Clinical and biochemical profile of polycystic ovarian syndrome patients attending a tertiary care hospital

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ABSTRACT

Introduction: Polycystic ovarian syndrome (PCOS) is the most common cause of infertility in females, affecting between 6 to 22% of women worldwide. This study aimed to study clinical and biochemical profile in patients with PCOS. **Methods:** A descriptive cross-sectional study was carried out. The patients who visited to Gynecology and Obstetrics department, College of Medical Sciences, Bharatpur, Chitwan with complaints of unable to conceive, irregular cycle and abnormal bleeding and diagnosed with polycystic ovarian syndrome were included in this study. Data was analyzed by using SPSS version 23.0. Data was analyzed by using descriptive statistical tolls. **Results:** Among the total 100 participants, 29%, had increased luteinizing hormones (LH), 2% had increased follicular stimulating hormone (FSH) level. The ratio of LH/FSH is >2 in 73% of the participants. Majority (65.0%) of them were in the age group 21 to 30 years. The mean±SD of age was 23.41±4.62 years. Among the participants 56% were pre-obese. The prevalence of hypothyroidism among the participants was 18.0% and serum prolactin level was increased in 17%. There were no statistically significance between age, marital status, thyroid status, serum prolactin, with LH, and FSH. However, body mass index (BMI) was statistically significant with FSH negatively (p=-0.229). **Conclusions:** In this study, most of the participants were pre-obese, and affects the age group between 21 to 30 years. BMI was statistically significant with FSH. However, other parameters were statistically insignificant with LH and FSH levels.

Keywords: Body mass index, follicular stimulating hormone, luteinizing hormone, polycystic ovarian syndrome.

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INTRODUCTION

Polycystic ovarian syndrome (PCOS) is a relatively common endocrinological complication affecting nearly 116 million women worldwide. The most prevalent clinical characteristics of PCOS are oligomenorrhoea, hirsutism, and acne.[1] Guidelines from the Endocrine Society recommend using the Rotterdam criteria for diagnosis, which mandate the presence of two of the following three findings-hyperandrogenism, ovulatory dysfunction, and polycystic ovaries, plus the exclusion of other diagnosis that could result in hyperandrogenism or ovulatory dysfunction.[1] Hypothalamic GnRH regulates the production of the pituitary gonadotropins Luteinizing hormones (LH) and follicular stimulating hormone (FSH). Gonadotropin Releasing Hormone (GnRH) is released in discrete pulses approximately every two hour, resulting in corresponding pulses of LH and FSH.[2]

The prevalence of PCOS was found to be 7% in tertiary care hospital of Kathmandu reported by Vaidya et al.[3] Saha et al. mentioned PCOS women had higher BMI 27.32±6 kg/m^2.[4] Najem et al. reported chronic anovulation and hirsutism were predominant clinical features of PCOS patients.[5] Nahar et al. showed significant positive relation between increased LH/FSH ratio, serum testosterone and serum

TSH level.[6] Sweta et al. confirmed the association between total cholesterol, trigylcerides, LDL-C, and VLDL-C, as well as serum HDL-C were lowered in PCOS patients which confirmed the risk of cardiovascular disease in patients.[7]

A very few studies have been done in Nepal to establish the relation between biochemical parameters and PCOS. Furthermore, limited studies have specifically used clinic-demographic aspects. Therefore, this study was design to study clinical and biochemical profile of the patients with polycystic ovarian syndrome attending College of Medical Sciences-Teaching Hospital.

METHODS

A descriptive cross-sectional study was carried out in the Central biochemistry department from March 1 to August 1, 2024. The participants who visited Gynecology and Obstetrics department, College of Medical Sciences, Bharatpur, Chitwan with the complaints of unable to conceive, irregular cycle, abnormal bleeding as newly diagnosed case of PCOS were included in this study. Patients already diagnosed PCOS under medication, and with hepatic disease, kidney damage and malignancy were excluded from this study. Ethical approval was taken from institutional review committee. The prevalence of PCOS in Nepal was 7%.[3] By taking this as prevalence, with 95.0% CI and 5.0% margin of error sample size was calculated by using following formula, $n = Z^2PQ/ d^2$ where, Z=1.96, P= Prevalence (7.0%), Q= 1-P, d=precision (5.0%) The calculated sample size was 100. The written consent was taken from all the patients before enrollment in this study. Sociodemographic variables were collected by using pre define questionnaire in Gynecology and Obstetrics department. 5 ml of venous blood samples were collected from all the study participants on second day of menstrual cycle in gel tube. It was then allowed to clot and centrifuge at 4000 rpm for 10 minutes to collect serum for the estimation of LH, FSH, prolactin, fT3, fT4 and TSH and was estimated in Maglumi 2000 immuno assay analyzer at central biochemistry laboratory. Data was analyzed by using statistical package for the social sciences (SPSS) version 23.0. Data was analyzed by using descriptive statistical tolls. In the descriptive statistics for categorical variable frequency and percentage were calculated while for continuous variable mean and standard deviation were calculated.

RESULTS

Among 100 samples, the mean age of respondents was 23.41±4.62. The majority of respondents from 21 to 30 years of age group (65%), followed by <20 years of age group (29%) and only 6% in 31 to 40 years of age group. The mean BMI of respondents was 26.4±2.95. Out of all the respondents, 56% were pre-obese, 28% were overweight and only 9% were obese.

The serum LH, FSH and prolactin level were increased in 29.0%, 2.0% and 17.0% of the participants respectively. Similarly, 81.0% of the study population had normal thyroid function, while 15.0% had hypothyroidism followed by 3% subclinical hypothyroidism.

The mean±SD level of LH, FSH, LH/FSH ratio, fT3, fT4, TSH and prolactin were 10.59±6.96 mIU/L, 4.83±4.07 mIU/L, 2.34±0.80, 2.92±0.7 pg/ml, 12.18±2.80 pg/ml, 3.49±1.95µIU/ml, and 22.32±12.56 µg/L respectively. (Table 1)

Table 1: Biochemical parameters of participants

	Frequency	Mean±SD
LH (mIU/L)		
Normal	71	10.59±6.96
Increased	29	
FSH (mIU/L)		
Normal	98	4.83±4.07
Increased	2	
LH/FSH		
>2	73	2.34±0.80
<2	27	
Serum prolactin(µg/L)		
Normal	83	22.32±12.56
Increased	17	
Thyroid status		
Euthyroidism	81	fT3 (pg/ml)= 2.92±0.70
Hypothyroidism	15	ft4(pg/ml)=12.18±2.80
Subclinical hypothyroidism	3	TSH (µU/ml)=3.49±1.95
Hyperthyroidism	1	

The participants who visited Gynecology & Obstetric department were presented with clinical symptoms like unable to conceive (36%), followed by irregular cycle (33%), and abnormal bleeding (31%). (Figure 1)

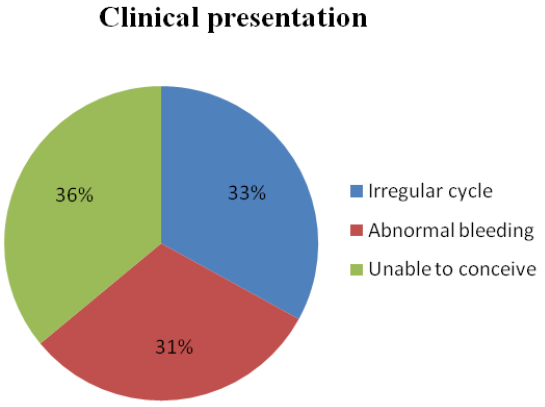

Figure 1: Clinical presentation of the study population

Table 2 shows the correlation between biochemical variables with LH and FSH. All the biochemical parameters were statistically insignificant with LH and FSH levels.

Table 2: Correlation between biochemical variables with LH and FSH

	LH		FSH	
	R	p-value	R	p-value
FT3	0.110	0.277	-0.008	0.938
FT4	-0.068	0.499	-0.146	0.146
TSH	0.026	0.799	0.042	0.677
Prolactin	-0.017	0.868	0.002	0.983

DISCUSSION

PCOS is the most common endocrinological disorder affecting women of reproductive age with wide range of clinical features and significant biochemical and hormonal changes. The highest prevalence of PCOS was found in age group between 21 to 30 years with the mean age 23.41±4.62 years which was comparable with the study done by Vaidya et al., where the mean age of the participant were 24.9±4.52 years.[3] In our present study, 45% of PCOS were married, and 55% were unmarried, which was different from the study done by Nahar et al., where 68% of the participants were married and 32% unmarried.[6]

In the present study, 36% had symptoms of not able to conceive, 33% had irregular cycle, and 31% had abnormal bleeding. This study was comparable with the study done by Ahmed et al.[7] However, the study conducted among undergraduate students in KMC reported 20.9% had prolonged menses, 7.3% tend to grow dark coarse hair, 20.7% overweight and 1.0% had milky discharge from nipple.[8]

Increased BMI is one of the strong risk factors for cardiovascular and other metabolic disturbances in PCOS. We found that 56.0% of the participants were found to be pre-obese (BMI 25-29.9 kg/m^2). The mean BMI was 26.40±2.95kg/m^2 which is comparable to the findings of Begum et al.[9] and Najem et al.[10] where 67.0% of the cases had BMI > 25kg/m^2 and 57% (BMI >30kg/m^2) in Libyan females respectively.

Serum LH concentrations are significantly elevated in PCOS due to an increased amplitude and frequency of LH pulses. Changes in pulsatility of GnRH are thought to alter the ratio of secretion of two pituitary gonadotrophins throughout the cycle. In the present study, 29.0%, 2.0%, and 17.0% participants had increased LH, FSH and prolactin level respectively. The mean serum LH was 10.59±6.96mIU/L, FSH was 4.79±4.09mIU/L and prolactin was 22.32±12.56 µg/L. Serum LH to FSH ratio >2 in 73.0% of the participants which was comparable with the study done by Nahar et al.[6] On the contrary, the study done by Shenta et al. showed that the LH/FSH ratio varies among groups. The ratio of LH/FSH in PCOS women was 5:1 in 15 to 29 years of age group, and 4:1 for 30 to 45 years of age compared with healthy women. [11]

The prevalence of thyroid dysfunction is common in PCOS. The occurrence of hypothyroidism among participant was 18.0%, in which 3.0% had subclinical hypothyroidism in the present study. The mean TSH level was 3.49± 1.9 µu/mL with reference range (0.3 to 4.5 µu/mL). On the contrary, Rajbanshi et al. found 11% hypothyroidism in Kathmandu with mean value of 6.65±21.17mIu/ml.[12] Islam et al. found hypothyroidism in 11.4% of participants.[13]

The findings in this study was comparable to the finding in the study done by Saadia et al.[14] and Alnakash et al.[15] There were no statistically significant relation between age (p=0.348, -0.095), fT3 (p=0.277, 0.110), fT4 (p=0.499, -0.068), TSH (p=0.799, 0.026), serum prolactin level (p=0.868, -0.017), with LH. As well as, there were also no statistically significant relation between age (p=0.988, 0.002), fT3 (p=0.938, -0.008), fT4 (p=0.146, -0.146), TSH (p=0.677, 0.042), serum prolactin level (p=0.983, 0.002), with FSH. However, in our study BMI was negatively correlate with FSH (p=0.022, -0.229). This study was quite different from the study revealed by Nahar et al.[6]

However, this study is hospital based which do not reflect the actual population of PCOS women. So, longitudinal studies should be carried out in large population to determine the long term consequences of PCOS.

CONCLUSIONS

This study concluded that there was no statistically significant with age, thyroid hormones and serum prolactin level with serum LH and FSH in PCOS patients. However, BMI was statistically negatively significant with FSH. PCOS is not simply a disorder of short term consequences such as irregular menses, abnormal bleeding, and hirsutism, but also affects long term health condition. So, should be diagnosed and treated early in adolescence.

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AUTHORS' CONTRIBUTION

SD conceptualized the entire study. SD, NKY, SP was involved in initial draft of the manuscript, data acquisition, and data analysis and editing. TKR was involved in data collection. BS was involved in data collection, and review of literature. The final version of the manuscript was prepared with the involvement of SD and NKY.

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