

Implications of Hyperinsulinaemia in Women with Polycystic Ovarian Disease

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Summary: A prospective study was undertaken at Kasturba Medical College, Manipal among PCOD subjects to find out the incidence of abnormal glucose tolerance test. A total of 100 patients entered the study. Ten (10%) patients exhibited impaired glucose tolerance test and 9(9%) exhibited frank diabetes on 75gm oral glucose tolerance test. Fasting insulin level was measured in 30 cases and this was compared with 23 controls. The mean fasting insulin level was 22.072 ± 17.5 uU/ml among cases and 16.70 ± 18.82 uU/ml among controls. This was significant when analyzed by Mann-Whitney 'u' test. ($u=50, 5, z=2.112, p<0.05$) Patients with abnormal glucose tolerance test were treated with diet or insulin depending on the severity of abnormal GTT. Nineteen patients with abnormal GTT were treated with diet and 4 of them conceived with a pregnancy rate of 21%. Of the 3 patients treated with insulin 2 conceived with a pregnancy rate of 66.66%. However the number of patients who received insulin were too small to comment on the pregnancy rate. There is a high prevalence of impaired GTT and diabetes among PCOD subjects. All patients with PCOD should undergo a 75gms oral glucose tolerance test. PCOD subjects with abnormal GTT do benefit from diet and insulin.

Introduction

Polycystic Ovarian Disease (PCOD) is the most common cause of menstrual disturbances and amenorrhoea in women below 40 years of age. It presents with features of infertility, obesity, hirsutism and glucose intolerance (Convey of Jacobs, 1993; Goldzichl, 1981). Disorders of insulin secretion, clearance and action are common in PCOD subjects. The presence of insulin resistance has been clearly demonstrated by many investigators (Barbeni et al, 1988). Patients with PCOD has a high prevalence of abnormal GTT (Convey & Jacobs 1993). Insulin has a modulating effect on several parts of the reproductive endocrine system and on ovarian stromal tissues. Insulin thus plays an important role in the pathophysiology of PCOD. The objective of this study was to assess the abnormal carbohydrate metabolism in patients with PCOD.

Materials and Methods

The study was conducted among PCOD patients attending the Gynecology Department and the infertility clinic - Manipal Assisted Reproduction Centre of Kasturba Medical College, Manipal. The study was done during a two year period from December 1994 to December 1996. Patients were diagnosed to have PCOD in the presence of at least three of the following criteria.

1. Oligomenorrhoea and infertility
- 2) Hirsutism
- 3) Transvaginal sonography picture showing multiple subcapsular follicles measuring less than 10 mm in diameter. The no. of follicles varied from 6-16.
- 4) Abnormal biochemical profile like raised LH, and/or elevated testosterone values.

After an overnight fast, 75 gm oral glucose tolerance test was performed in all subjects. Venous samples were taken at 0, 30, 60, 90 and 120 minutes and were analyzed for

plasma glucose. Altered glucose tolerance was diagnosed as per the revised criteria provided by the National Diabetes Data Group of National Institute of Health in 1979. Frank Diabetes was diagnosed when the fasting value was above 140mg/dl or when the 2 hour value was > 200 mg/dl and one more value during the 2 hour interval was > 200 mg/dl. If the 2 hour value was between 140-200 mg/dl and one more value during the 2 hour test > 200 mg/dl, a diagnosis of impaired glucose tolerance test was made.

Patients with frank diabetes and impaired glucose tolerance test were treated either with diet or insulin depending up on the severity of the abnormal GTT. Pregnancy rates after diet and insulin were analyzed.

Fasting insulin level was measured in 30 patients, using radioimmunoassay. Kits were supplied by the Board of Radiation and Isotope Technology, Bombay. These values were compared with 23 controls. Controls were healthy women with regular cycles.

Results

A 75 gm Oral glucose tolerance test was performed on all 100 patients with PCOD. Ten (10%) had evidence of impaired glucose tolerance test and 9 (9%) had frank diabetes according the criteria developed by the National Diabetic Data Group of National Institute of Health, USA. (Table I.)

Table I
Abnormal glucose tolerance test

GTT	No. of Patients	Percentage
Normal	81	81%
Impaired GTT	10	10%
Overt Diabetes	09	09%
Total	100	100%

There was no statistically significant correlation between

BMI and abnormal GTT when analyzed by Chi-square test. (Chi-Square=0.992, p>0.05). This shows that abnormal glucose intolerance seen in PCOD subjects is independent of obesity. (Table II.)

Table II
Correlation between BMI and GTT

BMI	Normal	Impaired	Diabetes	Total
<20	21(21%)	02(02%)	02(02%)	25(25%)
20-25	41(41%)	05(05%)	04(04%)	50(50%)
>25	19(19%)	02(02%)	04(04%)	25(25%)
Total	81(81%)	09(09%)	10(10%)	100(100%)

(Chi-square=0.992, p>0.05)

All patients with abnormal GTT were treated either with diet or insulin depending on the severity of abnormal GTT. Out of the 19 patients with abnormal GTT 4 conceived with a pregnancy rate of 21%. Out of 3 patients who received insulin, 2 conceived with pregnancy rate of 66.66% (Table III.)

Table III
Out come of patients with abnormal GTT when treated with diet or insulin

Method	No. of Patients	Pregnancy	Pregnancy rate
Diet	19	04	21%
Insulin	03	02	66.66%

Fasting insulin levels were measured in 30 cases. Insulin levels were also measured in 23 controls. Mean insulin level for PCOD was 16.70±17.58uU/ml for controls. This when analyzed by Mann-whitney "u" test was found statistically significant (u=50.5, z=2.112, p<0.05) suggesting evidence of insulin resistance. (Table IV).

Table IV

Mean insulin levels (Normal 0-30 uU/ml)

Controls	16.70±18.82uU/ml (Range 1-84uU/ml)
Cases	22.07±17.58uU/ml (Range 1-22.5uU/ml)

Discussion

The present study examined the relationship between PCOD with respect to glucose and insulin metabolism. The diagnosis of PCOD was based mainly on the basis of transvaginal sonography. Currently Transvaginal sonography is considered as one of the best modality to diagnose PCOD (Lufigaragi, 1992). We found incidence of impaired glucose tolerance test and 9% incidence of frank diabetes in patients with PCOD. Conway et al (1993) found a 6% incidence of diabetes in patients with PCOD. There was no significant correlation between BMI and abnormal GTT when analyzed by Chi-square test (Chi-square=0.922, p<0.05). This shows that abnormal glucose tolerance which occur in PCOD occurs independent of obesity. Dunaif (1989) also observed the same. Nineteen patients with abnormal GTT were treated with diet and 4 of them conceived with a pregnancy rate 21%. Kiddy et al (1992) observed a pregnancy rate of 38.46% with diet. Three out of the 4 patients who re-

ceived insulin conceived with pregnancy rate of 66.66%. However the no. of patients who received insulin are too small to comment on the pregnancy rate.

Fasting insulin levels in PCOD subjects were significantly higher when compared to these in controls. Nagamani et al (1986) also observed the same.

In summary, the present study indicates that patients with PCOD exhibit significant degree of insulin resistance. They have a high incidence of abnormal GTT. All patients with PCOD should undergo a 75gm 2 hour GTT. Patients with abnormal GTT do benefit from diet and insulin therapy.

References

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