

Original Research Article

Study on Adiponectin Levels in Polycystic Ovary Syndrome Cases**Mehre Afshan Mehdi¹, Suhail Ahmad², Saleha Shaheen³, Farhan Usmani⁴**¹*Senior Resident, Department of OBS/Gynae, Netaji Subhas Medical College & Hospital, Bihta, Patna, Bihar, India*²*Associate Professor, Department of Pharmacology, R.D.J.M. Medical College and Hospital, Turki, Muzaffarpur, Bihar, India*³*Associate Professor, Department of Biochemistry, Prashad Institute of Medical Sciences, Banthra, Lucknow, Uttar Pradesh, India*⁴*Associate Professor, Department of Biochemistry, Patna Medical College, Patna, Bihar, India***Received: 08-10-2021 / Revised: 23-11-2021 / Accepted: 06-12-2021****Abstract**

Introduction: Low adiponectin levels in polycystic ovarian syndrome (PCOS) have been largely attributed to obesity which is common among these patients. In addition, evidence also suggests that low adiponectin in PCOS may be related to insulin resistance (IR) in these women. However, studies on the role of adiponectin in younger and lean patients are limited. Therefore, the aim of the present study was to examine the association of adiponectin levels in young and lean women with PCOS. **Methodology:** This case control study included 75 participants for each. 75 women for cases were included who had PCOS. This study was carried in Department of Biochemistry & Department of Obs/Gynae in Patna Medical College, Patna, Bihar. The duration of study was over a period of two years. **Results:** The result of this study revealed that adiponectin level <13.0 in 27 PCOS cases and in 45 healthy participants, rest were having >13.0 adiponectin level. **Conclusion:** This study concludes that the serum adiponectin levels can be used as a potential independent biomarker for diagnosis of PCOS.

Keywords: PCOS, Adiponectin Level, Endocrine-Metabolic Diseases.

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Introduction

Polycystic Ovary Syndrome (PCOS) has been reported to be one of the most common endocrine-metabolic diseases which affect up to 10% of females of reproductive age group.^{1,2} In approximately 44% of women with PCOS, obesity has been found to be an accompanying factor which is characterized by central distribution of fat. Hyperinsulinemia, dyslipidaemia, and/or hypertension are highly dependent on obesity, especially in women with PCOS and the presence of these worsens the clinical presentation of PCOS.^{1,3} It is now a known fact that the adipose tissue stores a large quantity of fat as an energy source[4] as well as expresses a variety of genes of secretory proteins[5-9]. The human *apM1* gene, which is exclusively expressed in white adipose tissue, has been discovered just now. Adiponectin, the product of this gene is a 244-amino acid protein which has high structural homology to collagen VIII, X, complement C1q, and TNF. Peroxisome proliferator- activated receptor – agonists increases the expression of this protein Adiponectin[10-14]. The physiological role of this protein adiponectin has not been established so far but some recent studies described it to be a kind of matrix protein and has role in antiatherogenic and anti-inflammatory properties[15-18]. As adiponectin is a fat cell product which is secreted into the circulating blood, therefore, it can be held responsible for the metabolic and neuroendocrine derangements attributes of obesity and obesity-related disease, such as PCOS. It has been documented that

the plasma levels of adiponectin are lower in the obese subjects in comparison to non-obese subjects although it is secreted only from adipose tissue[19]. In recent studies, it has been shown that the plasma concentration of adiponectin increases with reduction in body weight[18], signifying that the expression of adiponectin is downregulated by adipose tissue. In few studies, the serum adiponectin concentrations have been found to be inversely correlated with the severity of insulin resistance as well as plasma levels of low-density lipoprotein cholesterol, and triglycerides. But no conclusive data is available at present on adiponectin plasma levels in women with PCOS. Keeping all these things in mind, the aim of the present study is to assess serum adiponectin levels in obese PCOS females and in normo-weight population.

Materials & Methods

Study Population: This case control study included 75 participants for each. 75 women for cases were included who had PCOS.

Study Area: This study was carried in Department of Biochemistry & Department of Obs/Gynae in Patna Medical College, Patna, Bihar.

Study Duration: Duration of study was over a period of two years.

Data Collection: We included 75 diagnosed cases of PCOS aged between 16–35 years with desired BMI. PCOS was diagnosed using the Rotterdam Criteria which states that PCOS is diagnosed if patient have any two of the following three features, 1) oligo/amenorrhea and/or anovulation, 2) hyperandrogenism and/or hyperandrogenemia, and 3) polycystic ovaries on ultrasound after exclusion of other etiologies. While 75 Controls were included healthy females with regular menstrual cycle from family and friends of the cases.

Controls participants also had BMI within desirable range. Socio-demographic information such as detailed menstrual and reproductive history, family history of menstrual or reproductive

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Mehdi et al

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problems, past medical history, and anthropometric profile were recorded. Fasting blood samples were drawn from all participants for assessment of blood glucose, lipid profile, adiponectin, insulin and androgen levels. Fasting serum adiponectin was estimated using the Bio-Rad PR 3100 which uses Enzyme Linked ImmunoSorbent Assay (ELISA) technique of quantitative hormone estimation. Adiponectin was categorized using the median value of the sample, 13.0 $\mu\text{U/ml}$.

Data Analysis: Data were analysed by using Microsoft Excel.

Results

In this study we included 75 PCOS cases and 75 healthy participants as control. Out of 150 participants 24 cases and 23 control were aged group 31-35 followed by 21-25, 16-20, 26-30 age group. In this study, 37 cases and 43 control were married rest were unmarried. This study seen that 63 cases having family history of PCOS, while in control 54 having family history of PCOS. It was found total cholesterol in 69 control and in 68 cases having less than 6.2 and rest having more than 6.2. The present study also shows that high density of lipoprotein >1.29 in 35 cases and in 43 control. The result of this study revealed that adiponectin level <13.0 in 27 PCOS cases and in 45 healthy participants, rest were having >13.0 adiponectin level.

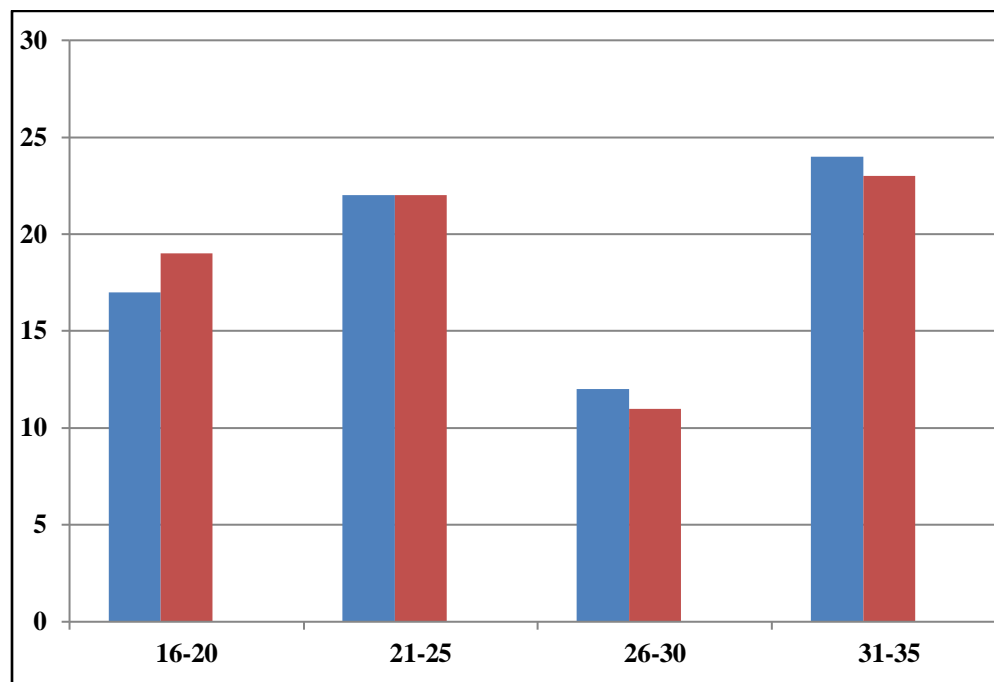


Fig 1: Distribution of cases-control according to age

Table 1: Characteristics & Adiponectin level in PCOS cases & control

Characteristics	Cases	Control
Marital status		
Unmarried	38	32
Married	37	43
Family history of PCOS		
Yes	63	54
No	12	21
Total cholesterol		
<6.2	68	69
>6.2	7	6
High density of lipoprotein		
<1.29	35	43
>1.29	40	32
BMI	19.3	18.3
Insulin resistance	3.1	2.9
Adiponectin level		
<13.0	27	45
>13.0	48	30

Discussion

The findings of the present study implied that the serum adiponectin levels of PCOS females with a desirable Body Mass Index (BMI) are significantly low. After adjustment for age, BMI, family history of

PCOS, marital status, total cholesterol level, HDL and IR, the association of PCOS remained consistent and statistically significant with low adiponectin level. There was not much effect of age parameter as the relationship between PCOS and low adiponectin changed very little across different age groups. It has been also reported that the family histories of PCOS and IR were associated significantly with lower adiponectin levels. In the present study, the low levels of adiponectin were found in lean young women with PCOS. It has been well demonstrated by multiple studies that the decreased levels of serum adiponectin were commonly found in females with PCOS. Some studies have shown a correlation of low adiponectin levels with presence of PCOS irrespective of the weight and/or BMI of patients[20-24]. The relationship between PCOS and lower levels of adiponectin has been disclosed in systematic review and meta-analysis of Toulis et al. after controlling for the potential effects of obesity by BMI matching on a sub-analysis. This study established the fact that the serum adiponectin levels are not independently determined by the degree of female adiposity only, but underlying disease may also be attributed for the same. Increasing IR in PCOS females can be held responsible for the lower adiponectin levels in the previous study. The similar results have been observed in the present study. It has been observed in type 2 diabetes mellitus that the adiponectin possessed insulin-sensitizing and anti-diabetic properties as well as the levels of adiponectin were also reduced [25,26]. An increase in the plasma levels of the adiponectin were observed in randomized controlled trials with treatment of PCOS patients with anti-diabetic medication such as metformin [27,28], rosiglitazone[29], and pioglitazone[30]. In the present study, an association of family history of PCOS and IR with lower adiponectin levels in PCOS females were observed. The genetic factors have been found to play an important role in the pathogenesis of PCOS. Familial clustering of PCOS has been reported in the first-degree relatives of the patients.³¹ It has been found that the pre-pubertal daughters with normal BMI, of PCOS females, present with disturbed metabolic profile including hypoadiponectinemia and hyperinsulinemia.³² In the present study, the cases and controls did not differ significantly regarding the history of PCOS. This finding pointed towards the hypothesis that the environmental factors e.g. diet, and exercise also play a role despite the fact that the family history is an important risk factor. PCOS is a syndrome and its polygenic causality cannot be ruled out and various dysfunctional changes in the metabolism of carbohydrates, insulin action, and steroid hormones have also been established. A similar family history of PCOS can therefore be found being a contributory factor along with others those cause PCOS. A similarity of family history in cases and controls is sometimes found. In the present study, significantly lower levels of adiponectin were found in PCOS patients of age younger than twenty-five years can be attributed to the involvement of a stronger genetic component in PCOS pathogenesis. It has been found that the serum adiponectin levels can be used as a potential independent biomarker for diagnosis of PCOS in lean females with fewer symptoms, or in females with a family history of PCOS.

Conclusion

This study concludes that the serum adiponectin levels can be used as a potential independent biomarker for diagnosis of PCOS in lean females with fewer symptoms, or in females with a family history of PCOS.

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