



ORIGINAL RESEARCH PAPER

Biochemistry

EVALUATION OF THYROID HORMONES IN POLYCYSTIC OVARIAN SYNDROME

KEY WORDS: PCOS, Thyroid Hormones, Hypothyroidism

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ABSTRACT

BACKGROUND: Polycystic ovarian syndrome (PCOS) is the most common endocrinopathy of reproductive age affecting 5% to 10% of women worldwide and is a leading cause of infertility. PCOS is closely associated with hypothyroidism and is risk factor for ovarian malfunction and infertility.

OBJECTIVES: To estimate and compare thyroid hormones in PCOS patients and healthy controls.

MATERIALS AND METHODS: A case control study was conducted on 100 individuals (50 PCOS patients and 50 healthy controls). Serum TSH, freeT3, free T4 were estimated by Chemiluminescence assay (CLIA).

RESULTS: Serum TSH levels were significantly increased in cases whereas free T3, free T4 were decreased in cases as compared to controls.

CONCLUSION: PCOS is associated with hypothyroidism. Evaluation of thyroid hormones may help in preventing complications like ovarian dysfunction and infertility.

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is the common endocrinopathy of females in the reproductive age and has a prevalence of 5% to 10%. It is a metabolic syndrome characterized by anovulation, hyperandrogenism and polycystic ovaries according to Rotterdam's classification. PCOS is diagnosed by the presence of atleast two of the three criteria(1,2). Polycystic ovaries are defined as multiple cysts in the ovaries. Hyperandrogenism is due to incomplete follicular development and is the central biochemical finding in PCOS with increased circulating levels of androgens such as testosterone, dihydrotestosterone and or androstenedione. Hyperandrogenism is believed to be cause for incomplete follicular development(3,4,5).

PCOS is associated with obesity, menstrual irregularity, insulin resistance and infertility, acne, hirsutism. In addition these patients may develop many other related endocrine and metabolic diseases and have increased risk of suffering endometrial cancer, diabetes, cardiovascular disease(6).

PCOS is believed to be a heterogenous dysfunction of multifactorial etiology. Thyroid dysfunction in PCOS is characterized by either autoimmune thyroiditis or subclinical hypothyroidism both being involved in the latent progression to hypothyroidism. It is linked to primary hypothyroidism in 6.3% of PCOS patients (7,8). PCOS patients present with overweight, fatigue, depression and anxiety. Despite their different etiologies, there is a significant overlap of symptoms between PCOS and hypothyroidism but they are independent risks of ovarian malfunction and pregnancy associated problems(9,10). Some ovarian related changes including the appearance of cystic lesions and increase in size and volume of ovaries are commonly seen in both PCOS and thyroid disorders(11,12). An abnormal thyroid concentrations could trigger alterations in ovulation and then menstruation(13). Initial stages of thyroid malfunction can result in modifications in ovulation as well as endometrial receptivity which may drastic influence on fertility(10). Thyroid hormone replacement therapy in hypothyroidism leads to steady regression of ovarian cysts, which provides a causal bond between hypothyroidism and ovarian stimulation(14). In hypothyroidism, pituitary triggers an increase in Thyrotrophic releasing hormone (TRH) that increase the concentration of Thyroid stimulating hormone (15).

As PCOS and hypothyroidism are closely associated and mostly it is subclinical hypothyroidism and only a small fraction of the T3, T4 hormones are unbound and free for biological activity. Hence, this study was planned to evaluate TSH, free hormones (free T3 and free T4) to arrive at the actual diagnosis and assessment of thyroid function in PCOS.

MATERIALS AND METHODS:

The study was conducted in Department of Biochemistry, Kurnool Medical College and Department of Obstetrics & Gynaecology, Government General Hospital, Kurnool during July 2016 to July 2017 after institutional ethical committee approval. A total of 100 participants in the age group of 18-40 years were included in the study. 50 diagnosed cases of PCOS were selected as cases and 50 healthy females were selected as controls. Patients with hypothyroidism, Diabetes mellitus, Hypertension, liver disorders, renal diseases and women on contraceptive pills were excluded from the study.

An informed consent and a brief clinical history were obtained from study participants. Fasting blood samples were collected on the 3rd day of menstrual cycle. Serum was separated by centrifugation and the samples were analysed for TSH, freeT3, freeT4 by Chemiluminescence immunoassay (CLIA) method using a Beckman Coulter Access2 fully automated analyser.

STATISTICAL ANALYSIS :

Data entered in Microsoft excel and statistical analysis was done using SPSS version 23. Numerical parameters were expressed as mean and standard deviation. Unpaired 't' test was used to analyse the data and P value < 0.001 was considered statistically significant.

RESULTS:

The results of the study are shown in Table 1. In the present study TSH levels were significantly increased in cases as compared to controls (P<0.001). FreeT3 and FreeT4 were significantly decreased in PCOS as compared to controls (P< 0.001). A P value of 0.001 was considered to be significant.

Table 1: Serum values of Thyroid hormones (mean ±SD)

Parameter	Cases (n=50)	Controls (n=50)	P value
TSH (mIU / ml)	8.31± 2.11	2.67± 0.53	0.001*
FreeT3 (pg / ml)	2.12± 0.03	3.05±0.78	0.001*
FreeT4 (ng / ml)	0.69 ± 0.01	0.95±0.01	0.001*

* Statistically significant

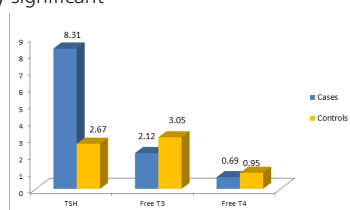


FIGURE 1: Thyroid hormones of study population

DISCUSSION:

Hypothyroidism is the disease state caused by insufficient production of thyroid hormones by thyroid gland. Insulin resistance and increased androgen production can cause hypothyroidism(16).

In our study TSH levels were significantly increased in PCOS patients as compared to controls with $p < 0.001$ whereas FreeT3 and Free T4 levels were significantly decreased in cases as compared to controls ($P < 0.001$). The results of our study were in agreement with other studies (17,18,19,20,21). TSH is the most sensitive indicator of hypothyroidism. The prevalence of hypothyroidism in reproductive age group is upto 4% and it is associated with a broad spectrum of reproductive disorders ranging from menstrual irregularities to infertility and abortions. Thyroid responsiveness by the ovaries could be explained by the presence of thyroid hormone receptors on human oocytes. TSH also affects estrogen metabolism, decreases the production of sex hormone binding globulin and increases free testosterone (22,13,23). This increased estrogen may increase the levels of thyroid binding globulin and mask the activity of free thyroid hormones. Thus, the clinical features of hypothyroidism overlap with features of PCOS (4).

CONCLUSION:

PCOS is associated with hypothyroidism which in turn causes disturbances in reproductive hormones. Regular monitoring of thyroid hormones is highly recommended in PCOS patients for institution of early treatment of hypothyroidism and in the management of infertility in PCOS.

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