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Original Research Article

Comparative study of clinical and endocrinal profile between lean and obese patients of polycystic ovary syndrome

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ABSTRACT

Background: Polycystic ovary syndrome (PCOS) is a common endocrine disorder having escalation in its prevalence. It is the most frequent cause of oligoanovulatory infertility. This study was conducted to compare the clinical and endocrinal profile of PCOS in lean PCOS (BMI<23 kg/m^2) and obese PCOS (BMI>23 kg/m^2) women.
Methods: A prospective study was conducted for 6 months in department of obstetrics and gynecology, GMERS Medical college, Junagadh. 100 healthy women who were euthyroid with age range 20-38 years who presented to gynecology OPD and diagnosed to have PCOS according to ESHRE/ASRM criteria were included in the study. BMI (body mass index) was calculated by the formula weight in kg/height in meter square. BMI were calculated were divided into 2 groups. Lean PCOS found in patients with BMI<23 kg/m^2 and overweight/obese PCOS found in patients with BMI>23 kg/m^2. History of menstrual irregularity, hirsutism, acne, alopecia, infertility, history of weight gain, history of voice change, family history of PCOS, diabetes was taken and hormonal profile was done.
Results: The findings showed a no significant correlation of clinical profile i.e., menstrual irregularities, acne vulgaris, acanthosis nigricans and hirsutism in both groups. The waist-hip ratio was higher obese PCOS women. High levels of serum testosterone were seen in obese women with PCOS, whereas there is no correlation between other hormone like FSH, LH, TSH and LH/FSH in both study groups.
Conclusions: PCOS is a risk factor for endocrinal and metabolic derangements irrespective of the BMI status. More than half of women with PCOS were obese. Increased BMI in PCOS women is associated with increased WHR and raised serum testosterone with no difference in other endocrine parameters.

Keywords: Hyperandrogenism, Infertility, Menstrual irregularities, Obesity, PCOS

INTRODUCTION

Polycystic ovary syndrome (PCOS) accounts for up to 7-10% of prevalence globally and is the most common endocrine disorder found in the reproductive age group.[1,2] Most common symptoms with PCOS female are hyperandrogenism, Menstrual irregularities, hypertension, metabolic syndrome, insulin resistance.[1,3] This heterogeneous androgen-excess disorder presents with different degrees of reproductive and metabolic dysfunctions. PCOS is associated with insulin resistance (IR) and metabolic syndrome.[4] Obesity, in particular, central obesity plays an important role in development of PCOS. Approximately 50% of PCOS women are overweight or obese and most of them have the abdominal phenotype.[5] Obesity may play a pathogenetic role in the development of the syndrome in susceptible individuals. Insulin possesses true gonadotrophic function and increased insulin availability at the level of ovarian tissue may favor excess androgen synthesis. Increased adiposity is associated with several abnormalities of sex steroid metabolism and results in increased androgen production and suppression of SHBG.[5,6] Furthermore, obese patients with PCOS have more severe cardiometabolic risk factors, compared with their lean counterparts.[7]

Objective

The objective of this study was to study clinical and endocrinal profile between lean and obese patients of polycystic ovary syndrome (PCOS).

METHODS

The study was carried out from January 2023 to June 2023. The study design included 100 females in the age group between 20 years to 38 years who attended gynecological OPD and were diagnosed with PCOS according to Rotterdam ESHRE/ASRM criteria.[8] Written informed consent was taken from all patients involved in the study. Waist to hip ratio was measured in all patients. Patients with BMI<23kg/m^2 were included in the lean PCOS and those with BMI≥23 kg/m^2 were considered overweight PCOS. Patients were examined thoroughly by taking history and gynecological examinations.

Women who attended gynecological OPD between 20-38 years and were diagnosed to have PCOS according to Rotterdam ESHRE/ASRM criteria, which defines PCOS as having two of the following; oligo ovulation or anovulation, clinical and or biochemical signs of hyperandrogenism and polycystic ovaries by ultrasonography.[8]

We excluded the women with hyperprolactinemia, hypothyroidism, pregnant, lactating women and women using oral contraceptive pills. The ethical committee of institute head approved the study. Results were analysed with special emphasis of clinical and endocrinal profile between lean and obese patients of polycystic ovary syndrome by using SPSS software for calculation in the study.

RESULTS

In this study out of 100 PCOS women, 80 women were in obese PCOS (BMI>23 kg/m^2) and 20 were in lean PCOS (BMI<23 kg/m^2).

Table 1: Comparison of age between study groups (N=100).

Age (years)	Group A (lean PCOS) (n=20)		Group B (obese PCOS) (n=80)		P value
	N	%	N	%	
19-25	11	55	21	26.25	0.021
26-30	08	40	38	47.5	
31-37	01	5	21	26.5	
Mean	24.55		28.5		

Table 1 shows that lean women with PCOS 40% were in age group of 26-30 years as compare to 47.5% in obese group.

Table 2: Overall BMI distribution of the PCOS women (N=100)

BMI (kg/m^2)	Definition	Distribution (n=100) %
<18	Under weight	8
18.5-23	Normal	12
23-27.5	Increased risk for metabolic syndrome	55
>27.5	High risk for metabolic syndrome	25

Table 2 shows BMI distribution of the PCOS women. 8% women were under weight and 12% women had normal weight. 55% women had increased risk for metabolic syndrome.

Table 3: Comparison of BMI between study groups (N=100).

Parameters	Non-obese mean (SD)	Obese mean (SD)
BMI	22.45 (0.90)	30.91 (2.86)

Unpaired t-test, p value, 0.0001, significant

Table 3 shows the comparison of BMI between study groups. In the present study, was found to be 22.45 in the lean PCOS group and 30.91 in the obese PCOS group. BMI was found to be higher in the obese PCOS group when compared to the lean PCOS with a statistically significant p value of <0.0001.

Table 4: Comparison of clinical profiles between study groups (N=100).

Parameters	Group A (lean PCOS) (n=20)		Group B (obese PCOS) (n=80)		P value
	N	%	N	%	
Menstrual irregularity	12	60	58	72.5	0.07
Hirsutism	12	60	54	67.5	0.526
Acnthosis nigricans	1	5	12	15	0.234
Acne/oily skin	14	70	67	83.7	0.160
Weight gain	5	25	30	37.5	0.294
Waist to hip ratio >0.8	3	15	56	70	<0.001

Table 4 shows comparison of clinical profile between 2 study groups. In this study menstrual irregularities were frequent in women of obese PCOS which was 72.5% as compare to women of lean PCOS was 60% (p<0.07); hirsutism was seen in 54 (67.5%) obese women with PCOS as compare to 12 (60%) in lean PCOS (p=0.526); Acanthosis nigricans was seen in 1 (5%) obese PCOS group as compare to 12 (15%) lean PCOS (p=0.234). 67

(83.7%) women with acene/oily skin were in obese PCOS group whereas 14 (70%) in lean PCOS group (p=0.160); 5 (25%) women with lean PCOS had recent weight versus 30 (37.5) with obese PCOS (p=0.294). The waist-hip ratio (>0.85) was 56 (70%) in obese PCOS women versus 3 (15%) in lean; p=0.001).

In our study, we found no significant difference in the frequency of menstruation irregularities clinical profile like hirsutism, acanthosis nigricans, acene, weight gain between the two groups. There was statically significance difference in weight to hip ratio between two groups.

Table 5: Comparison of endocrinal profile between study groups (N=100).

Parameters	Group A (lean PCOS) (n=20)		Group B (obese PCOS) (n=80)		P value
	N	%	N	%	
High serum TSH	1	5	2	2.5	0.55
low FSH	5	25	22	27.5	0.82
High LH	6	30	21	26.25	0.73
LH/FSH >1	8	40	31	38.75	0.91
Serum testosterone >70 ng/dl	0	0	26	32.5	0.003

Table 5 shows comparison of endocrinal profile between 2 study groups. There was no significant difference in endocrinal parameters like high serum TSH, low FSH, High LH and LH/FSH ratio between two groups in our study. Serum testosterone was significantly higher 32.5% in obese patient, with a statically p value 0.003.

DISCUSSION

PCOS is one of the most common endocrinal diseases of multifactorial origin affecting women of all age groups.[9] Chronic anovulation, symptoms of hyperandrogenism, and characteristics of polycystic ovaries as shown on an ultrasonogram are the major characteristics. The close association between obesity and PCOS is supported by epidemiological data, revealing that between 38-88% of women with PCOS are either overweight or obese.[10] There was no significant association found between menstrual irregularities and the study group, Akshaya et al also found comparable findings.[5] Acne was a presenting complaint in 18% of subjects and did not differ in an obese and lean group according to Akshaya et al.[5] In our study, out of 100 women with PCOS, the majority, i.e., 55 had a BMI of 25-29.9 kg/m^2 (overweight), followed by 25 with a BMI of >30 kg/m^2 (obese) which was comparable with Makhija et al studies.[11] The mean BMI value of our study was 22.45 in the lean PCOS group and 30.91 in the obese PCOS group which were like Makhija et al and Ali et el.[11,12]

Hirsutism is seen in both lean PCOS and obese PCOS. Acanthosis was more common in obese PCOS women, similar findings showed by Silfen et al in their study.[13] In the present study, 59 (59%) PCOS women had WHR>0.85 (central obesity) which included all 56 (70%) obese women and 3 (15%) lean PCOS women. Agarwal at el and Akshaya et al studies also had raised WHR in obese PCOS women.[5,14] It was noted that central obesity is more common in obese PCOS than the lean PCOS woman which is comparable to present study.

Abnormality of the hypothalamic-pituitary-ovarian axis has been implicated in the pathophysiology of PCOS. Estrogen secreted from ovaries leads to abnormal feedback leading to a rise in LH levels, thereby increasing LH/FSH ratio in PCOS women compared to healthy controls. LH/FSH ratio is increased to two or three. Most studies suggest that LH levels and LH to FSH ratio are higher in PCOS women than in control, but the absence does not rule out PCOS diagnosis. In the current study, there was no apparent difference between the two groups. A study by Agarwal et al and Saxena et al did not find any difference between BMI and LH/FSH ratio in women with PCOS.[14,15] In this study, we found no significant difference in the frequency of serum TSH between the two groups; Saxena et al also found comparable findings.[15] As opposed to non-obese women with PCOS, Liou et al reported that obese women with PCOS had lower blood LH levels and a lower LH to FSH ratio.[16] In our study, we inferred that serum testosterone levels were high in obese PCOS. A similar result was obtained in a study conducted by Ibrahim et al reported that total testosterone in serum was similar in both groups, but free testosterone levels were higher in obese compared with lean subjects.[17] Gupta et al in their study stated that high testosterone levels were seen in nonobese PCOS women.[18] In contrast, research by Garima et al Majumdar et al indicated that obese PCOS women had a higher prevalence of menstrual abnormalities.[19,20] In the current study, hirsutism was found in both lean PCOS and obese PCOS.

In our comparative study, collecting valid and reliable data for the study have selected to test theoretical relations can turn out to be formidable task.

CONCLUSION

PCOS is a common disorder in women that is associated with significant reproductive and nonreproductive morbidity as outlined here. It is an ill-defined symptom complex need its due attention. Most of women were obese. Central obesity was more common in obese PCOS than lean PCOS. Most of PCOS women, regardless of BMI, had symptoms like menstrual irregularities, acne, hirsutism, oily skin, acanthosis nigricans. Obese PCOS patients had acanthosis higher weight to hip ratio. High level of serum total testosterone was noted in women with higher BMI. Standardization of diagnostic criteria and prospective longitudinal data is required to improve our understanding of long-term health risks associated with

PCOS. Therapeutic timely intervention can halt this ongoing process.

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REFERENCES

1. Ghatnatti V, Patil S, Kour H. Assessment of clinical, biochemical, and hormonal profile of lean versus overweight polycystic ovarian syndrome patients: a cross-sectional study. APIK J Intern Med. 2022;10(1):13-6.
2. El Hayek S, Bitar L, Hamdar LH, Mirza FG, Daoud G. Poly cystic ovarian syndrome: an updated overview. Front Physiol. 2016;7:124.
3. Legro RS, Feingold KR, Anawalt B, Boyce A, Chrousos G, de Herder WW, et al. evaluation and treatment of polycystic ovary syndrome. In: Endotext. South Dartmouth (MA): MDText.com, Inc.; 2000.
4. Kamrul-Hasan AB, Aalpona FT. Comparison of clinical, metabolic, and hormonal parameters in lean vs. obese women with polycystic ovary syndrome: a single-center study from Bangladesh. Sri Lanka J Diabetes Endocrinol Metab. 2021;11:15-25.
5. Akshaya S, Bhattacharya R. Comparative study of clinical profile of lean and obese polycystic ovary syndrome women. Int J Reprod Contracept Obstet Gynecol. 2016;5:2530-3.
6. Pasquali R. Obesity and androgens: facts and perspectives. Fertil Steril. 2006;85:1319-40.
7. Cattrall FR, Healy DL. Long term metabolic, cardiovascular and neoplastic risks with polycystic ovary syndrome. Best Pract Res Clin Obstet Gynaecol. 2004;18:803-12
8. Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome (PCOS). Hum Reprod. 2004;19(1):41-7.
9. Kumar N, Agarwal H. Early clinical, biochemical and radiological features in obese and non-obese young women with polycystic ovarian syndrome: a comparative study. Horm Metab Res. 2022;54(9):620-4.
10. Barber TM, Franks S. Obesity and polycystic ovary syndrome. Clin Endocrinol 2021;95(4):531-41.
11. Makhija N, Tayade S, Toshniwal S, Tilva H. Clinico-metabolic profile in lean versus obese polycystic ovarian syndrome women. Cureus. 2023;15(4):e37809.
12. Ali EA, Ahmed AL, Satha M, Khateeb AL. The association between serum nesfatin-1 level and BMI in Iraqi patients with polycystic ovary syndrome (PCOS). Health Res Policy Syst. 2021;15:1490-5.
13. Silfen ME, Denburg MR, Manibo AM, Lobo RA, Jaffe R, Ferin M, et al. Early endocrine, metabolic, and sonographic characteristics of polycystic ovary syndrome (PCOS): comparison between nonobese and obese adolescents. J Clin Endocrinol Metab. 2003;88(10):4682-8.
14. Gupta P, Agrawal S, Agarwal A, Pandey A, Kumar N, Ali W. Comparison of Endocrine and Metabolic Profile of Obese and Lean PCOS Women with Infertility. Int J Infertil Fet Med. 2022;13(3):125-8.
15. Saxena P, Prakash A, Nigam A, Mishra A. Polycystic ovary syndrome: Is obesity a sine qua non? A clinical, hormonal, and metabolic assessment in relation to body mass index. Indian J Endocr Metab. 2012;16(6):996.
16. Liou TH, Yang JH, Hsieh CH, Lee CY, Hsu CS, Hsu MI. Clinical and biochemical presentations of polycystic ovary syndrome among obese and nonobese women. Fertil Steril. 2009;92(6):1960-5.
17. Mahmoud MI, Habeeb F, Kasim K. Reproductive and biochemical changes in obese and non obese polycystic ovary syndrome women. Alexandria J Med. 2015;51(1):5-9.
18. Gupta N, Radhakrishnan G, Madhu SV, Radhika AG. Comparison of metabolic and endocrinal parameters in obese and nonobese women of polycystic ovarian syndrome with normal controls. Fertil Sci Res. 2015;2:19-23.
19. Sachdeva G, Gainder S, Suri V, Sachdeva N, Chopra S. Obese and non-obese polycystic ovarian syndrome: comparison of clinical, metabolic, hormonal parameters, and their differential response to clomiphene. Indian J Endocrinol Metab. 2019;23(2):257-62.
20. Majumdar A, Singh TA. Comparison of clinical features and health manifestations in lean versus obese Indian women with polycystic ovarian syndrome. J Hum Reprod Sci. 2009;2(1):12-7.

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