

Research Article

ULTRASONOGRAPHIC EVALUATION OF POLYCYSTIC OVARIES IN INFERTILE FEMALES

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ABSTRACT

A hormonal condition common to women of reproductive age is polycystic ovary syndrome. Women with PCOS can have menstrual cycles that are infrequent or prolonged and excess male hormone levels. The ovaries can produce numerous small follicles that have failed to release eggs regularly, causing infertility. Ultrasonographic examination is currently used for evaluating polycystic ovaries. The ultrasound criteria for the diagnosis of PCOS is the presence of multiple cysts (> 10, 2–8 mm in diameter) arranged around an echogenic stroma. Females of childbearing age should be screened for polycystic ovaries through a baseline scan which is done on the 2nd or 3rd day of the cycle. The scan also predicts ovarian reserve and response that can guide to decide the stimulation protocols of assisted reproductive techniques. The objective of this systematic review is to highlight the significance of ultrasound in not only diagnosis but also deciding treatment modalities in infertile females with PCOS.

Keywords: Polycystic Ovarian Syndrome; Follicles, Ultrasonography; Hirsutism, Obesity; Infertility.

INTRODUCTION

The most common endocrine disorder in women is Polycystic Ovary Syndrome (PCOS). Its prevalence is 15%-20% among infertile women. The etiology of PCOS remains unclear. Women with PCOS have high levels of androgens e.g. testosterone and resultant low levels of Follicle Stimulating Hormone FSH relative to Luteinizing Hormone LH. The androgens will not be aromatized by the ovarian granulosa cells into estrogens, resulting in reduced levels of estrogen and consequent an ovulation (Badawy and Elnashar, 2011). Ultrasonographic examination is currently used for evaluating polycystic ovaries. The ultrasound criteria for the diagnosis of PCOS is the presence of multiple cysts (> 10, 2–8 mm in diameter) arranged around an echogenic stroma. There are two types of PCOS based on ultrasonographic patterns: a peripheral cystic pattern and a general cystic pattern. In the former type, small cysts are located in the sub-capsular region, whereas in the latter type, the small cysts occupy both the sub-capsular and the stromal regions of the ovary (Battaglia *et al.*, 1998). How PCOS affects the fertility potential of the female is a controversial topic and usually results from multiple intra and extra ovarian factors that work together or separately and end in sub-fertility. Multiple intra and extra ovarian factors can affect the reproductive potentials in PCOS women; increased body weight, hyperandrogenemia, insulin resistance, and excess. The early diagnosis and treatment can help the affected women (Bekhatroh and Adel, 2019).

MATERIALS AND METHODS

A review of scientific literature concerning the correlation of polycystic ovaries and infertility was done. Different platforms including medical journals, books and online resources (e.g., PubMed, Google Scholar & Medline) were explored to find the relevant data using the mesh Terms: PCOS, Infertility, ovarian volume, endometrial thickness, ultrasound findings, etc. The main focus was given to the latest data published in the last 10 years.

Next, we screened the articles for relevance based on their title and abstract and we excluded 16 articles, which left us with 24 articles to be included in our literature study. We then evaluated these articles with a self-drawn up checklist based on the evaluation and excluded 14 more. Eventually, 10 articles remained useful for our literature review.

SYSTEMATIC REVIEW

In the year 2020, Joy Mavondo conducted a cross-sectional survey on Prevalence and Ultrasound Presentations of Polycystic Ovarian Syndrome in Black African Women Presenting with Infertility and concluded that all women of childbearing age presenting with infertility and clinical signs of hyperandrogenaemia (e.g. hirsutism, acne) should be screened for polycystic ovaries as part of a women wellness program (Mavondo *et al.*, 2020). In the year 2019, Dr. Naushaba Tarannum Mahtab conducted a retrospective study, having a sample size of fifty-six infertile women including 16 diagnosed as having PCOS and 40 infertile women with the regular menstrual cycle (non-PCOS), on Transvaginalsonographic assessment of follicular development and endometrial thickness in letrozole stimulated cycles of PCOS and non-PCOS infertile women and concluded that in comparison with non-PCOS infertile women, the effect of letrozole on endometrial thickness and follicular growth in patients with anovulatory PCOS did not vary significantly (Mahtab *et al.*, 2019). In the year 2012, Sunal Panchal conducted a retrospective study on Baseline scan and ultrasound diagnosis of PCOS and concluded that on the 2nd and 3rd day of the menstrual cycle, this assessment can be done as a 'baseline scan' through ultrasound scan. This scan is done to categorize ovaries into one of the four types: normal ovaries, low reserve ovaries, poorly responding ovaries, and polycystic ovaries. Patients with the polycystic ovarian syndrome have variable pictures of ovaries on ultrasound. These differences can be explained by understanding the evolution of polycystic ovarian syndrome. In addition, it is possible to associate ultrasound results with biochemical and hormonal derangements. The scan also forecasts the ovarian reserve and response that can direct the decision of ART stimulation protocols (Panchal and Nagori, 2012). In 2016, Adem H Balen

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conducted a study on the management of anovulatory infertility in women with polycystic ovary syndrome: an analysis of the evidence to support the development of global WHO guidance and concluded that PCOS is associated with ~80% of cases of infertility due to an ovulation (Balen *et al.*, 2016). In 2012, Maureen Shannon conducted a study on polycystic ovary syndrome: a common but often unrecognized condition and concluded that women presenting with hirsutism, amenorrhea and/or irregular menses, or infertility should be considered for diagnostic testing for PCOS (Shannon and Wang, 2012). In 2011, Neil P Johnson carried out a randomized trial data analysis of factors predicting the success of metformin and clomiphene treatment for women with infertility owing to PCOS-related ovulation dysfunction in a randomized controlled trial and concluded that for women with ovulation dysfunction associated with polycystic ovary syndrome, BMI may be a significant prognostic factor in response to metformin, indicating that women with a lower BMI may react better to treatment with metformin (Johnson *et al.*, 2011). In 2015, Anju E Joham carried out a cross-sectional analysis of a longitudinal cohort study on Prevalence of Infertility and Use of Fertility Treatment in Women with Polycystic Ovary Syndrome having a sample size of 9145 respondents aged 28–33 years and concluded that infertility and use of fertility hormone therapy were significantly higher in women reporting PCOS in this community-based cohort of women. Strategies for maximizing fertility are significant, given the prevalence of PCOS and the health and economic burden of infertility (Joham *et al.*, 2015). In 2016, Anju E Joham conducted a study on Polycystic Ovary Syndrome, Obesity, and Pregnancy and concluded that sub fertility can occur in women with PCOS, and women should be aware of factors affecting fertility, particularly the effects of obesity and age. When pregnant, PCOS women have a substantially elevated risk of complications associated with pregnancy, including gestational diabetes, hypertensive disorders, premature birth, and cesarean section delivery. The offspring of PCOS females may have an elevated risk of congenital abnormalities and hospitalization in childhood (Joham *et al.*, 2016). In 2011, Xiaobo Shi conducted a study on the Co-involvement of psychological and neurological abnormalities in infertility with the polycystic ovarian syndrome and concluded that Psychological and neurological factors play a crucial role in PCO (Shi *et al.*, 2011). In 2010, Bina Shah performed a retrospective chart review of Endometrial Thickness, Uterine, and Ovarian Ultrasonographic Features in Adolescents with Polycystic Ovarian Syndrome and concluded that multiple peripheral ovarian follicles were found in the majority of adolescents with PCOS, with significant ovarian volumes in some, suggesting an essential function of ultrasonography in the diagnosis of PCOS even at a younger age (Shah *et al.*, 2010).

RESULTS AND DISCUSSION

Polycystic ovaries are associated with 80% of cases of infertility due to an ovulation. PCO has the clinical manifestation of hirsutism, obesity, acne, amenorrhea/ irregular cycle, etc. There is also co involvement of psychological and neurological abnormalities in infertility with PCO. So females of childbearing age should be screened for polycystic ovaries through a baseline scan which is done on the 2nd or 3rd day of the cycle. Patients of polycystic ovaries have a variable picture of ovaries on ultrasound depending upon the stage of evolution. The majority of patients demonstrated multiple peripheral ovarian follicles with large ovarian volumes in some, indicating an important role of ultrasonography in the diagnosis of PCOS even at a younger age. The scan can also predict ovarian reserve and response that can guide to decide the stimulation protocols of assisted reproductive techniques. Once pregnant, women with PCOS have a significantly increased risk of pregnancy-related complications.

CONCLUSION

Polycystic ovary syndrome is a hormonal condition common to women of reproductive age. Women with PCOS can have infrequent or prolonged menstrual cycles and excess male hormone levels. The ovaries can produce numerous small follicles that have failed to release eggs regularly, causing infertility. Ultrasound has a major role not only in the diagnosis of infertility related to PCOS but also in deciding treatment modalities and identifying fetal or obstetrical complications, once females with polycystic ovaries get pregnant.

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