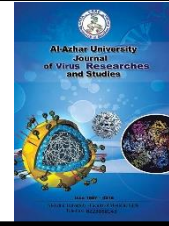




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Clinical and Hormonal Impacts of Unilateral Polycystic Ovarian Morphology (PCOM)

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Abstract

Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder in women of fertile age. The prevalence, time of onset, and severity of clinical features vary among different ethnic and racial groups. Though there is significant reproductive, endocrine, and metabolic morbidity of PCOS. The existence of unilateral PCO suggests that PCOS may be a primary ovarian disorder. To detect the correlation between the unilateral polycystic ovarian morphology and clinical presentations and hormonal profile of women with unilateral PCOM. An observational study was conducted at Al-Zahraa University Hospital, Department of Obstetrics and Gynecology, through the period from December 2020 to September 2021 on 60 women with unilateral polycystic ovarian morphology (PCOM) confirmed by ultrasound. Data about Clinical features, associated diseases, family history, hormonal levels, and ultrasonography were collected in all patients to exclude other disorders that mimic these clinical features of PCOS. The present study revealed that the mean ovarian volume of PCO had a significant negative correlation with FSH and a significant positive correlation with LH/FSH ratio, and prolactin hormone. The mean follicle number per ovary (FNPO) of PCO had a significant positive correlation with LH, LH/FSH ratio, and AMH. There was a statistically significant increase in E2 (pg/mL) hormone and AMH (ng/mL) in virgin and married women with unilateral PCO. There were no significant differences in FSH, LH, LH/FSH ratio, Total testosterone, DHEA-S, and prolactin hormone between married women with unilateral PCO and virgins with unilateral PCO. We propose that Unilateral PCOM that was diagnosed accidentally during transvaginal ultrasound examination may have no impact on clinical presentations or hormonal profile, thus the presence of unilateral PCOM may be primarily an ovarian disorder.

Keywords: Polycystic Ovarian Syndrome; FSH, LH, AMH; Clinical Correlation; unilateral Poly Cystic Ovarian morphology.

1. Introduction

Polycystic ovary syndrome (PCOS) is an extremely common heterogeneous endocrinological disorder that occurs in 5% to 20% women in reproductive age group depending on the diagnostic criteria used

and the population studied [1]. Polycystic ovary syndrome consists of Chronic anovulation, menstrual disturbance, hyperandrogenism, polycystic ovaries, metabolic syndrome [2-3]. The current

definition of PCOS is based on Rotterdam consensus meeting in 2003. It defines the syndrome as presence of any two of the following three criteria.

1) Menstrual disturbance; oligomenorrhea/ anovulation. 2) Clinical and/or biochemical signs of hyper Androgenism like acne, hirsutism etc., after exclusion of other causes of hyperandrogenism.

3) Ultrasound appearance of polycystic ovary [4, 5] (an increased ovarian volume > 10 ml), (presence of 12 or more follicles in either ovary measuring 2 to 10 mm in diameter with a pearl necklace appearance), unilaterally at ultrasound as a morphological indicator of PCOS. Only one ovary needs to meet these criteria [6]. The aim of hormonal assessment is to support the diagnosis of PCOS in case of unilateral PCOM to exclude other causes of menstrual irregularity and clinical hyperandrogenize and assess for associated clinical issues, such as diabetes and hyperlipidemia. Specific hormones have prominent roles in diagnosis of PCOS (such as Follicular stimulating hormone (FSH), luteinizing hormone (LH), Anti Mullerian hormone (AMH), estradiole (E2), Total testosterone, dehydroepiandrosterone sulfate (DHEA-S) and prolactin hormone [7]. The primary objectives of this study were to study the correlation between clinical, biochemical and ultrasonographic parameters in women with unilateral PCO.

2. Patients and Methods

This observational study was conducted at Al Zahraa University Hospital, Department of Obstetrics and Gynecology, through the period from December 2020 to September 2021. The study included "60" unilateral polycystic ovarian syndrome (PCOS) women, they were recruited from outpatient clinic after giving informed consent. The study protocol was approved by the local Ethics Review Committee. The study included women with only one ovary showed picture of PCOM defined by

an ovarian volume >10 ml and/ or a FNPO > 12 and the other ovary show no abnormality.

We excluded from the study pregnant or lactating women, women taking hormonal contraceptive or insulin sensitizer, women having thyroid abnormalities, Primary Hyper-prolactinoma, past History of ovarian surgery for example cystectomy and oophorectomy and women having ovarian or adrenal tumors were excluded from the study. All patients were evaluated on outpatient's basis and complete history was taken especially menstrual and obstetric. Obstetric history included fertility status of the patient. Clinical examination focused on anthropometry; height in cm, weight in kg, Hirsutism was graded on the bases of Ferriman- Galleway (FG) score. Abdominal and pelvic examination done.

2.1 Diagnostic evaluation with Ultrasonographic Assessment

Ultrasonographic examination of the ovaries was performed with the use of Ultrasonographic examination of the ovaries was performed with the use of 8-MHz transvaginal transducer and 4-MHz transabdominal transducer (LOGIQV5).

Ovarian volume and the number, diameter and distribution of follicles were recorded. Ultrasound examinations were conducted in the early follicular phase of the menstrual cycle. End points of interest included FNPO, and OV.

PCO was defined as the presence of 12 or more follicles measuring 2-9 mm in diameter in each ovary and / or ovarian volume > 10 ml. Other possible causes of symptoms were excluded.

2.2 Diagnostic evaluation with Biochemical Assays

Hormonal and ultrasound examinations were performed on the same day. In the early follicular phase (between Day 2 and Day 5) of a spontaneous normal cycle or

after a progesterone challenge test using Steronate (Norethisterone acetate 5 mg/12 h for 10 days) in women with oligomenorrhea. Serum levels of prolactin, TSH, E2, FSH, LH, LH:FSH ratio (LH:FSH ratio 2:1 was taken significant). Total Testosterone, dehydroepiandrosterone sulfate and anti-Mullerian hormone (AMH) prolactin hormone was measured.

2.3. Statistical analysis of the data

Data were fed to the computer and analyzed using IBM SPSS software Package version 20.0 (Armonk, NY: IBM Corp). The Kolmogorov-Smirnov test was used to verify the normality of distribution. Quantitative data were described using range (minimum and maximum), mean, standard deviation, median and interquartile range (IQR). Significance of the obtained results was judged at the 5% level, setting P-value <0.05 as significant.

3 .Results

A total of 60 women were included in the study and were analyzed. The study included 28 virgin and 32 married women (18 out of the 32 married women were infertile). Table. 1 shows the mean values of different characteristics of the women with unilateral PCO. The mean BMI was (25.12+/-4.45) which was in the range of overweight, 48.3% of our patient were overweight (BMI 25-29.9) kg/m². The Mean age was (27.92+/-4.63) years, Maximum number of patients accounting to 43.3%, presented between the age group of 25-29 years. Table. 2 shows the clinical presentation of the patient 31.7% of patients in our study group had oligomenorrhea. It was most common symptom in our study group, followed by infertility (30%) [15% primary infertility ,15% secondary infertility], then hirsutism (26.7%). with hirsutism. and finally (11.66%) had acne.

Table (1): Demographic data of the studied cases (n = 60).

	No.	%	Range	Mean ± SD.	Median (IQR)
Age (years)			20.0 – 40.0	27.92± 4.63	30 (25-30)
< 20	6	10.0			
20-24	22	36.6			
25-29	26	43.3			
30-35	3	5			
36-40	3	5			
BMI (kg/m²)			17.20-37.30	25.12±4.45	25.0(22.15-27.85)
Under Weight <18.5	4	6.6			
Healthy Weight 18.5 – 24.5	25	41.6			
Overweight 25 – 29.9	29	48.3			
Obese 30 – 39.9	6	10			
Parity			0.0-3.0	0.40±0.84	0.0(0.0-0.0)
Virgin	28	46.7			
Nullipara	13	21.7			
Multipara	19	31.7			

Table (2): Clinical presentation of the studied group (n = 60).

Complaint	No.	%
Infertility	9	15.0
1. Primary infertility	9	15.0
2. Secondary infertility		
Oligomenorrhea	19	31.7
Secondary Amenorrhea	3	5.0
Hirsutism	16	26.7
Acne	7	11.66

Table. 3 shows the polycystic ovary was significantly enlarged and shown increase Follicles Number Per Ovary than contralateral ovary. Table. 4 shows that the mean ovarian volume (OV) of PCO had significant negative correlation with FSH and significant positive correlation with LH/FSH ratio, and prolactine hormone.

Mean Follicles Number Per Ovary (FNPO) of PCO had significant positive correlation with LH, LH/FSH ratio, and AMH. Table. 5 shows that there was no significant correlation of ultrasonographic data of unilateral PCO (OV, FNPO) and clinical presentations.

Table (3): Descriptive analysis of the studied cases according to ultrasonographic findings (n = 60).

Ultrasonography	Unilateral PCO	Contralateral Ovary	P Value
Ovarian volume (cm³)			
Range	10.0 – 21.80	3.50 – 9.50	< 0.001
Mean ± SD.	12.99 ± 2.38	6.54 ± 1.57	
Median (IQR)	12.70 (10.95–14.18)	6.50 (5.50 - 8.0)	
FNPO			
Range	11.0 – 24.0	2.0 – 8.0	< 0.001
Mean ± SD.	14.48 ± 2.88	4.43 ± 1.45	
Median (IQR)	14.0 (12.0–16.0)	4.0 (3.0 – 6.0)	

Table (4): Correlation of hormonal profile changes with unilateral PCOM.

	Polycystic ovary			
	Ovarian volume (cm3)		FNPO	
	R	P-value	R	P-value
FSH (mIU/mL)	-0.364**	0.004	-0.179	0.172
LH (mIU/mL)	0.115	0.384	0.342**	0.007
LH/ FSH ratio	0.308*	0.017	0.397**	0.002
E2 (Pg/mL)	-0.038	0.771	0.164	0.211
Prolactin (ng/mL)	0.280*	0.030	0.153	0.243
Total testosterone (ng/mL)	0.054	0.680	0.091	0.487
DHEA-S (ng/dL)	-0.086	0.513	-0.011	0.932
AMH (ng/mL)	0.120	0.359	0.232**	0.022

Table (5): Correlation of ultrasonographic data of PCO and clinical presentation.

Polycystic ovary					
		Ovarian volume (cm ³)	P-value	FNPO	P-value
		Mean ± SD		Mean ± SD	
Parity	Virgin	12.7 ± 2.39	0.468	14.14 ± 2.95	0.540
	Nullipara	13.69 ± 3.43		15.23 ± 3.68	
	Multipara	12.92 ± 1.31		14.47 ± 2.14	
Hirsutism	No	13.02 ± 2.4	0.859	14.55 ± 2.83	0.785
	Yes	12.89 ± 2.42		14.31 ± 3.11	
Oligomenorrhea	No	12.95 ± 2.06	0.848	14.49 ± 2.92	0.986
	Yes	13.07 ± 3.03		14.47 ± 2.89	
1y infertility	No	12.97 ± 2.39	0.906	14.33 ± 2.6	0.288
	Yes	13.08 ± 2.51		15.5 ± 4.41	
2nry infertility	No	13 ± 2.54	0.910	14.47 ± 3.04	0.936
	Yes	12.9 ± 1.2		14.56 ± 1.88	
Acne	No	12.97 ± 2.44	0.911	14.63 ± 2.98	0.242
	Yes	13.09 ± 2.02		13.17 ± 1.33	
Amenorrhea	No	13 ± 2.42	0.795	14.53 ± 2.92	0.619
	Yes	12.63 ± 1.85		13.67 ± 2.52	

4. Discussion

PCOS has been classically described as “bilateral ovarian enlargement” with obesity, hirsutism and infertility. The occurrence of a single PCO with contralateral ovary being normal was first reported in 1964 [7-9]. Later, the ultrasound criteria were added to the definition of PCOS in International consensus definition and this definition incorporated the unilateral polycystic ovary also [10]. According to the Rotterdam criteria, one ovary fitting the international consensus definitions, or the occurrence of one of the criteria, is sufficient to qualify as PCOS [11]. We included 60 women in reproductive age with unilateral PCOM. Our study included virgin 28 case (46.7%), 32(53.33) of cases were married (18 out of the 32 married women were infertile) (56.25 %). In our study group Mean age was (27.92±/4.63) years. Jayasree et al. (2017) [12] conducted a study on adolescent group, the mean age of the study population was 17.1 years. Ghongdemath

and Venkatesh [13] conducted a cross sectional study which included total 74 women with unilateral PCOM. The mean age was (24.88 ±/ 4.03) [14]. In the present study: we found that most of the study group 48.3% were in overweight category, while 41.6% were in normal weight category, 10% were in obesity category, and 6.6% were in underweight category. The mean BMI (25.12±/4.45) Kg/m². Huang et al. [14] conducted a study on 121 women 16% of women with unilateral PCO were obese [14]. In agreement with our result Jayasree et al. [12] found that in the study applied on adolescent group 65.97% were in the overweight category and 30 were obese [20]. Also, in accordance with our result Ghongdemath and Venkatesh [13] found that in the study included total 74 women, the mean BMI was (25.48 ±/ 3.75) which was in the range of overweight [14]. The prevalence of oligomenorrhea in our study is 31.7%. It was most common symptom followed by infertility 30% and

hirsutism 26.7%. In accordance with our study Huang et al., [14] conducted study on 121 women, The most frequently symptom of concern was menstrual irregularity or oligomenorrhoea. On the contrary of our study Yao et al., [15] conducted study among the 12 unilateral PCO patients, (58.33%) of cases were infertile, (25%) of patients had abnormal menstruation (oligomenorrhea or/ and hypomenorrhea) (33.33%) of patients showed obesity and (8.33%) of patient hirsutism [15]. In contrast to our results, the study done in Finland, found hirsutism in 59% of PCOS women. In the study done on Scandinavian women, the prevalence of hirsutism was higher (84%) which explained the ethnic variation in manifestation of hirsutism Penttila et al., [16] and Vanky et al., [17]. Bello& Odeku [18] found among the 57 unilateral PCO, the most common complaint was infertility (37.1%), followed by oligomenorrhea (29.6%) [18]. Jayasree et al., [12] reported that in the study applied on adolescent group; among them, 141 (97.91%) patients presented with menstrual irregularity, and 118 (81.94%) patients presented with clinical features of hyperandrogenism [12].

Ghongdemath and Venkatesh, [13] conducted study included total 74 women, it was found the most common presentation was hirsutism (39.8%), next common was hirsutism with acne which accounted for 11% which was in agreement with Indian study done on Bengali women Bhattacharya et al., [19], [20].

Jahanfar [21] reported that of the 217 subjects who underwent a transvaginal Ultrasound, the incidence of unilateral scan-PCO was found to be around 8%. Clinical features were found within this group with the following incidence: oligomenorrhea 12%, amenorrhea 24 %, hirsutism 23% and acne 35% [21]. In the present study there was no significance between the ovarian volume and FNPO of polycystic ovary and the clinical features of women with unilateral PCOM. In contrast to our results, Yao et al. [15] found the

incidences of abnormal menstruation and infertility were statistically significant with unilateral PCO, but lower than the typical PCOS (both $p < 0.05$) [15].

Patients with unilateral polycystic ovaries may exhibit milder degrees of ovarian and endocrine dysfunction; however, these patients may be more difficult to diagnose Yao et al., [15].

In our study, in cases with unilateral PCO we found that the mean LH, FSH, total Testosterone, E2, Prolactin, and DHEAS were in normal range. While there was elevation in the level of AMH, LH/FSH ratio. Therefore, unilateral PCO associated with elevated AMH in 86.66% and elevation of LH:FSH ratio in 65% followed by 48.3% of our cases showed increased total testosterone hormone. The present study showed that there was statistically significant association between FSH level and LH/FSH ratio in unilateral PCO cases with hirsutism.

On the other hand, there was no statistically significant difference in hormonal profile in infertile cases with unilateral PCO or those complaining of Oligomenorrhea. Whereas there was statistically significant increase in prolactin hormone level in unilateral PCO women with Amenorrhea. Also, there was statistically significant increase in E2 (Pg/mL) hormone and AMH (ng/mL) in virgin women with unilateral PCO than married with unilateral PCO. In contrast to our study Bhattacharya et al., [19]. found that in Indian study done 64% of women were hyperandrogenic, the total testosterone which was measured and not free testosterone [13].

In Li et al. [22] literature, about 30% of women with PCOS had LH /FSH ratio $>3:1$ and many researchers consider this ratio diagnostic for the syndrome [22].

However only 16% of Najem et al [23] patients had LH/FSH ratio >3 , indicating the low sensitivity of this test as a diagnostic tool in Libyan patients with PCOS [23]. Yousouf et al., [24] reported previous study including 100 PCOS women showed oligomenorrhea was

significantly associated with increase in LH:FSH ratio, increased total testosterone, and increased LH. Also reported that LH:FSH ratio raised in unmarried group (56%) than in the married group (26%). [24].

The present study showed that there was no statistically significant correlation between ovarian volume and FNPO and the age and BMI of women with unilateral PCO.

In contrast to our study Dipankar et al., [2] found within the ultrasonography diagnosed PCOS subjects had positive predictive value of high of BMI [2].

Ghongdemath and Venkatesh, [13] found that mean ovarian volume had significant association with obesity. It was noticed that the polycystic ovarian morphology was more seen in the left ovary and the possible explanation given was that the pre-pubertal girls have significantly larger left ovary compared to the right [14].

The present study showed that the mean ovarian volume of unilateral PCO had significant negative correlation with FSH and significant positive correlation with LH/FSH ratio, and prolactin hormone, The mean FNPO of PCO had significant

positive correlation with LH, LH/FSH ratio, and AMH.

Dipankar al., [2] found in ultrasonography diagnosed PCOS subjects had positive predictive value of high total testosterone and LH:FSH ratio which supports our results.

Ghongdemath and Venkatesh, [13] reported hyperandrogenemia women were associated with Bilateral involvement of ovary on ultrasonography more than unilateral involvement. There was statistically significant increase in the mean ovarian volume in the hyperandrogenemia group when compared to the non-hyperandrogenemia group.

5. Conclusion

Based on our study, we could conclude that there was significant decrease in Fetal Movements in pregnant women administrated Betamethasone, also decrease in MCA resistance index in Dexamethasone group one week post treatment but still with in normal range and increase umbilical artery RI in both groups but also still with in normal range.

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