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A Study to Assess the Hormonal Profile of Polycystic Ovarian Syndrome in a Tertiary Care Hospital in Puducherry

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ABSTRACT

Polycystic ovarian syndrome (PCOS) is a complex, heterogeneous disorder characterized by oligomenorrhea, hirsutism, polycystic ovary with chronic anovulation and varying degrees of androgen excess. This cross sectional study was conducted at Department of Biochemistry, Sri Venkateshwaraa Medical College hospital and Research Institute, Pondicherry to assess the gynecological and thyroid profile in PCOS patients. Serum levels of FSH, LH, Prolactin, fT₃, fT₄ and TSH levels were estimated in 50 PCOS patients compared with age matched controls. The results of our study showed that fifty percent of the patients were in the age group of 17 to 25 years and remaining were in the age group of 26 to 40 years. There was a statistically significant correlation between FSH and TSH ($r=0.809$ $p<0.001$) in the higher age group. It was concluded that PCOS diagnosed patients of higher age group, both gynecological profile and thyroid profile should be assessed to prevent the further complications.

Keywords: polycystic ovarian syndrome, gynecological profile, thyroid profile.

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INTRODUCTION

Polycystic ovary syndrome (PCOS) is one of the most common female endocrine disorders [1]. It is a complex, heterogeneous disorder of unknown etiology and there is strong evidence that it can be classified as a genetic disease [2, 3]. PCOS produces symptoms in approximately 5% to 10% of women of reproductive age [4]. It is thought to be one of the leading causes of female subfertility and the most frequent endocrine problem in women of reproductive age [5]. The main features are anovulation, resulting in irregular menstruation, (amenorrhea and oligomenorrhoea), infertility due to chronic anovulation, and polycystic ovaries. The other features include excessive amount or effects of androgenic (masculinizing) hormones resulting in acne, hirsutism. Insulin resistance, hyperinsulinemia, obesity, Type 2 diabetes and dyslipidemia are also common. In addition, thyroid gland dysfunction manifested as hypothyroidism, is a common disorder also has been reported in PCOS patients. The clinical features of hypothyroidism also include weight gain, menstrual irregularities and infertility [6]. Most of the times hypothyroidism is subclinical and diagnosed first time during evaluation of PCOS [7, 8].

Moreover, insulin resistance and hyperinsulinemia probably interferes with overall androgen production leading to hirsutism, menstrual problems and anovulation [9]. The symptoms and severity of the syndrome vary greatly among the affected women. It has been observed that abnormal biochemical levels of LH, FSH, high LH/FSH ratio, increased testosterone levels. The diagnosis of PCOS depends on confirming the presence of hyperandrogenism with elevated serum testosterone and an elevated LH: FSH ratio. Either or both of these may be found in PCOS patients [10].

Therefore, this study was planned to correlate the hormonal status ie, gynecological index (LH, FSH, LH, Prolactin) and thyroid profile (fT3, fT4 and thyroid stimulating hormone) in patients with PCOS.

MATERIALS AND METHODS

This cross sectional study was done in Department of Biochemistry, Sri Venkateswaraa Medical College and Research Institute, Pondicherry. 50 patients who were diagnosed as PCOS and 50 age matched controls within the age group of 17 to 40 years were included in the study. Women with age group less than 17 and more than 40 diagnosed with Thyroid disorders, Diabetic mellitus, Hypertension, pregnancy and other systemic diseases were excluded from the study. Written informed consent from each patient and Institutional ethical committee approval was obtained. Serum hormone levels of Follicular Stimulating Hormone, Luteinizing Hormone and Prolactin were estimated for gynaecological profile and for thyroid profile, Thyroid Stimulating Hormone, fT3, fT4 was estimated by ELISA method.

Statistical Analysis

The correlation among the hormones was performed by Pearson correlation test and p value <0.05 was considered statistically significant. Mean and Standard deviation were also calculated.

RESULTS AND DISCUSSION

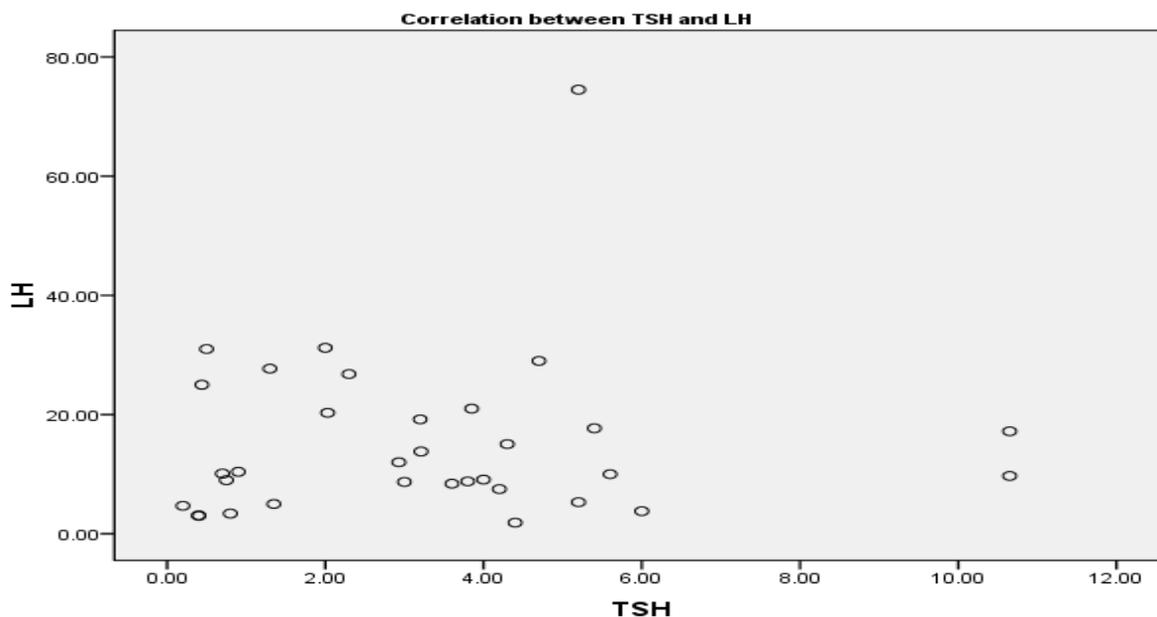
The current study was undertaken to evaluate gynecological profile and thyroid profile in PCOS patients. In our study fifty percent of the patients were in the age group of 17 to 25 years and remaining was in the age group of 26 to 40 years. The mean age of the study subjects was 27.1 ± 8.35 . Our study showed in PCOS patients there is raised levels of TSH as compared to healthy females ($p < 0.001$). This was supported by a study conducted in India earlier [11]. Table 1 showed that there is statistically significant increase in TSH levels. Thyroid stimulating hormone is (TSH) more reliable indicator of hypothyroidism and is often associated with low levels of fT3 and fT4. Women with PCOS have a high prevalence of increased thyroid-stimulating hormone (TSH) levels as evidenced by a study conducted by Dahiya et al [11]. Moreover, thyroid dysfunction prevalence in PCOS patients was estimated to be from 4% to 9% [12]. Hypothyroidism itself can aggravate PCOS symptoms. Hypothyroidism can lead to low levels of sex hormone binding globulin (SHBG) which in turn can lead to higher concentrations of free testosterone and increased testosterone throughout the body and aromatization to estradiol and reducing the metabolic clearance rates of androstenedione and estrone. Since thyroid hormones are involved in the gonadotropin induced estradiol and progesterone secretion by human granulosa cells, hypothyroidism will interfere with ovarian function and fertility [12]. A high level of testosterone is one of the factors which contribute to PCOS symptoms like infertility, polycystic ovaries, hirsutism, male pattern hair loss and acne. In addition our PCOS patients showed mean Prolactin levels were within normal range. PCOS is being multifactorial and often associated with interrelated hormonal deregulation; an attempt was made to correlate between the hormonal levels. Our study showed that in PCOS patients there was a positive significant linear correlation observed between FSH and TSH levels in higher age group which is represented in figure 3. ($r = 0.809$ and $p < 0.001$) Correlation between FSH and LH & FSH and Prolactin were represented in Figure 1 and 2 respectively which indicates that there was no significant correlation between them.

Table: 1: Study among patients of PCOD

N=50	Mean \pm SD
Age	27.1 \pm 8.35
LH	16.3 \pm 4.64
FSH	16.94 \pm 4.78*
Prolactin	10.96 \pm 5.00
fT3	3.03 \pm 0.29
fT4	1.32 \pm 0.33
TSH	3.25 \pm 2.63*

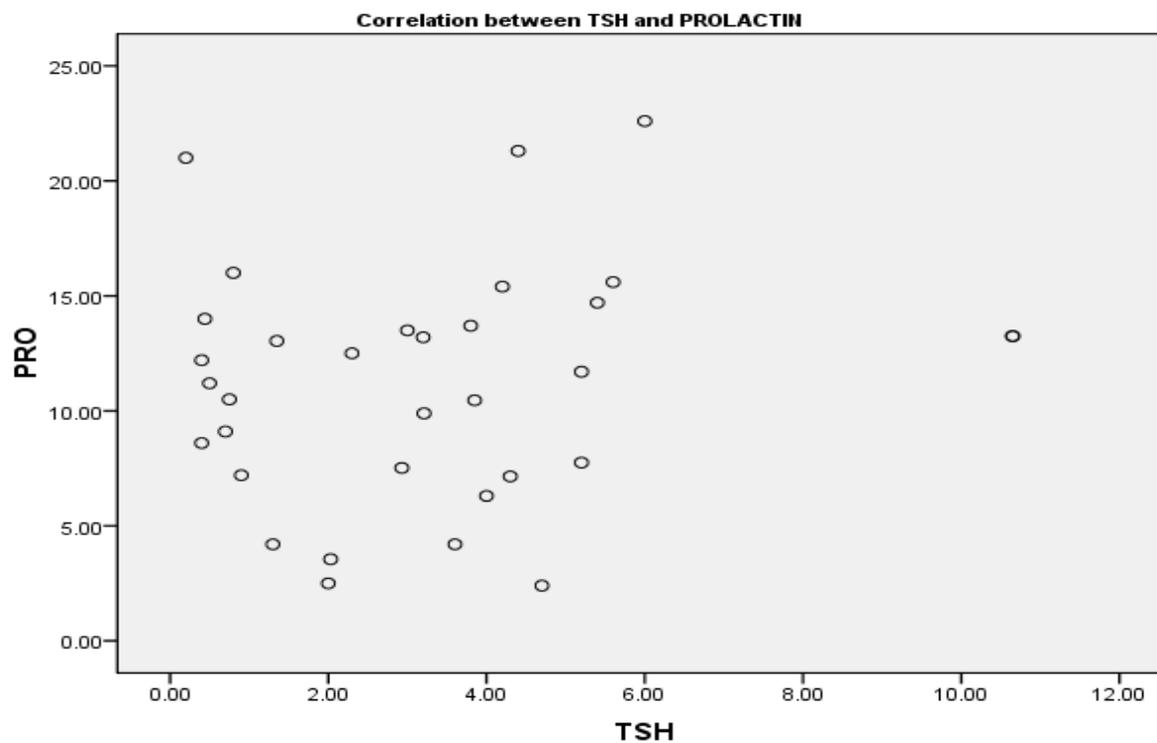
* $p < 0.001$ statistically significant.

Figure 1: Correlation between TSH and LH



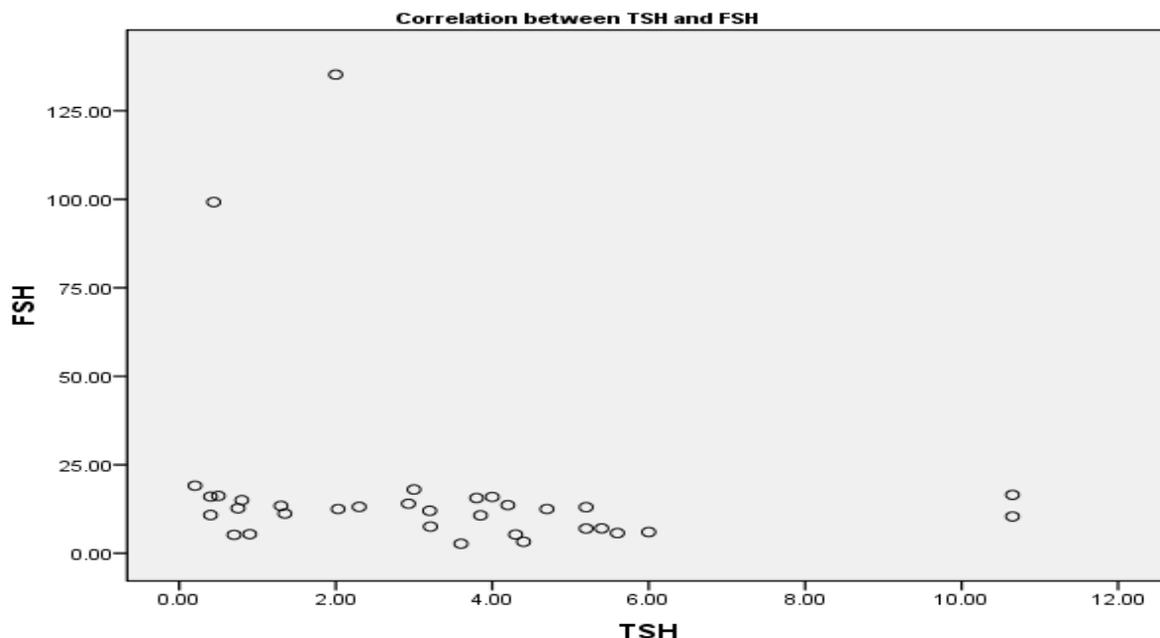
There is no significant correlation between TSH and LH as in figure 1.

Figure 2: Correlation between TSH and PROLACTIN



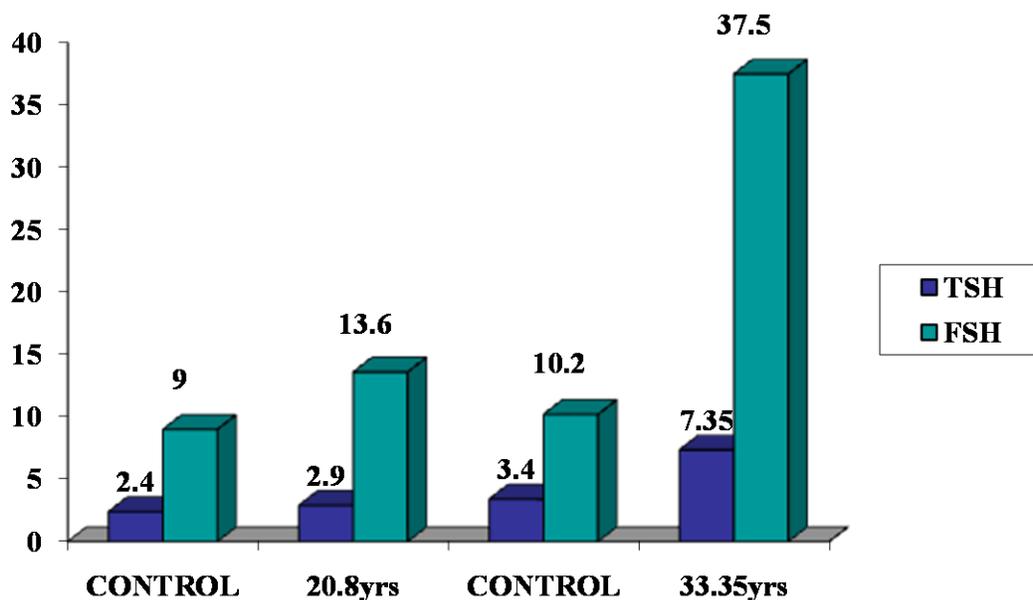
There is no significant correlation between TSH and Prolactin.

Figure 3: Correlation between FSH and TSH



There is a positive relationship between TSH and FSH ($r=0.809$ and $p<0.001$)

Fig 4: Correlation between FSH and TSH



Increase in FSH and TSH seen in PCOS patients of higher age group compared to control.

In our study mean serum LH was not significantly higher than mean serum FSH in PCOS women compared with control subjects. Legros et al found a modest association between

raised LH to FSH ratio in women with polycystic ovarian morphology [2]. Disturbed pulsatile release of gonadotrophin releasing hormone (GnRH) results in the relative increase in LH to FSH release due to Hypothalamic-pituitary-ovarian or adrenal axis abnormality [13]. However, the results obtained in this study where women with PCOS have equal LH and FSH value. On the other hand Cho LW et al found that, LH/FSH ratio has little use in diagnosing polycystic ovarian syndrome[14]. In our study subjects when the PCOS was diagnosed in the mean age of 20.8yrs, the gynaecological index is abnormal with normal thyroid profile. In the mean age of 33.35yrs, both gynaecological index and the thyroid profile were abnormal. (Figure 4) As age advances there is a tendency to increase in FSH values and an increase in TSH value was observed in PCOD patients.

CONCLUSION

The present study showed that when the PCOD is provisionally diagnosed in the patients of mean age 20.8yrs, the gynaecological profile is abnormal with normal thyroid profile whereas in the mean age of 33.35yrs both gynaecological profile and thyroid profile are abnormal. So, while assessing a case of PCOD in a patient of higher age group, both gynaecological profile and thyroid profile has to be considered. The actual relationship between FSH and TSH needs further study in larger population.

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