

Effectiveness of Ultrasound Testing in Antenatal Period Among Women Suffering from PCOS: A Review Article

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Abstract

When women with polycystic ovarian syndrome (PCOS) were compared to a reference population, the experiences of childbirth were found to be identical for both groups. The experiences of PCOS women giving delivery were not significantly impacted by metformin, obesity, or pregnancy problems. However, among women with PCOS, characteristics such as a higher body mass index, longer labor, and cesarean section were linked to lower delivery experience scores. Polycystic ovary syndrome (PCOS) is a prevalent disorder affecting reproductive-aged women in antenatal period characterized by hyperandrogenism, chronic an ovulation, and polycystic ovarian morphology. There are four recognized phenotypes of PCOS, each with distinct health implications. Path physiologically, PCOS involves abnormalities in various processes like gonadotropin secretion, ovarian function, insulin action, and adipose tissue function. Women with PCOS face increased risks of metabolic disorders, cardiovascular issues, subfertility, obstetric complications, and psychological disorders. Diagnosis involves a comprehensive evaluation including history, physical examination, hormonal testing, and ultrasound. Treatment strategies focus on managing symptoms, improving metabolic health, and enhancing fertility. Despite advancements in understanding PCOS, it remains underdiagnosed and misunderstood, highlighting the need for increased awareness and accurate diagnosis.

Keywords: Ultrasound, Antenatal Women, PCOS, Metabolic Disease, Diagnosis, Treatment Awareness.

INTRODUCTION TO PCOS

Compared to pregnant women without PCOS, pregnant women with PCOS are more likely to experience issues such gestational diabetes, hypertension, preterm birth, and early pregnancy loss. The metabolic characteristics of PCOS are connected to these issues. Pregnant PCOS women frequently struggle with obesity. Obesity raises the risk of pregnancy and aggravates PCOS symptoms. Polycystic ovary syndrome (PCOS) is a complex endocrine disorder affecting women of reproductive age. It is characterized by hormonal imbalances, irregular menstrual cycles, and the presence of multiple small cysts on the ovaries^{1 3}. The exact cause of PCOS is not fully understood, but genetic factors and environmental influences, such as obesity and insulin resistance, are believed to play a role^{1 2}. PCOS can lead to various health complications, including infertility, metabolic syndrome, obesity, impaired glucose tolerance, type 2 diabetes mellitus, cardiovascular risk, depression, obstructive sleep apnea, endometrial cancer, and nonalcoholic fatty liver disease / steatohepatitis¹. Early diagnosis and treatment are crucial to manage symptoms and prevent long-term health consequences. The diagnosis of PCOS typically involves a combination of medical history,

physical examination, laboratory tests, and imaging studies¹³. Treatment options may include lifestyle modifications, such as diet and exercise, medications to regulate menstrual cycles and manage symptoms, and fertility treatments for those experiencing infertility^{1 3}.

In the 2023 international guidelines, which provide updated evidence-based recommendations for the diagnosis and treatment of PCOS¹. These guidelines emphasize the importance of early diagnosis and personalized treatment, taking into accounts the diverse manifestations and co morbidities of PCOS. The guidelines also recommend the use of phenotype descriptions to improve diagnostic accuracy and tailor treatment to individual patients' needs. The guidelines were developed through a multi-year international evidence-based guideline development process involving geographically diverse international experts and consumers. The guidelines were published in 2018 and endorsed by more than 40 international societies involved in PCOS⁴.

Incident PCOS

The incidence of polycystic ovary syndrome (PCOS) varies widely, with a prevalence ranging from 8.7 to 17.8% in women of reproductive age^{5 6}. The condition is the most common endocrine disorder in women of reproductive age, and it has a significant economic impact, with \$4.36 billion in healthcare-related costs during the reproductive life span⁷. PCOS is characterized by androgen excess, ovulatory dysfunction, and polycystic ovarian morphology (PCOM), among which excessive androgen production by the ovaries is the key feature⁷. The heterogeneous presentation of PCOS leads to considerable debate regarding the criteria for the definition and diagnosis of the syndrome⁷.

Causes of PCOS

The causes of polycystic ovary syndrome (PCOS) are not fully understood, but they are believed to be related to abnormal hormone levels, particularly insulin resistance and high levels of insulin in the body. Insulin resistance leads to the overproduction of insulin, which in turn causes the ovaries to produce excess testosterone, disrupting follicle development and ovulation^{8 9}. Hormonal imbalances in PCOS include elevated levels of testosterone, luteinizing hormone (LH), low levels of sex hormone-binding globulin (SHBG), and sometimes raised levels of prolactin⁸. Moreover, genetics may play a role in the development of PCOS, as the condition often runs in families, suggesting a genetic link. While specific genes associated with PCOS have not been identified, having relatives with PCOS can increase an individual's risk of developing the syndrome⁸.

The latest causes for Polycystic Ovary Syndrome (PCOS) include genetic and environmental factors¹. Genetic factors include single nucleotide polymorphisms (SNPs) in relevant genes, which can be identified through genetic testing¹. Environmental factors include obesity, insulin resistance, and inflammation, which can contribute to the development and progression of PCOS¹. The review article by Hoeger et al. provides an update on the causes and therapeutics of PCOS, emphasizing the importance of early diagnosis and treatment to avoid detrimental effects¹. The authors discuss the available therapeutic options for PCOS, including lifestyle modifications, medications, and surgical interventions, and highlight the emerging evidence of personalized therapy and the related genetic basis⁴.

Clinical Feature

The clinical features of Polycystic Ovary Syndrome (PCOS) include menstrual dysfunction, anovulation, and signs of hyperandrogenism¹⁰. Additionally, symptoms may vary and can include acne, oily skin, weight gain, hirsutism (excess hair growth on the face and body), thinning hair on the scalp, irregular periods, fertility problems, depression, insulin resistance, and breathing problems during sleep (obstructive sleep apnea)¹¹. These symptoms are often associated with hormonal imbalances, particularly elevated levels of androgens and insulin resistance, which can lead to

complications such as infertility, gestational diabetes, miscarriage, endometrial hyperplasia, uterine cancer, and heart and blood vessel problems¹¹.

Diagnostic Criteria

The diagnostic criteria for Polycystic Ovary Syndrome (PCOS) include two of the following three criteria: clinical and/or biochemical evidence of hyperandrogenism, ovulatory dysfunction, and polycystic ovaries as indicated by ultrasound examination or anti-Müllerian hormone (AMH) level in adults¹². The diagnosis can be made in patients with irregular menstrual cycles and hyperandrogenism without the need for an ovarian ultrasound scan or AMH level measurement¹². The American Association of Clinical Endocrinologists (AACE), American College of Endocrinology (ACE), and Androgen Excess and PCOS Society (AES) recommend diagnostic criteria that include chronic anovulation, hyperandrogenism (clinical/biologic), and polycystic ovaries, along with obtaining levels of serum 17-hydroxyprogesterone and anti-Müllerian hormone to aid in the diagnosis of PCOS¹³. Polycystic ovary syndrome (PCOS) is diagnosed using various criteria established by different organizations. One commonly used set of diagnostic criteria is the Rotterdam criteria, which includes the presence of at least two out of three of the following features:

- 1) Oligoovulation and/or anovulation
- 2) Clinical and/or biochemical signs of hyperandrogenism
- 3) Polycystic ovaries on ultrasound examination (usually defined as the presence of 12 or more follicles in each ovary measuring 2-9 mm in diameter and/or increased ovarian volume (>10 mL) in at least one ovary)

Additionally, other causes of hyperandrogenism and ovulatory dysfunction should be excluded before making a diagnosis of PCOS.¹⁴ The latest diagnostic tools for Polycystic Ovary Syndrome (PCOS) include artificial intelligence (AI) and machine learning (ML) technology, which have been found to be highly accurate at diagnosing and classifying PCOS¹. These technologies can analyze various diagnostic data, such as clinical features, blood tests, and radiological findings, to improve the accuracy of PCOS diagnosis. The use of AI and ML in PCOS diagnostics may reduce the time to treatment and disease burden, as well as improve the diagnostic accuracy for this complex and multifactorial disorder. In addition to AI and ML, standard diagnostic tools for PCOS include pelvic exams, blood tests, and transvaginal ultrasounds³. During a pelvic exam, a healthcare provider can check for signs of PCOS, such as masses, growths, or other changes in the reproductive organs. Blood tests can measure hormone levels, including testosterone, which can be elevated in PCOS¹⁵. Transvaginal ultrasounds can check the appearance of the ovaries and the thickness of the lining of the uterus, which can be affected by PCOS. It is important to note that there is no single test to specifically diagnose PCOS, and diagnosis typically involves a combination of these diagnostic tools. Additionally, PCOS can be challenging to diagnose due to its overlap with other conditions, such as obesity, diabetes, and cardiometabolic disorders. However, the use of AI and ML technology in PCOS diagnostics may improve the accuracy and speed of diagnosis, reducing the disease burden and improving the care of women with PCOS¹⁶.

Consequences

The consequences of Polycystic Ovary Syndrome (PCOS) include various health risks and complications such as infertility or subfertility, endometrial cancer, diabetes, lipid abnormalities, cardiovascular risks, and obstructive sleep apnea². Women with PCOS are at an increased risk of developing these conditions, highlighting the importance of regular health monitoring and appropriate medical care to manage these risks effectively.¹⁷

Preventive Measures

During pregnancy Preventive measures for PCOS focus on lifestyle modifications and early detection. Here are some preventive strategies supported by research, including references from Vancouver-style citations:

1) Maintain a Healthy Weight:

- Maintaining a healthy weight through proper diet and regular exercise can help prevent during pregnancy PCOS or manage its symptoms effectively.¹⁸

2) Balanced Diet:

- Consuming a balanced diet rich in fruits, vegetables, whole grains, and lean proteins while limiting processed foods, sugary snacks, and refined carbohydrates may help regulate insulin levels and reduce the risk of manage PCOS during pregnancy PCOS.¹⁹

3) Regular Physical Activity:

- Engaging in regular physical activity can help manage weight, improve insulin sensitivity, and regulate menstrual cycles.²⁰

4) Avoiding Smoking and Excessive Alcohol Consumption:

- Smoking and excessive alcohol consumption may exacerbate hormonal imbalances and increase the risk of PCOS.²¹

5) Stress Management:

- Stress can worsen PCOS symptoms by affecting hormone levels. Techniques such as meditation, yoga, and deep breathing exercises can help manage stress effectively.²²

6) Regular Health Check-ups:

- Regular health check-ups, including pelvic exams and hormone level assessments, can help detect PCOS early and facilitate timely intervention.²³

Specialized Care: Pregnant women with PCOS may require specialized care to address the increased risks of complications such as gestational diabetes, preeclampsia, and preterm birth²³.

7) Early Treatment of Symptoms:

- Addressing symptoms such as irregular menstrual cycles, acne, excessive hair growth (hirsutism), and weight gain promptly can help prevent complications associated with PCOS.²⁴

By adopting these preventive measures, individuals can reduce their risk of developing PCOS or alleviate its symptoms, improving overall health and well-being.

Medical and Surgical Management of Antenatal Mother with PCOS

Polycystic Ovary Syndrome (PCOS) is a multifaceted endocrine disorder requiring a comprehensive approach to management ²⁵.

1) Medical Management:

- Lifestyle modifications, including exercise and dietary changes, are fundamental in PCOS management ²⁶

- Oral contraceptives are commonly prescribed to regulate menstrual cycles and reduce androgen levels ²⁷
- Anti-androgen medications, such as spironolactone, are effective in managing symptoms like hirsutism and acne ²⁸.
- Insulin-sensitizing agents like metformin play a role in improving insulin resistance and metabolic parameters ²⁹.
- Fertility medications such as clomiphene citrate or letrozole may be used to induce ovulation ³⁰.

2) Surgical Management:

- Ovarian drilling via laparoscopy is an option for inducing ovulation in cases where medication fails ³¹.
- Laser therapy, including laser hair removal or electrolysis, can help manage hirsutism ³².

3) Other Therapies:

- Bariatric surgery may be considered for severely obese women with PCOS to aid in weight loss and improve metabolic parameters ³³.

4) Regular Monitoring and Follow-Up:

- Regular hormonal testing and ultrasound monitoring are essential for assessing treatment efficacy and detecting any complications ³⁴.

5) The latest treatment options for Polycystic Ovary Syndrome (PCOS) include the use of Sodium-glucose cotransporter type 2 (SGLT-2) inhibitors, which have shown promising improvements in anthropometric parameters and body composition in PCOS patients¹. These inhibitors have the potential to be an early therapeutic option for PCOS due to their positive effects on metabolic parameters.

CONCLUSION

In conclusion, the study concludes by highlighting the necessity of treating pregnant women with PCOS with specialized monitoring and therapies and by acknowledging PCOS as a modifiable risk factor for unfavorable pregnancy outcomes. Monitoring symptoms closely, changing one's lifestyle, and receiving specialist treatment can all help reduce the risks of PCOS during pregnancy and enhance results for both the mother and the fetus.

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