



Polycystic Ovarian Syndrome and Endocrinological Disturbances: An Observational Study in a Tertiary Care Hospital of Bihar

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ABSTRACT

Introduction: Polycystic ovary syndrome (PCOS) has emerged as one of the commonest endocrine disorders among females. It has been found to be associated with insulin resistance and hence increased risk to develop T2DM and CVS disorders along with endometrial carcinoma. The current study was planned to assess the metabolic and endocrine pattern of PCOS women at a tertiary care hospital of Bihar.

Methodology: The present study was carried out in the department of Biochemistry, Darbhanga medical college, Laheriasarai. The cases were selected from OPD of Obstetrics and Gynaecology department. The study population comprised of 60 women aged 15-50 years of age of diagnosed case of PCOS in study group. IEC approval was prior obtained.

Results: It was observed that both serum FSH and LH was higher in the study group, although statistical significance was observed in case of serum LH. Serum insulin was also significantly higher in the study group. Similarly, a statistical significance was noted in blood profile of cases and control in terms of all the assessed parameters of thyroid profile.

Conclusion: PCOS is not a reproduction dysfunction but a multi system malfunctioning affecting a major proportion of female population. Hence, timely therapeutic intervention can halt this ongoing process.

Keywords: Polycystic ovarian syndrome (PCOS), serum FSH, serum LH, LH/FSH ratio.

INTRODUCTION

Polycystic ovarian syndrome (PCOS) has emerged as one of the commonest endocrine disorders among females in adolescent age group as well as in their reproductive age group. It is also the leading cause of infertility among female.¹ The syndrome is clinically characterized by irregular menses, anovulatory cycles, and features of hyperandrogenism. The characteristic sonographic finding is presence of multiple small sub-capsular cystic follicles in the ovary. Additionally, it has been found to be associated with insulin resistance and hence increased risk to develop T2DM and CVS disorders.²

Among endocrinological manifestations, elevated luteinizing hormone/follicle stimulating hormone (LH/FSH) ratio is the most typical finding among women with PCOS. Infact, an LH/FSH ratio is the diagnostic gold standard for this pathology.³ The clinical presentation of the syndrome varies from patient to patient.^{2,4} The pathogenesis of the disease, the clinical presentation of the patient and their biochemical profile depends on the interaction of various hormones. For PCOS patients, the mainstay of the treatment is correction of menstrual cycles and return of fertility. These women are also at higher risk to develop endometrial carcinoma.^{2,5,6} So, the treatment must focus on correction of impending endocrinological and biochemical pathology along with symptomatic relief.

Hence, these parameters are invincible in unveiling the pathogenesis of the disease process. For treatment making decision and make the prognosis of the disease, assessment of the lipid profile and endocrine status play a pivotal role. With this background the current study was planned to assess the metabolic and endocrine pattern of PCOS women at a tertiary care hospital of Bihar.

MATERIALS AND METHODS

Study site: The present study was carried out in the Department of Biochemistry, Darbhanga Medical College & Hospital, Laheriasarai, Darbhanga, Bihar to compare the endocrinological profile of clinically diagnosed women with PCOS and their healthy counterparts. These cases are selected from OPD of Obstetrics and Gynaecology department of Darbhanga medical college and hospital.

Study period: 12 months (from November 2019 to October 2020)

Study population: 120 (60 cases and 60 control)

Study design: The study population comprised of 60 women aged 15-50 years of age of diagnosed case of PCOS in study group. In control group 60 women of same age group from attendants of patients, medical college staff were taken and women residing in Darbhanga. Clearance was obtained from the institutional ethics committee and



consent forms were duly signed by the patients before inclusion in the study.

Methodology: 3ml of venous blood collected from antecubital vein after taking full antiseptic precautions. 1 ml of blood is transferred to fluoride tube for glucose estimation and 2ml is transferred to plain tube. Blood is allowed to clot at room temperature, then centrifuged, serum was separated and stored at 2-8 centigrade. Estimation done on next day. Estimation of serum FSH was done by ELISA (Sigma - Aldrich). FSH ELISA kit is a solid phase assay using streptavidin/biotin method. A standard curve was prepared related colored intensity to concentration of the FSH. Normal value in female in the follicular phase was considered to be 2 - 10IU/ml.

Estimation of serum LH was done by ELISA (Phoenix). The test was based on the principle of solid phase ELISA. The assay system utilizes a mouse monoclonal anti- α -LH antibody for solid phase (micro titre well) immobilization and a mouse monoclonal anti- β -LH antibody in the antibody-enzyme (HRP) conjugate solution. Normal value of serum LH was considered to be 1.24 – 7.8IU/ml.

Hormones free T3 (fT3), free T4 (fT4), thyroid stimulating hormone (TSH) and insulin were measured by the chemiluminescence immunoassay (CLIA) method using a Beckman Coulter Access fully automated analyzer. The hormone kits used in the Beckman Coulter Access analyzer (USA) were from Beckman Coulter, Ireland. The reference

range for fT3, fT4 and TSH was considered to be 2.50-3.90 pg/ml, 0.34-5.60 mIU/L and 0.34-5.60 mIU/L, respectively.

Statistical analysis: The data observed in this study were tabulated and inference was drawn. The range, mean value, standard deviation (SD) and p – value were statistically analyzed. The data for biochemical analysis are expressed as Mean \pm SD (standard deviation). Single and paired sample test was applied to determine the significance of biochemical parameters among groups. The entire data was analyzed by statistically program SPSS 23.0

RESULTS

The study composed of 120 female subjects equally divided in the study and the control group based on the inclusion and exclusion criteria. In both the groups, serum LH and FSH were analyzed. The table 1 shows that the serum FSH ranged from 2.5 -10.9 μ IU/ml with mean 5.5 ± 2.39 μ IU/ml and serum LH Range from 1.48- 12.8 μ IU/ml with mean 6.29 ± 2.63 μ IU/ml in control group. In the study group, the serum FSH ranged from 2.3 -10 μ IU/ml with mean 6.4 ± 1.81 μ IU/ml and serum LH ranged from 3.7- 14 μ IU/ml with mean 8.5 ± 2.6 . Hence, it was observed that both serum FSH and LH was higher in the study group, although statistical significance was observed in case of serum LH. [Table 1] Serum insulin was also significantly higher in the study group. [Table 1] Similarly, a statistical significance was noted in blood profile of cases and control in terms of all the assessed parameters of thyroid profile. [Table 1]

Table 1: Comparison of insulin, FSH & LH in study and control group

Parameter	Control group Mean \pm SD	Study group Mean \pm SD	t Value	p Value
Serum FSH (μ IU/ml)	5.50 \pm 2.39	6.4 \pm 1.81	2.33	> 0.05
Serum LH (μ IU/ml)	6.29 \pm 2.63	8.5 \pm 2.6	4.62	< 0.05
fT3 (pg/ml)	3.1 \pm 0.3	1.8 \pm 0.7	6.71	< 0.05
fT4 (mIU/ml)	0.9 \pm 0.2	0.5 \pm 0.1	5.24	< 0.05
TSH (mIU/ml)	3.4 \pm 1.3	8.2 \pm 2.4	11.32	< 0.05
Insulin (μ IU/ml)	7.7 \pm 2.45	13.55 \pm 3.45	10.6	< 0.05

DISCUSSION

PCOS is now a commonly encountered disorder of endocrine system. The pathophysiology of the disorder is multi-factorial and closely associated with derangement in the multiple system. The current study was a humble attempt to assess the changes in the hormonal levels of PCOS patients and compare these results with their healthy counterparts. These observations are in continuation with a larger study with varied findings. composed of 120 female subjects equally divided in the study and the control group based on the inclusion and exclusion criteria. Overall, the mean age of the study participants 27.8 ± 10.3 years.

Hypothyroidism, a condition with insufficient levels of thyroid hormone in the body. There are postulates that

affirms it to be associated with hyperandrogenism⁷. In the current study, an increased levels of TSH were noted in the study population. When compared with the TSH levels of the control population, a statistical significance was noted in the difference of the TSH levels of both the groups. Out of 60 cases in the study group, 21 females had TSH levels lower than 5.5 mIU/L, a staggering 29 patients had TSH levels higher than 5.5 up to 10 mIU/L. The results of the study are consistent with the findings of many of previous authors⁸⁻¹⁰. Ozdemir, et al studied the prevalence of thyroid dysfunction among PCOS patients and reported that 15.9% of the study participants had hypothyroidism.¹¹

Insulin resistance and hyperinsulinemia are closely associated with PCOS. Significant levels of insulin resistance (raised HOMA IR) were noted in the study (out of the



purview of this paper). Apart from that it was noted that women with PCOS had raised LH and FSH levels. Similar findings have been reported earlier^{2, 5, 6}. The pathology behind raised LH/FSH ratio has been directly related to testosterone adipocytes and subsequent induction of androgen receptor mediated insulin resistance via testosterone and hence leading to clinical features of hyperandrogenism¹². These hormonal derangement causes hyperplasia of theca cells and hence hirsutism. We observed this association in the present study, which supported results from previous studies^{12, 13}.

CONCLUSION

Till recently, PCOS was considered to be a single malfunction of reproductive system making it difficult to manage. But time and again researchers have focused on this condition and now it is a well-known fact that the symptom complex of PCOS is a syndrome. Timely therapeutic intervention can halt this ongoing process. Nevertheless, complaint related to a single feature should not be neglected.

Author's Contribution:

Dr. Amrita- Definition of intellectual content, Literature survey, Prepared first draft of manuscript, implementation of study protocol, data collection, data analysis and preparation of Figures

Dr. Sarika- Concept, design, clinical protocol, manuscript preparation, editing, and manuscript revision;

Dr. Alok Himanshu- manuscript preparation and submission of article, Coordination and Manuscript revision, Design of study, statistical Analysis and Interpretation;

Dr. Sude Kumar Singh- Review Manuscript; Literature survey.

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