



STUDY OF INSULIN RESISTANCE, GLUCOSE TOLERANCE AND LIPID PROFILE IN POLYCYSTIC OVARIAN SYNDROME

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ABSTRACT

To assess the correlation between insulin resistance and impaired glucose tolerance in PCO patients and also to evaluate IR and altered lipid profile in them. A prospective study was carried out from Feb. 2006 to Aug. 2007 on total of 75 patients. Out of them 40 patients were taken as cases having clinical and USG features of PCOS and 35 patients were taken as control having no features of PCOS. Fasting serum insulin, blood sugar, 2hr PGBS testosterone and lipid profile measured in both study & control group. PCOS is more prevalent in younger age groups. Average distribution of age in both groups was 23.6 ± 4 and 25.09 ± 4.5 respectively. Oligomenorrhoea is more common (60%) than secondary amenorrhoea (25%) in PCOS. Hyperandrogenism presents commonly as hirsutism (62.5%) and acne (35%). BMI was > 25 in 40% of cases and 20% of controls. 17.5% of PCOS women had impaired fasting and 2hr PGBS but none of them had frank diabetes. The mean fasting insulin value in PCOS was significantly higher than that of controls (i.e., 18.64 ± 9.33 vs. 8.59 ± 3.03). The fasting glucose to insulin ratio was < 4.5 in 52.5% of cases and > 4.5 in 91.4 % in controls. Primary infertility was common in 76.2% of cases. There were no significant lipid profile abnormalities in both groups. Hyperinsulinemia and insulin resistance are commonly associated with PCOS. Patients with IR have higher incidence of IGT hence as a prophylactic measure all patients with PCOS should be screened for insulin resistance and followed thereafter to prevent development of frank diabetes.

KEY WORDS: polycystic ovarian syndrome, insulin resistance, impaired glucose tolerance, fasting glucose: insulin ratio.



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INTRODUCTION

PCOS is the most common endocrine disorder in reproductive age with incidence of 5-7%. In 1935 Irving F. Stein and Michael L Leventhal¹ described it as a syndrome complex of oligomenorrhoea, hirsutism and obesity together with a demonstration of enlarged polycystic ovaries. In 1921, the French physician Achard and Thiers provided the first description of the relationship between androgen excess in women and disturbance in carbohydrate metabolism which was dubbed "diabetic des femme a barbe" (Diabetes of the bearded lady). Insulin resistance and glucose intolerance has been observed in 40% of women with PCOS as reported by David Guzick (1998). Though there is lack of consensus about the precise definition of the syndrome. At national institute of health consensus conference (1990) it has been defined as hyperandrogenism with chronic anovulation with exclusion of other causes of hyperandrogenism. ROTTERDAM sponsored PCOS workshop agreed that two of the following three criteria are required to diagnose the condition after exclusion of other causes of androgen excess.

- 1) Oligo and/or anovulation.
- 2) Clinical & /or biochemical signs of hyperandrogenism.
- 3) Polycystic ovary on USG scan defined as the presence of 12 or more follicles in each ovary measuring 2-9 mm diameter and /or ↑ed ovarian volume >10ml.

Women with PCOS have high prevalence of glucose intolerance & type -2 DM. Our current understanding about the syndrome indicates that there are links between the PCOS, endometrial cancer, obesity, cardiovascular disease, DM & metabolic syndrome X.

MATERIALS AND METHODS

The study of insulin resistance, glucose tolerance & lipid profile in PCOS was carried out in the department of Obst.& Gynaecology

of SCB Medical College Cuttack during the period of Feb 2006 –Aug 2007. The present study was conducted on total of 75 patients.

Inclusion criteria—

STUDY GROUP:

Comprised of 40 females in the age group of 16-40 years with clinical and ultrasonological diagnosis of PCOS, was subjected to thorough examination and investigation. Biochemical and hormonal estimation was done in all cases. Patient with known DM, PCOS on treatment, thyroid abnormality and prolactin abnormality were excluded from the study.

CONTROL GROUP:

Comprised of 35 female in the age group of 16-40 years with normal ovaries on ultrasonography and who had no evidence of hyperandrogenism.

Exclusion criteria –

Patient with known DM, PCOS on treatment, thyroid abnormality and prolactin abnormality were excluded from the study.

Parameters analyzed-

- Fasting Blood Sugar, 2hrs Post glucose blood sugar after 75 gms of glucose, fasting serum insulin, lipid profile & serum testosterone.
- Clinical parameters -- body mass index, acne & hirsutism. Blood sample were taken within 5 days of menstruation in both cases & controls. Serum fasting insulin & testosterone test were done by ELSIA method. Fasting glucose & insulin ratio \leq 4.5 was considered as abnormal.

RESULTS

- A total 75 women enrolled in the study. 40 women in study group & 35 in control group.

- TABLE -1 shows demographic characters in both groups were comparable. There were no significant differences in the two groups as regard to age, BMI, menstrual abnormality, hirsutism and acne.
- TABLE 2- shows fertility status & parity distribution.
- TABLE 3-shows about blood sugar, serum fasting insulin level, fasting glucose /insulin ratio. There is no significant difference in both groups ($p < 0.01$).
- TABLE -4 shows fasting lipid profile

Table-1.**Comparison of demographic characters between study and control group.**

Demographic characters	Study(n=40)	Control(n=35)	P-value
Age	23.6±4	25.09±4.5	S
BMI in Kg/m ²	23.26±2.73	21.99±2.48	S
Menstrual abnormality			
A)Oligomenorrhoea	24	7	
B)Sec amenorrhea	10	8	
C)menorrhagia	3	7	S
D)normal cycle	3	13	
Hirsutism	25	nil	S
Acne	14	nil	S

Table-2.**Parity & Fertility Distribution**

Para	Study Group		Control Group	
	No.	%	No.	%
Unmarried	19	47.5	20	57.15
P0	16	40	6	17.15
P1	5	12.5	4	11.42
P2	0	0	5	14.28
Primary Infertility	16	76.2	6	60
Secondary Infertility	5	23.8	4	40

Table-3.
Blood Sugar, Fasting Insulin & Fasting Glucose/Insulin Ratio

Blood Sugar MG/DL	Study Group		Control Group		P Value
	No.	%	No.	%	
Fasting					
<110	33	82.5	35	100	S(<0.01)
110-126	7	17.5	0	0	
2 Hrs Post Glucose					
<140	33	82.5	35	100	S(<0.01)
140-200	7	17.5	0	0	
Fasting Insulin (μ U/ml)	Mean	SD	Mean	SD	
	18.64	9.33	8.59	3.03	S(<0.01)
Fasting Glucose Insulin Ratio	No.	%	No.	%	
≤ 4.5	21	52.5	3	8.6	S(<0.01)
>4.5	19	47.5	32	91.4	S(<0.01)

Table-4.
FASTING LIPID PROFILE

LIPID PROFILE	STUDY GROUP		CONTROL GROUP		P VALUE
	MEAN	SD	MEAN	SD	
TOT.CHOL	162.95	25.47	147.47	15.45	S (<0.01)
TRIGLY.	142.65	44.40	135.57	24.51	S (<0.01)
LDL	91	22.12	80.97	15.42	S (<0.01)
HDL	43.55	5.40	49.64	4.97	S (<0.01)

TESTOSTERONE LEVEL

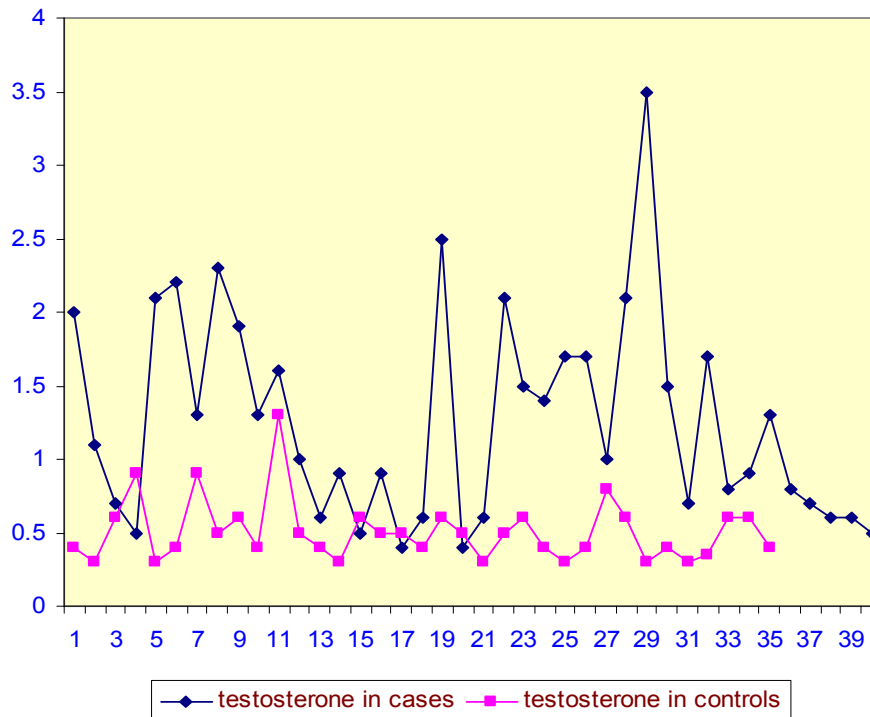


Figure shows testosterone level is much higher in study group compared to control group.

DISCUSSION

Since PCOS is a syndrome of reproductive age the mean age in our study being 23.6 ± 4 yrs & 25.0 ± 4.5 yrs in study & control group respectively and is comparable to G.S Conway et al study (1989) where the average age in study & control group were $27.8 [27.3-29.4]$ and $28.9 [25.9-31.8]$ respectively. Hence the present study is comparable to G.S. Conway et al study.

The biochemical & endocrinological changes seen in PCOS reflected with various menstrual irregularities. In our study oligomenorrhoea is the most common problem (60%), secondary amenorrhoea is 2nd most common problem (25%) which is similar to Robinson et al (1992) study oligomenorrhoea (67%), in Goldzeiler & Axelrod et al incidence of oligomenorrhoea (47%). In our study prevalences of obesity (BMI >25) is 40%,

Hirsutism is 62.5% and that of acne is 35% which were comparable to Robinson et al & G.S Conway et al study. Several studies shows that women with PCOS were more likely to have IGT or overt diabetes when compared with controls. Legro et al (1999) found that 31% of reproductive age women with PCOS had IGT, 7.5% had overt diabetes.

In our study it was found that 17.5% of the PCOS women had IGT but none of them had frank diabetes which may be due to younger ages of patients in our study. Legro et al (1998) found that fasting glucose to insulin ratio is a good measure of insulin sensitivity & fasting G/I ratio of <4.5 is abnormal. In the present study fasting G/I ratio of <4.5 was found in 52.5% of cases which is similar to western studies (50-60%) by Carmina E et al. Insulin is also an important regulator of lipids & lipoprotein A. Altered lipid profile reflects a state of insulin resistance. In our study none of the patients had overt dyslipidemia but

lipid profile in study group was comparatively on higher normal side as compared to that of control group.

CONCLUSION

PCOS is major health problem in young adult females in terms of quality of life. It can be said as a disaster in the sense that it decreases fertility, makes her cosmetically disfigured and

physically, mentally & socially depressed. Hyperinsulinemia & IR seems to be very commonly associated with PCOS. Insulin resistance is the key factor for development of obesity, IGT, DM., cardiovascular disease, hyperlipidemia & metabolic syndrome in PCOS patients. So PCOS patients need regular monitoring to avoid the untoward chronic illness.

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