

Original Article

BMI AND FI LEVELS IN REPRODUCTIVE AGE WOMEN WITH NORMAL AND POLYCYSTIC OVARIES

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ABSTRACT

BACKGROUND: Anovulation is the commonest cause for infertility in young reproductive age females. Poly Cystic Ovarian Syndrome being the commonest cause for anovulation with intact Hypothalmo-Pituitary-Ovarian Axis. **AIM:** PCOS is one of the commonest reproductive health problems in reproductive age group causing chronic anovulation leading to infertility. **METHODS AND MATERIALS:** The changes in BMI & FI levels of 30 normal reproductive age women were compared to that of 30 women with Poly Cystic Ovarian Syndrome. **STATISTICAL ANALYSIS:** The data was analyzed by using the Student's t-test. **RESULTS:** There is a significant increase in mean BMI, FI levels ($p<0.0001$) in women with polycystic ovaries when compared to women having normal ovaries on Ultra Sound study.

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1. Introduction

Today, in India when there is a hue and cry over population explosion at one end, there is a rise in incidence of infertility at the other end. Though Poly Cystic Ovarian Syndrome contributes to 5-10% of infertility in young women, it reflects only the tip of iceberg of PCO incidence.

PCOS though thought to be a heterogenous disorder of multifactorial etiology, the role of "insulin" a glucostatic hormone is being implicated largely in its pathogenesis. Resistance of the tissues to the action of insulin-INSULIN RESISTANCE at the molecular level is the basic cause for pathogenesis of PCOS. This insulin resistance may be due to genetic or acquired causes leading to defect in receptors, number of receptors or post-receptor mechanism at various stages.

PCOS is characterized by obesity, hyperinsulinemia, elevated leutinizing hormone levels, elevated androgen levels (virilisation), hirsutism (male hair growth pattern, follicular atresia (ovarian growth failure), ovarian enlargement and cyst formation, anovulation, amenorrhoea (absence of menstruation or irregular periods) and acanthosis nigricans. Thus PCOS is an important cause for reproductive morbidity including infertility and increased

pregnancy loss. It is also associated with increased risk for endometrial cancer due to unopposed action of estrogen and is also associated with increased metabolic and cardiovascular risk factors like glucose intolerance, hypertension, dyslipidemia. These risks are linked to insulin resistance which is a consistent finding in all ethnic groups. Insulin resistance is compounded by common occurrence of obesity although insulin resistance is also present in non-obese women with PCOS.

Normal insulin sensitivity varies widely and is influenced by age, ethnicity and obesity. A WHO consensus group concluded that insulin sensitivity of the lowest 25% of a general population can be considered as insulin resistant.

MATERIALS AND METHODS:

Women in reproductive age group (18-35 years), seeking treatment for infertility or irregular periods, but attained menarche at normal age of 11-15 years were selected from Out Patient clinics of gynecologists in Hanamkonda, Warangal District, Andhra Pradesh, India as Case group. Women who attained menarche at normal age and having regular periods seeking treatment for other medical problems were selected as Controls. Each subject was informed in detail the objectives of study, the aims of the protocol and the methods to be used. Their consent was obtained in the history. Any past or present intake of steroids was ruled out.

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Both the groups were subjected to serial ultrasound examination, FI level estimation and BMI measurement.

By ultrasound they were diagnosed as having normal or polycystic ovaries.

A blood sample of 5 ml was collected from cubital vein in the morning after overnight fasting between 8 to 9 A.M. for estimation of Fasting Insulin by Chemiluminescence method.

BMI was measured by using the formula:

$$\text{BMI} = \text{Wt (Kg)} / \text{Ht}^2 (\text{m})$$

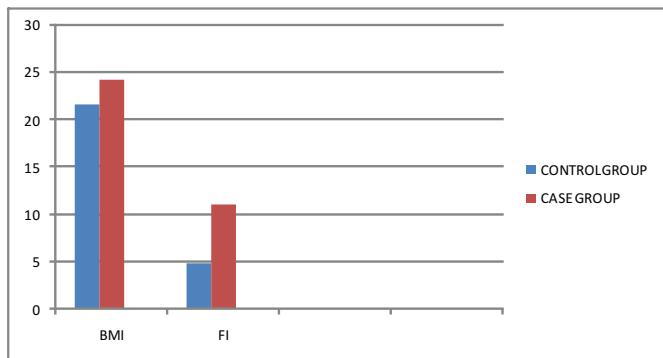
And subjects were classified as overweight - $\text{BMI} > 25$ or Obese- $\text{BMI} > 30$

Results

The mean BMI in Control group is 21.6 and that of Case group is 24.28 with p value < 0.001 . There is a significant increase in BMI in Case group when compared to Control group.

The mean Fasting Insulin in Control group is $4.9 \mu\text{U/l}$ and in Case group is $11.08 \mu\text{U/l}$ with p value < 0.0001 . There is a significant increase in FI in Case group when compared to Control group.

There is a significant increase in mean BMI ($p < 0.001$) and fasting insulin levels ($p < 0.0001$) in women with polycystic ovaries when compared to women having normal ovaries on ultrasound study.



DISCUSSION:

PCOS is an intriguing heterogeneous disorder in reproductive age women causing menstrual disturbances or infertility, the underlying pathology of which is attributed to insulin resistance.

The raised insulin levels are able to dispose the blood sugar and maintain normal levels. These patients become overt diabetics only when the pancreas is exhausted or there is a coexisting defect in beta cells of islets along with insulin resistance. The clinical presentation of patients with insulin resistance depends on the ability of the pancreas to compensate for the target tissue resistance to insulin. During the first stages, when compensation is effective the only metabolic abnormality is hyperinsulinaemia. Later on when beta cells fail to meet the challenge, the decreased insulin levels lead to impaired glucose tolerance test and frank diabetes.

Experimental studies in vascular tissue of lean and obese zucker rats in both in vivo and vitro studies by comparing the insulin signaling via P13 kinase and Erk MAP kinase pathways clearly demonstrated that there is a significant decrease in the ability of insulin to stimulate the phosphorylation of IRS-1, the association of p 85 regulatory subunit of P13 kinase with IRS-1 the activity of PI-3 kinase and the phosphorylation of Akt (a downstream serine kinase of the PI-3 kinase pathway) in the vasculature of obese insulin resistant rats.

Usually obesity imposed on receptor defect worsens insulin resistance in PCOS. Thus it is possible that weight reduction is beneficial in PCOS to decrease insulin resistance leading to normal follicular growth and ovulation. BMI is an independent risk factor for insulin resistance that worsens the condition when imposed on other factors. High levels of insulin are secreted in case group as BMI is increased to compensate for tissue resistance to insulin and maintain glucose levels within normal range.

CONCLUSION:

PCOS is associated with insulin resistance or hyperinsulinaemia. Thus PCOS is not just a reproductive disease but a systemic condition with increased risk for type2 diabetes, hypertension, obesity, cardiovascular risk factors and endometrial cancer. Hence women with PCOS should have comprehensive evaluation not only at the time of diagnosis but longitudinally thereafter since the risk of developing these associated disorders increases with age. Early recognition and intervention such as weight control, diet modification, lifestyle changes, exercise, screening with oral glucose tolerance test, using insulin sensitizing drugs, stoppage of smoking, high fiber diet and low fat diet with increase in monounsaturated fats, screening for endometrial cancer are to be considered. By creating and supporting a preventive attitude, we not only correct specific clinical consequences of anovulation, but can also reduce the co-morbidity.

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