Original Research Article

Association of endometrial status and changing menstrual patterns in polycystic ovarian syndrome

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Abstract

Polycystic ovarian syndrome (PCOS) is one of the most common reproductive and endocrinological disorders with a diverse spectrum of clinical manifestations affecting about 5-10% of women of reproductive age group. PCOS is a diagnosis of exclusion and many definitions have evolved over time. *Aim and objectives* A study was conducted from july 2015 to October 2017 in MGM Medical College and Hospital, Aurangabad after obtaining permission of institutional ethical committee. The aims and objectives of this study were to correlate endometrial status and changing patterns of menstrual complaints in PCOS. *Material and methods.* It was a cross sectional observational study of 100 patients. The endometrial thickness and changing pattern of menstrual irregularities were studied. *Results* 74% patients were between 21-35 years of age. 97% patients in the study presented with menstrual complaints. 61% patients had oligomenorrhoea with PCO morphology. 15% patients in the study had oligomenorrhoea with menorrhagia out of which 13.33% had endometrial hyperplasia. *Conclusion* We concluded that the endometrial status is not affected and still the menstrual pattern is altered. Hence menstrual complaints or endometrial thickness can't be the only parameters used for diagnosis of PCOS as they do not give a complete picture.

Key Words: PCOS, Endometrial thickness, Oligomenorrhoea

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INTRODUCTION

Polycystic ovarian syndrome (PCOS) is also called Stein and Leventhal syndrome. They described association of amenorrhoea with bilateral polycystic ovaries and obesity. PCOS is characterized by combination of hyperandrogenism, chronic anovulation and polycystic ovaries. (As shown by Rotterdam consensus workshop in 2003) It's the most common cause of hyperandrogenism, hirsutism and anovulatory infertility and is the most common endocrine disease in women of reproductive age group. PCOS incidence in women worldwide is 5-10%[1]. It occurs in 4% to 22% of women overall and in 50% of women seen at infertility clinics. It is characterized by low follicle-stimulating hormone levels, resulting in anovulation, elevated luteinizing hormone levels, resulting in hyperandrogenism, and insulin resistance.

Rotterdam diagnostic criteria – (2 out of 3)[2]

1. Oligoovulation or anovulation
2. Clinical and/or biochemical signs of hyperandrogenism
3. Polycystic ovaries -presence of 10- 12 or more follicles measuring 2-9mm in diameter in each ovary (even in 1 ovary is sufficient for diagnosis), or increased ovarian volume >10ml[3,4] [Exclusion of other etiologies like congenital adrenal hyperplasia, androgen secreting tumours, Cushing's syndrome]

Androgen excess in PCOS leads to inhibition of follicle development and estradiol production, there is increase in testosterone production and increase in peripheral

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conversion of estradiol to estrone by aromatase. As Polycystic ovarian disease is a hyperestrogenic state. So we expect patients to present with menorrhagia. But with changing lifestyle, a large number of patients present with hypomenorrhoea and / or oligomenorrhoea. Hence we conducted this study to correlate endometrial thickness with clinical presentation of syndrome.

MATERIAL AND METHODS

A cross sectional observational study of 100 patients was conducted from July 2015 to October 2017 in MGM Medical College and Hospital, Aurangabad after obtaining permission of institutional ethical committee. The aims and objectives of this study were to correlate endometrial status with the changing patterns of menstrual complaints in PCOS. The endometrial thickness and changing pattern of menstrual irregularities were studied.

Inclusion Criteria

- All newly diagnosed cases, according to Rotterdam's criteria between ages of 18-45yrs.
- All females who were already diagnosed with PCOS but were not currently on hormonal treatment for last 6months.

Exclusion Criteria

- Other aetiologies of anovulation like Hyperprolactinaemia
- Endocrinological disorders like

1. Diabetes mellitus Type I and II,
2. Thyroid disorders,
3. Congenital adrenal hyperplasia
4. Cushing's Syndrome

Patients coming to OPD with history suggestive of PCOS or with USG report suggestive of polycystic ovarian morphology were screened as per Inclusion and Exclusion criteria. History was elicited in detail. General and systemic examination was done. A USG was done, if not done previously, to look for State of ovaries and endometrial thickness. For patients presenting with infertility, follicular study was done. On day 2 a baseline scan was done and from day 9 follicle size was studied. The data was analyzed and accordingly the results were studied to give a conclusion.

RESULTS AND OBSERVATIONS

Table 1: Age Wise Distribution of patient N=100

Age-Group	No. of patients	Percentage
≤20 years	25	25%
21-35 years	74	74%
>35 years	1	1%
Total	100	100%
Mean±SD	23.42±4.18 years	

74% patients were between 21-35 years of age, with the mean age being 23.4 years.

Table 2: Distribution of patients according to Parity of married patients N=68

Parity	No. of patients	Percentage
Nulligravida	32	47.0%
Primipara	16	23.5%
Multipara	19	27.9%
GrandMultipara	01	1.47%
Total	**68**	**100%**

47% of Patients were Nulligravida after marriage.

Table 3: Distribution of patients according to symptoms at presentation N=100

Complaints at presentation	No. of patients	Percentage
Only Menstrual complaints	34	34%
Menstrual complaints with clinical signs of hyperandrogenemia	29	29%
Menstrual complaints with Infertility	19	19%
Menstrual complaint with infertility with clinical hyperandrogenemia	15	15%
Infertility with clinical hyperandrogenemia	3	3%

97% patients in the study presented with menstrual complaints out of which 29.89% had associated symptom of clinical hyperandrogenemia.

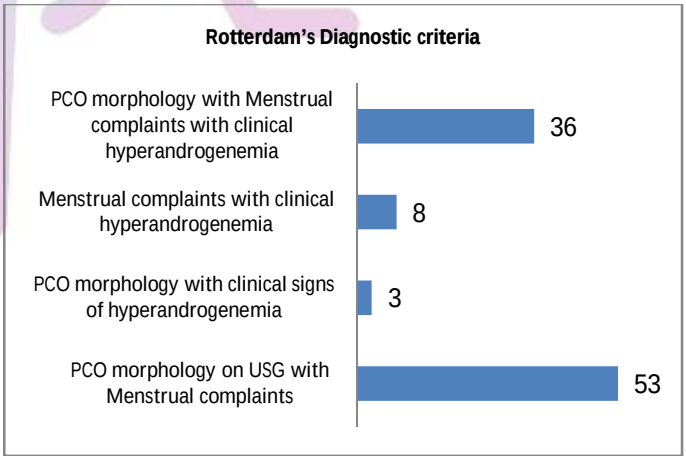

Figure 1: Distribution of patients according to Rotterdam's Diagnostic criteria N=100

64% patients were diagnosed due to presence of 2 criteria and rest 36% due to presence of all 3 criteria.

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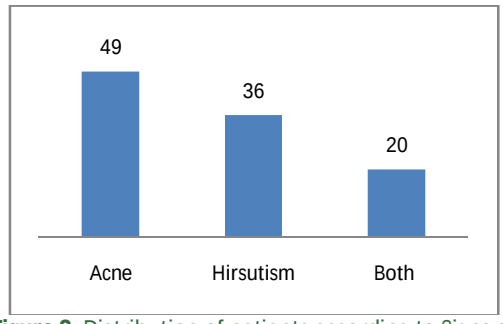

Figure 2: Distribution of patients according to Signs of hyperandrogenemia

49% patients had atleast 1 clinical sign of hyperandrogenemia in the form of Acne. 20% patients had both acne and hirsutism.

Table 6: Association of patients according to Type of menstrual bleeding and Polycystic ovarian morphology on Ultrasound N=100

Type of menstrual bleeding/PCO morphology	Present	Absent	Total
Normal cycles	4(4.34%)	1(12.5%)	5(5%)
Amenorrhoea	10(10.86%)	1(12.5%)	11(11%)
oligomenorrhoea	27(29.34%)	2(25%)	29(29%)
Hypomenorrhoea	7(7.6%)	2(25%)	9(9%)
Polymenorrhoea	3(3.26%)	0	3(3%)
Menorrhagia	4(4.34%)	0	4(4%)
Oligomenorrhoea with hypomenorrhoea	20(21.73%)	1(12.5%)	21(21%)
Oligomenorrhoea with menorrhagia	14(15.21%)	1(12.5%)	15(15%)
Polymenorrhoea with menorrhagia	3(3.26%)	0	3(3%)
Total	**92(100%)**	**8(100%)**	**100**

61% patients had the normoandrogenic phenotype of PCOS (oligomenorrhoea with PCO morphology). 20% patients presented with oligomenorrhoea with hypomenorrhoea which had PCO morphology on Ultrasound examination.

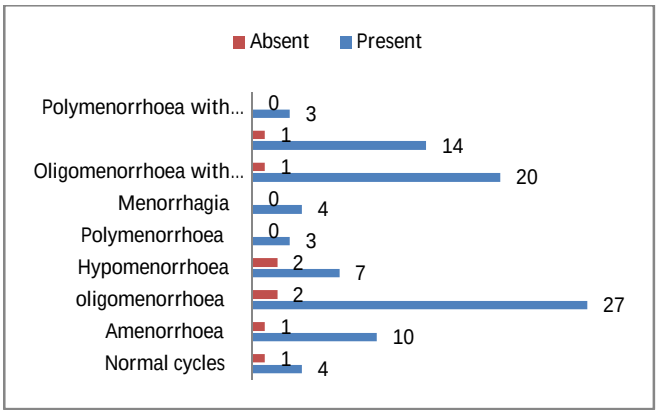

Figure 3: Type of menstrual bleeding/PCO morphology

Table 7: Distribution of patients according to endometrial thickness and PCO Morphology on USG N=100

ET [In mm]/ PCO morphology	Present	Absent	Total
≤4	6(6.52%)	1(12.5%)	7(7%)
4.1—10.9	78(84.78%)	7(87.5%)	87(87%)
≥11	8(8.69%)	0	8(8%)
Total	**92(92%)**	**8(8%)**	**100**

78% patients with normal endometrial thickness had polycystic morphology on ultrasound examination.

Table 8: Association between Types of menstruation and endometrial thickness (ET) N=100

Type of menstruation/ET (in mm)	≤4	4.1—10.9	≥11	Total	Chi-square value	p-value
Normal cycles	1 (14.28%)	4 (4.7%)	0	5 (5%)	1.71	P=0.426 NS
Amenorrhoea	0	8 (9.41%)	3 (37.5%)	11 (11%)	6.82	P=0.033 S
oligomenorrhoea	2 (28.57%)	26 (30.58%)	1 (12.5%)	29 (29%)	1.67	P=0.433 NS
Hypomenorrhoea	1 (14.28%)	7 (8.23%)	1 (12.5%)	9 (9%)	0.419	P=0.811 NS
Polymenorrhoea	1 (14.28%)	2 (2.35%)	0	3 (3%)	3.43	P=0.180 NS
Menorrhagia	0	3 (3.52%)	1 (12.5%)	4 (4%)	1.85	P=0.397 NS
Oligomenorrhoea with hypomenorrhoea	2 (28.57%)	19 (22.35%)	0	21 (21%)	9.12	P=0.016 S
Oligomenorrhoea with menorrhagia	0	13 (15.29%)	2 (25%)	15 (15%)	1.87	P=0.393 NS
Polymenorrhoea with menorrhagia	0	3 (3.52%)	0	3 (3%)	0.546	P=0.761 NS
Total	**7 (100%)**	**85 (100%)**	**8 (100%)**	**100 (100%)**		

15% patients in the study had oligomenorrhoea with menorrhagia out of which 13.33% had endometrial hyperplasia. 9.41% patients with amenorrhoea and 22.35% with oligomenorrhoea with hypomenorrhoea had normal endometrial thickness. This result was statistically significant.

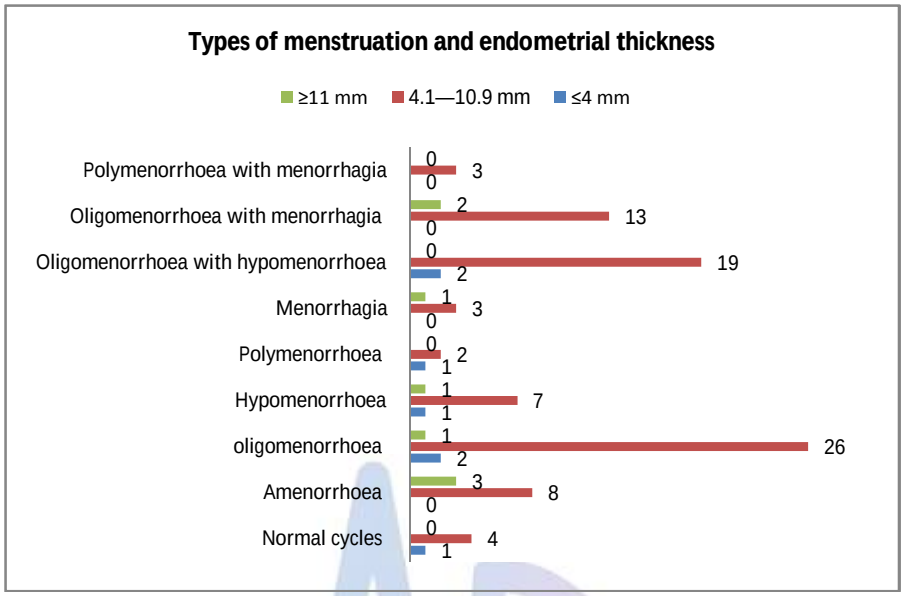

Figure 3:

Table 9: Association between endometrial thickness and menstrual pattern and amount of bleeding

Endometrial thickness(in mm) /Menstrual pattern	Frequency			Amount		
	Less	Normal	More	Scanty	Average	Heavy
≤4	4 (6.15%)	2 (6.89%)	1 (16.7%)	3 (10%)	4 (8.33%)	0
4.1-10.9	58 (89.23%)	22 (75.86%)	5 (83.3%)	26 (86.67%)	40 (83.34%)	19 (86.36%)
≥11	3 (4.61%)	5 (17.24%)	0	1 (3.33%)	4 (8.33%)	3 (13.63%)
Total	65 (100%)	29 (100%)	06 (100%)	30 (100%)	48 (100%)	22 (100%)
Chi-square value		9.27			3.77	
p-value		P=0.055 NS			P=0.437 NS	

65% patients in the study had oligomenorrhoea out of which only 89.23% had normal endometrial thickness. While 22% patients had menorrhagia, only 13.63% out of them had ET ≥11 mm. In my study frequency of menstrual bleeding had been affected in 71% patients while amount of menstrual bleeding was affected in 52% patients.

Table 10: Correlation between Endometrial thickness (ET) with Estrogen levels with menstrual pattern.

Estrogen levels (in ng/ml)	Menstrual pattern /endometrial thickness	Frequency			Amount		
		Less	Normal	More	Scanty	Average	Heavy
≤100	≤4 mm	1 (1.53%)	1 (3.44%)	0	1 (3.33%)	1 (2.08%)	0
	4.1—10.9 mm	4 (6.15%)	8 (27.58%)	0	2 (6.66%)	10 (20.83%)	0
	≥11mm	0	0	0	0	0	0
Chi-square value			0.207			1.13	
p-value			P=0.649 NS			P=0.287 NS	

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>100.1	≤4 mm	2 (3.07%)	1 (3.44%)	0	2 (6.66%)	1 (2.08%)	0
	4.1--10.9 mm	55 (84.61%)	14 (48.27%)	6 (100%)	24 (80%)	32 (66.67%)	19 (86.36%)
	≥11mm	3 (4.61%)	5 (17.24%)	0	1 (3.33%)	4 (8.33%)	3 (13.64%)
	Total	65 (100%)	29 (100%)	6 (100%)	30 (100%)	48 (100%)	22 (100%)
	Chi-square value		6.93			3.48	
	p-value		P=0.031 S			P=0.481 NS	

Hyperestrogenism is affecting frequency of menstruation more than amount of bleeding. In my study, irrespective of endometrial thickness, in hyperestrogenemia patients, oligomenorrhoea was more commonly seen while few had menorrhagia.

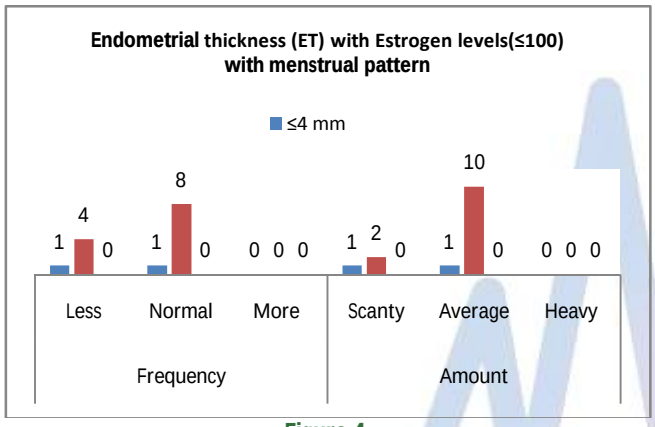

Figure 4:

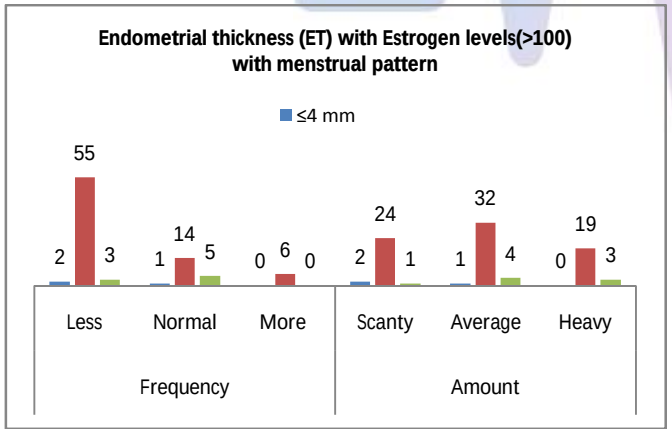

Figure 5:

DISCUSSION

Polycystic ovarian syndrome (PCOS) is one of the most common reproductive and endocrinological disorders with a diverse spectrum of clinical manifestations affecting about 5-10% of women of reproductive age group. During pubertal transition, several features may be in evolution and thus many findings may be transitory which stabilize later during adolescence. It is important to make an early diagnosis in order to prevent early and late sequel of the syndrome. PCOS is a diagnosis of exclusion and many definitions have evolved over time. Rotterdam criteria have been adopted worldwide. Now more emphasis is being given on the presence of either clinical and/or biochemical features of hyperandrogenism along with other features of PCOS for diagnosis. In our study 74% patients were between 21-35 years of age and the mean age of presentation was 23.4 years. The mean age of menarche was 12.8years.Sunanda B, Nayak S. in 2016[5] demonstrated in their study that 85% of the samples were in the age group of 21-25years.Ansu Mali Joshi et.al.in 2017[6] demonstrated the mean age as 24 ± 6 years in a retrospective analysis of 80 PCOS patients. Mohammad Abid Keen et.al.in 2017[7] demonstrated in his study the. Mean age of menarche in their patients was 13.8 ± 0.9 years with the mean age at presentation being 25.18years. In our study, 97% patients presented with menstrual complaints. 65% presented with oligomenorrhoea, 22% with menorrhagia, 30% with hypomenorrhoea and 6% with polymenorrhoea.5% had normal cycle while another 11% had developed amenorrhoea. Majumdar A.[8] demonstrated in his study that the prevalence of menstrual irregularities was more in overweight and obese group (79.2%) as compared to lean PCOS group (44%). Emily Zheng[9] conducted a study in 178 patients of PCOS with irregular mensus. Oligomenorrhoea was the most common pattern at presentation (71.4%).13.1% had regular mensus while 6.3% had polymenorrhoea. In various studies compared most common mode of presentation was with menstrual complaints with Oligomenorrhoea being the most common. In our study 92% patients had Polycystic Ovarian Morphology on ultrasound while 61% presented with the Normoandrogenic phenotype of PCOS i.e. oligomenorrhoea with PCO morphology on USG. In a cross-sectional community-based study conducted by Beena Joshi *et al* in 2014 in Mumbai oligomenorrhea with polycystic ovaries on USG was the most common phenotype (52.6%). In our study 85% patients presented with endometrial thickness between 4.1-10.9mm and 8% with ET >=11mm. The mean endometrial thickness was 6.86mm. 65% patients presented with oligomenorrhoea

out of which 89.23% came with endometrial thickness between 4.1 to 10.9mm.22% patients presented with menorrhagia out of which 13.63% patients had endometrial hyperplasia.11% patients presented with amenorrhoea out of which 72.72% patients had normal ET. In my study the proportion of patients having normal endometrial thickness is maximum. Cheung AP [11] conducted a prospective study in 56 PCOS patients presenting with infertility due to anovulation. 64.3% had proliferative endometrium with ET less than 7mm and 35.7% had endometrial hyperplasia. 25% patients had oligomenorrhoea with menorrhagia. Out of these 14.28% had endometrial hyperplasia. Most of the endometrial hyperplasia occurred in women with fewer than three episodes of menstrual flow per year on average. Shah B.[12] conducted a retrospective study to evaluate uterine and ovarian ultrasonographic features including endometrial thickness in 51 adolescent females of 10 to 18 years with PCOS. Uterine features revealed that the endometrial thickness increased to >7mm in 31.4% of girls. The number of follicles in ovaries were >10 in 84% cases with the presence of at least one >10mm cyst in 25% of girls.50.9% had oligomenorrhoea, 37.2% had amenorrhoea and 7.8% had regular menstrual cycle.

CONCLUSION

Maximum patients presented with normal endometrial thickness with oligomenorrhoea in a hyperestrogenic state. All patients with menorrhagia had hyperestrogenemia. Hence it was concluded that rising estrogen levels had a positive effect on the menstrual pattern and blood flow but not on endometrial thickness. Maximum patients of endometrial hyperplasia have normal frequency of cycle with average bleeding. Almost all patients with oligomenorrhoea and average blood flow had normal endometrial thickness. Hence it was concluded that endometrial status does not have a positive effect on menstrual frequency and blood flow. We summarise that the endometrial status is not affected and still the menstrual pattern is altered. Hence menstrual complaints or endometrial thickness (with or without polycystic ovarian morphology) mostly can't be the only parameters used for diagnosis of PCOS as they do not give a complete picture. Estrogen levels could be added as one of the diagnostic criteria for PCOS. Optimizing the diagnostic criteria to find out new phenotypes of PCOS can be the scope for further studies. Inspite of Hyperestrogenemia being present, the proportion of endometrial hyperplasia is less. This excess estrogen may be the cause of infertility. This may be another area on which further studies can be done. There was no conflict of interest in the study.

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