

THYROID PROFILE IN POLYCYSTIC OVARIAN SYNDROMESudhanshu Sekhara Nanda¹, Subhalaxmi Dash², Ashok Behera³, Bharati Mishra⁴**HOW TO CITE THIS ARTICLE:**

Sudhanshu Sekhara Nanda, Subhalaxmi Dash, Ashok Behera, Bharati Mishra. "Thyroid Profile in Polycystic Ovarian Syndrome". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 37, August 21; Page: 9594-9600, DOI: 10.14260/jemds/2014/3242

ABSTRACT: AIM: Finding the prevalence of hypothyroidism in PCOS and to determine the association between hypothyroidism and various clinical and laboratory parameters in PCOS. **SETTING:** The study was conducted as a prospective observational study on 196 USG diagnosed cases of PCOS who attended the outpatient wing of MKCG Medical College Hospital, Berhampur, Odisha, India. **METHODS:** All the USG proven cases of PCOS were subjected to investigations like FSH, LH, FBS, PPBS, Serum Insulin, TSH, Free T₃, Free T₄. After an overnight fasting, basal venous blood sample was taken. TFT including TSH, Free T₃ and Free T₄ was estimated using chemiluminescence method. According to this, TSH normal range was taken as 0.34-4.25 μ IU/ml, Free T₃ normal range was 2.4-4.2 pg/ml, Free T₄ normal range was 0.8-1.7 ng/dl¹³⁷. TSH above 4.25 μ IU/ml, Free T₃ below 2.4 pg/ml and Free T₄ below 0.8 ng/dl was considered as overt hypothyroidism and high TSH with normal Free T₃ and Free T₄ are considered as subclinical hypothyroidism. **RESULTS:** The mean age of presentation was 27.28 \pm 10.56 years. 78.57% of cases had menstrual complaints. 20.40 % of cases had Secondary Amenorrhoea, 56.12 % had Oligomenorrhoea, 2.04 % had Polymenorrhoea and 21.42% had normal menstrual cycles. 76.53 % of cases had Hyperandrogenism. 66.32 % had hirsutism, out of which 69.23 % had mild hirsutism, 29.23 % had moderate hirsutism and 1.53 % had severe hirsutism. 31.63% of cases had Acne. 70 % of married cases had Infertility. Out of that 79.59 % had primary infertility and 20.40 % had secondary infertility. 38.77 % had infertility of duration 1-2 years, 51.02 % had infertility of 3-5 years and 10.20 % had infertility of >5 years. 64.28 % of cases had increased BMI (\geq 25 kg/m²). The prevalence of hypothyroidism in PCOS was 13.26 %. Out of that 57.69 % had subclinical hypothyroidism and 42.30 % had overt hypothyroidism. 96.15 % of PCOS with hypothyroidism had menstrual irregularities like oligomenorrhoea and secondary Amenorrhoea. This association was found to be statistically significant. 96.15 % of PCOS with hypothyroidism had features of hyperandrogenism like acne and hirsutism. This association was found to be statistically significant. 84.61 % of PCOS with hypothyroidism had increased BMI (\geq 25 kg/m².) This association was found to be statistically significant. PCOS and Hypothyroidism are closely related. **CONCLUSION:** There is increased prevalence of hypothyroidism in PCOS. The relationship between thyroid profile and PCOS is being tried to be explored more and thus the problems of PCOS can be solved to some more extent.

KEYWORDS: polycystic ovarian syndrome, hypothyroidism, hyperthyroidism.

INTRODUCTION: Polycystic ovary syndrome (PCOS) is a heterogeneous collection of signs and symptoms that when gathered together, form the spectrum of a disorder with mild presentation in some and severe disturbances in others. The condition is now well recognized as having a major effect throughout life on the reproductive, metabolic, and cardiovascular health of affected women, from adolescence till old age.

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Irvin.F.Stein and Michael.L.Leventhal first described a symptom complex associated with chronic anovulation in 1935 which consisted of oligomenorrhoea, hirsutism, obesity and bilaterally enlarged polycystic ovaries.^[1]

PCOS is one of the most common endocrinopathies affecting 4-7 % of women in the reproductive age group^[2,3,4,5,6] and contribute to a major share of anovulatory infertility. It is more prevalent in South Asian women than in Caucasians,^[7] though it can present in women of any ethnicity. PCOS is associated with 75% of anovulatory infertility.^[8] Even if they conceive, they can have very high pregnancy loss rates.

The current diagnostic criteria for PCOS is the 2003 Rotterdam ESHRE/ASRM revised consensus^[9,10] according to which at least 2 of the following criteria are sufficient for the diagnosis:

1. Chronic oligo/anovulation,
2. Clinical and/or biochemical evidence of hyperandrogenism,
3. Appearance of polycystic ovaries on ultrasound, after excluding other aetiologies for anovulation and hyperandrogenism.

There is increasing focus on the association between PCOS and hypothyroidism. Primary hypothyroidism is the most common pathological hormone deficiency, the prevalence of overt and subclinical disease being 0.3% and 4.3%, respectively.^[11] Deficiency of thyroid hormones has many profound end-organ effects, which also include those in the reproductive system of the human female. Longstanding hypothyroidism can interfere with gonadotropin secretion by increasing serum prolactin levels^[12]. Clinical manifestations including menstrual irregularities and impaired fertility are the results of anovulation and/or luteal phase defect.^[13]

Though the exact relation between PCOS and thyroid gland is still an enigma, both pose a diagnostic dilemma as both share a common array of symptoms such as obesity, menstrual irregularities due to anovulation, acne, hirsutism, infertility, miscarriages, carbohydrate intolerance in the form of insulin resistance. An association has been reported between PCOS and hypothyroidism. Most of the times hypothyroidism is subclinical and diagnosed first time during evaluation of PCOS.^[14,15]

A variety of disturbances in reproductive hormone profiles are found to be associated with a state of hypothyroidism. As the features of both PCOS and hypothyroidism are overlapping and an association between these two disease states is not uncommon, therefore, thyroid profile should be analyzed along with the reproductive hormonal profile which may help in better understanding of the etiology and management of PCOS.^[16]

With the advent of modern laboratory technologies to assay the hormone levels in body accurately and to detect antibodies, the relationship between thyroid profile and PCOS is being tried to be explored more and thus the problems of PCOS can be solved to some more extent.

MATERIALS & METHODS: The study was conducted amongst patients attending the out-patient wing of Dept. of Obstetrics & Gynaecology at MKCG Medical College, Berhampur, Odisha, India from October 2012 to June 2014. It was a prospective, observational study to find the prevalence of hypothyroidism in PCOS patients and also to determine the association between clinical and laboratory parameters of PCOS with hypothyroidism.

The study was conducted in 196 USG proven cases of PCOS. Clinical examination was followed by a baseline pelvic ultrasound. A trans abdominal pelvic ultrasonography was carried out using a 3.5

MHz probe on Sonoace X4 mode. Ovarian volume (0.523 x length x width x thickness) and number of follicles in each ovary were noted. The mean values were obtained by adding values of both the ovaries and then dividing by two. An ovary was diagnosed as being polycystic if the ovarian volume was >10 cc or if it contained ≥ 12 follicles.

All the USG proven cases of PCOS were subjected to investigations like FSH, LH, FBS, PPBS, Serum Insulin, TSH, Free T₃, Free T₄. After an overnight fasting, basal venous blood sample was taken. TFT including TSH, Free T₃ and Free T₄ was estimated using chemiluminescence method. According to this, TSH normal range was taken as 0.34-4.25 μ IU/ml, Free T₃ normal range was 2.4-4.2 pg/ml, free T₄ normal range was 0.8-1.7 ng/dl.¹³⁷

TSH above 4.25 μ IU/ml, Free T₃ below 2.4 pg/ml and Free T₄ below 0.8 ng/dl was considered as overt hypothyroidism and high TSH with normal Free T₃ and Free T₄ are considered as subclinical hypothyroidism.

Exclusion Criteria:

1. Congenital hypothyroidism
2. Thyroidectomy patients
3. History of radiation to head and neck in cancer patients.
4. Women who are not willing for examination and further investigations and follow up.

RESULTS: In the study titled "Thyroid profile in Polycystic Ovarian Syndrome" the following observations had been drawn from the study.

Out of 196 cases studied 97 (49.49%) belonged to 26-35 years, 70 (35.71%) belonged to 15-25 years and 29 (14.79%) belonged to 36-45 years. The mean age of presentation was 27.28 \pm 10.56 years [Table 1]. Out of 196 cases of PCOS, 154 (78.57%) had menstrual complaints (oligomenorrhoea, polymenorrhoea and secondary amenorrhoea), 150 (76.53%) had features of hyperandrogenism (acne, hirsutism), 49 (70.00%) out of 70 married cases had infertility. Out of 49 cases of infertility, 39 (79.59%) had primary infertility and 10 (20.40%) had secondary infertility [Table 2].

Out of 196 cases of PCOS, 26 (13.26%) had hypothyroidism, 2 (1.02%) had hyperthyroidism and 168 (85.71 %) had normal TFT. Mean TSH was 2.7 \pm 3.02 μ IU/ml. Mean Free T₃ was 3.19 \pm 0.932 pg/ml. Mean Free T₄ was 1.16 \pm 0.422 ng/dl. Out of 26 cases of PCOS with hypothyroidism, 15 (57.69%) had subclinical hypothyroidism and 11 (42.30%) had overt hypothyroidism [Table 3].

According to a study conducted by Onno E Janssen et al,^[14] hypothyroidism is present in 10.9 % of PCOS patients. A study conducted by Didem Ozdemir et al, reported prevalence of hypothyroidism in 15.9 % of PCOS patients.^[17]

Out of 26 cases of PCOS with hypothyroidism, 25 (96.15%) had menstrual irregularities including oligomenorrhoea and secondary amenorrhoea and 1 (3.84%) did not have menstrual complaints like oligomenorrhoea and secondary amenorrhoea.

Out of 170 cases of PCOS without hypothyroidism, 125 (73.52%) had menstrual irregularities including oligomenorrhoea and secondary amenorrhoea and 45 (26.47%) did not have menstrual irregularities including oligomenorrhoea and secondary amenorrhoea. Here, oligomenorrhoea and secondary amenorrhoea are more in PCOS with hypothyroidism when compared to PCOS without hypothyroidism. Chi squared equals 6.427 with 1 degree of freedom.

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The two-tailed P value equals 0.0112 (<0.05). The association was considered to be statistically significant [Table-4]. In a study conducted by Z Velija-Asmi et al, disruption of menstrual cycle, usually oligomenorrhoeatype, was present in 36% of subjects. Subclinical hypothyroidism was significantly correlated with disorders of the menstrual cycle in PCOS women.^[18]

Out of 26 cases of PCOS with hypothyroidism, 25 (96.15%) had features of hyperandrogenism like acne and hirsutism and 1 (3.84%) did not have features of hyperandrogenism like acne and hirsutism. Out of 170 cases of PCOS without hypothyroidism, 125 (73.52%) had features of hyperandrogenism like acne and hirsutism and 45 (26.47%) did not have features of hyperandrogenism like acne and hirsutism. Features of Hyperandrogenism are more in PCOS with hypothyroidism when compared to PCOS without hypothyroidism. Chi squared equals 6.427 with 1 degree of freedom. The two-tailed P value equals 0.0112 (<0.05).

The association was considered to be statistically significant [Table 5]. According to a study conducted by Dahiya k et al, serum testosterone levels were found to be increased in PCOS patients with hypothyroidism ^[16] which leads to increased manifestations of hyperandrogenism like hirsutism and acne.

This may be explained as hypothyroidism reduces sex hormone binding globulin and increases free testosterone. In another study conducted by Z Velija-Asmi et al, serum testosterone and its manifestations like hirsutism and acne are more common in PCOS with subclinical hypothyroidism.^[18]

Out of 26 cases of PCOS with hypothyroidism, 22 (84.61%) had increased BMI (overweight and obese) and 4 (15.38%) did not have increased BMI. Out of 170 cases of PCOS without hypothyroidism, 104 (61.17%) had increased BMI (overweight and obese) and 66 (38.82 %) did not have increased BMI.

Increased BMI (overweight and obese) is more in PCOS with hypothyroidism when compared to PCOS without hypothyroidism. Chi squared equals 5.396 with 1 degree of freedom. The two-tailed P value equals 0.0202 (<0.05). The association was considered to be statistically significant [Table-6]. A study conducted by Ralf Dittrich et al in 2008 concluded that PCOS patients with hypothyroidism has significantly increased BMI.^[19]

DISCUSSION: PCOS and Hypothyroidism are closely related. There is increased prevalence of hypothyroidism in PCOS. The symptoms of both PCOS and hypothyroidism are similar. PCOS patients with hypothyroidism have increased prevalence of menstrual complaints like oligomenorrhoea and secondary amenorrhoea. PCOS patients with hypothyroidism have increased prevalence of Hyperandrogenism, Acanthosis Nigricans, Insulin Resistance and Increased BMI.

As the features of both PCOS and hypothyroidism are overlapping and an association between these two disease states is not uncommon, thyroid profile should be analyzed which may help in better understanding of the etiology and management of PCOS²¹. The relationship between thyroid profile and PCOS is being tried to be explored more and thus the problems of PCOS can be solved to some more extent.

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Age distribution	No. of Cases	Percentage
15-25 yrs	70	35.71
26-35 yrs	97	49.49
36-45 yrs	29	14.79
Total	196	100.00

Table I: AGE DISTRIBUTION

	Menstrual Complaints	No. of Cases	Percentage
Menstrual Complaints	Secondary Amenorrhoea	40	20.40
	Oligomenorrhoea	110	56.12
	Polymenorrhoea	4	2.04
	Normal	42	21.42
	Total	196	100
Infertility	Primary	39	79.60
	Secondary	10	20.40
Hyperandrogenism		150	76.53

Table 2: DISTRIBUTION OF MENSTRUAL COMPLAINTS

Thyroid Function		No. of Cases	Percentage
Hypothyroidism	Overt hypothyroidism	11	26
	Subclinical hypothyroidism	15	
Hyperthyroidism		2	1.02
Normal TFT		168	85.71
Total		196	100.00

Table 3: DISTRIBUTION ACCORDING TO THYROID FUNCTION

	Menstrual Irregularities	No. Menstrual Irregularities	Total
PCOS with hypothyroidism	25 (96.15%)	1 (3.84%)	26
PCOS without hypothyroidism	125 (73.52%)	45 (26.47%)	170
Total	150	46	196
'P' Value	<0.0112		

Table 4: ASSOCIATION BETWEEN MENSTRUAL IRREGULARITIES (OLIGOMENORRHOEA AND SECONDARYAMENORRHOEA) AND HYPOTHYROIDISM

	Hyperandrogenism	No. Hyperandrogenism	Total
PCOS with hypothyroidism	25 (96.15%)	1 (3.84%)	26
PCOS without hypothyroidism	125 (73.52%)	45 (26.47%)	170
Total	150	46	196
'P' Value	0.0112		

Table 5: ASSOCIATION BETWEEN HYPERANDROGENISM (ACNE, HIRSUTISM) AND HYPOTHYROIDISM

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	Increased BMI	No. Increased BMI	Total
PCOS with hypothyroidism (26)	22 (84.61%)	4 (15.38%)	26
PCOS without hypothyroidism(170)	104 (61.17%)	66 (38.82%)	170
Total (196)	126	70	
'P' Value	0.0202		

Table 6: ASSOCIATION BETWEEN INCREASED BMI AND HYPOTHYROIDISM

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Date of Submission: 10/08/2014.
Date of Peer Review: 11/08/2014.
Date of Acceptance: 18/08/2014.
Date of Publishing: 20/08/2014.