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Review

Correlation of Polycystic Ovary Syndrome with Infertility on Sonography: A Systematic Review

Sania Shabir[1*], Sayyeda Khadija[2], Amna Shafiq[3]

University of Auckland - Waipapa Taumata Rau

***Corresponding Author's Email: saniashabir0@gmail.com**

Abstract

PCOS is a hormonal disorder that affects women during their reproductive years (ages 15 to 44). It is a condition that affect ovulation and the ovaries. Many fluid-filled sacs develop inside the ovaries in PCOS. These are follicles, each of which contains an immature egg. The egg is never mature enough to cause ovulation to occur. Woman can't get pregnant if they don't ovulate. The levels of estrogen and progesterone are smaller than normal, although the levels of androgen are higher than usual. The aim of this research is to assess the sonographic features and presentation of PCOS in infertile women and the determination of prevalence of PCOS in infertile with Transvaginal high resolution Ultrasound. An electronic database search with data range from 1989-2020 was performed (Science Direct, Google Scholar, PubMed and Springer). All studies, fully available evaluating PCOS on TVS/ TAS. Thirty-one articles were found. Performance of Ultrasound diagnosis was evaluated. Prevalence of PCOS in women with infertility varies in different reports from was 16.7% in Nigeria,18.93% in Saudi Arabia and 54.9% in India.12 numbers of follicles measuring 2-9 mm was best border of PCOS with sensitivity of 99% and specificity of 75%. It is concluded that TVS is superior to TAS. PCOS represents 80% of an ovulatory infertility cases. Sonographic criteria of PCOS is 10-12 follicles with a maximum diameter <8 mm, increased ovarian volume (12.3 ml) and increased echo density of the ovarian stroma while in a study in 2008-2010 for the definition of PCOM, the former threshold of >12 for FN is no longer valid. A serum AMH >35 pmol/l (or >5 ng/ml) appears to be more sensitive and specific.

Keywords: Polycystic ovaries syndrome, infertility, Transvaginal ultrasound, ovulation, FNPO, FNPS

INTRODUCTION

Infertility assessment should start with six months after ineffective pregnancy attempt If the couple have sex (2-3 times/week) without contraceptive methods according to the American Society for Reproductive Medicine.

Infertility assessment should start in women with PCOS or any other cause of subfertility. PCOS is an endocrine disorder that affects 8 to 10 per cent of persons and can be characterized as loss of pregnancy after 12 months of unprotected relationships in women over 35 years of age. Polycystic ovarian syndrome include infertility, sexual, neurological and metabolic properties (PCOS is the most common cause of female infertility) (De Souza, Nattiv et al. 2014).

Up to 15 in 100 women have this condition during their reproductive years, according to retrospective studies (Busnelli et al., 2015).

In one study, reproductive disease affects between 5% and 13% of reproductive women. At least 12% of couples worldwide are currently affected by infertility. After the international consensus in Rotterdam in 2003, ultrasound guidelines have been used for the diagnosis of PCOS (Balen et al., 2003).

The criterion for confirming PCOS were two of these Clinical characteristic elements - oligomenorrhoea/ amenorrhea, hyper androgenic signs and radiological. PCO ultrasound findings, either in ovarian volumes: 1 or 2 ovary > 10 cm^3 or 1 or two ovary >12 follicles. Increased ovarian volume (12.3 ml), echo-density of the ovary stroma, and PCOS indications (10 follicles with a median diameter <8 mm). The scan should be repeated during ovarian quiet to assess the volume and area of the follicle with a diameter of more than 10 mm (Sreesujatha et al., 2016).

RESULTS

Prevalence of PCOS was different in different articles and areas. 16.7% prevalence found in Nigeria and 54.9% in India while 18.93% in Saudi Arabia. Primary infertility was found in 61.3 percent of PCOS and secondary infertility was found in 38.7% of PCOS women. The most sensitive feature was ≥ 12 follicles (82% and 69% in the right and left ovary)

To determine diagnostic findings following are thresholds.

1. The 26 follicle FNPO thresholds had the greatest balance between sensitivity (85%) and specificity (94%),
2. The nine follicle FNPS threshold was 69% sensitive and 90% specificity,
3. 10 cm (3) OVs had the 81% sensitivity and 84% specificity. The ovary volume, area, stroma and mean S/A ratio were significantly higher for PCOS patients than for multifollicular and control groups. The specificity for PCOS diagnosis stood at 21%, 4%, 62% and 100%, respectively.

DISCUSSION

Using a 3.5 mHz long-focused transducer, trans-abdominal pelvic ultrasonography is performed. Medical characteristics of 556 patients with PCO diagnosed by ultrasound (Akiyama et al., 2019).

FNPO, follicle numbers in a single cross section (FNPS) and OV were suggested as diagnostic thresholds. When it came to distinguishing between controls and PCOS, a FNPO threshold of 26 follicles provided the perfect balance of sensitivity (85%) and precision (94%) (Hamilton-Fairley and Taylor, 2003).

The research took place between May 2001_April 2002 included 49 women with PCOS, ranging in age from 18 to 39 years' old who had never given birth (Regidor and Schindler 2016) and divided into two groups. Austrian women and immigrant women. Examined women show typical symptoms of PCOS. Both groups had erratic cycles: 26.1 percent of Austrian immigrant women and 22.2 percent of Moslem immigrant women had no menstrual bleeding without treatment, and 78.6 percent of both groups had amenorrhea for more than two months without being pregnant (Melo, Vieira et al. 2010).

A total of 750 infertile women's data in April 2018 to June 2019 was collected and 255 cases were examined and selected as a sample. In the follicular process (13th day of the cycle), All of the patients underwent two ultrasound examinations. PCO demonstrated with (73.95%) (Saltvedt et al., 2006).

Patients with PCOS may be classified as mild, moderate or high-risk based. A mild score assigned to 5.1 percent of cases, 61.5 percent to moderate cases, and 33.3 percent to extreme cases. In the high-risk population, 89.8% of women did not become pregnant (Baqai et al., 2010).

An ovulatory infertility was diagnosed in 98 (34%) of the 289 couples who were categorized according to the cause of their infertility. Just 17 (17%) of the 98 an ovulatory patients had regular ovaries, while 81 (83%) had PCO. PCO is present in 81 (83%) of 98 an ovulatory patient, 40 (53%) of 76 patients with sperm dysfunction, 26 (50%) of 52 patients with tubal disorder, and 28 (44%) of 63 patients with unexplained infertility among 289 couples categorized into four key diagnostic categories (Rafique et al., 2020).

A study held in the Infertility Care and IVF center from May 1, 2007 to August 1, 2008 include 320 infertile women between the ages of 18 and 45. Primary infertility was found in 61.3 percent of PCOS women and secondary infertility was found in 38.7% of PCOS women (ZHU 2016).

For all 320 women, transvaginal ultrasonic screening with an 8 MHz vaginal transducer was performed twice (Hussein and Alalaf, 2013).

A study from January-February 2007 showed Transvaginal ultrasound observations of ovaries (Dewailly et al., 2011).

The ovarian volume, area, stroma, and mean s/s proportion of PCOS patients was significantly greater than in multifollicular and control groups. The sensitivity to PCOS diagnostics was 21%, 4%, 62%, and 100%. The relationship between PCOS and the control or multifollicular women can be evaluated by the S/A relationship with a sensitivity and a specificity of 100 percent (Hassan and Killick, 2003)

From January December 2009, 1210 people in a study at the Baqai Institute of Reproduction and Develop-mental Sciences (BIRDS), all of whom were concerned about their fertility. PCOS was found in 496 (40.9 percent) of the 1210 women who participated (Baqai et al., 2010)

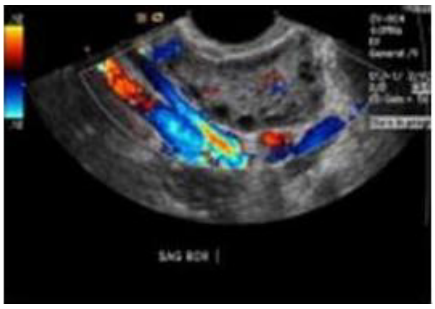

Figure 1. Transvaginal Ultrasound of 25 years old female (inability to conceive). Multiple (8-10) peripherally arranged small follicles in both ovaries.

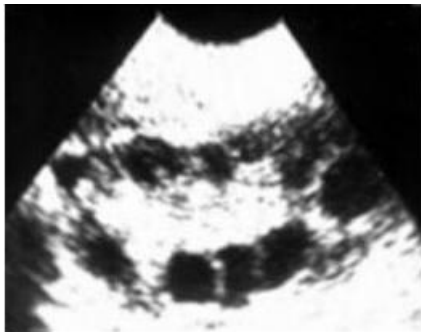

Figure 2. Typical ultrasound evidence of PCO/PCOS of the peripheral cystic pattern: a high number of small sub capsular follicles (13 follicles with a maximum diameter <8 mm), increased ovarian volume (12.3 ml) and increased echo density of the ovarian stroma.

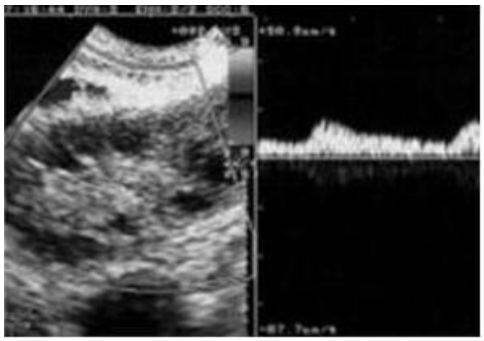

Figure 3. Intra-ovarian stromal vascularization in PCO/PCOS: small stromal vessels with low downstream impedance (resistance index = 0.54).

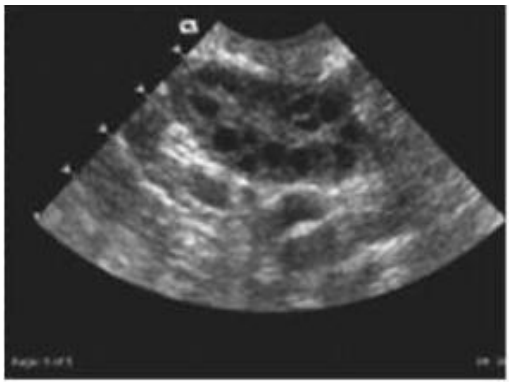

Figure 4. The transvaginal ultrasound images show multiple follicles between 0.5 - 1.0 cm in diameter in excess of 10 on each side. Ovaries were borderline-enlarged

Between 2008 and 2010, ultrasound evidence collected in 240 patients for the purpose of investigating menstrual irregularities, and infertility. Threshold values of FNPO and Serum AMH of 19 follicles and 35 pmol/l provided the best balance between sensitivity (81 and 92 percent) and specificity (92 and 97 percent) (Hussein and Alalaf, 2013).

The previous threshold of >12 for FN has ceased to be applicable in the definition of PCOS. The serum AMH > 35 pmol/l (or > 5 ng/ml) is considered to be more sensitive and specific (Smith-Tran, 2018).

The ultrasound features in the polycystic ovary are: 1) enlarged ovaries that are generally more spherical in shapes; 2) a number of small follicles of equal size that are clustered along the periphery, impressing like a "pearl string;" 3) hyper-higher and hyper-eco-stroma in the middle of ovaries (Jones et al., 2012).

In 2014, the Société Androgen Excess (AEPS) recommended FNPO (follicle number per ovary) 25 to concept of PCOM, using newer technology to provide the best resolution to ovarian follicles (i.e. transducers' frequency >8 MHz). If this technique is not available, ovarian volume is recommended for the diagnosis of PCOS (Battaglia et al., 2012).

In one study, 432 women with PCOS were associated with 153 aged female supervisors (Yaman, Ebner et al. 2002) Both participants received a cross-vaginal or trans rectal ultrasound screening on days 3-5 of the menstrual cycle. FNPO has better forecast PCOS as a single metric. While S/A has enhanced the FNPO's predictive power (Swan et al., 2005).

While treating patients with PCOS who want to improve infertility, The 2 x 2000 mg myoinositol + 2 x 200 mg of folic acid twice daily mixture.3602 patients have been evaluated for PCO syndrome. After 2 to 3 months total of 545 women were pregnant. This indicates that 15.1% of females surveyed were pregnant during the research (Oddens, 1999).

CONCLUSION

In this review study, it is concluded that trans-vaginal Ultrasound is more skillful than Trans-abdominal. PCOS represents 80% of an ovulatory infertility cases (Ragab et al., 2015) PCOS's ultrasound criterion is 10 follicles with a diameter of <8 mm and an improved ovarian volume of 12.3 ml. While the previous threshold of >12 for FN is no longer applicable in the 2008-2010 PCOM classification report. A more stable and precise AMH serum >35 pmol/l (or >5 ng/ml) is apparently found. Though adding S/A increased the FNPO's predictive capacity.

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