

# Prevalence of Hypothyroidism in PCOS in Jharkhand

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**Abstract:** Polycystic ovarian syndrome and thyroid disorders are common endocrine disorders in females worldwide. These two problems are having many common features but are with very different etiopathogenesis. The increase in ovarian volume and cystic changes in ovaries have been reported in primary hypothyroidism due to disturbed ratio of FSH and LH. It is also seen that thyroid disorders are more common in women with PCOS as compared to the normal population may be due to other associated factors like insulin resistance, increased androgen secretion and obesity. There might be some common factors in individuals predisposing to both disorders but till date not any common pathophysiology is established between these two. The increased ovarian volume and fertility improves by administration of thyroxin apart from that it helps to control obesity and to some extent obesity related disorders. The diagnosis of hypothyroidism during adolescence will be helpful to improve especially fertility and PCOS related clinical conditions. The thyroid function study was done in PCOS patients between 18 to 35 years of age residing in Jharkhand and the results were compared with age matched healthy women. Having no medical problem or on contraceptive steroids females. Serum fasting free t3, free t4 and TSH levels were estimated. PCOS was confirmed by USG. Results of present study shows the prevalence of hypothyroidism in PCOS patient in Jharkhand.

**Keywords:** Hypothyroidism, Polycystic Ovaries, Freet3, Freet4

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## 1. Introduction

There is worldwide increase in incidence of PCOS and thyroid disorders. The incidence of PCOS is more than 22% among adolescent females by the Rotterdam criteria in India. Its incidence is higher in urban females than rural females. [1]. According to some it is up to 33% in general population.

Poison et al found that 22% of females had polycystic ovaries by ultrasound examination, most of them were without any abnormal menstrual history [2]. Similar studies have confirmed that about 25% of normal cycling women have polycystic ovaries on ultrasound examination.

The prevalence of infertility in PCOS females is caused mainly by anovulation. It varies between 35 and 94% [3]. Females with PCOS are likely to have children as healthy women, mostly require infertility treatment. [4] Females with PCOS are at a higher risk of miscarriage and Gestational Diabetes. The reason of which is not very clear. Probably the high LH concentration in follicular phase

causes a decrease in rates of conception and increase in miscarriage [5].

Thyroid disorders in males and females are the most common endocrinal disorders in India. the incidence is 10 to 15% more in females as compare to males. [6] The prevalence of thyroid dysfunctions is 15-25% in different parts of India where as that in developed countries is 4-9%. [7]. Why incidence is more India is not clear. Probable reasons may be due to:

- Iodine deficiency which has been corrected partly by iodised salt but vigorous use of iodine supplement may result in aggravation or induction of autoimmune thyroid disorders.
- Ignorance of proper diet, goitrogens, injudicious use of pesticides or exposure to industrial pollutants.

Thyroid disorders are more common in women with PCOS as compared to the normal population. this may be due to either other associated factors like insulin resistance, increased androgen secretion and obesity or vice-versa. It is

well-known that hypothyroidism has effect on ovarian morphology. In hypothyroidism there is increase in TRH that causes increase in prolactin and TSH. Prolactin inhibits ovulation and change in FSH and LH ratio and TSH acts on FSH receptors – the action of both results in polycystic ovarian changes.

Sinha et al. compared the prevalence of hypothyroidism in PCOS versus normal females and seen > 50% versus < 16% [8]. There is increased incidence of hypothyroidism and autoimmune thyroiditis in PCOS [9]. The metabolic, reproductive and cardiovascular disorders are more affected in PCOS with autoimmune thyroiditis [10]. The thyroid disorders may occur due imbalance of reproductive hormones. FSH and T3 together inhibits the process of folliculogenesis. [11]

Sinha et al. compared the prevalence of hypothyroidism in PCOS versus normal females and seen > 50% versus < 16% [12]. In another study there was prevalence of hypothyroidism in young females with PCOS with TSH level more than 4.5 $\mu$ IU/ml. [13]

Muderris II et al seen in almost all females with hypothyroidism significantly higher ovarian volume (with or without polycystic changes) than normal. It was also seen thyroxin replacement helped to decrease the ovarian volume to normal.[14] Kachuei, et al. has also shown significantly higher prevalence of hypothyroidism in PCOS patients (62.3%) than that in control subjects (35.7%) [15].

## 2. Materials and Methods

After obtaining the clearance from institutional ethics committee the assessment of thyroid function test on PCOS patients was carried out in the Departments of physiology and Obstetrics and Gynaecology in Rajendra Institute of Medical Sciences, Ranchi district of Jharkhand.

Cross sectional study was done to study the thyroid function in PCOS patients between 18 to 35 years of age who visited in OPD of RIMS, Ranchi and to compare the results with age matched healthy women who gave consent having no medical problem or on contraceptive steroids female undergraduate and postgraduate medical and nursing students in RIMS.

Serum FT3, FT4 and TSH estimation was done by CMIA technology with flexible assay protocols, referred to as chemiflex. Excel software package was used for statistical analysis.

## 3. Results

Study participants (case and control group) Total of 100 subjects diagnosed with PCOS, and 70 control were assessed in the current study. PCOS and control groups were matched for age and shows the comparison of mean of age, BMI, FT3, FT4, TSH, between the study population and the expected reference interval. All patients lived in different parts of Jharkhand.

*Table 1. Mean age and STD of PCOC subjects and control.*

PARAMETERS	MEAN AND STD OF PCOS SUBJECT	MEAN AND STD OF CONTROL
AGE	26.68 $\pm$ 5.05YRS	26.88 $\pm$ 5.42YRS

Table 1 shows The average age of participants was 26.68.7 $\pm$ 5.05years for the PCOS group and for the control group 26.88 $\pm$ 5.42 years. The difference is non significant.

*Table 2. Mean and STD of FT3, FT4 and TSH in PCOS subjects and control with p value.*

Parameters	Mean and STD of PCOS subject	Mean and STD of control	Reference interval	P VALUE
FT3	3.125 $\pm$ 2.23	3.022 $\pm$ 0.063	1.7 - 4.2pg/ml	0.713 NOT SIGNIFICANT
FT4	3.243 $\pm$ 3.805	2.077 $\pm$ 3.143	0.7-1.8ng/dl	0.0364 SIGNIFICANT
TSH	9.705 $\pm$ 9.931	3.61 $\pm$ 1.862	0.3-5.5mU/ml	<0.0001 EXTREMELY SIGNIFICANT

Table 2 Shows: the compression of mean with standard deviation of FT3, FT4 and TSH levels in PCOS subjects and control. FT3 mean in subjects was 3.125 $\pm$ 2.23 and in control it was 3.022 $\pm$ 0.063 the level was low in subjects but the difference was non significant as p value was 0.713. Mean FT4 was in

subjects 3.243 $\pm$ 3.805, and that in control was 2.077 $\pm$ 3.143 the level was low in subjects and the difference was significant with p value 0.0364. TSH mean was 9.705 $\pm$ 9.931 in subjects and was 3.61 $\pm$ 1.862 in control which was high in subjects and the difference was highly significant with p value < 0.0001.

*Table 3. Percentage of PCOS subjects and control in different FT3 range.*

Serum FT3 (REF RANGE 2.0-4.4pg/ml)	PCOS Subjects	Percentage (%) of Subjects	Control	Percentage (%) of Control
<2.0pg/mL	20	20%	5	7.14%
2.0-4.4pg/mL	56	56%	64	91.43%
$\geq$ 4.4pg/mL	14	14%	1	1.43%

Table 3 shows: the percentage of PCOS subjects and control in different range of serum FT3 levels. FT3 in 20% of PCOS subjects and 7.14% was < 2.0pg/ml, 56% of subjects

and 91.43% of control were with 2.0 – 4.4pg/ml FT3. The group with more than 4.4pg /ml FT3, 14% were subjects and 1.43% were control.

**Table 4.** Percentage of subjects of PCOS and control with different range of serum FT4.

Serum FT4 (0.7 -1.8ng/dl)	Subjects of PCOS	Percentage of subjects	Control	Percentage of control
<0.7ng/dl	62	62%	12	17.14%
0.7-1.8ng/dl	32	32%	43	61.43%
>1.8ng/dl	8	8%	15	21.43%

In table 4 the percentage of subjects of PCOS and control with different range of serum FT4 is there. with < 0.7ng/dl level 62% subjects versus 17.14% control, with 0.7 – 1.8ng/dl 32% subjects versus 61.43% control and

with > 1.8ng/dl 8% subjects 8% versus control 21.43% were there. In most of PCOS subjects FT4 level was < 0.7ng/dl where as in control group most of were having 0.7 – 1.8ng/dl.

**Table 5.** Percentage of control and PCOS subjects with different TSH levels.

Serum TSH (REF RANGE 0.3-5 µIU/ml)	Subjects of PCOS	Percentage (%) OF subjects	Control	Percentage (%) of Control
<0.3µIU/ml	1	1%	4	5.71%
0.3-5µIU/ml	34	34%	56	80%
>5µIU/ml	65	65%	10	14.29%

In table 5 65% subjects and 14.29% control were having increased TSH > 5µIU/ml. The difference is quite significant. In 34% subjects and 80% control were with TSH level between 0.3- 5µIU/ml. < 0.3µIU/ml TSH level was in subjects 1% and in control 5.71%.

hypothyroidism among PCOS females was 65% versus control 14.29%. Study by Sinha et al had similar findings in 80 PCOS females with 80 controls hypothyroidism in PCOS females was 50% versus 16% in control females. Kachuei, et al. has also shown significantly higher prevalence of hypothyroidism in PCOS patients (62.3%) than that in control subjects (35.7%).

**Table 6.** Percentage of hypothyroidism PCOS subjects versus control.

Parameters	Hypothyroid	Euthyroid
Percent in subjects with PCOS	65	35
Percent in control	14.29	85.71

Table 6 concludes percentage of hypothyroidism PCOS subjects versus control. 65% subjects are hypothyroid and 14.29% control are hypothyroid. 35% of subjects and 85.71% of control are euthyroid. In both the difference is quite significant.

## 4. Discussion

This study was undertaken with the aim to estimate the thyroid function status in diagnosed PCOS patients in Jharkhand. The study on thyroid status in PCOS women is not very sufficient in different regions of India. The present study was conducted on 100 patients of PCOS in 18-35 years of age. After screening 120 patients with menstrual abnormalities, acne, hirsutism and infertility PCOS was seen in 100 patients according to Rotterdam classification of PCOS and rest were excluded from the study. The control group consists of 70 healthy females of same age as of PCOS females. Emphasis was given mainly on thyroid related tests like serum FT3, FT4 and TSH estimation.

FT3 level was more ( $3.125 \pm 2.23$ ) in PCOS females than control ( $3.022 \pm 0.068$ ) but difference were non significant. FT4 level was higher ( $3.243 \pm 3.805$ ) in PCOS females than control ( $2.077 \pm 3.143$ ) and the difference was significant. These results were very similar to the findings by Kachuei M et al. this might be due to chronic inflammatory disorders in PCOS, as it was observed in PCOS incidence of autoimmune diseases and CRP level are high. Diagnosis was done on the basis of TSH level.

With TSH level of 5µIU/dl as the cut-off point to diagnose hypothyroidism, it was identified that the prevalence of

## 5. Conclusion

As there is definite relation of thyroid disorders and pcos the screening studies to assess the hypothyroidism in the population especially during adolescence will help early diagnosis and treatment this will improve menstrual problems, fertility and PCOS related other clinical conditions. It can be diagnosed by serum estimation of FT3, FT4 and TSH level. Long-term studies are required to assess the significance of thyroid dysfunction in patients with PCOS, especially on fertility.

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