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# Evaluation of clinical and hormonal parameters in obese polycystic ovarian syndrome from Bahawalnagar city, Pakistan

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**Abstract:** Polycystic ovary syndrome (PCOS) is known as a widespread endocrine disorder that is affecting up to 12 percent of all women. There is a noteworthy relationship of symptoms in between thyroid diseases and PCOS. Thyroid gland is very important endocrine gland and has special effects equally on androgen and estrogen metabolism. Obesity is also related to polycystic ovary syndrome and hypothyroidism which is resulting in insulin resistance. The main objectives of this study were to reveals about the prevalence of the hypo-thyroidism and hyper-prolactinemia in between women with and without polycystic ovary syndrome. The level of thyroid hormone was measured in the obese and polycystic ovary patients. This was a case of control study. The Blood samples for the measurement of hormonal level in age of (16 to 40) females, which is collected from the department of Gynecology and obstetrics in DHQ Hospital Bahawal Nagar. Questionnaire was also filled by the patients. The blood samples were stored at-20◦c until the thyroid stimulating hormone (TSH) were performed, free tri-idothyrionine (FT3), free tetre-idothydrionine (FT4), Estrogen, Prolactin and an increased level of TSH Estrogen but decreased FT4 and FT3 level in Polycystic Ovary Syndrome group as compared to Obese PCOS group. Remarkable upraise of TSH level in PCOS Obese females as interconnected to the PCOS females, obese females and the normal females was supposed. Prolactin level was found higher in PCOS and Obese-PCOS female group but lower in obese and normal female group. it was found that many of the PCOS obese having females had higher level of estrogen but low level in PCOS female as compared to PCOS obese in which level are low too. The thyroid antibodies were higher in PCOS obese group as well in PCOS group. Thus thyroid profile analysis can help in the treatment and providing the better insight into symptomatology.

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**Keywords:** Polycystic ovary syndrome, endocrine disorder, thyroid hormone, Estrogen, Prolactin

## Introduction

Polycystic ovary syndrome also causes Endocrine Disorders in women especially in their reproductive age. It is found that 65-67% of all pre-menopausal women are suffering from polycystic ovary syndrome (PCOS). It is a metabolic syndrome which is described by hyper-andro-genism anovulation and polycystic ovary. In clinical index of PCOS having infertility, oligo-menorrhea, hirsutism, acne, and fat. In addition many patients adopt many other linked endocrine and metabolic diseases, and have high risk of endometrial cancer, glucose tolerance, diabetes and cardio-vascular diseases (Uml *et al*., 2011). Now, the primary appearances connected with Polycystic Ovary Syndrome (PCOS). Hyper-androgenism in which high amount of androgen such as testosdterone, dihydro-testosterone (DHT). In clinical manifestations of hyper-androgenism having hisutism, acne, androgenic alopecia and the development of male features. Amenorrhea or Oligomenorrhea is also the features of PCOS, oligomennorhea is associated to irregular menstruation and Amenorrhea is associated with deficiency of menstrual period. These symptoms are due to hormonal imbalance. Raised in circulating androgen level is observed in 80-90% of women with oligomenorhea, as increased level of free testosterone description for the wide range of unusual findings in laboratory analysis (Lin *et al*., 2013). Polycystic Ovaries are third feature of Polycystic Ovary Syndrome (PCOS), and this shows the several cysts in the ovaries. Other side is that it is very crucial to understand that the just a women have multiple cysts on ovaries does not mean she is travail from PCOS. PCOS is commonly detected by the appearance of at least two out of three common structures the common symptoms are obesity, weight gain, insulin resistance, high cholesterol, oily skin, or high blood pressure

(Aubuchon *et al*., 2011). A large number of women with Polycystic Ovary Syndrome (PCOS) may have some defect in thyroid gland, according to some worldwide researches it is found that hypo-thyroidism can cause the decrease of sex hormone binding globulin and upraise the level of testosterone. The testosterone is known as one of the main factor that takes part in PCOS symptoms. The cyst presence on ovaries is one of the diagnostic criteria of PCOS. A self-reliant explanation of PCOS and its diagnostic trait is residues problematic because the particular reason of PCOS is mysterious. According to some researchers there is self-reliant heredity component which is getting exaggerated by gestational life and the living style. The consciousness of PCOS is getting increased by passing each day in the mutual population and medical communal with the proofs of females suffering from PCOS are more disposed to metabolic syndrome and its other problems (McFarland *et al*., 2012). The following figure is an ultrasonography which shows the association in concerning normal and polycystic ovary. The follicles are filled by the fluid that is performing in dark color. The multiple follicles in polycystic ovaries are enflamed in size. The dys-function and abnormalities of thyroid are among the most common diseases of the endocrine gland. The deviations in the stream of thyroid hormone to the peripheral tissues are interconnected with the adjustment in the measure of metabolic process. Juvenile hypo-thyroidism if undamaged can lead to sexual immaturity. The untouched juvenile hypo-thyroidism can cause delay in the onset of adolescence monitored by an-ovulatory cycles. In adult women unembellished hypo-thyroidism may be linked with weakened libido and failures of ovulation. Complications in pregnancy are linked with unconcealed and subclinical hypo-thyroidism although the impress has improved in diverse studies and researches (Rotterm, 2004). The primary belongings of abnormal thyroid levels inter-connected commonly to alterations in ovulation and menstruation. Ovulation may be compromised by alteration in the manufacturing of sex hormone binding globulin (SHBG), follicle stimulating hormone (FSH), estrogen and androgen. The alterations in TRH will disturb the feedback loop among pituitary, hypothalamus and the ovary which cause deviations in menstruation and ovulation. All of these alterations can be gentle especially when symptoms of thyroid dys-function are not specious and do not prime to variation in menses or ovulation (Azziz *et al*., 2006). Thyroid hormone co-operate with your reproductive hormone, estrogen and progesterone to action of the normal task of the ovaries and maturation of the egg (Escobar *et al*., 2005; Danish *et al*., 2020). The essential part of PCOS is increased in BMI and detected in many PCOS cases. The linkage of obesity and thyroid dys-function is also an exciting thing with blurry patho-physiological gadget as it is detected that TSH is elevated in people having higher BMI. Obesity is inter-connected to higher pro-inflammatory markers and increase in resistance to insulin which undertakes to the decline in de-iodinase 2 action at the stage of pituitary gland subsequently to decrease T3 level and increase the TSH level (Dunaif *et al*., 2008).

In Bahawalnagar, this region is considered to be one of those regions which are known as iron deficient which leads to thyroid and reproductive deformities leading to disturb the menstrual cycle of a female.

**Materials And Methods**

The study was conducted at Pathology laboratory of DHQ Hospital Bahawalnagar.

The study subject includes Patients having age of 16years to 40 years. The Inclusion and exclusion criteria was also applied to selection of the subject. The study was carried out in Pathology laboratory of DHQ Hospital Bahawalnagar with collaboration of gynecology and obstetrics Department. The duration of study is From September 2017 to June 2019. The clinical assessment includes nutrition, depression, hair loss, oligomenorrhea, menorrhea, excessive facial hair, exercise routine in a week and junk food intake in a week clinical features of hypothyroidism, BMI, USG abdomen and pelvis. Non probability convenient sampling technique was employed for appropriate sample size 4cc blood sample was taken from each respondent in yellow cap (SST tube) and then centrifuged after sample clotting and stored in lab at -20◦C and then the tests were done (Pilton *et al*., 2002).

The patients were taken from four categories,

I: 22 healthy females.

II: 22 obese females.

III: 22 obese females with polycystic ovary syndrome.

IV: 22 females having polycystic ovary syndrome.

A questionnaire according to the study was prepared to record the patient's demographic data, history of disease, laboratory results and clinical findings. Written consent was taken from each patients or from their close relatives for their inclusion in the study (Puurunen *et al*., 2009).

**Methodology**

A total of 300 blood samples in a duration of 9 months were collected aseptically from suspected patients of Polycystic ovarian syndrome reported in department of gynecology and obstetrics and ward at the DHQ hospital Bahawalnagar on the basis of their presenting symptoms. The symptoms include

complaint of weight gain, difficulty in losing weight, sensitive to cold, difficulty in thinking, hard to concentrate, depression, hair loss and thinning of hair, oligomenorrhea, menorrhea, excessive facial hair, and junk food intake. (Gilling *et al*., 1994). Clinical features of hypothyroidism, BMI, USG abdomen and pelvis, serum TSH, free T3, Free T4 levels, serum prolactin levels, serum estrogen the collected blood specimen were carefully labeled and then they transported to the pathology laboratory carefully (Tee *et al*., 2008). 88 specimens from 300 patients were included in the study, keeping in view that all the randomly selected specimens must be positive for showing suggestive signs of PCOS. After complete clinical examination and proper consent taking, the suspected patients were selected. After the process of selection of subjects, for the purpose of sample collection, suspected patients were provided with Performa, vacutainer, 5ml syringe for collecting sample. After receiving sample in containers in the laboratory, they were properly labeled and then centrifuged about 30 min. The Cobas e601 analyzer is a fully automated discrete immunoassay analyzer intended for the in vitro quantitative/qualitative determination of analytes in body (Drepper *et al*., 2006). Electro-chem iluminescence (ECL) is used in Cobas it is a kind of luminescence which is produced during electrochemical reactions. That is designed for both quantitative and qualitative in vitro assay determinations for a broad range of applications (including anemia; bone, cardiac and tumor markers, critical care fertility hormones, maternal care and infectious diseases). The volume of the sample reagent was poured carefully. Upto 40µl serum is used in hitachi sample cups. Data analysis were done by statistical package of social sciences SPSS version 21(Rodin *et al*., 1994).

**Results**

The thyroid stimulating hormone **(TSH)** levels were observed in 88 female blood samples. The blood samples were taken from four groups of females. Groups are polycystic ovary syndrome, Obese, polycystic ovary syndrome and obese and the normal group. With the help of using Scheffe test, the **TSH** levels were found to be higher in polycystic ovary syndrome and obese females group as compared to other groups (Tablee 1 & 2). The free tri-idothyrionine (FT3) levels were observed in the 88 female blood samples. The blood samples were taken from four groups of females. The groups are included polycystic ovary syndrome, obese, polycystic ovary syndrome and obese and the normal group. Mean FT3 levels of each group were taken. With the help of Scheffe test, FT3 levels were found to be significantly higher in normal females group as compares to other groups (Table 3). The free tetraidothyrionine (FT4) levels were observed in 88 female blood samples. The blood samples were taken from four female groups. All the groups contains polycystic ovary syndrome, obese, polycystic ovary syndrome and obese and the normal. Mean FT4 levels of each group were taken. With the help of Scheffe test, FT4 levels were found to be significantly higher in females group as compared to other groups. Prolactin levels were observed in eighty eight female blood samples. The blood samples were taken from four groups of females. All the groups was contains polycystic ovary syndrome, obese, polycystic ovary syndrome and obese and the normal. Mean prolactin levels of each group were taken. With the help of Scheffe test, the prolactin levels were found to be significantly higher in polycystic ovary syndrome group as compared to other groups (Table 4).

The levels of Estrogen were observed in eighty eight female blood samples. The blood samples were taken from four female groups. All the groups contains polycystic ovary syndrome, obese, polycystic ovary syndrome and obese and the normal. Mean estrogen levels of each group were taken. With the help of Scheffe test, estrogen levels were found to be significantly higher in polycystic ovary syndrome and obese females group as compared to other groups (Table 5).

**Discussions**

The resolution of the study was to match the levels of dissimilar hormones in different groups of polycystic ovary syndrome (PCOS), obese, polycystic ovary syndrome and obese, and normal in of age group between 18-40. The most significant levels of hormones were found in polycystic ovary syndrome and obese females group. They have expressively high TSH level and they were found to be hypo-thyroid (Pellatt *et al*., 2007). The obese group, polycystic ovary syndrome (PCOS) and the normal females group had significantly low TSH levels in contrast to polycystic ovary syndrome and obese females group. And it can be measured as eu-thyroid. (Stewart *et al*., 1990). The result of this study is in line with the study by Janssen, who distinguished important increase in TSH level in polycystic ovary syndrome as compare to controls. Other studies have also noted changes in TSH level in females in different cyclic conditions, found important in elevation level of TSH in in-fertile women (Gambineri *et al*., 2009) The main reason of infertility ovulatory ds-function, create expressively high TSH level in in-fertile females. Found important in elevation levels of TSH in females with reduced fertility (Gilling *et al*., 1997). This study creates the important association of higher waist perimeter, with expressively elevated TSH level and lower FT3 & FT4 levels. It exposed important relationship of obesity

with hypo-thyroidism, present important high levels of TSH in the obese females (Fagius *et al*., 2003) The result of this research work displayed suggestively elevated levels of FT3 and FT4 levels in obese females group though associating all with the PCOS (Balen *et al*., 2006). Low levels of FT3 & FT4 sideways high level of TSH are important for hypo-thyroid's in polycystic ovary syndrome and polycystic syndrome and obese females group (Jedel *et al*., 2010). It is establish with major elevated TSH levels and important low FT3 and FT4representing hypo-thyroid's. They are also creates important link of hypo-thyroids enlarged ovarian volume important to polycystic ovary syndrome. Important high TSH level in obese, but no significant alteration in the level of FT3 & FT4 in obese as likened to lean group. In additional study indicates major low FT3 and FT4 level and high TSH level in females with menstrual dys-function (Hedider *et al*., 2001). This is also present in the association of hypo-thyroidism with obesity. It is also significantly elevated prolactin level and by using correlation present among those females with higher prolactin level 23% have hypo-thyroids (Sverrisdottir *et al*., 2008). In a different study it is observed co-relation of FT4 with polycystic ovary syndrome (Yildirir *et al*., 2006; Mushtaq *et al*., 2020). The prolactin levels are significantly higher in polycystic ovary syndrome group and the polycystic ovary syndrome and obese women group display that hyper-prolactinemia is associated to hypo-thyroidism. The higher occurrence of hypo-thyroids present in in-fertile females (Giallaria *et al*., 2008). This shows a positive co-relation of high TSH levels within high prolactin levels in in-fertile females. And it also presents relationship of an-ovulatory cycles and abnormal menstrual patterns with raised prolactin levels. In this study, the estrogen levels are high in polycystic ovary syndrome and obese females group as matched to polycystic ovary syndrome females, obese females and normal females group (Tekin *et al*., 2007).

**Table 1: The Comparison in alterations of individual and mean TSH concentration was detected by using one way ANOVA with comparison in polycystic ovary syndrome, polycystic syndrome and obese, obese females and normal females of age group (16-40)**

| (I) Sampling Group | | Mean Difference (I-J) | Std. Error | Sig. |
|---|---|---|---|---|
| Polycystic ovary syndrome (PCOS) | Obese Female | 4.52512 | 1.96733 | 0.160 |
| | Polycystic ovary syndrome and Obese females | -1.85691 | 1.96733 | 0.826 |
| | normal females | 6.88342* | 1.96733 | 0.009 |
| Obese Female | Polycystic ovary syndrome | 4.52512 | 1.96733 | 0.160 |
| | Polycystic ovary syndrome and Obese females | -6.38108 | 1.96733 | 0.018 |
| | normal females | 2.35823 | 1.96733 | 0.967 |
| Polycystic ovary syndrome and Obese females | Polycystic ovary syndrome | 1.85591 | 1.96632 | 0.826 |
| | Obese Female | 6.38109* | 2.96733 | 0.018 |
| | normal females | 8.73932* | 1.96733 | 0.000 |
| Normal females | Polycystic ovary syndrome | 6.88342 | 1.96733 | 0.009 |
| | Obese Female | -2.35824 | 1.96733 | 0.697 |
| | Polycystic ovary syndrome and Obese females | -8.73933 | 1.96733 | 0.000 |

**Table II: Comparison in alterations of individual and mean FT3 concentration was detected by one way ANOVA with comparisons in polycystic ovary syndrome, polycystic and obese. obese females and normal females of age group ( 16-40)**

| (I) Sampling Group | | Mean Difference (I-J) | Std. Error | Sig. |
|---|---|---|---|---|
| Polycystic ovary syndrome (PCOS) | Obese Female | -0.89417 | 0.27602 | 0.020 |
| | Polycystic ovary syndrome and Obese females | 0.20883 | 0.27602 | 0.903 |
| | normal females | -1.20296 | 0.27602 | 0.001 |
| Obese Female | Polycystic ovary syndrome | 0.89416* | 0.27602 | 0.020 |
| | Polycystic ovary syndrome and Obese females | 0.68536 | 0.27602 | 0.113 |
| | normal females | -0.30877 | 0.27602 | 0.742 |
| Polycystic ovary syndrome and Obese females | Polycystic ovary syndrome | 0.20882 | 0.27602 | 0.903 |
| | Obese Female | 0.68536 | 0.27602 | 0.113 |
| | normal females | 0.99414 | 0.27602 | 0.006 |
| Normal females | Polycystic ovary syndrome | 1.20295* | 0.27602 | 0.001 |
| | Obese Female | 0.30877 | 0.27602 | 0.743 |
| | Polycystic ovary syndrome and Obese females | 0.99415 | 0.27602 | 0.006 |

**Table III: Comparison in alterations of FT4 in individual and mean concentration was by using one way ANOVA with comparison in polycystic ovary syndrome, polycystic syndrome and obese, obese females and normal females of age group (16-40)**

| (I) Sampling Group | | Mean Difference (I-J) | Std. Error | Sig. |
|---|---|---|---|---|
| Polycystic ovary syndrome | Obese Female | -2.54864 | 1.14778 | 0.185 |
| | Polycystic ovary syndrome and Obese females | 0.36909 | 1.14778 | 0.991 |
| | normal females | 3.08637 | 1.14778 | 0.072 |
| Obese Female | Polycystic ovary syndrome | 2.54864 | 1.14778 | 0.185 |
| | Polycystic ovary syndrome and Obese females | 2.91772 | 1.14778 | 0.100 |
| | normal females | -0.53773 | 1.14778 | 0.973 |
| Polycystic ovary syndrome and Obese females | Polycystic ovary syndrome | 0.63909 | 1.14778 | 0.991 |
| | Obese Female | 2.91772 | 1.14778 | 0.100 |
| | normal females | 3.45545 | 1.14778 | 0.034 |
| Normal females | Polycystic ovary syndrome | 3.08636 | 1.14778 | 0.072 |
| | Obese Female | 0.53773 | 1.14778 | 0.973 |
| | Polycystic ovary syndrome and Obese females | 3.45546* | 1.14778 | 0.034 |

**Table IV: comparison in changes of individual and mean prolactin concentration was by using one way ANOVA with comparison in polycystic ovary syndrome, polycystic syndrome and obese, obese females and normal females of age group (16-40)**

| (I) Sampling Group | | Mean Difference (I-J) | Std. Error | Sig. |
|---|---|---|---|---|
| Polycystic ovary syndrome | Obese Female | 51.58136 | 103.5834 | 0.970 |
| | Polycystic ovary syndrome and Obese females | 26.12182 | 103.5834 | 0.996 |
| | normal females | 261.37636 | 103.5834 | 0.109 |
| Obese Female | Polycystic ovary syndrome | 51.58136 | 103.5834 | 0.970 |
| | Polycystic ovary syndrome and Obese females | -25.45955 | 103.5834 | 0.996 |
| | normal females | 208.79500 | 103.5834 | 0.266 |
| Polycystic ovary syndrome and Obese females | Polycystic ovary syndrome | -26.12182 | 103.5834 | 0.996 |
| | Obese Female | 25.45955 | 103.5834 | 0.996 |
| | normal females | 235.25455 | 103.5834 | 0.176 |
| Normal females | Polycystic ovary syndrome | 261.37636 | 103.5834 | 0.109 |
| | Obese Female | 208.79500 | 103.5834 | 0.266 |
| | Polycystic ovary syndrome and Obese females | 234.25455 | 103.5834 | 0.175 |

**Table V: Comparison in changes of individual and mean estrogen concentration was detected by using one way ANOVA with comparison in polycystic syndrome, syndrome and obese, obese females and normal females of age group (16-40)**

| (I) Sampling Group | | Mean Difference (I-J) | Std. Error | Sig. |
|---|---|---|---|---|
| Polycystic ovary syndrome | Obese Female | -122.25318 | 199.10306 | 0.947 |
| | Polycystic ovary syndrome and Obese females | 685.7913 | 199.10306 | 0.016 |
| | normal females | 16.49364 | 199.10306 | 0.100 |
| Obese Female | Polycystic ovary syndrome | 121.25318 | 199.10306 | 0.947 |
| | Polycystic ovary syndrome and Obese females | -538.53818 | 199.10306 | 0.072 |
| | normal females | 105.75955 | 199.10306 | 0.963 |
| Polycystic ovary syndrome and Obese females | Polycystic ovary syndrome | 686.79136* | 199.10306 | 0.016 |
| | Obese Female | 538.53818 | 199.10306 | 0.071 |
| | normal females | 643.29773 | 199.10306 | 0.019 |
| Normal females | Polycystic ovary syndrome | 15.49364 | 199.10306 | 1.000 |
| | Obese Female | -105.75955 | 199.10306 | 0.963 |
| | Polycystic ovary syndrome and Obese females | -644.29773 | 199.10306 | 0.019 |

**Conclusion**

Polycystic ovary syndrome (PCOS) is the most common endocrino-pathy among reproductive-aged women in the Bahawalnagar, affecting approximately 9% of female patients. While the pathophysiology of the syndrome is multifaceted and there is no solo defect from which it is known to result, so it can be hypothesized that insulin resistance is a key factor.

Metabolic syndrome is double as common in patients with PCOS compared with the general population, and patients with polycystic ovary syndrome are four times more expected than the general population to develop type 2 diabetes mellitus. Patient performance is adjustable, ranging from asymptomatic to having numerous gynecologic, dermatologic and metabolic indicators. It can be determined from the resulting study that obesity and obesity associated hormones having a main role in altering the levels of ovarian hormone and further reproductive hormones in females at different cyclic level. Furthermore, thyroid hormone levels can be related with the reproductive hormones.

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