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Original Research Article

A comparative study of thyroid stimulating hormone among lean and obese women with polycystic ovarian syndrome

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ABSTRACT

Background: The polycystic ovarian syndrome (PCOS) is an abnormality of young women of reproductive age. Between 20-50% of women with PCOS are normal weight or thin, and the pathophysiology of the disorder in these women may be related to a hypothalamic-pituitary defect that results in increased release of LH. PCOS and Thyroid disorders share certain common characteristics, risk factors, and pathophysiological abnormalities. In this study we have compared the serum TSH levels in obese and non-obese PCOS women to detect if there is a significant difference in the occurrence of hypothyroidism based on the BMI.
Methods: Non-pregnant women attending the gynecological OPD diagnosed with PCOS as per Rotterdam criteria were included. Serum TSH was done in all women diagnosed as PCOS and based on their BMI women were either included in obese or non-obese group using Asian cut-off for BMI and the values compared.
Results: In the present study 152 women were included. Women with low BMI and normal BMI were grouped as lean PCOS or non-obese PCOS and the overweight and obese women together were grouped as obese PCOS. The total number in the lean group was 28 and 124 in the obese group. Raised serum TSH levels were observed in 23.02%(35) women out of which 17.14%(6) belonged to the non-obese group and the remaining 82.85%(29) to the obese group. Among the 152 women thyroid enlargement was seen in 1.3%(2). Both women had raised serum TSH levels and both belonged to the obese group.
Conclusions: The results of our study seem to indicate that thyroid dysfunction in PCOS women developed irrespective of presence or absence of obesity.

Keywords: Body mass index, Hypothyroidism, Non-obese, Obese, Polycystic ovarian syndrome, Serum TSH

INTRODUCTION

The polycystic ovarian syndrome (PCOS) is an abnormality of young women of reproductive age associated with menstrual dysfunction, infertility, hyperandrogenism, and insulin resistance. The prevalence in India of polycystic ovary syndrome (PCOS) in women of reproductive age ranges between 9.13% to 36%.[1,2] The prevalence of PCOS among adolescent and young women in Mumbai in a recent study was 22.5%.[3] Not all women with PCOS are obese. Between 20-50% of women with PCOS are normal weight or thin, and the pathophysiology of the disorder in these women may be related to a hypothalamic-pituitary defect that results in increased release of LH.[4] Hypothyroidism is associated with a broad spectrum of gynaecological disorders from

menstrual irregularities to infertility. Hypothyroidism can affect cycle length and the severity is directly related to serum TSH values.[5]

Prevalence of hypothyroidism in the reproductive age group is 2-4%.[6] Both PCOS and thyroid disorders being common endocrinological disorders, a study was done to explore the relationship between the two disorders. The authors concluded that while the prevalence of hypothyroidism is increased in PCOS patients, more studies are needed to establish a pathophysiological pathway.[7]

PCOS and thyroid disorders share certain common characteristics, risk factors, and pathophysiological abnormalities. Simultaneously, certain etiopathogenetic factors that operate to create these dysfunctions are dissimilar. Polycystic appearing ovaries maybe a clinical feature of hypothyroidism, though hypothyroidism should be excluded before diagnosing PCOS.[7]

As the above studies suggest, PCOS is associated with hypothyroidism. Whether there is a difference in the pattern of subclinical Hypothyroidism in lean women and obese women with PCOS has not been studied extensively.

This study is being planned in order to define the impact of obesity on the serum TSH values in PCOS women.

The objective of this study was to compare the serum TSH levels of obese and lean women with PCOS among the patients visiting outpatient facility in a tertiary care teaching hospital in Bangalore.

METHODS

Prospective cross sectional study from October 2015-May 2016. The study was conducted on women registering in the obstetrics and gynecological department in Bangalore Baptist Hospital which is a tertiary care centre. The obstetrics and gynecological department including the reproductive medicine unit has an average outpatient input of 4000 which includes high risk obstetrics, infertility and oncology. Women visiting outpatient facility and diagnosed to have PCOS.

Inclusion criteria

- Women diagnosed with PCOS in reproductive age group.

Exclusion criteria

- Pregnant women.

Patients attending OPD facility underwent routine clinical examination including weight and height estimations. BMI will be calculated using Asian cut-off. Patients fulfilling the inclusion criteria and diagnosed as PCOS as per the Rotterdam criteria, were informed of their eligibility to participate in the study. After taking an informed consent from these women, a proforma is filled. 2 ml venous blood sample was drawn from the woman for serum TSH estimation and value recorded. Cut-off body mass index (BMI) with body fat as standard consensus statement for indian population was considered, i.e., underweight: ≤ 17.9 kg/m^2, normal BMI: 18.0-22.9 kg/m^2, overweight: 23.0-24.9 kg/m^2 and obese: > 25 kg/m^2. Women with underweight BMI range and normal BMI were grouped as lean PCOS or non Obese PCOS and the overweight and obese women together were grouped as obese PCOS. Normal serum TSH range considered was 0.4-4.2 µIU/L as per our laboratory definition.

Quality control

Test for serum TSH was carried out in NABL accredited laboratory. Serum TSH estimation was done using electrochemiluminiscence method using COBAS E411. Data was entered in excel sheet every week and 5 per cent of data rechecked every week to make it error free. The study was explained and informed consent taken. Decision to not participate in the study did not affect the treatment of any person.

Statistical analysis

The data collected will be entered into an excel sheet and analysis will be done using relevant statistical methods. Frequency tables and percentages were calculated. The prevalence of lean PCOS was expressed in percentage. Mean Serum TSH levels estimated for non obese and obese. Student t test was done to compare the mean TSH levels of non obese and obese PCOS groups. All groups will be compared using ANOVA.

RESULTS

In our study 152 women with PCOS were included. Women with low BMI and normal BMI were grouped as lean PCOS or non Obese PCOS and the overweight and obese women together were grouped as obese PCOS. The total number in the lean group was 28 and 124 in the obese group. There were no women who belonged to underweight BMI range in our study. Raised serum TSH levels were observed in 35 women out of which 6 belonged to the non obese group and 29 to the obese group.

Table 1: Regular versus irregular cycles in study group.

		Frequency	Percentage
Cycles	Irregular	140	92.1
	Regular	12	7.9

The Table 1 shows the distribution of cycle pattern in the 152 women with PCOS. 92.1% had irregular cycles.

Table 2: Pattern of occurrence of infertility.

Infertility	**No**	**38**	**27.7**
	Primary	74	54.01
	Secondary	25	18.24

The Table 2 and chart show the distribution of infertility among the women in the study. Primary infertility 54.01% was the commonest.

Table 3: Presenting complaints.

Complaints	**Hypomenorrhoea**	**6**	**3.9**
	Anxious to conceive	97	63.8
	Irregular cycles	49	32.2

Among the symptoms that the women presented with infertility was the commonest with 63.8 % of the women giving such complaints.

Table 4: Occurrence of acne.

		Frequency	**Percentage**
Acne	No	136	89.5
	YES	16	10.5

The Table 4 shows that acne was present in 10.5% (16) of all subjects.

Table 5: Hirsutism present versus absent.

Hirsutism	**No**	**110**	**72.4**
	YES	42	27.6

The Table 5 shows that hirsutism was present in 27.6% (42) of all the women.

Table 6: Cycles in non obese and obese women.

Cycles	**Non obese**	**Obese**	**Chi-square**	**p value**
Regular	2 (7.14)	10 (8.06)	.027	.870
Irregular	26 (92.85)	114 (91.93)		
Total	**28**	**124**		

Out of 91.93% (114) women in the obese group had irregular cycles while 8.06% (10) in the group had regular cycles. In the normal group 7.14% (2) had regular cycles and 92.85 % (26) presented with irregular cycles. The difference was not statistically significant.

Table 7: Family history in non obese and obese.

Family history	**Non obese**	**Obese**	**Chi-square**	**P value**
Present	2 (7.14)	11 (8.87)	.087	.768
Absent	26 (92.85)	113 (91.12)		

A positive family history of PCOS was present in 8.87% (11) women in the obese group while 7.14 % (2) in the non obese group had family history of PCOS. The association was not statistically significant.

Table 8: Acne in non obese and obese PCOS women.

Acne	**Non obese**	**Obese**	**Chi-square**	**P value**
Present	4 (14.2)	12 (9.67)	.515	.473
Absent	24 (85.71)	112 (90.322)		
Total	**28**	**124**		

A total 14.2% (4) in the non obese group had acne while in the obese group 9.67% (12) presented with acne. The difference in presence of acne in both groups was not statistically significant.

Table 9: Hirsutism in non obese and obese PCOS women.

Hirsutism	**Non obese**	**Obese**	**Chi-square**	**P value**
Absent	22 (78.57)	88 (70.96)	.660	.416
Present	6 (21.42)	36 (29.03)		

Hirsutism was observed in 29.03% (36) of the women in the obese group and in the non obese group in 21.42% (6) women. The difference was not statistically significant.

Table 10: Thyromegaly in non obese and obese PCOS women.

Thyromegaly	**Non obese**	**Obese**	**Chi-square**	**P value**
Absent	28 (100)	122 (98.38)	.458	.499
Present	0	2 (1.61)		

Table 11: Thyroid abnormality in non obese and obese PCOS women.

	Non-obese total number (%)	**Obese total number (%)**	**Chi- square**	**P value**
Abnormal serum TSH	6 (21.4)	29 (23.38)	.049	.824
Normal serum TSH	22 (78.57)	95 (76.61)		

Thyromegaly was seen in 1.61% (2) of all patients. Both women with thyromegaly belonged to the obese group.

In this study 21.4% (6) of subjects in the normal BMI range had high Serum TSH value while 23.38% (29) in

the obese group had high serum TSH levels. The difference was not statistically significant.

Table 12: Women with high serum TSH-non obese and obese.

	Non obese	Obese
Irregular cycles	6	25
Family history	0	2 (100%)
Infertility	3 (14.28)	18 (85.72%)
Acne	0	6 (100 %)
Hirsutism	0	17 (100 %)
Thyromegaly	0	2 (100%)

An abnormal TSH level was observed in 23.02% (35) women. Of this 17.14% (6) belonged to the non obese group and the remaining 82.85% (29) belonged to the obese group. Thus, 21.42% of the non obese group had high serum TSH level, 23.38% of the obese BMI group had high Serum TSH levels.

Table 12 compares various characteristics between the 2 groups with high serum TSH levels.

Women in non obese and obese group with abnormal serum TSH levels were compared for regularity of cycles. While all women in the lean group had irregular cycles, 86.2% (25) women in the obese group had irregular cycles.

Table 13: Cycle pattern in women with high serum TSH-non obese and obese.

High serum TSH	Non-obese total number (%)	Obese total number (%)	Chi- square	P value
Regular cycles	0	4 (13.7)	.934	.334
Irregular cycles	6 (100)	25 (86.2)		

DISCUSSION

The mean age of the women in the present study was 28.2±4.8. The mean age of menarche was 13.08±1.3.

In our study, of the 152 women with PCOS 18.4% (28) were in the lean BMI/ Non obese group and 81.6% (124) were in the obese group. The results are similar to the study conducted by Ramanand et al .8which compared the clinical features of PCOS women and they reported obese versus non obese as 75% versus 25%. A study conducted by Kalra, et al, in which the percentage of obese, overweight and normal BMI in 65 Indian POCS women based on ACOG criteria was 15.38%, 44.61%, and 40%, respectively.[9] The discrepancy may be because of the cut-off BMI. The results establish the possible need to acknowledge the non obese group of PCOS and the possible difference in treatment approach as well.

In the our study serum TSH levels ≥ 4.2 µIU/ml were noted in 23.02% (35) women with PCOS in contrast to Ramanand et al, where they reported thyroid dysfunction as 15%.[8] Enzevaei et al, in their study enrolled 75 PCOS patients among which 19 patients (25.5%), had TSH > 3.75 and 56 patients (74.4%) were euthyroid.[10] The difference is probably due to the cut-off Serum TSH in both the studies. The pathophysiological process causing thyroid dysfunction in PCOS women has not been established yet.

In our study 21.42% of subjects in the non obese group had high serum TSH value while 23.38% (29) in the obese group had high serum TSH levels.[6] The difference was not statistically significant.

Ramanand et al, enrolled 120 women out of which 16 in the obese group had hypothyroidism and SCH while 1 in the non obese group had hypothyroidism.[8]

Among the sequelae of PCOS infertility is an important complication.

In our study we report infertility in 86.84%. The incidence in obese versus non obese is 70.16% versus 42.85%. Ramanand et al in their study reported that 44.68% married PCOS women complained of infertility.[8] There was no significant difference between obese PCOS and non-obese PCOS women as far as infertility was concerned in their study. The difference might be due to the recruitment of more number of married women. While the difference was not statistically significant PCOS women are at a risk of needing treatment for infertility irrespective of BMI.

Drawbacks of the study

The BMI cut-off used in our study was based on the consensus for Asian population. The sample size for our study was small.

CONCLUSION

The results of our study seem to indicate that thyroid dysfunction in PCOS women developed irrespective of presence or absence of obesity. This is in contrast to other studies where a positive correlation was established between high BMI and development of thyroid dysfunction. This difference might possibly be due to the

difference in cut-off for serum TSH/ BMI as per Asian cut-off used in our study.

Irregular cycles is one of the most common complaints that women in reproductive age present with, and PCOS and thyroid dysfunction are the common differential diagnoses. The occurrence of both these disorders together shows that the approach and treatment for these need not be mutually exclusive. While obesity is seen in both the disorders it might not be the common link.

Recommendations

Testing for thyroid faction in women with PCOS should be done as a routine irrespective of the BMI of the patient as co-existing thyroid dysfunction and PCOS was noted in 23.02% women in our study.

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

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