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Comparative study of cortisol level between PCOS women and normal women

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Abstract
Introduction: Polycystic ovary syndrome (PCOS) is now recognized as the most common endocrinopathy in women of reproductive age group, affecting 5%–10% of women worldwide. It is characterized by oligoovulation or anovulation, signs of androgen excess and polycystic Ovaries.
Material and Method: This case control study conducted in Department of Obstetrics & Gynecology, FH Medical College over a period of 6 months.
Result: In this study two groups were involved, one was case group and another one was control group. In the control group 15 normal females were included & in the case group 15 females with PCOS were included.
Conclusion: The mean values of cortisol are significantly higher in females with PCOS. However, the limitation of the study may be the small sample size.

Keywords: cortisol level, PCOS women, normal women

Introduction

Polycystic ovary syndrome (PCOS) is a chronic condition. It leads to morbidities, which could be in short-term i.e. sub fertility and pregnancy-related complications and long-term risks like type 2 diabetes, cardiovascular disease, depression, poor quality of life etc [1]. It is reported that 2–18 % of women have PCOS. It is the most common endocrine disorder among reproductive-aged women [2 – 4]. Its high prevalence has attracted significant public attention all over the world. It has been estimated that USA healthcare system invests $4billion annually for PCOS identification and management. Due to its heterogeneity and uncertainty about its aetiology, PCOS is a complex endocrine condition. Stein & Leventhal was the first person who described this syndrome. The diverse nature of PCOS was evident by them. They described seven women with variable clinical characteristics i.e. obesity, hirsutism, acne and amenorrhoea, related with enlarged bilateral polycystic ovaries. It was recommended by NIH, US that the diagnostic criteria for PCOS should comprise the concomitant presence of anovulation and hyper and rogenaemiaeither clinical or biochemical.

Since PCOS is a very common disorder worldwide, it is essential to have unity about the diagnostic criteria [5]. A meeting was held in December 2012 US by NIH to achieve this goal. The recommendation's by NIH have been summarized and presented very recently [6-7]. In global context, Rotterdam definition [8] was considered as the most appropriate for PCOS. It was suggested that a more appropriate, less 'ovary-centric' name for the syndrome should be considered. Apart from symptoms like hirsutism, acne, irregular menses, infertility and excessive bodyweight, psychological disorders may also have an association with PCOS [9-12]. They may have significant implications on the quality of life [13-15]. Though, there are very few available studies, yet it has been shown that similar psychological profiles exist in both NIH and non-NIH phenotypes of PCOS. It implies that the presence of psychological dysfunction happens even in milder phenotypes of the syndrome. It has been suggested that psychological function and quality of life should be considered in all women with PCOS. Psychological symptoms and quality of life should be assessed with appropriate validated questionnaires or structured interviews. To evaluate anxiety, depression and other psychological aspects, the most widely used questionnaires are Hospital Anxiety and Depression Scale [16]. The Rosenberg's Self-Esteem Scale [17], the Beck Anxiety Inventory symptoms) [18] and the Beck Depression Inventory [19]. The Symptom Checklist 90 (SCL-90-R) is also used widely to assess depression

and anxiety.
The use of this questionnaire totally depends on the specialist's involved in different studies. The heath-related quality of life (HRQoL) has been investigated by generic questionnaires, such as the Short Form-36 questionnaire (SF-36). The PCOSQ questionnaires a more specific questionnaire which is validated for PCOS patients. It involves the analysis of emotions, body hair impact, weight, menstrual problems and infertility [20-22].

Material and Methods

Study population
In this study two groups were involved, one was case group and another one was control group. In the control group 15 normal females were included & in the case group 15 females with PCOS were included.

Study area
This case control study conducted in Department of Obstetrics & Gynecology, FH Medical College over a period of 6 months.

Data collection
Five ml of fasting blood were collected on the 2nd day of menstrual cycle under aseptic precautions. All the parameters were tested by automatic hormone analyzer & data were collected.

Inclusion criteria
Reproductive age group women with chronic anovulation, & polycystic ovaries on USG were included in this case study.

Exclusion criteria
Women with oral contraceptive, corticosteroid & antidiabetic drug were excluded in this study.

Study analysis
Data were analyzed by the using Microsoft excel & statistics.

Observation and Result
This case control study was included two groups, one was of healthy group & another one was PCOS group. Only reproductive age group women were included in case study as well as in control study. In our study acne were found 73.4% followed by hirsuitism (53.4%), weight gain (40%), alopecia (6.7%), acanthosis (6.7%), stress (53.4%). P value of different parameters shown in table no. 3.

Table 1: This table showed *p* value of Age and BMI

Parameters	Case group (n=15) mean±SD	Control group (n=15) mean±SD	*p* value
Age	27.33±0.83	24.40±0.86	0.86
BMI (kg/m^2)	24.70±4.1	22.90±2.78	.102

Table 2: Base line symptoms showed in this table

Symptoms	Case group (n=15)	Control group (n=15)
Acne	11 (73.4%)	0 (0%)
Hirsuitism	8 (53.4%)	0 (0%)
Weight gain	6 (40%)	0 (0%)
Alopecia	1 (6.7%)	0 (0%)
Acanthosis	1 (6.7%)	0 (0%)
Stress due to above symptoms	8 (53.4%)	0 (0%)

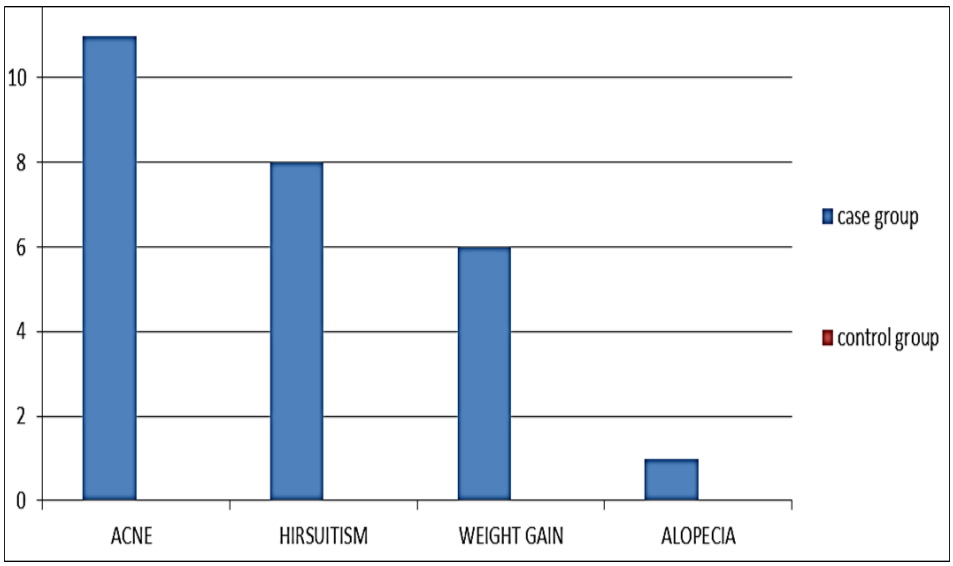

Fig 1: This chart showed base line symptoms in both group

Table 3: Different parameters showed in this table

Parameters	Case group (n=15) mean±SD	Control group (n=15) mean ±SD	*p* value
Fasting blood sugar	85.93±3.44	79.60±7.6	<0.01
Insulin(µg/ml)	11.50±3.44	9.12±2.59	<0.01
LH	12.6±5.9	5.93±1.46	<0.01
FSH	8.6±2.38	8.54±1.78	0.828
Prolactin	13.71±4.00	12.12±3.3	0.09
TSH	2.45±1.04	2.20±0.89	0.316
Cortisol	16.29±8.3	9.82±1.65	<0.01

Discussion
It has been observed in the present study that the mean values of cortisol were significantly higher in women with PCOS in comparison to controls. LH, FBS, Fasting insulin, GTT, HOMA-IR levels were also found significantly higher in the cases than the controls. Though, differences between the mean levels of FSH, prolactin and TSH were statistically non-significant between the two groups. For the androgen profile, mean Testosterone and DHEAS levels were higher among the PCOS women. In the study group, bilateral ovaries were found bulky

with mean ovarian volume and number of follicles significantly higher in ultrasonography. Several studies have been conducted in PCOS women about the alteration in adrenal or extra-glandular cortisol production and metabolism, but results are controversial [23-30]. Tsilchorozidou T, *et al*. conducted a study on on lean women with PCOS were compared with controls who were closely matched for body mass index (BMI) [31]. They confirmed that there is an increased production rate of cortisol and androgens as measured in vivo in lean PCOS women. In a study by Shabir I, *et al*. studied 197 cases and 55 controls [32]. They have found that serum cortisol levels were significantly higher in lean PCOS women in comparison to controls and over-weight PCOS women group. Tock L *et al*. conducted a study on 37 PCOS women (16 non-obese and 21obese) and 18 non-obese controls. Fasting glucose, insulin, androgens, and gonadotropins levels were determined. Before and after dexamethasone (DEX) 0.25 mg, salivary cortisol was measured. The results showed that non-obese PCOS women had higher basal salivary cortisol, serum dehydroepiandrosterone sulfate and LH levels than obese PCOS. Kiałka M, *et al*. studied 40 patients with PCOS and 55 without PCOS [33].

They found the increased evening plasma cortisol level with impacted diurnal secretion rate in PCOS women. It has been suggested in previous studies that in PCOS, the cortisol is dysregulated, through increased HPA axis activity. The pituitary-adrenal axis is upregulated due to the excessive adrenal gland-derived androgen secretions. It is also suggested that PCOS patients have altered cortisol metabolism because of increase in the 5-alpha-reductase activity, which may be a secondary phenomenon due to hyperinsulinemia [31]. The present study also demonstrated increased insulin levels in women with PCOS as compared to normal women of same reproductive age group. Thus, the increased peripheral metabolism of cortisol can be suggested. This increased metabolism can be attributed to the increased inactivation of cortisol by 5-alpha- reductase and to the decreased reactivation of cortisol from cortisone by 11-beta-hydroxysteroid dehydrogenase Type 1. These results in impaired negative feedback suppression of ACTH secretion, causing increased ACTH levels and it leads to increased cortisol and androgens in PCOS.

Conclusion

The mean values of cortisol are significantly higher in females with PCOS. However, the limitation of the study may be the small sample size.

References

1. ACOG Committee on Practice Bulletins—Gynecology. ACOG Practice Bulletin No. 108: Polycystic ovary syndrome. Obstet Gynecol 2009;114(4):936-49.
2. Farah L, Lazenby AJ, Boots LR, Azziz R. Prevalence of polycystic ovary syndrome in women seeking treatment from community electrologists. Alabama Professional Electrology Association Study Group. J Reprod Med 1999;44(10):870-4.
3. Knochenhauer ES, Key TJ, Kahsar-Miller M, Waggoner W, Boots LR, Azziz R. Prevalence of the polycystic ovary syndrome in unselected black and white women of the southeastern United States: a prospective study. J Clin Endocrinol Metab 1998;83(9):3078-82.
4. March WA, Moore VM, Willson KJ, Phillips DI, Norman RJ, Davies MJ. The prevalence of polycystic ovary syndrome in a community sample assessed under contrasting diagnostic criteria. Hum Reprod (Oxford, UK) 2010;25(2):544-51.
5. Ehrmann D. Polycystic ovary syndrome. New England Journal of Medicine 2005;352:1223-1236. doi:10.1056/NEJMra041536
6. Final Report National Institute of Health. Evidence-based Methodology Workshop on Polycystic Ovary Syndrome 2012;3-5. http://prevention.nih.gov/workshops/2012/pcos/resourc-es.aspx.
7. Dunaif A, Fauser BC. Renaming PCOS – a two state solution. Journal of Clinical Endocrinology and Metabolism 2013;98:4325-4328. doi:10.1210/jc.2013-2040
8. The 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). Human Reproduction 2004;19:41-47. doi:10.1093/humrep/deh098
9. Hahn S, Janssen OE, Tan S, Pleger K, Mann K, Schedlowski M, Kimmig R, Benson S, Balamitsa E, Elsenbruch S. Clinical and psychological correlates of quality-of-life in polycystic ovary syndrome. European Journal of Endocrinology 2005;153:853-860. doi:10.1530/eje.1.02024
10. Elsenbruch S, Hahn S, Kowalsky D, Offner AH, Schedlowsky M, Mann K, Jansen O. Quality of life, psychological wellbeing and sexual satisfaction in women with PCOS. Journal of Clinical Endocrinology and Metabolism 2003;88:5801-5807. doi:10.1210/jc.2003-030562
11. Hollinrake E, Abreu A, Maifeld M, Van Voorhis BJ, Dokras A. Increased risk of depressive disorders in women with polycystic ovary syndrome. Fertility and Sterility 2007;87:1369-1376. doi:10.1016/j.fertnstert.2006.11.039
12. Dokras A, Clifton S, Futterweit W, Wild R. Increased risk for abnormal depression scores in women with polycystic ovary syndrome: a systematic review and meta-analysis. Obstetrics and Gynecology 2011;117:145-152. doi:10.1097/AOG. 0b013e318202b0a4
13. Coffey S, Bano G, Mason H. Health-related quality of life in women with PCOS: a comparison with the general population using the PCOS questionnaire and the SF-36. Gynecological Endocrinology 2006;22:80-86. doi:10.1080/09513590600604541
14. Barnard L, Ferriday D, Guenther N, Strauss B, Balen AH, Dye L. Quality of life and psychological well being inpolycystic ovary syndrome. Human Reproduction 2007;22:2279-2286. doi:10.1093/ humrep/dem108
15. Moran LJ, Deeks AA, Gibson-Helm ME, Teede HJ. Psychological parameters in the reproductive phenotypes of polycystic ovary syndrome. Human Reproduction 2012;27: 2082-2088. doi:10.1093/ humrep/des114
16. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. Acta Psychiatrica Scandinavica 1983;67: 361-370. doi:10.1111/j.1600- 0447.1983.tb09716.x
17. Rosenberg's Self-Esteem Scale & Rosenberg M. Society and the adolescent self-image. Princeton, NJ: Princeton University Press 1965.
18. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. Journal of Consulting and Clinical Psychology 1988 56 893–897. (doi:10.1037/0022-006X.56.6.893)
19. Beck AT, Ward CH, Mendelson M, Erbaugu J. An inventory for measuring depression. Archives of General Psychiatry 1961;4:561-571.

(doi:10.1001/archpsyc.1961.01710120031004)
20. Symptom Checklist 90 (SCL-90-R). Symptoms Checklist-90 – revised. In Handbook of Psychiatric Measures. American Psychiatric Association, 2000.
21. Ware J & Sherbourne C. The MOS 36-Item Short Form Health Survey (SF-36). I. Conceptual framework and item selection. Medical Care 1992 30 473–483. (doi:10.1097/00005650-199206000-00002)
22. Jones G, Benes K, Clark T, Denham R, Holder M, Haynes T *et al*. The PCOS health-related quality of life questionnaire (PCSOQ): a validation. Human Reproduction 2004;19:371-377. (doi:10.1093/humrep/deh048
23. Kamel N, Tonyukuk V, Emral R, Çorapçıolu D, Batemir M, Güllü S. Role of ovary and adrenal glands in hyperandrogenemia in patients with polycystic ovary syndrome. Experimental and clinical endocrinology & diabetes 2005;113(02):115-21.
24. Glintborg D, Hermann AP, Brusgaard K, Hangaard J, Hagen C, Andersen M. Significantly higher adrenocorticotropin-stimulated cortisol and 17-hydroxyprogesterone levels in 337 consecutive, premenopausal, caucasian, hirsute patients compared with healthy controls. The Journal of Clinical Endocrinology & Metabolism. 2005;90(3):1347-53
25. Vassiliadi DA, Barber TM, Hughes BA, McCarthy MI, Wass JA, Franks S, Nightingale P, Tomlinson JW, Arlt W, Stewart PM. Increased 5α-reductase activity and adrenocortical drive in women with polycystic ovary syndrome. Journal of Clinical Endocrinology & Metabolism 2009;94(9):3558-66.
26. Benson S, Arck PC, Tan S, Hahn S, Mann K, Rifaie N *et al*. Disturbed stress responses in women with polycystic ovary syndrome. Psychoneuroendocrinology. 2009;34(5):727-35.
27. Roelfsema F, Kok P, Pereira AM, Pijl H. Cortisol production rate is similarly elevated in obese women with or without the polycystic ovary syndrome. The Journal of Clinical Endocrinology & Metabolism. 2010;95(7):3318-24.
28. Wachs DS, Coffler MS, Malcom PJ, Shimasaki S, Chang RJ. Increased androgen response to follicle-stimulating hormone administration in women with polycystic ovary syndrome. The Journal of Clinical Endocrinology & Metabolism. 2008;93(5):1827-33.
29. Mrozithska S, Milewicz T, Kiałka M, Gosztyła K, Lurzythska M, Kabzithska-Turek M. There is no difference in the plasma cortisol level between women with body mass index (BMI) greater than or equal 25 kg/m² and polycystic ovary syndrome and the control group without polycystic ovary syndrome and BMI 25 kg/m². Przeglathd lekarski 2016;73(4):207.
30. Kiałka M, Ociepka A, Milewicz T, Krzyczkowska-Sendrakowska M, Gosztyła K, Stochmal E *et al*. Evening not morning plasma cortisol level is higher in women with polycystic ovary syndrome. Przeglad lekarski. 2014;72(5):240-2.
31. Tsilchorozidou T, Honour JW, Conway GS. Altered cortisol metabolism in polycystic ovary syndrome: insulin enhances 5_-reduction but not the elevated adrenal steroid production rates.the Journal of Clinical Endocrinology & Metabolism. 2003;88(12):5907-13.
32. Shabir I, Ganie MA, Praveen EP, Khurana ML, John J, Gupta N *et al*. Morning plasma cortisol is low among obese women with polycystic ovary syndrome. Gynecological Endocrinology. 2013;29(12):1045-7.
33. Tock L, Carneiro G, Pereira AZ, Tufik S, Zanella MT. Adrenocortical production is associated with higher levels of luteinizing hormone in non-obese women with polycystic ovary syndrome. Int. J Endocrinol. 2014, 1-7. doi: 10.1155/2014/620605