

Original Research Article

Association of hypothyroidism and polycystic ovarian syndrome: a study in a semi urban area

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Received: 19 June 2019

Accepted: 02 July 2019

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ABSTRACT

Background: Polycystic ovarian syndrome reported to be one of the most common endocrine disorders in the women of the reproductive age, causing oligoovulatory infertility. In many cases, apparently healthy looking women are being diagnosed with either subclinical or overt hypothyroidism after having the symptoms of PCOS. This study was done to analyse the association of PCOS and hypothyroidism in our geographical area.

Methods: 50 women of reproductive ages between 18 to 45 years, who were diagnosed with PCOS, based on Rotterdam's criteria, 2003 and 50 healthy women as controls, were included into the study. After taking the demographic details from all the patients, they were all subjected to ultrasound for the detection of the cysts. Blood was collected for various biochemical tests including the thyroid profile.

Results: The mean age of all the patients in the study group was 23.6 ± 7.2 compared to 27.1 ± 4.6 of the healthy controls. The Body Mass Index amongst both the groups was 29.1 ± 3.1 and 23.4 ± 2.9 kg/m² respectively. The levels of thyroid profile were significantly high among the study group with 58%, 54%, 68% as the number of patients with elevated T3, T4 and TSH values. The prevalence of subclinical hypothyroidism was 48.3%, while 51.7% of them had overt hypothyroidism. A higher BMI was found among the patients with PCOS and hypothyroidism.

Conclusion: The prevalence of hypothyroidism among the PCOS patients is certainly on the rise accentuating its association with this endocrine disorder especially among the young adults.

Keywords: Endocrine disorder, Hypothyroidism, Oligoovulatory infertility, Polycystic ovarian syndrome, Reproductive age, Subclinical hypothyroidism

INTRODUCTION

Polycystic ovarian syndrome (PCOS) was for the first time discovered in 1935 and since then has been reported to be one of the most common endocrine disorders in the women of the reproductive age, causing oligoovulatory infertility.^{1,2} Apart from infertility, these patients also suffer from dysfunctional menstruation, endometrial carcinoma as well as other metabolic disorders such as insulin resistance, diabetic mellitus, dyslipidemia,

hypertension, increases pregnancy loss and cardiovascular disease.³⁻⁷

PCOS has been reported to occur in 5-10% of the women in the reproductive age all over the world and is a cause for severe morbidity among these women.⁸ In India, the incidence seems to be more than 10%.⁹

In the past few years, there has been a reasonable doubt of thyroid dysfunction being associated with PCOS. In many cases, apparently healthy-looking women are being

diagnosed with either subclinical or overt hypothyroidism after having the symptoms of PCOS.¹⁰ Hypothyroidism had been individually or with the association of PCOS, been identified as one of the risk factors for coronary artery disease by altering the lipid metabolism. Hypothyroidism also leads to Insulin resistance, which is one of the causes of PCOS.¹¹ It was observed that patients with PCOS tend to have four times more risk of metabolic disorders than those without.¹² These changes in the metabolic functions may occur very early on in life, i.e. in adolescent age, but will continue throughout the life.¹³ There are very few studies corroborating the association between PCOS and hypothyroidism. This study was therefore done to analyse this association in our geographical area.

METHODS

This study was done by Department of General Medicine at Mallareddy Institute of Medical Sciences from June 2017 to June 2018. 50 women of reproductive ages between 18 to 45 years, who were diagnosed with PCOS, based on Rotterdam’s criteria, 2003 were included into the study. The nature of the study was explained to the patients and informed consent was taken from all of them.

For the inclusion of the patients into the study, they should have at least two of the following symptoms, ≤ 8 menstrual periods in a year or more than 35 days cycles, hyperandrogenism, ≥ 2.6 nmol/l serum testosterone, ≥ 6.0 pg/ml free testosterone, presence of polycystic ovaries with a measurement ≥ 12 follicles in each ovaries having a size of 2mm each. 50 apparently healthy patients who did not have any signs and symptoms of either hypothyroidism or PCOS and were diagnosed for neither were taken as controls. These patients had come to the hospitals for other ailments or had accompanied the patient. Patients with other etiologies such as congenital adrenal hyperplasia, Cushing’s syndrome and androgen secreting tumors were excluded from the study. Those using hypolipemic drugs or antihypertensive drugs or any drugs that would alter the sex hormones or the glucose levels were also excluded from the study.

After taking the demographic details from all the patients, the presence or absence of oligomenorrhoea or amenorrhoea were confirmed by the patients. They were all subjected to ultrasound for the detection of the cysts. The patients were asked to fast for overnight and venous blood was taken from the patients for the detection of fasting blood, thyroid profile (TSH, T3, T4), lipid profile and total testosterone. The serum was separated, and the biochemical tests were performed. The patient was then advised to have breakfast and after 2 hours, blood was collected for post prandial glucose levels.

Body mass index was calculated for all the patients based on their high and weight. Hip circumference, waist circumference was also measured, and hip-waist ratio

was calculated. The statistical analysis was done using SPSS software and mean and standard deviation were analysed.

RESULTS

The mean age of all the patients in the study group was 23.6 ± 7.2 compared to 27.1 ± 4.6 of the healthy controls. The Body Mass Index amongst both the groups was 29.1 ± 3.1 and 23.4 ± 2.9 kg/m² respectively. Most of the people in the study group had hirsutism (62%) and 18% of them had goitre. The same was seen in very few people in the control group. The levels of thyroid profile were significantly high among the study group with 29, 27, 34 as the number of patients with elevated T3, T4 and TSH values (Table 1).

Table 1: Demographic and thyroid parameters of patients and study group.

Details	Patients with PCOS Mean±SD/no	Controls	P value
Age (in years)	23.6±7.2	27.1±4.6	< 0.01
Age of menarche	12.5	12.7	NS
BMI (kg/m ²)	29.1±3.1	23.4±2.9	<0.01
Hirsutism	31 (62%)	3 (6%)	< 0.01
Goitre	9 (18%)	1 (2%)	< 0.01
Raised T3	29 (58%)	3 (6%)	< 0.001
Raised T4	27 (54%)	1 (2%)	< 0.001
Raised TSH	34(68%)	4 (8%)	<0.001
Raised LH/FSH ratio	29 (58%)	0 (0)	< 0.001
Free testosterone	33 (66%)	0 (0)	< 0.001

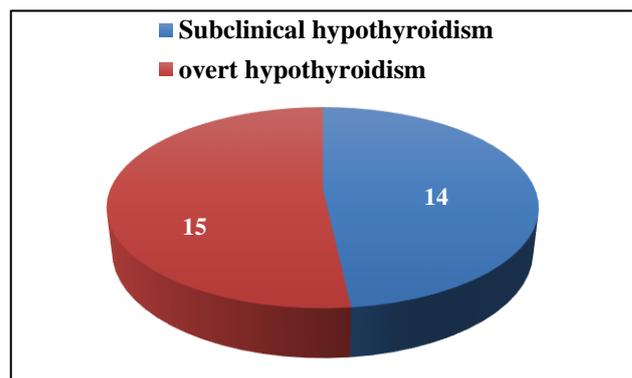


Figure 1: Type of hypothyroidism among the study group.

Of the total 50 patients in the study, 29 of them (58%) had hypothyroidism, most of whom, 14 (48.3%) of them had subclinical hypothyroidism, while 15 (51.7%) of them had overt hypothyroidism with all the thyroid parameters in the higher range (Figure 1).

Among other biochemical parameters, almost one third of the study group patients has an elevated total cholesterol, LDL and lowered HDL Levels. Around 24% of these patients were on the borderline towards being a diabetic and prehypertension/ hypertension was detected among 22% of them. In almost all these patients, central obesity was observed (Table 2).

Table 2: Biochemical parameters of the study and control group.

Variables	PCOS N (%)	Controls	P value
Prediabetes	12 (24%)	0 (0)	<0.001
Hypertension	11 (22%)	0 (0)	<0.001
Elevated TC	36 (72%)	9 (18%)	<0.001
Elevated LDL	35 (70%)	10 (20%)	<0.001
Lowered HDL	32 (64%)	12 (24%)	<0.001
Dyslipidemia	35 (70%)	9 (18%)	<0.001
Central obesity	34 (78%)	8 (16%)	<0.001

DISCUSSION

Presence of PCOS amongst patients can result in different metabolic disturbances including dyslipidemia, hypercholesterolemia and insulin resistance. Prevalence of hypothyroidism in the general population is reported to be 10-11% and among the reproductive age it is 2-4%.¹⁰ In the present study, the prevalence of hypothyroidism among the PCOS patients was 34%. In a study by Jansirani et al, the prevalence was 21.9% while in another study by Uma et al, it was 22.7%. Kachuei et al reported an incidence of thyroid disorder among PCOS patients to be 26.9%.^{10,14,15} These results corroborate the fact that there is a strong association between PCOS and thyroid dysfunction. The connection between the two can be related to the presence of obesity and insulin resistance. It has been reported that autoimmune disease, as it is seen in hyperestrogenic state is more common in women than in males.¹⁶ This is due to the fact that estrogen receptors have a proliferative action on estrogen receptors on the B and T lymphocytes as well as on macrophages.¹⁷

The mean age in our study was 23.6±7.2 among the PCOS patients, which shows that younger women are prone to hormonal dysfunction. This was corroborated by Pinto et al, where the mean age was 24 years and by Jansirani et al, where the range was 21-25 years.^{10,18} The major complaint among these women was irregular menstrual cycles.

A higher BMI was found among the patients with PCOS and hypothyroidism, with the mean being closer to 30 kg/m², while in the controls it was in the normal range. In a study by Jansirani et al, the number of overweight patients were 37% and obese were 32%¹⁰. Similar results were reported by Najem et al.¹⁹

Hypertension was observed in 22% of the cases in our study, while pre-hypertension was seen in 17.5% of the cases in a study by Sinha et al, and 2.5% in their study had hypertension.¹⁴ 4% of prevalence of hypertension was reported by Najem et al, while Huang et al reported 8%.¹⁹ A higher incidence of 18.6% was reported by Azevedo et al and Barcellos et al reported an incidence of 20.3%.²⁰⁻²²

Hirsutism was seen in 62% of our cases and goitre in 18% with raised testosterone in 66%. In a similar test by Sinha et al, hirsutism was seen in 72.5% of the cases and raised testosterone was observed in 75%.¹⁴ In studies by Carmina et al and Azziz et al, hirsutism was observed in 65-75% of the black, white and south east Asian women.^{23,24} Najem et al observed 91% of the patients to be affected by hirsutism.¹⁹

In the present study, raised LH/FSH ratio was observed in 58% of the cases, while in a study by Sinha et al, it was 55%, which corroborated our study.¹⁴ Raised LH was also found in a study by Alankesh et al in 64% of the cases and 45.4% in a study by Babaszewaska et al.^{25,26}

There were 14 patients (28%) had subclinical hypothyroidism in this present study, while 30% had overt hypothyroidism. Sinha et al reported subclinical hypothyroidism in 22.5% while clinical hypothyroidism in only 2.5% of the cases. Amongst them, autoimmune hypothyroidism was observed in 22.5%. A study by Ghash et al evaluated that hypothyroidism resulted in a lowering of the sex hormone binding in the globulin level and thereby increase in the testosterone levels.²⁷ Thus, hypothyroidism worsens the risk of PCOS in the women.

CONCLUSION

The prevalence of hypothyroidism among the PCOS patients is certainly on the rise accentuating its association with this endocrine disorder. It is more so on the rise among the younger adults, making it an important health hazard, leading to severe morbidities, such as infertility, androgenesis and irregular periods. Obesity and dyslipidemia also seem to increase the development of this disorder.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Ram Babu MV, Vittal DS. Association of hypothyroidism and polycystic ovarian syndrome: a study in a semi urban area. *Int J Adv Med* 2019;6:1106-9.