ORIGINAL ARTICLE

Fasting Glucose to Insulin Ratio in Obese and None Obese Women with Polycystic Ovarian Syndrome

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ABSTRACT

Polycystic ovarian syndrome is one of the common endocrinopathies of females of reproductive age group. This syndrome is having familial predisposition. The basic problem is in the Hypothalamic pituitary axis leading to increased LH/FSH ratio. Insulin resistance is common finding and resultant hyperinsulinemia leads to altered steroid Hormone metabolism and various manifestations of this syndrome. In this study 60 female patients of PCOS half obese and half non obese were taken from Gynae and obstetric OPD of Services Hospital Lahore. They were diagnosed on the basis of history, clinical Examination and raised LH/FSH ratio. 40 females half obese and half non obese were taken as control. The fasting glucose and insulin levels were determined in both case and controls. The ratio was calculated. When compared it was found that fasting glucose did not differ significantly but insulin levels were significantly higher especially in obese group. So ratio of glucose to insulin (GIR) was decreased. Cut off value was taken 4.5. It was seen that 33% of non obese & 60% of obese cases were having GIR less than 4.5 so they were found to be insulin resistant & require insulin sensitizing drugs.

Key words: Polycystic ovarian syndrome, insulin resistance, fasting glucose

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is a disorder affecting approximately 5-10% women of reproductive age and is one of the most common endocrinopathies. It consists of at least two of three following features: polycystic ovaries, hyperandrogenism and an ovulation[1]. This syndrome is the most common form of an ovulatory infertility[2]. This syndrome seems to run in families though the genetics are not fully understood at this time. Sisters and daughters of women with PCOS have about 50% chances of having the disorder[3]. Even if the family history s not suggestive an ultrasonography usually reveals polycystic ovary in the patient's mother or sister[4]. The aetiology of polycystic ovarian syndrome is uncertain. There is some evidence of autosomal transmission related to strong familial clustering[5]. Serum (blood) levels of androgens (male hormones), including androstenedione, testosterone and Dehydroepiandrosterone sulfate may be elevated[6]. Women with PCOS have high fasting levels of insulin. In addition to hyperinsulinemia and insulin resistance, first phase secretion, impaired glucose tolerance, dyslipidemia, hypertension and impaired fibrinolysis have also been described in PCOS[7]. In addition, insulin resistance in PCOS has been associated with adiponectin—a hormone secreted by adipocytes that regulates lipid metabolism and glucose levels; both lean and obese women with PCOS have lower adiponectin levels than women without PCOS[8]. Abnormalities in insulin action are poorly detected by simple determination of either glucose or insulin[9]. Measurement of abnormal glucose tolerance often indicates abnormality in the fasting blood glucose, 02 hours after 75 gram glucose intake or the fasting glucose to insulin ratio (GIR)10.

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MATERIALS AND METHOD

This study included 60 female patients from Obstetrics and Gynaecology department Services Hospital, Lahore. All subjects were at their reproductive age and already diagnosed and documented as patients of polycystic ovarian syndrome on the basis of history, thorough physically examination, serum (LH/FSH) ratio and pelvic ultrasonic findings. Half of them were obese with body mass index (BMI) ≥30 and other half non-obese with BMI≤29.9. Forty healthy females, 50% obese & 50% non obese were taken as control groups.

METHOD OF DATA COLLECTION

Both patients and controls were with overnight fast of 10-12 hours. In addition to routine blood tests fasting insulin and glucose levels were determined. For this purpose 05 ml venous blood was drawn from anticubital vein. Out of this 1.5 ml was transferred to a tube containing sodium fluoride and EDTA for

glucose estimation. Rest after sample was allowed to clot in a plastic tube. After centrifugation clear serum was stored in plastic cups at -20°c for insulin estimation. Glucose estimation was done by enzymatic (glucose oxidase) method[11]. Insulin Assay was done on stored serum by enzyme immunoassay (EIA)[12].

RESULTS

In this study 60 females between the ages 18-45 year were registered. Half of them were obese. It was seen that symptoms of this syndrome were more marked in obese group as compared to non obese. Among 86.7% of obese and 80% of non obese were infertile. History of oligomenorhoea was positive in 73.3% of obese and 60% of non obese PCOS women. Family history of PCOS was positive in 26.7% of obese PCOS women which was significantly higher than that of non-obese (20%).Acne and hirsutism is an important finding. Hirsutism was seen in 66.7% of both obese and non obese PCOS. Acne was observed in 40% of both groups.

Important findings on history and clinical examination of patients

Feature	Obese group	Non obese
History of prolonged menstrual cycle	73.3%	60%
History of infertility	86.7%	80%
Family history of PCOS	26.7%	20%
Hirsutism	66.7%	66.7%
Acne	40%	40%

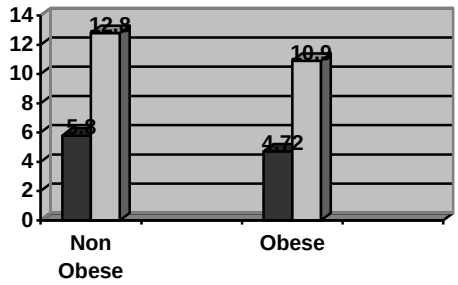
Fasting glucose, insulin and glucose to insulin ratio in obese and non obese cases and control

Fasting Levels		N	Non Obese		Obese	
			Mean	StD	Mean	St D
Glucose	Cases	30	72.8	11.4	79.50	15.83
	Control	20	81.0	7.0	78.0	11.0
Insulin	Cases	30	12.4	8.6	16.8	6.77
	Control	20	6.3	2	7.14	2.95
Fasting GIR	Cases	30	5.8	4.0	4.72	3.72
	Control	20	12.8	5.0	10.9	5.06

Mean fasting level of glucose in obese group was 79.50 mg/dl, while in non obese it was 72.8 mg/dl. Similarly fasting insulin level was 16.86 µU/L in obese and 12.4 µU/L in non-obese group. When average ratio was calculated it was 4.72 in obese and 5.8 in non-obese group.

The mean fasting levels of blood glucose in normal obese subjects was 78 mg/dl, while in non obese normal subjects was 81.0 mg/dl. The mean level of fasting insulin in normal obese subjects was 6.30 µU/L and in non obese normal subjects was 7.14 µU/L.

Fasting Glucose, Insulin and Glucose to Insulin Ratio in Obese and Non Obese Cases and Control



DISCUSSION

It was seen in this study that oligomenorrhoea was present in 73% of obese and 60% of non-obese cases. In a previous study it was found that insulin.

Sensitivity depends on menstrual pattern. Non-obese women with PCOS who were oligomenorrhic were more likely to be insulin resistant than those with regular cycles[13]. In our study. Similar finding was observed.

In this study the findings of fasting glucose and insulin in both obese and non-obese PCOS (values given in results) are comparable with a similar study done by Lgro et all in 1998 in which fasting glucose did not differ but PCOS women had significantly higher fasting insulin levels than control women (P,0.001)[14].

About 33% (10 out of 30) non obese cases had fasting glucose to insulin ratio (GIR) <4.5 (Cut off value). In a recent study done by cibula et al (2002) on 41 non obese PCOS with BMI <30 kg/m^2 and found that fasting GIR was 4.9. Which is comparable to present study while ratio is less than our study but more than cut off value[15].

In obese group the mean value of GIR (4.72) is comparable with the values obtained by a research conducted on 40 obese white women from south central Pennsylvania who had fasting GIR 4.4 $\pm$ 1.9.

CONCLUSION

Fasting insulin and GIR are sensitive measure of insulin resistance in patients with PCOS. In the present study 33% of non obese and 60% of study obese PCOS were insulin resistant (GIR<4.5) these are the patients who need insulin lowering agents and not ovulation induction therapy alone.

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