Association of Thyroid disorders with Polycystic ovarian disease - An analysis in Tertiary Care Hospital

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Abstract

Introduction: The leading causes for menstrual irregularities in women are polycystic ovarian syndrome and Hypothyroidism. Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder among the reproductive age group women. [1,2,3,4]. Hypothyroidism is another complicated disorder found particularly in young reproductive age group women. Many facts and findings from various literatures stimulated us to conduct this study about thyroid function status in newly diagnosed PCOS patients.

Objective: To assess thyroid function status using serum T3, T4, TSH and estimate the prevalence of hypothyroidism and their clinical profile in newly diagnosed polycystic ovarian syndrome patients.

Patients and methods: In the current study, we selected 100 young women who came to the OPD with complaints of menstrual irregularities and clinical evidence of hyperandrogenemia and /or infertility. The study was conducted at: Rajkiya Mahila Chikitsalya. It was a cross sectional, observation study.

The study included women aged between 15-35 yrs. with menstrual irregularities and / or clinical hyperandrogenemia. PCOS confirmation was based on revised Rotterdam criteria 2003.

Results: The mean age of hypothyroid female is 26 years and that of euthyroid female is 24 years. Statistically no difference in mean age of both groups. 78 patients are euthyroid. 22 patients have hypothyroidism (22%). Most of the patients attained Menarche at the age of 13-15 years. 74% patients had oligomenorrhea. Symptoms were found in 79 patients in which maximum cases were having Menstrual irregularity and Infertility (32.91%).

Keywords: PCOS, Hypothyroidism, infertility, menstrual irregularity, Menarche.

Introduction

The leading causes for menstrual irregularities in women are polycystic ovarian syndrome and Hypothyroidism. Polycystic ovarian syndrome (PCOS) is the most

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common endocrine disorder among the reproductive age group women.[1,2,3,4] and it races with other metabolic disorders resulting in complications if left untreated. PCOS is a complex disorder with chronic anovulation, hyperandrogenism and hyperinsulinemia with multiple cysts in ovaries[5].

Western population studies show the prevalence of PCOS to be about 4-8% among young women [3.] In India studies show the prevalence of 5-10%. [1] Even though the definition of PCOS is not fully established, they usually present with different complaints from simple acne to complicated infertility based on their response to the available androgen.

Most of them are obese and are at risk of developing Diabetes mellitus, dyslipidemia, metabolic syndrome, cardiovascular disorders, carcinoma of endometrium or cervix [6,7, 8.]

Hypothyroidism is another complicated disorder found particularly in young reproductive age group women. Hypothyroid patients may present with simple weakness and fatigue to complicated infertility. Many healthy-looking women may have subclinical or occult and even overt hypothyroidism that has remained undiagnosed. They are identified only after developing complication or following a routine health check-up. Several women with menstrual disorder or infertility attending gynecology department were retrospectively analyzed to have polycystic ovaries and / or elevated serum TSH (Thyroid Stimulating Hormone). PCOS and hypothyroidism both together or individually adds the risk for infertility and menstrual irregularities. The burden of infertility in India is in the ascending trend and the expenditure per birth in infertile PCOS women has risen tremendously. Studies conducted in combining these two disorders show that they are significantly related.

The ultimate finding in PCOS is hyperandrogenism which is aggravated in the presence of hypothyroidism. Screening for hypothyroidism in PCOS patients in our population gives a better idea about the epidemiology of this disorder and the importance of evaluating thyroid function status in them. Many facts and findings from various literatures stimulated us to conduct a cross sectional study about thyroid function status in newly diagnosed PCOS patients by using a single and best indicator of thyroid function status- TSH.

Objective

To assess thyroid function status using serum T3, T4, TSH and estimate the prevalence of hypothyroidism and their clinical profile in newly diagnosed polycystic ovarian syndrome patients.

Patients and Methods

- Sample size: In the current study, we selected 100 young women who came to the OPD with complaints of menstrual irregularities and clinical evidence of hyperandrogenemia and /or infertility.

- Study place: Rajkiya Mahila Chikitsalya.

- Study design: A cross sectional, observation study.

- Study Period and Ethical considerations: Study was done after taking approval of ethical committee of this institute and obtaining consent from patients.

Inclusion criteria

1. Women aged between 15-35 yrs. with menstrual irregularities and/or clinical hyperandrogenemia

2. PCOS confirmation based on revised Rotterdam criteria 2003: (2 / 3 criteria should be satisfied)

3. History of abnormal uterine bleeding (cycle lasting more than 35 days) or long cycles/Amenorrhea (no cycles in the past 6 months).

4. Clinical and / or Biochemical features of hyperandrogenism.

5. Ultra-sonogram finding: Multiple cysts (> 12 in number of 2-9mm) either one or both ovaries.

Other cause of hyperandrogenism like congenital adrenal hyperplasia, Virilizing tumor, Prolactinoma, Cushing syndrome were be ruled out.

Clinical hyperandrogenemia is defined as to have acne and / or hirsutism and / or Androgenic pattern of alopecia. Biochemical hyperandrogenism was defined as elevated testosterone.

Exclusion criteria

1. Patients on treatment for Hypothyroidism, Oral contraceptives, Anticonvulsants, Metformin.

2. Other conditions mimicking PCOS were ruled out by detailed history and complete physical examination.

Methodology

After 10-12 hours of fasting, 3mL of venous blood sample was taken from the patients under strict aseptic precaution. Serum was separated and used to perform the analytes estimation. Normal level of TSH was taken as 3.5–5μIU/mL and >5μIU/mL as hypothyroid state. Normal serum total testosterone as 14-76 ng/mL and >76 ng/mL as hyperandrogenic state.

Statistical analysis

Comparison of various parameters was performed by "t" test, correlation between two variables were performed by Pearson's correlation co- efficient "r", analysis was done by using SPSS Ver. 20 computer package for statistics.

Results

Demography

The mean age of hypothyroid female is 26 years and that of euthyroid female is 24 years. Statistically no difference in mean age of both groups. 78 patients are euthyroid. 22 patients have hypothyroidism (22%).

In euthyroid group, majority of females are in age group 20-25 years (33.3%) followed by 28.2% in 25-30 years age group, 24.4% were aged less than 20 years and 14.1% patients were in greater than 30 years age group. Similarly, in hypothyroid population, majority of females are in age group 25-30 years (40.9%) followed by 31.8% patients in 20-25 years age group, 22.7% in less great than 30 years age group and 4.5% in less than 20 years age group.

AGE DISTRIBUTION			Age groups				Total
			<20	20-25	25-30	>30	
Groups	Euthyroid	N	19	26	22	11	78
		%	24.4%	33.3%	28.2%	14.1%	100.0%
	Hypothyroid	N	1	7	9	5	22
		%	4.5%	31.8%	40.9%	22.7%	100.0%
Total		N	20	33	31	16	100
		%	20.0%	33.0%	31.0%	16.0%	100.0%

P VALUE=0.16

Table 1: Age distribution and prevalence of thyroid disorders.

Out of 100 patients, 54 patients were found in urban area and 46 patients were found in rural area. More patients with PCOS were from urban area as compared to rural areas. This suggests that dissimilar dietary practices and the level of physical activity might influence the prevalence of PCOS.

Parity: Out of 100 patients, 15 patients were found parous and 85 patients were found nulliparous. Since infertility is one of the main complaints in PCOS, more patients were nulliparous in my study.
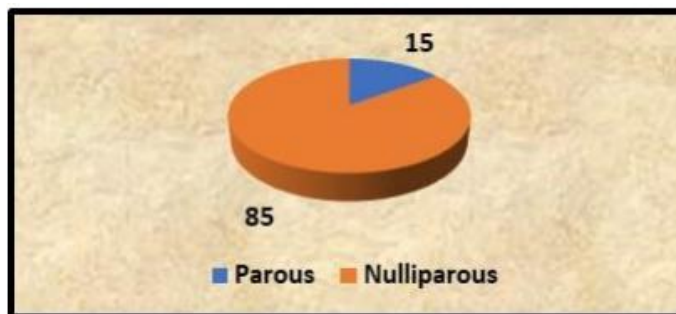

Graph 1: Parity of patients

Age at menarche: Most of the patients attained Menarche at the age of 13-15 years. It is observed most of the PCOS patients have a higher age of menarche.

Age at menarche	Number	Percent
11	2	2.0
12	17	17.0
13	26	26.0
14	27	27.0
15	21	21.0
16	7	7.0
Total	100	100.0

Table 2: Age at Menarche

Pattern of menstrual cycles: Most of the females (74%) had oligomenorrhoea. It is also a reason with which they presented to the gynecological OPD. This was followed by 15 patients who had amenorrhea, 2 of them had frequent cycles while 8 patients had a regular menstrual pattern.
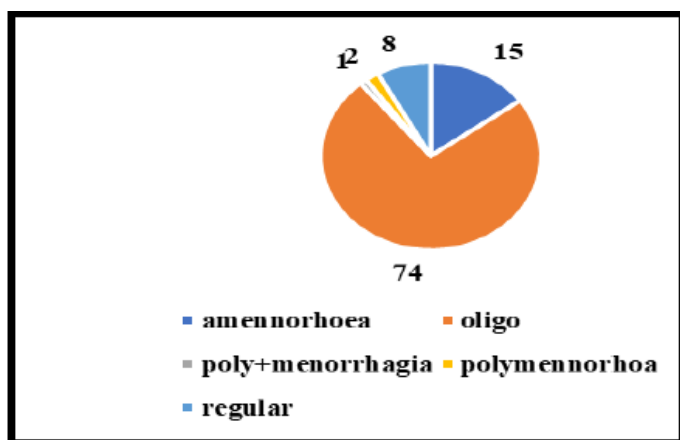

Graph 2: Pattern of menstrual cycles

Clinical profile: Symptoms: Symptoms were found in 79 patients in which maximum cases were having Menstrual irregularity and Infertility (32.91%).

Patient Symptoms	No of patients	Percentage
Menstrual irregularity & weight gain	10	12.65
Menstrual irregularity & infertility	26	32.91
Infertility & weight gain	2	2.53
Menstrual irregularity, Infertility & weight gain	22	27.84
Weight gain	2	2.53
Infertility	9	11.39
Menstrual irregularity	8	10.12
Total	79	100.0

Table 3: Patient's symptoms

The associated complaints found in 78 patients in which maximum cases were found of Acne (48.7%) followed by Hirsutism (34.61%), Acne and hirsutism both (8.97%), Galactorrhea (3.84%) and recurrent pregnancy loss (3.84%).
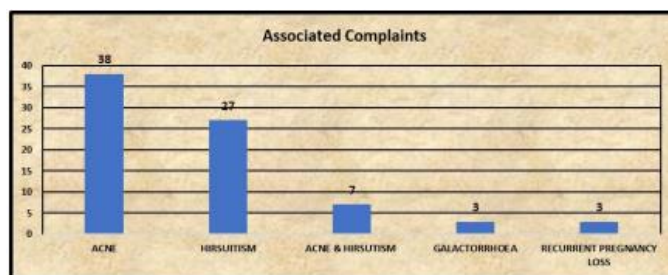
Graph 3: Associated complaints

TSH: In hypothyroid females, the mean TSH is 10.32 (mIu/L) and in euthyroid females mean TSH level is 2.43 (mIu/L). Statistically there is significant difference in mean TSH level between two groups (P-value 0.001). TSH is the first-line screening test for the majority of patients with a suspected thyroid problem. The thyroid produces insufficient amounts of T3 and T4, which leads to loss of negative feedback inhibition, and increased production of TSH from the anterior pituitary.

| TSH (mIu/L)	N	Mean	S.D.	Minimum	Maximum	P value
Hypothyroid	22	10.32	6.91	5.11	28.50	0.001 (S)
Euthyroid	78	2.403	1.33	.46	4.88	
Total	100	4.14	4.73	.46	28.50	

Table 4: Stimulating hormone

Goitre: In hypothyroid females 40.9% had goiter and in euthyroid females' prevalence of goiter was 16.7%. Goiter is a manifestation of thyroid hyperplasia and increased thyroid vascularity which results from a compensatory increase in the release of TSH which is seen in patients of hypothyroidism.

Table 5: Blood sugar level

		N	Mean	Std. Dev	Minimum	Maximum	P value
FBS (mg/dl)	Hypothyroid	22	83.59	9.515	72	107	0.22
	Euthyroid	78	89.32	21.468	53	168	
	Total	100	88.06	19.580	53	168	
PPBS (mg/dl)	Hypothyroid	22	122.09	24.174	88	172	0.38
	Euthyroid	78	129.19	35.927	74	318	
	Total	100	127.63	33.713	74	318	

In hypothyroid females mean FBS is 83.59 mg/dl and PPBS is 122.09 mg/dl. Similarly, in euthyroid females mean FBS is 89.32 mg/dl and PPBS is 129.19 mg/dl. In accordance with the high prevalence of insulin resistance and obesity, glucose intolerance, type 2 diabetes are more common in women with PCOS.
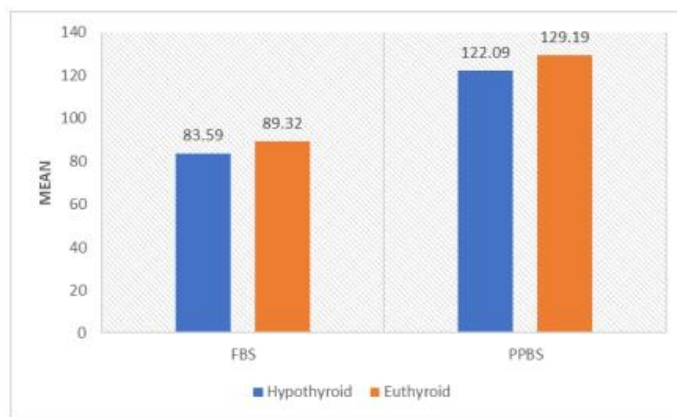
Graph 4:

Endometrial thickness: Most of the patients (87%) had a normal endometrial thickness in the range of 4-9mm. Maximum patients presented with normal endometrial thickness with oligomenorrhoea.

Ovarian volume: In hypothyroid females mean Ovarian Volume (L) is 13.77 cm3 and Ovarian Volume (R) is 12.50 cm3. Similarly, in euthyroid females mean Ovarian Volume (L) is 11.37 cm3 and Ovarian Volume (R) is 11.19 cm3. Ovarian Volume is one of the diagnostic criteria in PCOS.

		N	Mean	S.D.	Minimum	Maximum	P value
OV.VOL (L) (cm³)	Hypo thyroid	22	13.77	2.95	10	22	0.001 (S)
	Eu thyroid	78	11.37	2.68	8	30	
	Total	100	11.90	2.91	8	30	
OV.VOL (R) (cm³)	Hypothyroid	22	12.50	2.80	9	19	0.07
	Eu thyroid	78	11.19	3.00	0	19	
	Total	100	11.48	2.99	0	19	

Table 6: Ovarian volume

Discussion

The mean age of all females is 25.18 years with mean age of a hypothyroid female is 26.82 years and majority of females are in the age group 25-30 years (40.9%) in the current study. Ganvir et al.[9] found reported mean age of the patients with PCOS was 19 ± 4.84 years. Ramanand et al.[10] studied 102 euthyroid PCOS women was compared with 18 hypothyroid PCOS women. The

mean age in years was 21.74± 4.31 in euthyroid PCOS and 23.83± 6.04 in hypothyroid PCOS patients.

Out of 100 patients in the current study, 54 patients were from urban areas and 46 patients were from rural areas. Patidar et al. (2021)12 studied Thyroid function in women with polycystic ovary syndrome and found that 75.8% females were resident of urban area whereas only 24.2% females were resident of rural area. Pervin et al (2006)13 found that majority of the study subjects (78%) were living in urban areas and only 22% of them were living in rural areas.

Our study shows 26 patients had positive family with PCOS and 74 patients had no family history of PCOS. Kahsar-Miller et al and Bronstein et al14 reported family history of PCOS among first-degree relatives.

In our study the prevalence of Goitre in hypothyroid females is 40.9% and in euthyroid females' prevalence of Goitre is 16.7%. Shan mugham et al 201815 reported that among the study patients, 11% of them had Goitre.

In the current study, most of the patients (87%) had a normal endometrial thickness in the range of 4-9mm. Lakshmi et al (2018).[16] studied that more patients presented with normal endometrial thickness with oligomenorrhoea in a hyper estrogenic state.

In hypothyroid females mean TSH is 10.32mIU/L and mean testosterone is 71.69ng/dL, similarly, in euthyroid females mean TSH level is 2.43 mIU/L and mean testosterone level is 52.9ng/dL. Statistically there is significant difference in mean TSH and testosterone level between two groups (P-value 0.001; 0.003 respectively).

Sinha et al17 found that out of 168 young Brazilian PCOS women with the mean age of 24 years, 149 (88.7%) had normal thyroid function and 19 (11.3%) subclinical hypothyroidisms with TSH levels between 4.5 and 10mIU/l, representing a higher prevalence of subclinical hypothyroidism in PCOS than in the general population. Ramanand et al6 found that among hormonal parameters no statistical difference in testosterone levels between the two groups. Shan mugham et al18 reported mean free T3 in patients with PCOS was 3.12±1.26 pg/ml, the mean free T4 being 1.28±2.42 ng/dl. The mean TSH levels in the study patients was 4.62±2.12 mIU/ml

Conclusion

Polycystic Ovarian Syndrome is an ill-defined complex disorder and needs a keen attention while treating. As ethnicity plays a vital role in this disorder, the characteristics of this disorder in different population should be known. There exists a cycle in the pathogenesis of PCOS from hypothalamus to ovary and vice-versa. In conclusion, thyroid disorder and PCOS are undoubtedly associated with each other. The present study suggests that coexistence of hypothyroidism significantly increase the severity of insulin resistance as well as obesity in patients with PCOS.

Acknowledgments

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