DOI Number: 10.5958/2320-608X.2017.00069.5

Thyroid Hormone Levels in Patients with Polycystic Ovarian Syndrome

Santosh Palekar[1], Umesh Balgi[2], Sandhya Metta[1], Anvar Batakurki[3]

[1]Assistant Professor, [2]Associate Professor, Department of Physiology, Kamineni Institute of Medical Sciences, Nalgonda, [3]Gynaecologist, Government Hospital, Bagalkot

ABSTRACT

Context: Polycystic ovarian syndrome, commonly known as PCOS, is an endocrine disorder seen in women of reproductive age. Polycystic ovarian syndrome is estimated to effect 4-12% of women throughout the world and is most commonly characterized by hyperandrogenism and insulin resistance each of which affect 60% to 80% of PCOS patients and 50-80% of PCOS women respectively. **Aims**:To evaluate the levels of thyroid hormones in women with PCOS. **Method** :80 female patients with PCOS based on Rotterdam criteria,80 volunteer females included as controls , serum levels of TSH, T3 and T4 were tested in two groups. **Results** Significant increase in TSH along with a significant decrease in T3 and T4 in PCOS females matched against controls ($p< 0.05$).

Conclusion PCOS is linked to hypothyroidism and more studies should be carried to reveal the precise relationship.

Keywords: *Thyroid hormones, polycystic ovarian syndrome, T3, T4, TSH*

INTRODUCTION

Polycystic ovarian syndrome (PCOS) [the major endocrinopathy of females in the reproductive age] and the thyroid disorders are the two most common endocrine disorders in the general population and though these both disorders differ in etiopathogenesis , these two entities have common features[2]. Polycystic ovarian syndrome (PCOS) also called as Stein- Leventhal syndrome causes the signs and symptoms due to elevated male hormone in women[10]. These include irregular or no menstrual periods, excess body and facial hair, acne, pelvic pain, patches of thick, darker and valvetty skin[10]. During the reproductive years, PCOS is associated with important reproductive morbidity including infertility, irregular uterine bleeding and increased pregnancy loss[10]. Associated with increased cardiovascular and metabolic risk factors like type 2 diabetes, obesity, obstructive sleep apnoea, mood disorders, heart disease and endometrial cancer[3]. The first recognition of an association between glucose intolerance and hyperandrogenism (HA) was the famous report of the bearded diabetic woman by Archard and Thiers in 1921[4].The level of thyrotropin releasing hormone (TRH) in primary hypothyroidism is raised which leads to rise in prolactin and thyroid stimulating hormone (TSH)[2]. The change in the ratio of follicle stimulating hormone (FSH) and Leutinizing hormone(LH) and increased DHEA from the adrenal gland, all these contributes towards polycystic morphology by inhibing ovulation[2]. Increased TSH also has its effects on FSH receptors. Increased TSH also contributes in the deposition of collagen in the ovaries[2]. According to the study conducted by Muderris *et al*, twenty six females on treatment for primary hypothyroidism with mean TSH 57.1mcg/dl underwent evaluation of ovarian volumes before and after replacement with thyroxine[2]. Out of twenty six, ten of the hypothyroid females had polycystic appearing ovaries on ultrasound sonography test[2]. All the women with primary hypothyroidism had significantly higher ovarian volumes than controls[2]. Normalization of ovarian volumes in all patients with or without polycystic appearing ovaries , after replacement with thyroxine[2]. Consistent regression of the ovarian cysts after thyroid hormone replacement therapy supports a causal relationship between hypothyroidism and ovarian stimulation[5]. Speculation regarding the autoimmune thyroiditis, which predisposes subjects to develop characteristics suggestive of PCOS or whether PCOS is the forerunner of autoimmune thyroiditis is not yet cleared[2]. The aim of the present study is to evaluate

thyroid hormones level and their role in women with polycystic ovarian syndrome.

MATERIALS AND METHOD

The study was conducted on the subjects attending the out patient clinic in M.R.Medical college & Teaching Hospital , Gulbarga, Karnataka between July 2012 to Feburary 2013. The study included 80 female patients suffering from PCOS. Diagnosis of PCOS is made according to the Rotterdam European Society for Human Reproduction and Embryology/ American Society for Reproductive Medicine. The protocol was approved by the local ethics committee. All the patients gave a written consent.The Control group (n= 80) consisted of healthy subjects without any systemic disorder. Free T3, Free T4 and TSH concentration were measured by mini-VIDIS.

Inclusion criteria

- Female between 18 to 39 years of age
- Presented with clinical history of PCOS and Hypothyroidism.

Exclusion criteria

- Female below 18years and over the age of 39years were excluded from the study
- Diabetes Mellitus
- Hperprolactinemia
- Congenital adrenal hyperplasia
- Androgen secreting tumours
- Cushing syndrome
- Infection diseases
- Hypertension
- Medications including OC pills, antilipidemic drugs, insulin sensitizing drugs, within 3 months before enrolement.

STATISTICAL ANALYSIS

All data analysed using the Statistical Package for Social Sciences (SPSS) software computer program version 20.0.

Data expressed as mean ± Standard Deviation(SD) following analysis using independent t-test. A value of $p<0.05$ was considered significant.

RESULTS

Table 1: Serum level of TSH in women with PCOS were significantly elevated compared to healthy control group. Serum level of free T4 and free T3 were significantly decreased compared to healthy control group.

Parameters	Patients n=80	Control n =80	P-value
TSH	8.2 ± 8.0	1.6± 1.2	0.00*
Free T4	0.3 ± 0.2	1.0 ± 0.2	0.00*
Free T3	5.4 ± 1.8	9.2 ± 2.0	0.00*

Table shows mean ± SD and probability (p) *

*P – value < 0.05 is considered significant

DISCUSSION

The prevalence of subclinical thyroid dysfunction in reproductive years is about 4-6%[2].Various publications have reported increased incidence of thyroid disorders in females with PCOS[2].A higher prevalance (26.9% versus 8.3% of controls) of autoimmune thyroiditis (AIT) in PCOS has been reported in one study to date[7]. Sinha et al, compared 80 PCOS females with 80 controls and found significant higher prevalance of goiter in PCOS as compared to controls[2]. Janssen et al, documented a high mean level of TSH in PCOS patients[1]. Ghosh et al, analysed the part of hypothyroids in the causation of PCOS and proposed that hypothyroidism resulted in reducing sex hormone binding globulin level and increament of testosterone level[1]. The most obvious connection between PCOS and hypothyroidism is increased BMI and insulin resistance common to both conditions[2]. Experimental studies have shown that in normal conditions, thyroid hormones may influence the expression or activation of uncoupling protein, b-adrenergic receptor, and peroxisome proliferator-activated receptor-gamma, all of which are involved in regulating insulin sensitivity (Frederiksen et al., 2002; Dallongeville et al., 2003; Wang et al., 2004)[8]. The association of IR and hyperinsulinemia of PCOS with elevation of various cytokines such as IL-4, IL-6, TNF-a, and their alteration after treatment with insulin sensitizers is well established[9]. Obesity is

associated with increase in proinflammatory markers and increase in insulin resistance[2]. This leads to decreased deiodinase-2 activity at pituitary level resulting in relative T3 deficiency and increase in TSH levels[2]. High insulin levels cause the pituitary gland to make too much luteinzing hormone (LH) and too much LH causes overproduction of testosterone, these hindering ovulation[10]. Kachuei et al, found that women with PCOS had a 65% increase in thyroid peroxidase antibodies and a 26.6% increase in the incidence of goiter, when compared to age matched subjects[10]. It has been proposed that women with Subclinical hypothyroidism and ovulatory dysfunction, infertility, or desire to become pregnant should be treated[6].Our study revealed a significant increase in mean ± SD level of serum TSH level in PCOS patients in contrast to controls[1]. In this study there was a significant decrease in mean ± SD level of serum T4 and T3 in PCOS women compared with those in control group.

CONCLUSION

The study suggests that hypothyroidism is related to PCOS and this will lead to autoimmune disease. Thyroid health has a profound impact on the pathology of PCOS affecting all aspects of disorder[10]. Correcting subclinical hypothyroidism is the key in improving overall hormonal and metabolic health[10]. Doctors should look at the specific relationships that exist in each and every patient to create a plan that helps to restore optimal metabolic and hormonal health[10].

Source of Financial Support – Self

Conflict of Interest – None

REFERENCES

1. Osman AA et al., Evaluation of Thyroid Hormones Level in Sudanese Women with Polycystic Ovarian Syndrome, Sch. J. App. Med. Sci., March 2016; 4(3A):664-668
2. Singla R, Gupta Y, Khemani M, Aggarwal S. Thyroid disorders and polycystic ovary syndrome: An emerging relationship. Indian J Endocrinol Metab. 2015;19:25–9. [PMC free article] [PubMed]
3. Sinha U, Sinharay K, Saha S, Longkumer TA, Baul SN, Pal SK. Thyroid disorders in polycystic ovarian syndrome subjects: A tertiary hospital based cross-sectional study from Eastern India. Indian J Endocrinol Metab. 2013;17:304–9. [PMC free article] [PubMed]
4. Ramanand SJ, Ghongane BB, Ramanand JB, Patwardhan MH, Ghanghas RR, Jain SS. Clinical characteristics of polycystic ovary syndrome in Indian women. Indian J Endocrinol Metab. 2013;17: 138–45.[PMC free article] [PubMed]
5. Muderris II, Boztosun A, Oner G, Bayram F. Effect of thyroid hormone replacement therapy on ovarian volume and androgen hormones in patients with untreated primary hypothyroidism. Ann Saudi Med.2011;31:145–51. [PMC free article] [PubMed]
6. Benetti-Pinto CL, Berini Piccolo VR, Garmes HM, Teatin Juliato CR. Subclinical hypothyroidism in young women with polycystic ovary syndrome: An analysis of clinical, hormonal, and metabolic parameters.Fertil Steril. 2013;99:588–92. [PubMed]
7. Garelli S, Masiero S, Plebani M, Chen S, Furmaniak J, Armanini D, et al. High prevalence of chronic thyroiditis in patients with polycystic ovary syndrome. Eur J Obstet Gynecol Reprod Biol. 2013;169:248–51.[PubMed]
8. Mueller A, Schöfl C, Dittrich R, Cupisti S, Oppelt PG, Schild RL, et al. Thyroid-stimulating hormone is associated with insulin resistance independently of body mass index and age in women with polycystic ovary syndrome. Hum Reprod. 2009;24: 2924–30. [PubMed]
9. Ganie MA, Marwaha RK, Aggarwal R, Singh S. High prevalence of polycystic ovary syndrome characteristics in girls with euthyroid chronic lymphocytic thyroiditis: A case-control study. Eur J Endocrinol.2010;162:1117–22. [PubMed]
10. https://en.wikipedia.org/wiki/Polycystic_ovary_syndrome
11. http://www.hashimotosawareness.org/pcos-and-thyroid-health-2
12. http://www.runningwithpcos.com/pcos-information-and-facts.html