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ORIGINAL ARTICLE

Frequency of Subclinical Hypothyroidism among Patients of Polycysitic Ovarian Syndrome (PCOS)

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ABSTRACT

Introduction: Polycystic ovarian syndrome (PCOS) is the most common form of chronic anovulation associated with androgen excess; perhaps occurring in 5-10% of reproductive women. PCOS is viewed as a heterogeneous disorder of multifactorial etiology. It is also associated with increased metabolic and cardiovascular risk factors. Subclinical hypothyroidism is "mild" thyroid failure in which thyroid stimulating hormone (TSH) is elevated and free thyroxine (fT4) is normal.

Objective: To determine the frequency of subclinical hypothyroidism among patients of polycystic ovarian disease presenting in the outpatient department of tertiary care hospital.

Study Setting: The Study was conducted in Mayo Hospital, Lahore.

Duration of Study: June 5, 2019 to January 3, 2020

Study Design: Cross-Sectional Study

Methods: All polycystic ovarian disease patients were enrolled. Blood samples of the patients were taken by using aseptic techniques and sent to pathology laboratory for measurement of serum TSH level. The frequency of subclinical hypothyroidism among patients of polycystic ovarian disease was identified. Data were entered and analyzed using SPSS v25.0. Data were stratified for age and BMI to deal with effect modifiers. For post stratification, Chi-square test was applied to see the significance. A p-value≤0.05 was considered significant.

Results: Total 136 patients with polycystic ovarian disease were selected for this study. Mean age was 28.4±7.9 years. Among 136 patients, 26(19.1%) had subclinical hypothyroidism. By stratification of subclinical hypothyroidism, it was found that age >30 years and obese had significant effect having subclinical hypothyroidism (p=0.00001, p=0.001).

Conclusion: Subclinical hypothyroidism may be a modifiable risk factor, associated with polycystic ovarian disease. Steps should be taken to minimize more this risk factor by screening and early intervention.

Key Words: Subclinical Hypothyroidism, Polycystic Ovarian Disease.

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is the most common form of chronic anovulation associated with androgen excess; perhaps occurring in 5-10% of reproductive women.[1] PCOS is viewed as a heterogeneous disorder of multifactorial etiology. It is also associated with increased metabolic and cardiovascular risk factors.[2]

The main endocrine derangements responsible for the clinical manifestations are hyperandrogenemia and abnormal insulin response to glucose. About 50-70% of these patients are insulin resistant and suffer from metabolic syndrome that predisposes them to diabetes mellitus and cardiovascular diseases.[3]

Hypothyroidism has been shown to cause many metabolic derangements, such as decrease in glucose disposal or its uptake by muscles or adipose tissues in response to insulin, increase in the level of sex hormone-binding globulin, weight gain, and hyperlipidemia, all of which can lead to insulin resistance.[4]

In particular it has been extensively demonstrated that thyroid hormones, and specifically T3, have insulin antagonistic effects at the liver level that lead to an increased glucose hepatic output, via an enhanced rate of gluconeogenesis and glycogenolysis.[5] For this reason all the existing criteria used for diagnosis of PCOS necessitate exclusion of hypothyroidism at first.[6]

A study showed that about 22.5% of the patients with polycystic ovarian syndrome had hypothyroidism.[7] Another study showed a frequency of about 25.5% of hypothyroidism among patients with polycystic ovarian syndrome.[8]

The rationale of this study is to determine the frequency of hypothyroidism among patients with polycystic ovarian syndrome presenting to the outpatient department of tertiary care hospital. No local literature is available to provide information regarding local population of PCOS. Thus this study will bridge this gap and will highlight about the frequency of hypothyroidism among females with PCOS. This information will help gynecologists to screen for the subclinical cases of hypothyroidism among patients of PCOS and their early management. This will lead to a decrease in considerable morbidity caused by co-existence of the two manageable conditions.

MATERIALS AND METHODS

Study Setting: The Study was conducted in Gynaecology & Obstetrics Department, Lady Aitchison Hospital, Lahore.

Duration of Study: June 5, 2019 to January 3, 2020.

Study Design: Cross-Sectional Study

Sampling Technique: Non-Probability Consecutive Sampling

Sample Size: Sample size of 136 cases is calculated with 95% confidence level, 7% margin of error and taking expected percentage of subclinical hypothyroidism among patients of polycystic ovarian disease as 22.5%.[7]

RESULTS

Total 136 patients with polycystic ovarian disease were selected for this study. Mean age was 28.4±7.9 years.

According to age distribution among cases, 77(56.6%) were in 15-30 years age group, while 59(43.4%) were in 31-45 years age group.

According to BMI distribution, 76(55.9%) had normal BMI, while 57(41.9%) and 3(2.2%) were overweight and obese respectively.

Among 136 patients, 26(19.1%) had subclinical hypothyroidism. By stratification of subclinical hypothyroidism, it was found that age >30 years and obese had significant effect having subclinical hypothyroidism (p=0.00001, p=0.001).

Table-1: Frequency distribution of age groups

Age groups	Frequency	Percent
15-30 years	77	56.6
31-45 years	59	43.4
Total	136	100.0

Table-2: Frequency distribution of BMI

Body Mass Index (BMI)	Frequency	Percent
Normal (18-24.9)	76	55.9
Overweight (25-29.9)	57	41.9
Obese (>30)	3	2.2
Total	136	100.0

Table-3: Frequency distribution of subclinical hypothyroidism

Subclinical Hypothyroidism	Frequency	Percent
Yes	26	19.1
No	110	80.9
Total	136	100.0

Table-4: Stratification of subclinical hypothyroidism with respect to age

Age groups	Subclinical Hypothyroidism		Total	p-value
	Yes	No		
15-30 years	5	72	77	0.00001
	6.5%	93.5%	100.0%	
31-45 years	21	38	59	
	35.6%	64.4%	100.0%	
Total	26	110	136	
	19.1%	80.9%	100.0%	

Table-5: Stratification of subclinical hypothyroidism with respect to BMI

Body Mass Index (BMI)	Subclinical Hypothyroidism		Total	p-value
	Yes	No		
Normal (18-24.9)	11	65	76	0.001
	14.5%	85.5%	100.0%	
Overweight (25-29.9)	12	45	57	
	21.1%	78.9%	100.0%	
Obese (>30)	3	0	3	
	100.0%	0.0%	100.0%	
Total	26	110	136	
	19.1%	80.9%	100.0%	

DISCUSSION

Polycystic ovarian syndrome (PCOS) is a complex metabolic, endocrine and reproductive disorder results in overproduction of androgens and is associated with insulin resistance. The most common symptoms of PCOS can range from menstrual disorder, infertility and hyperandrogenemia to metabolic syndrome.[104]

The Polycystic ovary morphology is defined by ESHRE/ASRM consensus criteria is at least one ovary with ≥12 follicles of 2-9 mm (between 2-5 days of cycle) or ovarian volume greater than 10 ml in the absence of a cyst or dominant follicle >10 mm, established with ultrasound examination of ovaries.[105]

The European Society for human reproduction and Embryology (ESHRE) and the American Society for Reproductive Medicine, convened in Rotterdam, The Netherlands, in 2003, concluded that diagnosis of PCOS should be based on at least two of the three major criteria including (i) Oligo / Anovulation (ii) Clinical or biochemical signs of hyperandrogenism and (iii) echographic Polycystic ovaries, after the exclusion of other pathologies with a similar clinical presentation such as congenital adrenal hyperplasia, Cushing's syndrome and androgen-secreting tumours.[103]

Thyroid disorders and polycystic ovary syndrome (PCOS) are two of the most common endocrine disorders in the general population. An increase in ovarian volume and cystic changes in ovaries have been reported in primary hypothyroidism. Rise in thyrotropin-releasing hormone (TRH) in primary hypothyroidism leads to increased prolactin and thyroid stimulating hormone (TSH).

Prolactin contributes toward polycystic ovarian morphology by inhibiting ovulation as a result of the change in the ratio of follicle stimulating hormone (FSH) and luteinizing hormone and increased dehydroepiandrosterone from the adrenal gland.[106]

It is increasingly evidenced that thyroid disorders are more common in women with PCOS when compared to normal population.[107-109] Still, even in studies establishing a relationship between PCOS and thyroid disorders, whether this is due to common predisposing factors or pathophysiological connection is still vague.

In the present study, the mean age of the study patients was 28.4±7.9 years which is the common reproductive age group, with high incidence of PCOS. The mean BMI of the study patients was 29±4.4 kg/m^2 showing a tendency towards overweight and obesity.

This is the common predisposing factor in both of these endocrinological conditions. Also 2.2% of the study patients fall under obese category. Rahul Mittal studied the prevalence of PCOS and thyroid dysfunction in obese women and concluded that there is increase in prevalence of PCOS and hypothyroid cases among the obese person.[110]

In study conducted by Najem, et al 74% had USG features of polycystic ovaries while Ganie et al found that 100% patients had polycystic ovaries.[111-112] Clinical features of hyperandrogenism like acne, hirsuitism was present in 52 patients which is similar to other studies.

In present study, subclinical hypothyroidism was present in 19.1% of the patients. In a comparative study done by Sinha et al involving 80 patients with PCOS and 80 patients as control, biochemically thyroid disorders were detected in 22 (27.5%) out of 80 patients with PCOS as compared to only 9 of control population (11.25%; P <0.05).

Subclinical hypothyroidism was detected in 18 patients (22.5%; 8.75% of control), 2 patients had clinically overt hypothyroidism (2.5%), and autoimmune thyroiditis was detected in 18 patients (22.5% vs. 1.25% of control) as evidenced by raised anti-TPO antibody levels (means 28.037±9.138 and 25.72±8.27 respectively; P = 0.035). PCOS patients had higher mean TSH level than control group (4.547±2.66 and 2.67±3.11 respectively; P <0.05).[113]

Pinto et al analysed the relationship between selected clinical and metabolic parameters in women with PCOS and subclinical hypothyroidism. Out of the 168 women studied,[114] had subclinical hypothyroidism.

Considering the metabolic parameters, serum low-density lipoprotein cholesterol and PRL levels were significantly higher in the women with SCH (122.6 ± 25.6 mg/dL and 17.7±7.7 ng/mL, respectively) compared with those with normal thyroid function (105.6±33 mg/dL and 14±10.3 ng/mL, respectively).[107]

Recently, in a study by Ganie et al 175 girls with euthyroid chronic lymphocytic thyroiditis (CLT) and 46 age-matched non-CLT girls underwent evaluation for diagnosis of PCOS.[111] These girls were all 13-18 years old (mean age 14.7 years). In girls with euthyroid CLT prevalence of PCOS was significantly higher when compared to their control counterparts (46.8 vs. 4.3%, P< 0.001).[111]

In particular it has been extensively demonstrated that thyroid hormones, and specifically T3, have insulin antagonistic effects at the liver level that lead to an increased glucose hepatic output, via an enhanced rate of gluconeogenesis and glycogenolysis.[5] For this reason all the existing criteria used for diagnosis of PCOS necessitate exclusion of hypothyroidism at first.[6]

A study showed that about 22.5% of the patients with polycystic ovarian syndrome had hypothyroidism.[7] Another study showed a frequency of about 25.5% of hypothyroidism among patients with polycystic ovarian syndrome.[8]

CONCLUSION

Subclinical hypothyroidism may be a modifiable risk factor, associated with polycystic ovarian disease. Steps should be taken to minimize more this risk factor by screening and early intervention.

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