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A Correlation Study between Polycystic Ovarian Syndrome (PCOD) and Its Related Endocrinal Hormones in Udaipur, Rajasthan, India

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Abstract **Original Research Article**

Background: Polycystic ovary syndrome (PCOS) is a complex endocrine disorder affecting 5–10 % of women of reproductive age. It generally manifests with oligo/anovulatory cycles, hirsutism and polycystic ovaries, together with a considerable prevalence of insulin resistance. ***Objectives:*** The objective of the study is to establish correlation among testosterone, insulin, FSH, LH and lipid profile among the women with polycystic ovary syndrome (PCOS), in order to evaluate their diagnostic and prognostic significance**.** ***Methodology:*** This study includes total 300 female participants of age Group between 18-40 year of age**.** They were divided in to two groups. Group 1(n=150) includes women having PCOD and Group 2(n=150) is control Group. Fasting Blood samples were obtained from all participants to measure Blood sugar, Lipid Profile insulin, HOMA-IR, Testosteron, FSH, LH and Prolactine**.** ***Result:*** The Mean level of S.Testosteron, S.FSH, S.LH, S.Prolactine and HOMA-IR Fasting Blood sugar, S.cholesterol, S, and Triglyceride S.Insulin is found to be Lower Control Group as compared to PCOD group and difference among them found to be statically significant. ***Conclusion:*** From our study I would like to conclude that a PCOS, as a syndrome, has got multiple components including reproductive, metabolic and hormonal, with long-term health concerns that cross the life span. Moreover, PCOS patients have a higher risk of metabolic and cardiovascular diseases and their related morbidity, if compared to the general population.

Key words: PCOD, Insulin, HOMA-IR, Testosteron, FSH, LH, Prolactine.

INTRODUCTION

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in women and major cause of anovulatory infertility. PCOS patients can present a wide range of signs and symptoms, which make difficult the precise grading of the condition. Diagnosis of PCOS is currently based on the criteria of the ESRHE/ASRM Rotterdam consensus meeting in 2003 [1], which broadened the previous NIH classification of 1990 [2]. It based on at least two of the following features: oligo-anovulation, hyperandrogenism and polycystic ovaries by ultrasound [1]. In 2006, the Androgen Excess Society (AES) set up a committee of experts to review all the data published on PCOS for the purpose of simplifying diagnosis [3]. The AES criteria require clinical and/or biochemical hyperandrogenism simultaneously with oligo/anovulation and ultrasonographic evidence of polycystic ovaries.

There is increasing evidence suggesting that PCOS affects the whole life of a woman, can begin in utero in genetically predisposed subjects, it manifests clinically at puberty, continues during the reproductive years. It can also expose patients to increased risk of cardiovascular disease, hypertension, diabetes and other metabolic complications, especially after menopause [4]. During the fertile period it may cause anovulatory infertility and could be associated with increased prevalence of gestational complications, such as miscarriage, gestational diabetes and preeclampsia [5]. Early diagnosis is therefore crucial by enabling close follow-up and in an attempt to reduce the risk of such complications.

Therefore, the present investigations will be carried out to assess testosterone, LH, FSH & insulin hormones level, HOMA-IR level. Subsequently regular assessing of sugar glucose, lipid profile and differential diagnosis of prolactin (PRL) 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 Biochemistry and Department of

Obstetrics & Gynaecology, Geetanjali Medical College & Hospital, Udaipur, Rajasthan, India from June 2012-Dec 2013. A total of 300 subjects of age group between 18-40 years belonging to both normal & polycystic ovary syndrome will be classified as:

Group-1:150 women with PCOD (Cases) of polycystic ovary disease will be taken.
Group-2:150 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 PCOD are attending outdoor OPD of the hospital, first time diagnosed PCOD, 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 it in to fluoride and plain vaccutainer. An Uniq ID number was given to each sample to hidden the identity of participants. All samples were centrifugated at 3000 RPM for a period of 10 minutes to obtain a Plasma and serum.

Blood Glucose (FBS) measured by GOD POD method and lipid profile (S. Cholesterol, Triglyceride, HDL, VLDL, LDL) measured by enzymatic colorimetric method from all samples.

Fasting Insulin level estimation was done by enzyme linked immune assay (ELISA) method based electrochemilumnescence and HOMA-IR will be estimated by calculation (fasting sugar×fasting insulin/22.5).

Various Endocrinal Hormones like testosterone, LH, FSH, Insulin and Prolactine was measured by enzyme linked immune assay (ELISA) method based on electrochemilumnescence from all samples.

After assessing all the values, Mean, Standard deviation of all subjects & parameters were analysed. Statistical analysis was performed with SPSS 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. Comparison of the categorical variables (among category comparison) was done by using Chi-Square test.

RESULTS & DISCUSSION

Infertility, hirsutism, and oligomenorrhea were more common among the subjects with PCOS, but there was a considerable spontaneous restitution of cyclic regularity with time. Women with PCOS were more often hysterectomized and entered menopause later compared with referents. The hormone data show a typical profile for PCOS. Compared with referents women with PCOS showed marked increase in prevalence of central obesity, higher basal serum insulin concentrations, and a higher prevalence of diabetes mellitus and hypertension [65].

Table-1: Age wise distribution of participants

Group	Number(n)	Mean Age(Yr)
Group 1(PCOD)	150	26.30 ± 5.0
Group 2(Control)	150	24.50 ± 4.13

Table-2: Location wise distribution of participants

Location	Group 1(PCOD)	Group 2(Control)
Rural	57(38%)	36(36%)
Urban	93(62%)	64(64%)
Total	150(100%)	150(100%)

Table-3: Comparison of weight between case and control group

Group	Number(n)	Mean wt (kg)
Group 1(PCOD)	150	58.91 ± 5.24
Group 2(Control)	150	48.36 ± 5.8

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

Group	Number(n)	Mean W/H ratio
Group 1(PCOD)	150	0.84 ± 0.13
Group 2(Control)	150	0.79 ± 0.05

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

Group	Number(n)	Mean BMI
Group 1(PCOD)	150	23.70 ± 2.73
Group 2(Control)	150	18.72 ± 2.41

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

Group	Number(n)	Married	single
Group 1(PCOD)	150	100(66.7%)	50(33.3%)
Group 2(Control)	150	59 (39%)	91(61%)

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

			GROUP		Total
			Control	Cases	
M.H./CYCLE	<5	Count	0	11	11
		% within GROUP	0.0%	16.5%	3.66%
	5-9	Count	0	138	138
		% within GROUP	0.0%	92.3%	46%
	>=10	Count	150	1	151
		% within GROUP	100.0%	0.6%	50.33%
Total		Count	150	150	300
		% within GROUP	100.0%	100.0%	100.0%

Table-8: Showing valid Hirsutism status of Case group

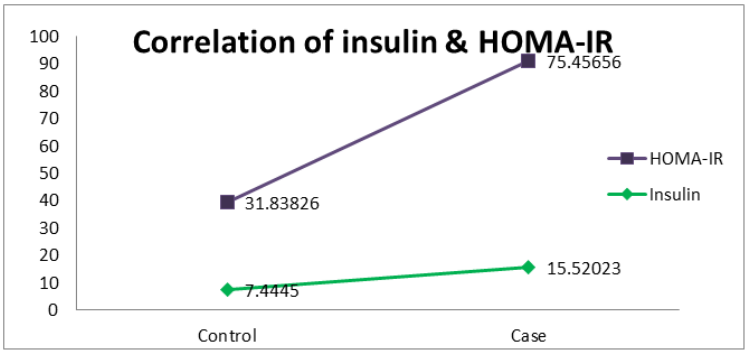
TOTAL COUNTS	HIRSUTISM		NON HIRSUTISM	
	Counts	valid %	Counts	valid %
Cases (150)	80	53%	70	46%

Table-9: 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-10: 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	150	147.12± 39.13	<0.001
	Control	150	90.86 ± 43.62	
S.FSH(µIU/ml)	Case	150	76.42 ± 45.67	<0.001
	Control	150	22.22 ± 17.11	
S. Testosteron(ng/ml)	Case	150	13.82 ± 6.38	<0.001
	Control	150	2.67 ± 1.48	
S. Insulin(U/ML)	Case	150	15.52 ± 6.29	<0.001
	Control	150	7.44 ± 2.04	
HOMA-IR	Case	150	75.45± 41.15	<0.001
	Control	150	31.83 ± 10.69	



Graph-1: Showing Correlation of insulin & HOMA-IR between case and control group

- 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 9).
- 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 9).
- 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 10).
- 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 10).
- Testosterone is higher (mean value 13 ± 6.3) in Cases than Controls (mean value = 2.67 ± 1.4) (Table 10).
- Insulin hormone is higher (mean value 15.5 ± 6.2) in Cases than Controls (mean value = 7.4 ± 2.0) (Table 10).
- HOMA-IR is higher (mean value 75 ± 41.1) in Cases than Controls (mean value = 31.8 ± 10.6) (Table 10).

Although the exact cause of PCOS is unknown, it is understood to be a multifactorial condition with a genetic component. Approximately 20–40% of first-degree female relatives of women with PCOS go on to develop PCOS themselves, compared to estimated 4–6% prevalence in the general population [6]. Many women with PCOS have female relatives with PCOS, even if it was never diagnosed as with type 2 diabetes, it is likely that numerous genes each make a small contribution to the etiology of PCOS; and recent genome-wide association studies have identified candidate genes [7-9]. Any underlying genetic predisposition is likely complicated by epigenetic and environmental factors such as an unhealthy diet and lack of physical activity.

Clinically, PCOS may manifest as a mild menstrual disorder or a severe disturbance of reproductive and metabolic functions [10]. Most visible signs are caused by excessive production of insulin or androgens. Hirsutism (excess hair growth on the face and body) is present in ~ 70% of women with PCOS and is considered to be a good marker for hyperandrogenism but should be evaluated biochemically.

CONCLUSION

From our study I would like to conclude that a PCOS, as a syndrome, has got multiple components including reproductive, metabolic and hormonal, with long-term health concerns that cross the life span. Moreover, PCOS patients have a higher risk of metabolic and cardiovascular diseases and their related morbidity, if compared to the general population.

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