAFLD), dyslipidaemia, metabolic syndrome, Alzheimer's disease, and endometrial cancer [Stener-Victorin E, Teede H, Norman RJ, et al. 2024].

Etiology and Risk Factors of Polycystic Ovarian Disease (PCOD)

Polycystic Ovarian Disease (PCOD) is a multifactorial disorder that develops through the interaction of genetic, hormonal, metabolic, environmental, and lifestyle factors. Although the exact cause remains unknown, current evidence suggests that multiple mechanisms contribute to ovarian dysfunction, hyperandrogenism, insulin resistance, and chronic anovulation. These factors act synergistically, resulting in hormonal imbalance and the characteristic clinical manifestations of the disease.

Genetic Factors

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Genetic predisposition plays an important role in the development of PCOD. Women with a family history of PCOD, type 2 diabetes mellitus, obesity, or metabolic syndrome have a higher likelihood of developing the disorder. Several genes involved in steroid hormone synthesis, insulin signaling, gonadotropin regulation, inflammation, and ovarian follicular development have been implicated. The inheritance pattern is considered polygenic, meaning that multiple genes collectively influence disease susceptibility. Genetic abnormalities may alter ovarian steroidogenesis, insulin receptor function, and androgen metabolism, predisposing susceptible individuals to hormonal disturbances. However, genetic predisposition alone is insufficient to cause PCOD, and environmental triggers are often required for disease expression.

Hormonal Imbalance

Hormonal dysregulation is the hallmark of PCOD. Increased secretion of luteinizing hormone (LH) stimulates excessive androgen production by ovarian theca cells. At the same time, relatively lower follicle-stimulating hormone (FSH) levels impair maturation of ovarian follicles, preventing normal ovulation. Elevated androgen concentrations inhibit follicular development and contribute to symptoms such as acne, hirsutism, androgenic alopecia, and menstrual irregularities. Increased insulin levels further enhance androgen production, thereby worsening endocrine dysfunction.

Insulin Resistance and Hyperinsulinemia

Insulin resistance is one of the most significant metabolic abnormalities associated with PCOD. Body tissues become less responsive to insulin, prompting the pancreas to produce higher amounts of insulin to maintain normal blood glucose levels. Hyperinsulinemia promotes ovarian androgen synthesis and suppresses hepatic production of sex hormone-binding globulin (SHBG), leading to increased circulating free testosterone. This hormonal imbalance contributes to anovulation, infertility, obesity, and metabolic syndrome. Insulin resistance may occur in both obese and lean women, although it is generally more severe in obese individuals.

Obesity and Lifestyle Factors

Obesity is not the primary cause of PCOD but significantly aggravates its clinical manifestations. Excess adipose tissue contributes to insulin resistance, chronic inflammation, hormonal imbalance, and increased androgen production. Central or abdominal obesity is particularly associated with metabolic complications. Lifestyle factors such as sedentary behavior, excessive consumption of calorie-rich processed foods, irregular eating habits, inadequate sleep, and psychological stress further increase the risk of developing PCOD and worsen disease severity. Regular physical activity and healthy dietary habits are therefore essential components of prevention and management.

Environmental Factors

Environmental exposures are increasingly recognized as contributing factors in PCOD. Exposure to endocrine-disrupting chemicals, environmental pollutants, pesticides, plastics containing bisphenol A (BPA), and certain industrial chemicals may interfere with normal hormonal regulation and ovarian function. Urbanization, changing dietary patterns, reduced physical activity, and chronic psychosocial stress have also been associated with the increasing prevalence of PCOD worldwide.

Chronic Low-Grade Inflammation

Women with PCOD frequently exhibit chronic low-grade systemic inflammation characterized by increased production of inflammatory cytokines and oxidative stress. Persistent inflammation interferes with insulin signaling, ovarian steroidogenesis, and follicular maturation. Inflammatory mediators contribute to endothelial dysfunction, cardiovascular risk, and metabolic disturbances while further aggravating insulin resistance and hyperandrogenism.

Oxidative Stress

Oxidative stress results from an imbalance between reactive oxygen species (ROS) and antioxidant defense mechanisms. Increased oxidative stress damages ovarian tissue, disrupts follicular development, impairs oocyte quality, and contributes to infertility. It also promotes insulin resistance and chronic inflammation, creating a vicious cycle that accelerates disease progression.

Psychological Stress

Chronic psychological stress activates the hypothalamic-pituitary-adrenal (HPA) axis, leading to increased cortisol secretion. Elevated cortisol influences glucose metabolism, appetite regulation, fat accumulation, and reproductive hormone secretion. Stress-related hormonal disturbances may worsen menstrual irregularities, ovulatory dysfunction, and metabolic abnormalities while negatively affecting treatment adherence and quality of life.

Role of yoga in PCOD/PCOS

“Yoga” is an age-old Indian practice that aims to balance the body, mind, and spirit. Venkateswarlu C (2020), Yamamoto-Morimoto K et. Al (2019). Practicing yoga regularly can restore balance and harmony within the whole body, including the reproductive system (Yadav A et. Al 2024). Gonçalves et al. (2017) showed that women with endometriosis, who practice yoga, reported lower levels of chronic pelvic discomfort and improved quality of life (Gonçalves et al. (2017). It has been demonstrated that yoga, when used alone or in conjunction with other treatments, can effectively manage lifestyle diseases like diabetes, PCOS, and other reproductive disorders (Thakur D et. Al 2021, Gowri MM et. Al 2022). Another study reported a significant decrease in serum testosterone levels among women with PCOS after two months of walking and yoga (Vishesha Patel et. Al 2020).

The three aspects of yoga most frequently used for their health- promoting effects are asanas, pranayama, and meditation (Govindaraj R et. Al 2016). Asanas, or physical postures, intended to support spiritual development, mental acuity, and bodily well-being (Vyas-Doorgapersad S et. Al 2014). Pranayama, or yogic breathing techniques, can be done independently, or in combination with asanas to enhance its effects (Dhaniwala NKS et. Al 2020, Aggarwal A et. Al 2020). Studies have shown the benefits of pranayama on the physiological and psychological aspects of patients suffering from various diseases, including premenstrual syndrome (Jayawardena R et. Al 2020, Feula AJM et. Al 2024).

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