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**ORIGINAL ARTICLE**

# Anatomical Changes in Young Women with Polycystic Ovary Syndrome and First Line Treatment, A Clinical Study

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## ABSTRACT

**Aims and objectives:** The aims and objectives of current study were to provide health awareness to the young women about closed correlation among polycystic ovary syndrome and obesity which caused physio-anatomical changes with its treatment protocol.

**Materials and Methods**

**Study deigned:** This study was conducted from 10-11-2021to march 31-3-2022 at different medical centers of Sind Pakistan.

**Sample sized:** 150 total women of age in between 20-30 years were selected and divided them into two different groups. In Group-C 50 normal female with regular menstrual cycle were included while in Group-A 70 female individuals with irregular menstrual cycle (polycystic ovary syndrome) were placed. On the other hand in Group-B, 30 women with polycystic ovary syndrome and obesity treated with Metformin, Clomiphene and Rosiglitazone medicine

**Variables analysis:** Body mass index (BMI), Insulin blood levels, Androstenedione blood levels, systolic and diastolic blood pressure and blood glucose levels.

**Recommended Medications:** Metformin, Clomiphene and Rosiglitazone

**Raw Data presentation:** Concluded raw data was bio-statistically represented with the application of SPSS model 2020 in which Mean Standard Deviation (Mean±SD) of different variables were considered as significant (P<0.05) variation of various regressions and concluded results were graphically showed in results.

**Results:** The findings of this study indicated that Body mass index, Insulin blood levels after 2 hour, Androstenedione blood levels, Systolic blood pressure, Diastolic blood pressure and Random Blood glucose levels of women with polycystic ovary syndrome of Group-A were (27.1±1.02, 9.1±1.01, 130.1±0.03, 140.1±1.04, 90.1±1.04, 150.1±1.01) and showed a remarkable significant (P<0.05) changes as compared with the Group-C (27.1±1.02, 9.1±1.01, 130.1±0.03, 140.1±1.04, 90.1±1.04, 150.1±1.01) respectively. In Group-B 30 women individuals with polycystic ovary syndrome were treated with different medicine and their levels of different variables (23.1±1.01, 9.7±1.04, 110.1±0.01, 120.1±1.01, 80.1±1.03, 130.1±1.01) were significantly (P<0.05) changed than the Group-A (27.1±1.02, 9.1±1.01, 130.1±0.03, 140.1±1.04, 90.1±1.04, 150.1±1.01) comparatively.

**Conclusion:** Losing weight has positive implications on hormone levels, metabolism, and clinical traits. The addition of insulin-sensitizing drugs and antiandrogens to weight loss programmes can also result in an additional clinical and endocrinological benefit. These unmistakably highlight the part that obesity plays in the pathogenesis of PCOS. In contrast to obese and lean women, surprisingly few women with metabolic syndrome displayed polycystic ovarian syndrome symptoms. Our findings imply that at the population level, the polycystic ovarian syndrome just represents a specific subset of the metabolic syndrome, more serious issue.

**Keywords:** Polycystic ovary syndrome, Obesity, Androstenedione, Hormones, Metformin, Clomiphene, Rosiglitazone

## INTRODUCTION

Polycystic ovary syndrome is a medical disorder during which excess amount of androgens hormones excreted from female [2]. The excess amount of androgens hormones is found in male than female. A mature egg is discharged from an ovary during ovulation. This takes place so that a male sperm may fertilize it. During period in female the egg is expelled from the body if it is not fertilized. In number of cases a woman may occasionally produce insufficient amounts of the hormones than the required quantity for ovulation and ultimately ovaries may grow a large number of tiny cysts, when ovulation is absent [3]. Mainly the androgens are hormones that produced cysts in young women. Androgen levels are frequently elevated in women with polycystic ovary syndrome and menstrual cycle in women become disturbed. It is unclear what causes of polycystic ovary syndrome specifically [1]. Insulin sensitivity is prevalent in polycystic ovary syndrome patients. This implies that insulin use by the body is poor. Increased insulin levels can lead to greater androgen levels in the body. Additionally, obesity might raise insulin levels and exacerbate polycystic ovary syndrome symptoms [5].

Major cause of polycystic ovary syndrome is irregular periods in young women. Any female has an increased risk of developing certain issues if she has PCOS and excessive amounts of androgen [1]. The ovulation process might be hampered by ovarian cysts. Each month, one egg released by ovaries and a woman cannot conceive if a healthy egg is not accessible for sperm to fertilize [7]. If body producing too many androgens might be due to insulin resistance. The cells in muscles, organs, and other tissues don't absorb blood sugar properly if it have insulin resistance. Ultimately glucose levels of the biological system become increased [10]. Diabetes is a condition that can affect your neurological and cardiovascular systems. The risk of cardiovascular disease is increased by this set of symptoms. High blood pressure, high blood sugar, poor HDL cholesterol, and high triglyceride levels are among the symptoms [8].

Independent of weight, insulin resistance is a typical finding in PCOS. Compared to weight-comparable, reproductively normal women, women with PCOS have a 36–41% reduction in insulin-mediated glucose elimination, mostly reflecting insulin action on skeletal muscle [7]. Obesity does not cause this problem, but it significantly worsens it. As opposed to control women of similar body weight, only obese women with PCOS have hepatic insulin resistance, which is shown by increased post absorptive glucose synthesis and decreased sensitivity to insulin-mediated reduction of endogenous glucose production [9]. In PCOS, fasting insulin levels are elevated. However, there exist insulin secretion flaws that are unrelated to fat. 2 Women with PCOS who have a first-degree relative with type 2 diabetes show these anomalies more clearly than other PCOS patients [12].

The first insulin sensitizing medication utilized in PCOS to examine how insulin resistance contributes to the pathophysiology of the condition was metformin [13]. Since then, a number of studies have shown contradictory data about the contribution of metformin to PCOS. Numerous meta-analyses that included all available data have also been published with contrasting conclusions [14]. In another study there was a task that assess the treatment benefits of clomiphene and metformin combined with dietary changes on infertility in obese polycystic ovarian syndrome women and finally concluded that metformin and clomiphene can be used in combination with a change in lifestyle to treat obese PCOS patients' reproductive endocrine and lipid metabolism, reduce the sizes of their left and right ovaries, and promote menstruation recovery, ovulation, and conception [14]. In PCOS-afflicted obese women, rosiglitazone treatment reduces insulin resistance and increases glucose tolerance; Rosiglitazone reduces ovarian androgen synthesis, which seems unrelated to any variations in LH levels; Overproduction of ovarian hormones appears to be significantly influenced by hyperinsulinemia [16].

## MATERIALS AND METHODS

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**Study deigned:** This study was conducted from 10-11-2021to march 31-3-2022 at different medical centers.

**Sample sized:** 150 total women of age in between 20-30 years were selected and divided them into two different groups. In Group-C 50 normal female with regular menstrual cycle were included while in Group-A 70 female individuals with irregular menstrual cycle (polycystic ovary syndrome) were placed. On the other hand in Group-B, 30 women with polycystic ovary syndrome and obesity treated with Metformin, Clomiphene and Rosiglitazone medicine

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**Raw Data presentation:** Concluded raw data was bio-statistically represented with the application of SPSS model 2020 in which Mean Standard Deviation (Mean±SD) of different variables were considered as significant (P<0.05) variation of various regressions and concluded results were graphically showed in results.

## RESULTS

Table-1: Group-C, (n=50) Normal female individuals

| Variables | Units | (Mean ± SD) | (P< 0.05) |
|---|---|---|---|
| Body mass index | kg/m$^2$ | 20.1±1.04 | 0.04 |
| Insulin blood levels after 2 hour | µU/ml | 10.1±2.01 | 0.01 |
| Androstenedione blood levels | ng/dL | 100.1±0.02 | 0.02 |
| Systolic blood pressure | mm Hg | 120.1±1.01 | 0.01 |
| Diastolic blood pressure | mm Hg | 80.1±1.03 | 0.03 |
| Blood glucose levels Random | mg/dL | 120.1±1.02 | 0.02 |

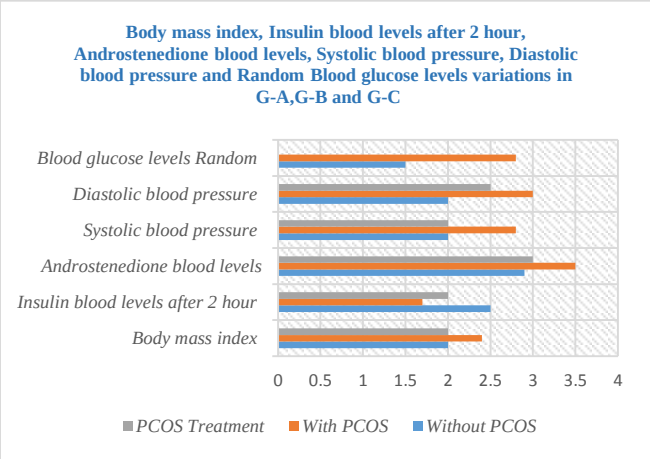
Table-2: Group- A, (n=70) female individuals with polycystic ovary syndrome

| Variables | Units | (Mean ± SD) | (P< 0.05) |
|---|---|---|---|
| Body mass index | kg/m$^2$ | 27.1±1.02 | 0.02 |
| Insulin blood levels after 2 hour | µU/ml | 9.1±1.01 | 0.01 |
| Androstenedione blood levels | ng/dL | 130.1±0.03 | 0.03 |
| Systolic blood pressure | mm Hg | 140.1±1.04 | 0.04 |
| Diastolic blood pressure | mm Hg | 90.1±1.04 | 0.04 |
| Blood glucose levels Random | mg/dL | 150.1±1.01 | 0.01 |

The findings of this study indicated that Body mass index, Insulin blood levels after 2 hour, Androstenedione blood levels, Systolic blood pressure, Diastolic blood pressure and Random Blood glucose levels of women with polycystic ovary syndrome of Group-A were (27.1±1.02, 9.1±1.01, 130.1±0.03, 140.1±1.04, 90.1±1.04, 150.1±1.01) and showed a remarkable significant (P<0.05) changes as compared with the Group-C (27.1±1.02, 9.1±1.01, 130.1±0.03, 140.1±1.04, 90.1±1.04, 150.1±1.01) respectively. In Group-B 30 women individuals with polycystic ovary syndrome were treated with different medicine and their levels of different variables (23.1±1.01, 9.7±1.04, 110.1±0.01, 120.1±1.01, 80.1±1.03, 130.1±1.01) were significantly (P<0.05) changed than the Group-A (27.1±1.02, 9.1±1.01, 130.1±0.03, 140.1±1.04, 90.1±1.04, 150.1±1.01) comparatively.

Table-2: Group- B, (n=30) female individuals with polycystic ovary syndrome and treated with different medicine like Metformin, Clomiphene and Rosiglitazone etc.

| Variables | Units | (Mean ± SD) | (P< 0.05) |
|---|---|---|---|
| Body mass index | kg/m$^2$ | 23.1±1.01 | 0.02 |
| Insulin blood levels after 2 hour | µU/ml | 9.7±1.04 | 0.04 |
| Androstenedione blood levels | ng/dL | 110.1±0.01 | 0.01 |
| Systolic blood pressure | mm Hg | 120.1±1.01 | 0.01 |
| Diastolic blood pressure | mm Hg | 80.1±1.03 | 0.03 |
| Blood glucose levels Random | mg/dL | 130.1±1.01 | 0.01 |




## DISCUSSION

Teede, HJ et al., 2013 stated in their study that polycystic ovary syndrome (PCOS) is an endocrine and metabolic condition that is likely hereditary in origin and is modified by environmental variables such as diet and physical exercise. The primary clinical signs of PCOS are hyperandrogenism-related, including hirsutism, acne, and monthly irregularities. PCOS is linked to being overweight or obese [17]. There is no recognized cause of PCOS. The discovery that PCOS is more common among the sisters and mothers of these individuals supports the hereditary nature of the condition. Additionally, a research done with twins found that monozygotic twins are more likely to have PCOS than dizygotic twins. Numerous genes that affect androgen synthesis, gonadotropin activity, insulin action, and energy control have been studied [18].

A disorder known as polycystic ovarian syndrome (PCOS) is characterized by persistent oligo-anovulation and hyperandrogenism [9]. However, the majority of women with PCOS do not regularly exhibit many of the symptoms of the metabolic syndrome. Most PCOS women have the abdominal phenotype, and around 50% of them are overweight or obese. In those who are prone to the condition, obesity may be a pathogenetic factor. In reality, insulin has a genuine gonadotrophic activity, and increased ovarian tissue insulin availability may encourage excessive testosterone production [19]. In women with PCOS, obesity, especially the abdominal phenotype, may have a role in insulin resistance and the resulting hyperinsulinemia. Therefore, the promotion of hyperandrogenism in these women may be significantly influenced by obesity-related hyperinsulinemia [20].

There may be additional mechanisms by which obesity favors the development of hyperandrogenism in PCOS, including increased estrogen production rate, increased opioid system and hypothalamic-pituitary-adrenal axis activity, decreased sex hormone binding globulin synthesis, and possibly high dietary lipid intake [15].

One of the common endocrine disorders that affects women of reproductive age is polycystic ovary syndrome (PCOS). Infertility in women, hyperandrogenism, hirsutism, metabolic insulin resistance, impaired glucose tolerance, type 2 diabetes mellitus, cardiovascular disorders, and psychiatric traits are only a few of the many clinical effects of PCOS. Over the past few decades, obesity and excess weight have become widespread chronic conditions [16]. Some PCOS characteristics, such as hyperandrogenism, hirsutism, infertility, and pregnancy problems, are exacerbated by obesity. Diabetes mellitus type 2 and cardiovascular disease are both exacerbated by obesity and insulin resistance. Furthermore, PCOS's reproductive and metabolic characteristics are made worse by obesity, which also worsens insulin resistance. Obesity is known to be linked to anovulation, pregnancy loss, and difficulties in late pregnancy [14].

Many clinical investigations have been conducted since the first time metformin was used to treat PCOS in 1994 [13]. Metformin, an insulin-sensitive medication, enhances glucose metabolisms by enhancing intestinal glucose absorption, decreasing aberrant hepatic glycogen synthesis, enabling anaerobic glycolysis, and enhancing glucose uptake and use by peripheral tissues like muscles [10]. In Group-B the weight and BMI were significantly lower that received metformin and clomiphene along with lifestyle modification after treatment than Group-A individuals because they were not taking any treatment and these differences were statistically significant ($P< 0.05$). The weight and BMI after treatment in the Group-B receiving metformin and clomiphene along with lifestyle modifications such as a low-fat diet, increased exercise, and a ban on smoking and drinking were significantly lower than those before treatment among which the differences were statistically significant ($P<0.05$).

## REFERENCES


1. Guh, DP, Zhang, W, Bansback, N, Amarsi, Z, Birmingham, CL, Anis, AH. The incidence of co-morbidities related to obesity and overweight: a systematic review and meta-analysis. BMC Public Health. 2009;9:88.
2. Barber, TM, McCarthy, MI, Wass, JA, Franks, S. Obesity and polycystic ovary syndrome. Clin Endocrinol (Oxf). 2006;65:137-145.
3. Saboor Aftab, SA, Kumar, S, Barber, TM. The role of obesity and type 2 diabetes mellitus in the development of male obesity-associated secondary hypogonadism. Clin Endocrinol (Oxf). 2013;78:330-337.
4. Teede, HJ, Joham, AE, Paul, E, et al. Longitudinal weight gain in women identified with polycystic ovary syndrome: results of an observational study in young women. Obesity (Silver Spring). 2013;21:1526-1532.
5. Wild, S, Pierpoint, T, McKeigue, P, Jacobs, H. Cardiovascular disease in women with polycystic ovary syndrome at long-term follow-up: a retrospective cohort study. Clin Endocrinol (Oxf). 2000;52:595-600.
6. Barber, TM, McCarthy, MI, Franks, S, Wass, JA. Metabolic syndrome in polycystic ovary syndrome. Endokrynol Pol. 2007;58:34-41.
7. Mohlig, M, Floter, A, Spranger, J, et al. Predicting impaired glucose metabolism in women with polycystic ovary syndrome by decision tree modelling. Diabetologia. 2006;49:2572-2579.
8. Ramezani-Binabaj, M, Motalebi, M, Karimi-Sari, H, Rezaee-Zavareh, MS, Alavian, SM. Are women with polycystic ovarian syndrome at a high risk of non-alcoholic Fatty liver disease; a meta-analysis. Hepat Mon. 2014;14:e23235.
9. Sanchon, R, Gambineri, A, Alpanes, M, Martinez-Garcia, MA, Pasquali, R, Escobar-Morreale, HF. Prevalence of functional disorders of androgen excess in unselected premenopausal women: a study in blood donors. Hum Reprod. 2012;27:1209-1216.
10. Yildiz, BO, Bozdag, G, Yapici, Z, Esinler, I, Yarali, H. Prevalence, phenotype and cardiometabolic risk of polycystic ovary syndrome under different diagnostic criteria. Hum Reprod. 2012;27:3067-3073.
11. Legro RS, Barnhart HX, Schlaff WD, Carr BR, Diamond MP, Carson SA, et al. Clomiphene, Metformin, or Both for Infertility in the Polycystic Ovary Syndrome. N Engl J Med. 2007;356(6):551–566. Balen, AH, Conway, G S, Kaltsas, G, et al. Polycystic ovary syndrome: the spectrum of the disorder in 1741 patients. Hum Reprod. 1995;10:2107-2111.
12. Moran LJ, Pasquali R, Teede HJ, Hoeger KM, Norman RJ. Treatment of obesity in polycystic ovary syndrome: a position statement of the Androgen Excess and Polycystic Ovary Syndrome Society. Fertil Steril. 2009;92(6):1966–1982.
13. Teede HJ, Meyer C, Hutchison SK, Zoungas S, McGrath BP, Moran LJ. Endothelial function and insulin resistance in polycystic ovary syndrome: the effects of medical therapy. Fertil Steril. 2010;93(1):184–191.
14. He D, Jiang F. Meta-analysis of letrozole versus clomiphene citrate in polycystic ovary syndrome. Reprod Biomed Online. 2011;23(1):91–96.
15. Morin-Papunen LC, Vauhkonen I, Koivunen RM, Ruokonen A, Martikainen HK, Tapanainen JS. Endocrine and metabolic effects of metformin versus ethinyl estradiol-cyproterone acetate in obese women with polycystic ovary syndrome: a randomized study. J Clin Endocrinol Metab. 2000;85(9):3161–3168.
16. 12. Machado RB, Tachotti F, Cavenague G, Maia E. Effects of two different oral contraceptives on total body water: a randomized study. Contraception. 2006;73(4):344–347.
17. Wang Y. Effect analysis of metformin combined with clomiphene in the treatment of polycystic ovarian syndrome combined with infertility. Chinese Community Doctors. 2014;21:78–80.
18. Manneras-Holm, L, Leonhardt, H, Kullberg, J, et al. Adipose tissue has aberrant morphology and function in PCOS: enlarged adipocytes and low serum adiponectin, but not circulating sex steroids, are strongly associated with insulin resistance. J Clin Endocrinol Metab. 2011;96:E304-E311.
19. Carmina, E, Bucchieri, S, Esposito, A, et al. Abdominal fat quantity and distribution in women with polycystic ovary syndrome and extent of its relation to insulin resistance. J Clin Endocrinol Metab. 2007;92:2500-2505.
20. Romero-Corral, A, Caples, SM, Lopez-Jimenez, F, Somers, VK. Interactions between obesity and obstructive sleep apnea: implications for treatment. Chest. 2010;137:711-719.