



Research Article

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CASE STUDY OF THYROID DYSFUNCTION ASSOCIATED WITH POLYCYSTIC OVARIAN SYNDROME (PCOS)

Kaavya M^{1*}, Nithin Palanisami P S², Rashmi Thakur¹, Saru Sree Mu¹

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ABSTRACT

Background: In recent times, there's a noticeable rise in endocrine dysfunctions, with increasing clinical resemblance between PCOS and autoimmune thyroid disease. The exact cause of this association remains uncertain, but these conditions share a reciprocal relationship. While they exhibit common clinical features, risk factors, and pathophysiological abnormalities, the root causes differ. Polycystic ovaries can be a manifestation of hypothyroidism, making it necessary to rule out hypothyroidism before diagnosing PCOS. Common factors like increased adipose tissue, insulin resistance, high leptin, and abnormal autoimmunity play a vital role in linking these conditions. These shared signs and symptoms emphasize the association between PCOS and hypothyroidism, though the etiopathological basis of this complex relationship is not fully established. **Methodology:** Cross-Sectional study of 200 patients involved after history, examination. Statistical analysis by SPSS v.22. **Result:** In this study, we aimed to evaluate thyroid function in PCOS patients using serum TSH levels and estimate the prevalence of hypothyroidism. We also examined prolactin levels in diagnosed PCOS patients, considering criteria like age distribution, BMI, clinical manifestations, fertility status, and thyroid status. **Conclusion:** Our findings suggest that PCOS is more prevalent in patients with thyroid disorders such as autoimmune thyroiditis and subclinical hypothyroidism compared to the general population. Additionally, PCOS increases the risk of cardiovascular diseases like hypertension and dyslipidemia. Subclinical hypothyroidism with PCOS further elevates the risk of hypertension compared to euthyroid PCOS patients. The study reveals that thyroid dysfunction occurs in 29.0% of PCOS patients, emphasizing importance of screening for thyroid abnormalities in PCOS patients.

INTRODUCTION

PCOS is the most common cause of secondary amenorrhoea, associated with hyperandrogenism; occurring in 6-10% of

reproductive female.[1] polycystic ovary syndrome involves various endocrine abnormalities, mainly it affects ovarian function. In the long term, it is also associated with increased

¹Sree Balaji Medical College, Chrompet, Chennai, India

²Visalakshi Clinic, Cheyur, Tiruppur, India

*For Correspondence: dr.kaavya87@gmail.com

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coronary heart diseases and metabolic syndrome [2]. These are associated with hyperinsulinaemia and it is worsening by Obesity, however hyperinsulinaemia is also present in normal BMI woman with PCOS. In addition, it's important to note that hyperinsulinemia is observed in women with Polycystic Ovary Syndrome (PCOS), even in those with a normal BMI. PCOS can result in significant reproductive morbidity during the reproductive years, which includes issues such as abnormal uterine bleeding, infertility, and an increased risk of pregnancy loss [3].

Thyroid dysfunction & anatomical abnormalities of the gland are one of the commonest abnormalities of the endocrinopathy [4]. Thyroid hormone if not supplied properly to the effector tissue then it may hamper many metabolic pathway. At Initial phase of thyroid disorder (before symptoms starts appearing) can affect ovulation and endometrial proliferation, which may have severe effect on fertility. Hypothyroidism which is present at birth if left untreated can leads to late onset of puberty which may further lead to anovulatory cycles [5]. In women of reproductive age, severe hypothyroidism may cause decreased libido and cycles will be anovulatory. Hashimoto thyroiditis is an autoimmune disease which may also leads to primary ovarian failure. Hyperthyroidism may also causes complications in pregnancy, but impact of it is variable among different study groups [6].

Hence it is evident that both PCOS & Hyperthyroidism may affect fertility of patients [7]. Hence, many studies have been conducted in the recent years from various countries regarding thyroid disorders in polycystic ovarian syndrome patient to find the relationship between both this disorders [8]. In many studies the biochemistry results showed elevated TSH levels. There is five times increase risk of autoimmune thyroiditis in patients suffering from polycystic ovarian syndrome [9]. So the research has been conducted to study the etiology & prevalence of different thyroid disorders in polycystic ovarian syndrome cases visiting to our hospital [10].

MATERIAL AND METHODS

The study was conducted in Sree Balaji Medical College, Chennai, after ethical committee approval, for the duration of 24 months (Jan 2021 to Dec 2022).

Subjects and Schemes: Design of Study– Cross-Sectional study

Sample Size: 200 patients

Study centre: Gynaecology OPD, Obstetrics and Gynaecology department, Sree Balaji Medical College, Chennai.

Inclusion Criteria

- A. Women aged between 18-40 years suffering from abnormal menstrual cycle & Infertility.
- B. The diagnosis of PCOS is established based on the Rotterdam criteria from 2003, which require the fulfilment of at least 2 out of 3 criteria.
 1. These criteria include a history of oligomenorrhea (cycles lasting more than 35 days) or long cycles, as well as amenorrhea (no menstrual cycles occurring in the past 6 months).
 2. Hyperthyroidism clinical feature & biochemistry reports.
 3. USG findings: 1 or both ovaries: > 12 follicles, 2-9 mm in size (<1cm). Volume of ovary > 10cc.

Exclusion Criteria

1. Encompass individuals currently undergoing treatment for hypothyroidism, consuming OCP's (oral contraceptive pills), Anti-epileptics, oral hypoglycaemia drugs like-Metformin.
2. Patients who are of very low BMI category are excluded.
3. Neoplasia: Thyroid and Adrenal

METHODOLOGY

Before conducting the study we have taken informed written consent from all the volunteers. All study participants underwent a comprehensive evaluation based on their medical history, clinical assessments, and laboratory investigations. Participants provided information regarding their age, marital status, history of infertility (primary or secondary), menstrual history, which included any occurrences of oligomenorrhea, irregular periods, or amenorrhea, as well as any previous ultrasound (USG) diagnoses of PCOS.

Subsequently, we conducted clinical examinations to assess other features such as hirsutism and acne. Anthropometric measurements were taken to calculate their Body Mass Index (BMI). Additionally, blood samples were collected for the evaluation of thyroid function, including serum TSH, serum FT3, and serum FT4 levels. In our study, we based our results on specific criteria, including age, BMI, clinical manifestations, and thyroid function test results. Obesity and overweight were

defined according to the WHO criteria, with obesity as a BMI \geq 30 kg/m and overweight as a BMI \geq 25 kg/m. Amenorrhea was defined as the absence of menstrual cycles in the last 6 months, while oligomenorrhea was defined as menstrual cycles lasting 35 days or longer.

Menstrual bleeding was considered irregular when it occurred more frequently than every 21 days or lasted longer than 8 days. Infertility was defined as the failure to achieve spontaneous conception after one year of marriage and regular unprotected intercourse, with male infertility ruled out. This assessment of infertility was conducted for married women, with primary infertility defined as couples who had not achieved pregnancy after at least 1 year of unprotected intercourse and no use of contraception. Secondary infertility was defined as the inability to conceive in women who had previously experienced at least one successful pregnancy but were now unable to do so [11].

Statistical Analysis

We conducted data cleaning, validation, and analysis using Statistical Package for the Social Sciences (SPSS) software, version 22 for Windows. Categorical data were presented as frequencies and percentages, while continuous variables were expressed as mean \pm standard deviation [12]. A p-value is significant when it is less than 0.05 (typically \leq 0.05).

RESULTS

In this study, we aimed to assess the thyroid function status through the measurement of serum TSH and estimate the prevalence of hypothyroidism in PCOS patients. Additionally, we sought to determine the prolactin level alterations in individuals diagnosed with PCOS. We have discussed the following criteria's such as: Mean age distribution of patients, Mean BMI value of patients, and Clinical manifestation of patients. Fertility status of patients and their percentage and Thyroid status of patients were calculated.

1. Mean Age Distribution

The mean age distribution of patients was calculated and tabulated in Table 1. A higher number of patients, constituting 67.5%, fell within the age group of 21-29. Conversely, a notably lower number of patients, accounting for just 8%, were observed in the 20-year-old age group. This distribution is visually depicted in Figure 1. The mean value of age was calculated, mean value is 27.75 ± 3.64 .

Table 1: Patient's mean age distribution

Age (years)	No. of patients	Percentage (%)
<20	8	4
21-29	135	67.5
30-39	57	28.5

Mean 27.75 ± 3.64

Table 2: Mean BMI value of patients

BMI (Kg/m ²)	No. Of Patients	Percentage (%)
Normal Weight	62	31
Overweight	75	37.5
Obese	63	31.5

Mean 27.45 ± 3.42

Table 3: Clinical manifestation of patients

Clinical Manifestation	No. of patients	Percentage (%)
Oligomenorrhea	122	61
Acne	35	17.5
Hirsutism	119	59.5

2. Mean BMI value of participants

The mean BMI value of participants were calculated and tabulated in Table 2 and graphically represented in Fig.2. The higher no. Of patients having over weight (No. Of patients-75, 37.5%). Similarly, equal no. Of patients was observed in Normal Weight =62 and Obese patients=63. The mean value of BMI patients is 27.45 ± 3.42 .

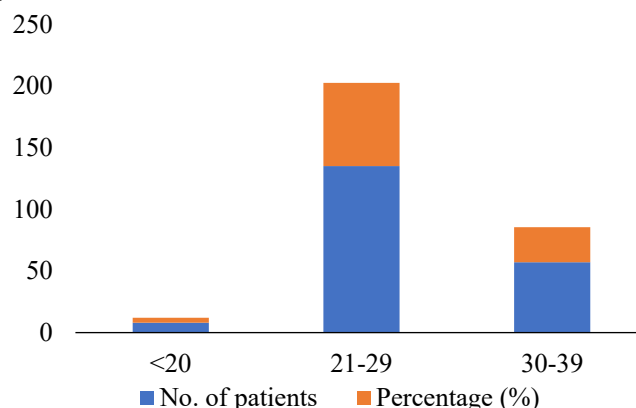


Figure 1: Graphical representation of mean age distribution

3. Clinical Manifestation of patients

The clinical manifestations like oligomenorrhea, acne, hirsutism was calculated and tabulated in Table 3. The higher no. of patients having oligomenorrhea was observed (No. of patients 122, 61%) followed by hirsutism (No. of patients = 119; 59.5%). Similarly, very few no, of patients having acne (No. of patients=35; 17.5%) and is graphically represented in Figure 3.

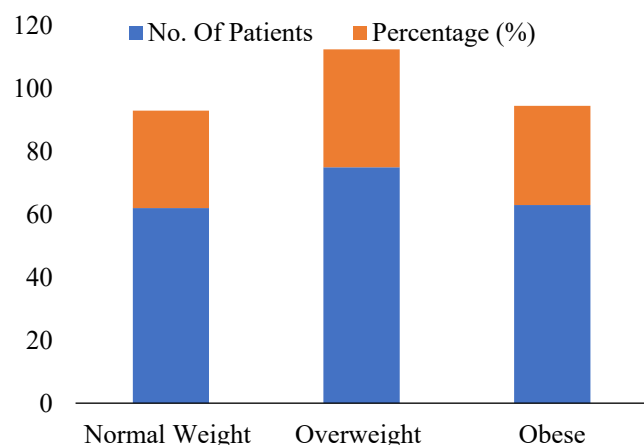


Figure 2: Graphical representation of mean BMI value of patients

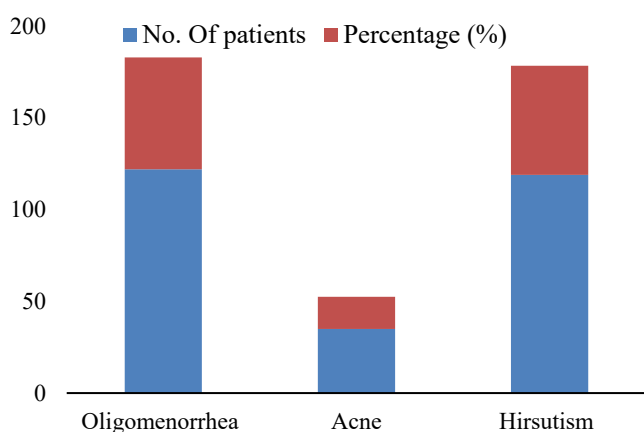


Figure 3: Graphical representation of clinical manifestation of patients

4. Fertility status of patients

The fertility status of patients and their percentage were calculated and tabulated in Table 4. A higher no. of patients having normal fertility (No. of patients 120. 60%) was observed. Very few no. of secondary infertility patients was observed (No. of patients-20; 10%) and it is clearly represented in Figure 4.

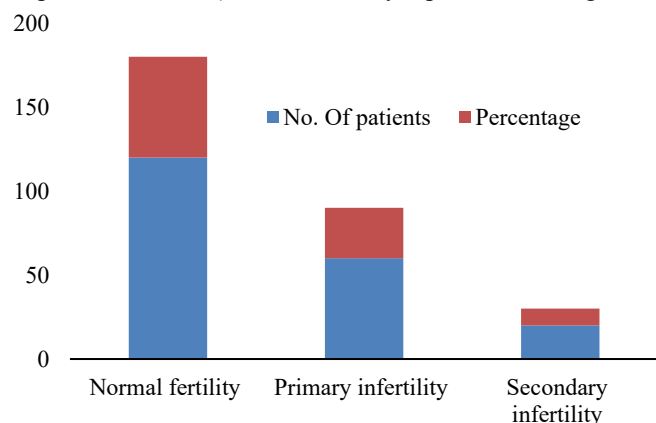


Figure 4: Graphical representation of fertility status of patients and their percentage

Table 4. Fertility status of patients & their percentage.

Fertility status	No. of patients	Percentage
Normal fertility	120	60
Primary infertility	60	30
Secondary infertility	20	10

Table 5: Thyroid status of patients and their percentage

Thyroid status	No. of patients	Percentage
Euthyroidism	130	65
Hypothyroid	58	29
Hyperthyroidism	12	6

5. Thyroid status of patients

Thyroid status of patients likes Euthyroidism, hypothyroidism and hyperthyroidism were calculated and tabulated in Table.5 The higher no. of Euthyroidism patients was observed (No. of patients 130; 65%) followed by hypothyroidism (No. of patients 58; 29%). Very few no. of patients having hyperthyroidism was observed (No. of patients 12; 6%) as shown in Figure 5. Comparison between hypothyroidism and hyperthyroidism, the higher no. of hypothyroidism patients was observed and represented in Figure 6.

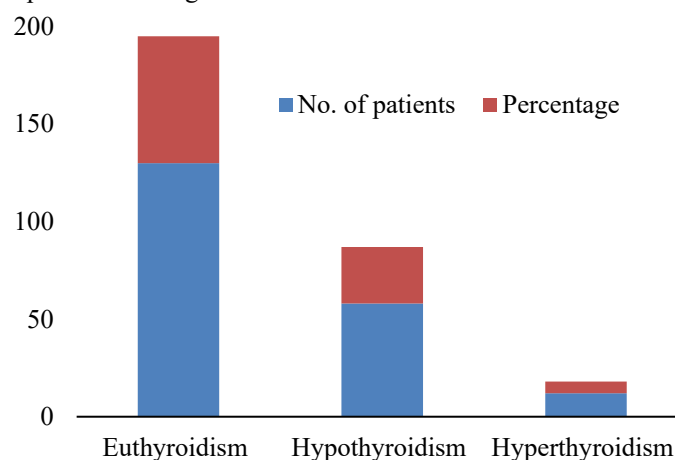


Figure 5: Graphical representation of thyroid status of patients and their percentage

DISCUSSION

(PCOS)Polycystic ovary syndrome is the most common cause of secondary amenorrhoea. It is heterogeneous condition characterised by menstrual irregularities, hyperandrogenism and on Ultrasound polycystic ovaries. Polycystic Ovary Syndrome (PCOS) and thyroid dysfunction are among the most prevalent endocrine disorders in females of reproductive age. Clinical feature &pathophysiology of these disorders are very different.

But presentation of these both disorders are same. Thyroid hormones plays an important role in reproductive physiology of female. Like polycystic ovarian syndrome there is hypertrophy of ovaries & formation of cyst in hypothyroidism also. Hyperthyroidism can also cause menstrual irregularities, but biochemical reports are different than hypothyroidism. In our study, we investigated 200 females with Polycystic Ovary Syndrome (PCOS) in the reproductive age group (18-40 years) who sought medical evaluation at the Department of Obstetrics and Gynaecology (OBGY) of Sree Balaji Medical College and Hospital to assess their thyroid function. The mean age of the study population was 27.75 ± 3.64 years. The majority of cases, numbering 135 (67.5%), were in the age range of 21-29 years, while 57 (28.5%) fell into the 30-40 years age group. Our findings align with previous studies, which also indicated a high proportion of PCOS cases within the 21-29 years age group, as presented in Table 1.

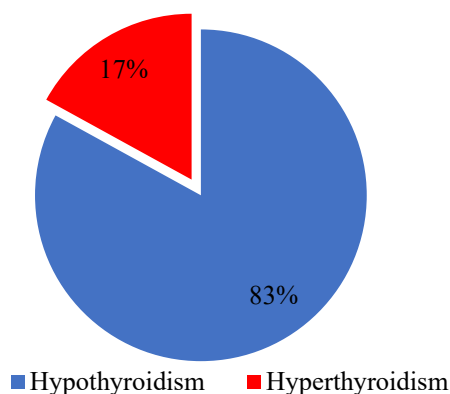


Figure 6: Graphical representations of thyroid status between hypothyroidism and hypothyroidism

In Our study we found that, 75 (37.5%) patients were overweight, 63 (31.5%) patients are obese and 62 (31.0%) patients were within normal weight level, as shown in Table 2 . In our study, we identified the clinical manifestations with which patients presented. Hirsutism, as assessed by the modified F.G. score, was found in 59.5% of the patients. Menstrual irregularities and oligomenorrhea were prevalent in 61% of the patients, and 35 individuals (17.5%) presented with acne in their facial region, as depicted in Table 3.

Regarding fertility status, our study revealed that a majority of patients, numbering 120 (60%), exhibited normal fertility.in Table 3. Very few no. of secondary infertility patients was observed (No. of patients-20; 10%) as shown in Table 4. In our

study, the thyroid abnormalities show that 58 (29.0%) patients were diagnosed with primary hypothyroidism, which was the most common thyroid abnormality in this study. Our study shows that among the total study population which was (200), out of the 130 (65%) patients were in the euthyroid state, 58 (29%) patients were diagnosed with hypothyroidism and 12 (6%) patients were found to have hyperthyroidism in our study population by doing thyroid function tests as shown in Table 5.

CONCLUSION

In conclusion, our study highlights the higher prevalence of Polycystic Ovary Syndrome (PCOS) among individuals with thyroid disorders, particularly Autoimmune Thyroiditis (AIH) and subclinical hypothyroidism (SCH), when compared to the general population. We also observed that PCOS is associated with an increased risk of cardiovascular diseases, such as hypertension and dyslipidemia, in comparison to those without PCOS. Notably, patients with both Subclinical Hypothyroidism (SCH) and PCOS face an elevated risk of hypertension compared to those with euthyroid PCOS. Our study has confirmed that the overall occurrence of thyroid dysfunction in PCOS patients is 29.0%. This underscores the importance of screening all PCOS patients for potential thyroid abnormalities.

FINANCIAL ASSISTANCE

Nil

CONFLICT OF INTEREST

The authors declare no conflict of interest

AUTHOR CONTRIBUTION

Kaavya M contributed to preparing the protocol, collecting data, analyzing and drafting the manuscript, and conceptualizing the whole research. Nithin Palanisami PS took responsibility for data processing literacy and statistical analysis along with Kaavya M. Rashmi Thakur, who was responsible for protocol preparation, collection of data, and analysis and helped in drafting the manuscript. Saru Sree Mu helped with data processing

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