



An Update on Polycystic Ovarian Syndrome



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Abstract

A common and complicated endocrine condition that affects women of reproductive age is polycystic ovarian syndrome (PCOS). The key characteristics of PCOS, the difficulties in diagnosing it, and its effects on reproductive and metabolic health are all highlighted in this abstract. The link between PCOS and infertility is examined, along with suggested treatment options. This paper aims to increase knowledge and comprehension of PCOS among medical professionals and the general public by highlighting the condition's complex nature. One of the most common endocrine disorders in women is polycystic ovarian syndrome, which is estimated to affect 6 to 20 percent of women worldwide.

Keywords: Polycystic ovarian syndrome; Women; Infertility

Introduction

Reproductive, metabolic, and endocrine abnormalities are all part of the common hormonal disorder known as polycystic ovarian syndrome (PCOS) [1]. It affects 5 to 15% of women who are reproductive age [2]. The endocrine condition known as polycystic ovarian syndrome (PCOS) is frequently seen and is characterized by abnormalities in the reproductive, metabolic, and endocrine systems. A common endocrine condition that affects women of reproductive age is polycystic ovarian syndrome (PCOS), which is characterized by a complex interplay of hormonal, metabolic, and reproductive dysregulation [1]. One of the most prevalent endocrine disorders in women, it is thought to affect 6 to 20 percent of women globally [3].

Menstrual irregularities, hyperandrogenism, polycystic ovaries, and metabolic disturbances are just a few of the clinical signs and symptoms of polycystic ovarian syndrome [2]. As a result of disrupted ovulation and hormonal imbalances, menstrual irregularities, also known as oligomenorrhea or amenorrhea, appear [4-7].

Etiology of Polycystic Ovarian Syndrome

The exact cause of PCOS remains unclear, but it is believed to involve a complex interplay of genetic, environmental, and hormonal factors [8]. Genetic predisposition, insulin resistance,

and elevated androgen levels have been implicated in the development of PCOS (Barber et al., 2016).

The cause of PCOS is multifactorial, involving a complex interplay of genetic, environmental, and hormonal factors.

Genetic Predisposition

Genetic predisposition is believed to play a significant role, with studies identifying several candidate genes associated with PCOS susceptibility. Insulin resistance, characterized by impaired tissue response to insulin, is a key pathophysiological feature in PCOS. Elevated insulin levels stimulate ovarian androgen production, contributing to hyperandrogenism, a hallmark of PCOS [8]. Other potential contributing factors include dysregulation of the hypothalamic-pituitary-ovarian axis and alterations in adipokines and inflammatory markers [9].

Insulin Resistance

Insulin resistance is a key feature in the pathogenesis of PCOS. It refers to the diminished response of target tissues, such as muscle, liver, and adipose tissue, to the action of insulin [8]. Insulin resistance leads to compensatory hyperinsulinemia, which stimulates the ovaries to produce excessive androgens [10]. Insulin resistance in PCOS is thought to result from a combination of genetic and environmental factors, including obesity, sedentary lifestyle, and dietary factors.

Hyperandrogenism

Hyperandrogenism, characterized by elevated levels of androgens (e.g., testosterone) in circulation, is a central feature of PCOS. It contributes to the clinical manifestations of the syndrome, such as hirsutism, acne, and menstrual irregularities [8]. In PCOS, theca cells in the ovaries exhibit enhanced androgen production, leading to the disruption of normal follicular development and ovulation [1]. Insulin resistance and hyperinsulinemia play a crucial role in stimulating ovarian androgen production in PCOS [10].

Dysregulation of Gonadotropin Secretion

PCOS is associated with abnormalities in the hypothalamic-pituitary-ovarian (HPO) axis, leading to dysregulated gonadotropin secretion. Increased secretion of luteinizing hormone (LH) relative to follicle-stimulating hormone (FSH) is a characteristic endocrine profile observed in PCOS [8]. The dysregulation of gonadotropin secretion disrupts follicular development and ovulation, contributing to anovulation and infertility in PCOS [10].

Inflammation and Oxidative Stress

Inflammation and oxidative stress have been implicated in the pathogenesis of PCOS. Women with PCOS exhibit increased levels of pro-inflammatory cytokines and markers of oxidative stress [9]. Chronic low-grade inflammation and oxidative stress can contribute to insulin resistance, hyperandrogenism, and dysregulation of the HPO axis, further exacerbating the manifestations of PCOS [10].

Prevalence of Polycystic Ovarian Syndrome

Bozdog et al. carried out an organized review and meta-analysis. According to a 2016 study, 10% of women who are reproductive age have PCOS overall. Nevertheless, there were differences in prevalence between various geographic and racial groups. For example, research done in Asia revealed a higher prevalence, ranging from 5% to 18% [2].

According to estimates, between 6 and 12 percent of women in the United States who are of reproductive age in the country are thought to have PCOS [1]. Prevalence rates in Europe have been reported to be between 6 and 20 percent, with higher rates seen in Mediterranean nations [2]. According to studies conducted in Australia and New Zealand, the prevalence ranges from 8 to 13 percent [2].

Significant public health effects result from PCOS's high prevalence. Provision of appropriate care and management is complicated by cases that go undiagnosed or are incorrectly diagnosed. Azziz and others [1] emphasized the value of raising professional healthcare workers' awareness to improve PCOS early detection and intervention.

Aside from affecting reproductive health, PCOS also raises the risk of metabolic diseases. According to studies, women with PCOS

are more likely to experience insulin resistance, dyslipidemia, obesity, type 2 diabetes, and cardiovascular disease [9]. These coexisting conditions emphasize even more the need for PCOS prevention and management strategies that are efficient.

Infertility in Polycystic Ovarian Syndrome

For women with polycystic ovarian syndrome (PCOS), infertility is a serious concern. The hormonal and metabolic imbalances brought on by PCOS can interfere with regular ovulation and reduce fertility. Effective management and treatment require an understanding of the connection between PCOS and infertility. One of the main factors contributing to female infertility is known to be polycystic ovarian syndrome. Ovulatory dysfunction is a condition that 70–80 percent of women with PCOS experience, which makes it more challenging for them to conceive [9]. There are fewer opportunities for fertilization due to PCOS's oligo-ovulation or anovulation, which decreases ovulation's frequency and predictability [2].

Ovulation and follicular development are further disrupted by the hormonal imbalance in PCOS, which is characterized by elevated luteinizing hormone (LH) levels relative to follicle-stimulating hormone (FSH) levels [8]. Infertility issues are exacerbated by the resulting irregular menstrual cycles and anovulation [9].

PCOS is linked to additional factors that may affect fertility in addition to ovulatory dysfunction. As a defining characteristic of PCOS, hyperandrogenism can impede follicular maturation and impact the viability of oocytes [9]. Insulin resistance, which is frequently seen in PCOS, may also contribute to infertility. Insulin resistance can cause hyperinsulinemia, which prompts the ovaries to overproduce androgens and further interferes with follicular development and ovulation [10].

Interventions meant to induce ovulation are frequently used in the management of infertility in women with PCOS. First-line treatments to restore ovulation and enhance fertility outcomes include lifestyle changes like weight loss and increased insulin sensitivity through diet and exercise [9]. Pharmacological interventions, such as ovulation induction with clomiphene citrate or assisted reproductive technologies like in vitro fertilization (IVF), may be taken into consideration when lifestyle changes are insufficient [8].

It is significant to note that not all women with PCOS experience infertility; some may become pregnant naturally or with little medical assistance. To improve fertility outcomes for women with PCOS, early detection, appropriate counseling, and customized interventions are required. However, the link between PCOS and infertility highlights the importance of these factors.

Clinical Features of Polycystic Ovarian Syndrome

The clinical presentation of polycystic ovarian syndrome can vary widely among individuals. Common symptoms include

Menstrual Irregularities

One of the defining features of polycystic ovarian syndrome (PCOS) is menstrual irregularities. Women with PCOS often experience oligomenorrhea (infrequent menstrual periods) or amenorrhea due to anovulation or irregular ovulation [8]. Menstrual cycles may be prolonged, unpredictable, or accompanied by heavy bleeding.

Hyperandrogenism

Hyperandrogenism characterized by elevated levels of androgens (e.g., testosterone) in circulation, is a key clinical feature of PCOS. It manifests as hirsutism (excessive hair growth in a male pattern), acne, and male-pattern baldness [1]. These androgen-related symptoms can significantly impact the quality of life for women with PCOS.

Polycystic Ovaries

On ultrasound examination, women with PCOS often exhibit enlarged ovaries with multiple small follicles, giving them a characteristic "polycystic" appearance [1]. However, it is important to note that the presence of polycystic ovaries alone is not sufficient for diagnosing PCOS, as other criteria must also be met.

Metabolic Abnormalities

PCOS is strongly associated with metabolic abnormalities, including insulin resistance, impaired glucose tolerance, dyslipidemia, and obesity [8]. Insulin resistance, characterized by diminished tissue response to insulin, is a key feature and contributes to the pathogenesis of PCOS. Women with PCOS are at an increased risk of developing type 2 diabetes and cardiovascular disease.

Fertility Issues

Infertility or subfertility is a common concern for women with PCOS. Ovulatory dysfunction, resulting from irregular or absent ovulation, is a major contributor to infertility in PCOS [1]. Difficulty conceiving and prolonged time to pregnancy are often reported by women with PCOS.

Psychological and Emotional Distress

PCOS can also have a significant impact on a woman's psychological well-being. Studies have shown a higher prevalence of depression, anxiety, and decreased quality of life among women with PCOS [9]. Body image concerns, fertility-related distress, and hormonal imbalances can contribute to psychological and emotional distress in women with PCOS.

Diagnostic Criteria for Polycystic Ovarian Syndrome

It is significant to remember that not all women with PCOS will display the same clinical characteristics, and the presentation can vary between people. After ruling out other potential causes, PCOS must meet at least two of the following three criteria:

irregular menstruation, clinical and/or biochemical signs of hyperandrogenism, and polycystic ovaries on ultrasound [1].

Due to its complex presentation and lack of specific diagnostic markers, PCOS diagnosis presents significant challenges. In order to meet the widely accepted Rotterdam criteria for diagnosis, at least two of the following three features must be present: oligo- or anovulation, clinical or biochemical signs of hyperandrogenism, and polycystic ovaries on ultrasound [2]. These criteria, however, have limitations and might not fully encompass the range of PCOS phenotypes, which could result in underdiagnosis or misclassification [1].

Conclusion

A complex endocrine disorder called polycystic ovarian syndrome (PCOS) has a number of reproductive, metabolic, and psychological symptoms. The quality of life for affected women is significantly impacted by the clinical features of PCOS, which include menstrual irregularities, hyperandrogenism, polycystic ovaries, metabolic abnormalities, fertility problems, and psychological distress. To reduce the long-term health effects of PCOS, early detection and effective management are crucial.

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