Polycystic ovarian syndrome is a complex endocrine disorder of women of reproductive age group. Patients clinically present with obesity, hirsutism, acne and menstrual irregularities and infertility which affect the quality of life by having medical, social, cosmetic and psychological implications. 1 PCOS is hypothesized to result from excessive androgens production by ovaries 2 however insulin resistance and raised levels of gonadotropins are also being held responsible for this disease process. 3, 4 PCOS is the most common cause of an-ovulatory infertility affecting 90-95% of patients. 5, 6 PCOS is the most common female endocrine disorder in developed countries with prevalence of 15-20 % but prevalence is much higher in south Asian women (52%). 7 Despite its high prevalence and economic burden, no single criterion has been sufficient enough to correctly diagnose it. 8 Currently used criteria include clinical features, hormonal assays and sonographic features. Hormonal assays are expensive investigations and when used alone each of this criteria is unreliable and can result in marked number of false positive and false negative diagnosis. 9, 10

Materials and Methods

This was as descriptive cross sectional study conducted at department of radiology, Combined Military Hospital, Lahore from Nov 2018 to April 2019. Study was approved by ethical committee of CMH Lahore.
Polycystic Ovarian Syndrome was defined according to Rotterdam consensus which states presence of any two of the following:

1-Oligomenorrhea/Anovulation
2-Signs of Hyperandrogenism.
3-Polycystic ovaries detected on Grey Scale Ultrasound;>12 follicles in each ovary and/or increased ovarian volume (>10 mL).8

Sample size was 205 cases, calculated keeping confidence level 95% with 5% margin of error, and expected percentage of deranged ovarian artery Doppler indices as 84.2%.12 Patients were selected by Non-Probability, Consecutive Sampling.

Inclusion criteria were diagnosed cases of PCOS as per Rotterdam criteria as stated above. Married patie-nts of reproductive age (18-40 years) were scanned at day 3rd to 8th day of menstrual cycle. Exclusion Criteria were patients who were receiving oral contraceptive pills or having biochemical evidence of hyperprolactinaemia, thyroid disease or adrenal hyperplasia detected on screening laboratory investigations.

Transvaginal USG (TVS) was used to localize ovarian arteries in the ovarian hilum on both sides. Pulsed Doppler range gate was set across vessel and average of three waveforms was obtained. Ovarian Doppler artery indices including Pulsatility index (PI=S-D/mean) and Resistive index (RI=S-D/S) were computed. Data was stratified for age, BMI and duration of PCOS.

Results

This study involved 205 women aged between 18-40 years presenting with PCOS. Pulsatility and Resistive indices of both ovarian arteries was calculated & labelled as deranged if it was above or below the cut-off value (Pulsatility Index: 4.25 – 0.91, Resistive Index: 0.93 – 0.005). The mean age of the patients was 27.2 – 5.9 years while the mean duration of PCOS was 18.4 – 7.1 months. The BMI of patients ranged from 20.8 Kg/m² to 34.0 Kg/m² with a mean of 26.9 – 3.9 Kg/m². 68 (33.2%) women were obese. The Pulsatility index ranged from 2.01 to 4.27 with a mean of 3.28 – 0.68 while the Resistive index ranged from 0.80 to 0.94 with a mean of 0.87 – 0.03. Ovarian artery Doppler indices were deranged in 175 (85.4%) women with PCOS. There was no statistically signi-

ificant difference in the frequency of deranged ovarian artery Doppler indices across various subgroups based on patients age (p-value=0.944), BMI (p-value=0.995) and duration of PCOS (p-value=0.931).

<table>
<thead>
<tr>
<th>Deranged ovarian artery Doppler indices</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>175</td>
<td>85.4%</td>
</tr>
<tr>
<td>No</td>
<td>30</td>
<td>14.6%</td>
</tr>
<tr>
<td>Total</td>
<td>205</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 1: Percentage of deranged ovarian artery Doppler indices in women with PCOS n=205

<table>
<thead>
<tr>
<th>Subgroups</th>
<th>n</th>
<th>Deranged ovarian artery Doppler indices (n=175)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-29 years</td>
<td>131</td>
<td>112 (85.5%)</td>
<td>0.944</td>
</tr>
<tr>
<td>30-40 years</td>
<td>74</td>
<td>63 (85.1%)</td>
<td></td>
</tr>
<tr>
<td>Duration of PCOS (months)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-18 months</td>
<td>101</td>
<td>86 (85.1%)</td>
<td>0.931</td>
</tr>
<tr>
<td>19-30 months</td>
<td>104</td>
<td>89 (85.6%)</td>
<td></td>
</tr>
<tr>
<td>BMI (Kg/m²)</td>
<td></td>
<td></td>
<td>0.995</td>
</tr>
<tr>
<td>20-25 Kg/m²</td>
<td>58</td>
<td>49(84.4%)</td>
<td></td>
</tr>
<tr>
<td>25-30 Kg/m²</td>
<td>69</td>
<td>57(82.6%)</td>
<td></td>
</tr>
<tr>
<td>30-34 Kg/m²</td>
<td>78</td>
<td>69(88.4%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Stratification & prevalence of deranged ovarian artery Doppler indices in women with PCOS n=205

Discussion

Polycystic ovarian syndrome is a complex endocrine disorder of women of reproductive age group. PCOS
has a prevalence of 6.6% in women of reproductive age and affects 4-5 million women of reproductive age in the United States.\(^1\)

In the present study, the mean age of the patients with PCOS was 27.2 – 5.9 years. A similar mean age of 27.2 – 4.8 years and 27 – 5.2 years has been reported by Artani et al.\(^9\) and Wahab et al.\(^{67}\) among women presenting with PCOS. Akram et al.\(^7\) reported similar mean age of 26.7 – 4.8 years among such women while Usmani et al.\(^{14}\) observed it to be 28 – 4.2 years. Similar observation was made by Chaudhari et al.\(^{15}\) and Kumar et al.\(^{16}\) who reported mean age of PCOS as 27.7 – 7.6 years and 28.6 – 6.3 years respectively.

We observed that the mean BMI of these patients was 26.9 – 3.9 Kg/m\(^2\). Similar mean BMI has been reported among women with PCOS by Akram et al.\(^7\) (26.2 – 4.5 Kg/m\(^2\)) and Qazi et al.\(^{17}\) (27.6 – 5.7 Kg/m\(^2\)) in local population and Gupta et al.\(^{18}\) (26.5 – 5.1 Kg/m\(^2\)).

In the present study, the mean Pulsatility index was 3.28 – 0.68 while the mean Resistive index was 0.87 – 0.03 in 84.5% in women with PCOS. Similar results have been reported in another local study where Bano et al.\(^{12}\) observed the mean PI and RI to be 3.89 – 0.76 and 0.93 – 0.10 respectively among 84.2% of women presenting with PCOS. Our observation is in line with that of Maciolek-Blewniewska et al.\(^{21}\) who reported similar mean PI (3.19 – 0.52) and mean RI (0.87 – 0.04) in women with PCOS. Similar PI (3.34 – 0.18) & RI (0.86 – 0.02) in 88% of women have been reported by Aleem et al.\(^{22}\)

**Conclusion**

In our study we observed the frequency of deranged ovarian artery Doppler indices in 85.4% of women with PCOS. This significant percentage suggests potential role of Doppler indices in the diagnostic workup of women with suspicion of PCOS.

A very strong limitation to this study was lack of a control group which could have further established the role of deranged ovarian artery Doppler indices in the discrimination of women with and without PCOS. Such a study is highly recommended in future research.

**Conflict of Interest:** None

**References**


10. Battaglia C. The role of USG and Doppler analysis


