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Original Research Article: A Study of Various Endocrinal Hormones and Insulin Resistance in Women of Polycystic Ovarian Syndrome (PCOS) In Rajasthan, India

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Original Research Article

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Abstract: Polycystic ovary Syndrome (PCOS) is one of the most common female endocrine disorders. PCOD produces symptoms in approximately 5% to 10% of women of reproductive age (12–45 years old). It is thought to be one of the leading causes of female subfertility. To establish correlation among LH, FSH, Insulin, HOMA-IR (homeostasis model assessment-estimated insulin resistance) fasting blood sugar and lipid profile among the women with polycystic ovary syndrome (PCOS), in order to evaluate their diagnostic and prognostic significance. This study includes total 500 female participants of age Group between 20-40 year of age**.** They were divided in to two groups. Group 1(n=300) includes women having PCOD and Group 2(n=200) is control Group. Fasting Blood samples were obtained from all participants to measure Blood sugar, Lipid Profile FSH, LH and Insulin. The Mean level of Fasting Blood sugar, S. cholesterol, S, Triglyceride, S.FSH, S. LH ,S. Insulin, S. HOMA IR is found to be higher in PCOS group as compared to control group and difference among them found to be statically significant. From our study we would like to conclude that Polycystic ovary syndrome (PCOS) is a common condition characterized by menstrual abnormalities and clinical or biochemical features of hyperandrogenism. Being Gynecologist we should keep in mind that the patient with PCOS that presents metabolic changes has a higher risk of suffering from infertility and that her altered emotions may be a cause for a delay in seeking medical advice, which will inevitably compromise her fertility even more.
Keywords: PCOD, FSH, LH, Insulin, Lipid Profile

INTRODUCTION

Polycystic ovary Syndrome (PCOS) is a condition that affects women of menstruating age. Although it is not life-threatening, it can be uncomfortable and can cause fertility challenges for some women. Women with polycystic ovary Syndrome (PCOS) can get pregnant, but their risk of pregnancy complications is higher than average [1]. The polycystic ovary syndrome (PCOS) is a mostly hyper androgenic disorder and is possibly the most common endocrinopathy of premenopausal women [2]. The primary defect in polycystic ovary syndrome (PCOS) appears to be an exaggerated androgen synthesis (Testosterone) and secretion by the ovaries and the adrenal glands (according to "NIH criteria", [2,3]. In a substantial proportion of polycystic ovary syndrome (PCOS) patients, the primary defect in androgen secretion is triggered by factors such as the hyperinsulinism resulting from insulin resistance and/or the secretion of metabolically active substances by visceral adipose tissue, because these factors may facilitate androgen synthesis at the ovaries and the adrenals of predisposed women [2].

Therefore, the present investigations will be carried out to assess LH and FSH hormones level. Subsequently regular assessing of Blood sugar, lipid profile in clinical biochemistry laboratory is important to monitor & study the effect of these parameters among normal and polycystic ovary Syndrome (PCOS) women & its adverse consequences.

MATERIAL & METHOD

This prospective study was Conducted at Department of Obstetrics & Gynaecology, RNT medical college and attached hospital, Udaipur, Rajasthan, from 2011-2014

A total of 500 subjects of age group between 18-40 years belonging to both normal & polycystic ovary syndrome will be classified as:

Group-1:300 women with PCOS (Cases) of polycystic ovary disease will be taken.
Group-2:200 normal women will be taken as control for these parameters.

All PCOD women & controls were underwent a complete history and physical examination. Women with PCOD should be interviewed of their name, address, age, socio-economic status, and menstrual history, age of menarche, education level and family history of PCOD. All women were gone through gynaecological ultrasonography to determine their uterus and ovaried condition.

Inclusion criteria

Women with PCOS are attending outdoor OPD of the hospital, first time diagnosed PCOS, Diagnosed polycystic ovarian syndrome, age ranging from 18-40 years. Women with PCOD Willing to have physical examinations like Weight, Height, BMI, W/H ratio, Blood Pressure, Hirsutism, Acne, Dark patches, Virilization, Ultra sonography etc. Polycystic ovary syndrome (PCOS) associated with Diabetes, obesity, cardiovascular disorders, Irregular menstrual disorder and anovulation, Hirsutism & Acne symptoms.

Exclusion criteria

Women with diagnosed adrenal hyperplasia, androgen secreting neoplasm, other pituitary (acromegaly) and adrenal disorders like Cushing syndrome, Virilizing adrenal or ovarian neoplasm**,** hyperProlactinemia and other infertility cause **,**Thyroid hormone related infertility, Women having history of smoking, taking alcohol or tobacco chewing **,**Any other type of gynaecologic complications except related with Polycystic ovary syndrome (PCOS) will be excluded from the study.

Fasting 10 ml venous blood samples were obtained from all participants and collected. All samples were centrifugated at 3000 RPM for a period of 10 minutes to obtain a Plasma and serum. Blood Glucose (FBS) measured by Hexokinase method and lipid profile (S. Cholesterol, Triglyceride, HDL, VLDL, LDL) measured by colorimetric method from all samples. Various Endocrinal Hormones like LH and FSH and Insulin was Measured by enzyme linked immune assay (ELISA) method based on electrochemilumnescence from all samples. HOMA-IR will be estimated by calculation (fasting sugar×fasting insulin/22.5).

All obtained data were analyzed statistically for calculation of p-value by using Prizam software. Comparison between cases and with control is done by independent student's t test. By using't' values now P value is less than 0.05 (P value < 0.05), it is significant.

RESULTS & DISCUSSION

Table-1: Age wise distribution of participants

Group	Number(n)	Mean Age(Yr)
Group 1(PCOS)	300	1. 28.5 ± 4.45
Group 2(Control)	200	26.52 ± 4.13

Table-2: Location wise distribution of participants

Location	Group 1(PCOD)	Group 2(Control)
Rural	114(38%)	72(36%)
Urban	186(62%)	128(64%)
Total	300(100%)	200(100%)

Table 3: Comparison of weight between case and control group

Group	Number(n)	Mean wt (kg)
Group 1(PCOS)	300	59.92 ± 7.24
Group 2(Control)	200	48.22 ± 3.8

Table-4: Comparison of waste hip (W/H) ratio between case and control group

Group	Number(n)	Mean W/H ratio
Group 1(PCOS)	300	0.99 ± 0.13
Group 2(Control)	200	0.89 ± 0.50

Table-5: Comparison of BMI between case and control group

Group	Number(n)	Mean BMI
Group 1(PCOS)	300	24.70 ± 2.73
Group 2(Control)	200	18.62 ± 2.41

Table-6: Comparison of Marital status between case and control group

Group	Number(n)	Married	single
Group 1(PCOS)	300	200(66.7%)	100(33.3%)
Group 2(Control)	200	118 (59%)	82(41%)

Table-7: Comparison based on menstrual cycle history between case and control group

			GROUP		Total
			Control	Cases	
M.H./CYCLE	<5	Count	0	22	22
		% within GROUP	0.0%	7.3%	4.4%
	5-9	Count	0	277	277
		% within GROUP	0.0%	92.3%	55.4%
	>=10	Count	200	1	201
		% within GROUP	100.0%	0.3%	40.2%
Total		Count	200	300	500
		% within GROUP	100.0%	100.0%	100.0%

Table-8: Comparison of various biochemical parameters between case and control group

parameter	Group	N	Mean SD	p-value
FBS(mg/dl)	Case	300	106.7 ± 19.4	<0.001
	Control	200	96.12± 17.03	
S.choletsterol(mg/dl)	Case	300	189.1 ± 45.47	<0.001
	Control	200	157.49± 23.80	
S.Triglyceride(mg/dl)	Case	300	160.69 ± 36.98	0.025
	Control	200	154.62 ± 23.42	
S.HDL(mg/dl)	Case	300	40.24± 6.30	0.006
	Control	200	38.66 ± 6.25	
S.LDL(mg/dl)	Case	300	116.95± 42	<0.001
	Control	200	87.98± 22.27	
S.VLDL(mg/dl)	Case	300	32.0± 7.32	0.032
	Control	200	30.84 ± 4.72	

Table-9: Comparison of level of various endocrinal hormonal statuses between case and control group

parameter	Group	N	Mean SD	p-value
S.LH(µIU/ml)	Case	300	147.12± 39.13	<0.001
	Control	200	90.86 ± 43.62	
S.FSH(µIU/ml)	Case	300	76.42± 45.67	<0.001
	Control	200	22.22 ± 17.11	
S. Insulin(U/ML)	Case	300	15.52 ± 6.29	<0.001
	Control	200	7.44± 2.04	
HOMA -IR	Case	300	75.45± 41.15	<0.001
	Control	200	31.83± 10.69	

- Comparison of the fasting basal sugar (FBS) between the two groups shows that FBS is higher (mean value = 106.7 ± 19.49) in Cases group than Controls (mean value = 96.1 ± 17.0.(Table 8)
- Comparison of the Triglyceride (TG) between two groups shows that TG is higher (mean value = 160.6 ± 36.98) than Controls (mean value = 154.6 ± 23.42). Comparison of Total Cholesterol (TC) between two groups shows that TC is higher (mean value = 189.1 ± 45.47) in Cases than Controls.(Table 8)
- Comparison of the luteinizing hormone (LH) between two groups shows that LH is higher (mean value 147 ± 39) in Cases than Controls (mean value = 90.8 ± 43.6). (Table 9)

- Comparison of the follicular stimulating hormone (FSH) between two groups shows that FSH is higher (mean value 76.4 ± 45.6) in Cases than Controls (mean value = 22.2 ± 17.1). (Table 9)
- Comparison of the Insulin between two groups shows that Insulin is higher (mean value 15.52 ± 6.29) in Cases than Controls (mean value = 7.44± 2.04). (Table 9)

Hardiman P. *et al*, Ricardo Azziz *et al***.** study show that polycystic ovary syndrome (PCOS) is a genetically complex endocrine disorder of women of uncertain etiology and is a common cause of anovulatory infertility, menstrual dysfunction, and hirsutism. PCOS appears to be associated with an increased risk of metabolic aberrations, including insulin resistance and hyperinsulinism, type 2 diabetes mellitus, dyslipidemia, cardiovascular disease, and endometrial carcinoma [4-10].

Cahill D. *et al*. study shows overweight and obesity: a common finding in women with PCOS because their body cells are resistant to the sugar-control hormone insulin. This insulin resistance prevents cells using sugar in the blood normally and the sugar is stored as fat instead.[11,12,13,14]

By Hull M study, A high LH: FSH ratio was the most frequently found abnormality (raised in 68.4% of patients) followed by LH (65.8%), free Testosterone (FT, calculated from total Testosterone (T). Each of these four estimations was above the normal ranges in 25% of patients [15].

By Hardiman P. *et al*, disorders of lipid metabolism (dislipidemia), cholesterol and triglycerides, PCOS patients show decreased removal of atherosclerosis-inducing remnants, seemingly independent of insulin resistance/Type II diabetes. Cardiovascular disease, with a meta-analysis estimation, a 2-fold risk of arterial disease for women with PCOS relative to women without PCOS, independent of BMI[4,16,17].

Dunaif *et al*, Hyperinsulinaemia and insulin resistance are a well-known feature in polycystic ovarian syndrome (PCOS). Whether hyperinsulinaemia in PCOS is primarily due to a defect in insulin action to increased insulin secretion, to decreased hepatic clearance of insulin, or to an interaction between all these disorders is, however, not clear [18-20].

Legro RS *et al.* The homeostatic model assessment (HOMA), a more complex fasting calculation, has been compared to clamp techniques with good results. HOMA is the product of fasting glucose (mg/dL) and insulin (μU/mL) divided by a constant [21-24]. One major limitation of HOMA rests on the previous reflection that many young PCOS women display stimulated but not fasting metabolic abnormalities [22-24].

CONCLUSION

From our study we would like to conclude that polycystic ovary syndrome (PCOS) is a common condition characterized by menstrual abnormalities and clinical or biochemical features of hyperandrogenism. Being Gynecologist we should keep in mind that the patient with PCOS that presents metabolic changes has a higher risk of suffering from infertility and that her altered emotions may be a cause for a delay in seeking medical advice, which will inevitably compromise her fertility even more.

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