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EVALUATION OF VITAMIN-D & CALCIUM LEVEL IN WOMEN WITH POLYCYSTIC OVARIAN DISEASE IN A TERTIARY CARE CENTRE

Biochemistry

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ABSTRACT

Introduction: PCOD is the most common endocrine disorder in females of reproductive age group. PCOD leads to metabolic & hormonal disturbance. **Objective:** To asses level of vitamin D & Calcium in PCOD cases as compared to age matched controls **Material & Method:** Total of 60 PCOD cases were enrolled along with 60 control subjects, cases were selected according to revised Rotterdam criteria. Vitamin D was evaluated with CLIA technique, Calcium estimation was done by system pack kit method. All values were expressed as Mean + SD. p value <0.05 was considered significant. **Conclusion:** Low levels of vitamin D & Calcium was observed in PCOD cases when compared with healthy controls.

KEYWORDS

Vitamin D, PCOD, Calcium

INTRODUCTION

Polycystic ovarian disease (PCOD) is a common endocrine disorder seen in women of reproductive age group. PCOD can lead to Diabetes mellitus, endocrine gland cancer and cardiovascular diseases it is associated with anovulation, increased insulin secretion, and central obesity**(1)**. The patients symptoms begins with menstrual irregularity, laboratory investigations shows elevated androgen levels, and clinically presents with hirsutism and acne, these clinical outcomes were proved by the presence of polycysts in the ovaries by ultrasonography**(2)**. Other clinical signs of this syndrome include many metabolic disorders such as hypertension, dyslipidemia, metabolic syndrome, glucose tolerance and insulin resistance, and consequently hyperinsulinemia. The human body gets vitamin D from endogenous or exogenous sources. Exogenously from diet, while endogenously from photochemical conversion of cholesterol to 7-dehydrocholesterol in the skin by sunlight followed by hepatic or renal hydroxylation.In the skin, Photolysis of dehydrocholesterol resulted in the formation of vitamin D3 by UV light. The vitamin D3 molecules then undergoes hydroxylation, the first in the liver to 25OHD through D3-hydroxylase and the second in the kidney to 1,25-dihydroxy vitamin D3 which goes in the circulation by binding to vitamin D binding protein **(3)(4)**. The cause for PCOD is unknown, however literature suggest the involvement of genes and environment (lifestyle) as strong causative factors**(5)**.There are suggestions that calcium has important role in activation and maturation of oocyte in animals **(6)** therefore, abnormalities in calcium metabolism may play an important role in patho- genesis of PCOD. Many studies have suggested that both calcium and vitamin D supplements may improve insulin sensitivity in women with PCOD**(7)**. Vitamin D is seen to be important for regulation of pathways involved in glucose metabolism and therefore, insulin secretion. Thus, its deficiency could lead to glucose intolerance, insulin resistance & metabolic syndrome also **(8)(9)**.The cellular effect of vitamin D is mediated through the intra-nuclear vitamin D receptor (VDR).The presence of VDR in the ovary, uterus, placenta and testis suggests role of vitamin D in reproductive physiology vitamin D deficiency is believed to contribute for a spectrum of gynecological disorders of which PCOD appears the best studied**(10)(11)(12)**. This case control study is done to investigate levels of Vitamin D & Calcium status between PCOD & non PCOD subjects.

MATERIAL & METHOD

This case control study was carried out in collaboration between Biochemistry and Obstetrics & Gynaecology department of Varun Arjun Medical College & Rohilkhand Hospital, Banthra, Shahjahanpur(U.P) from a period of October 2021 to November 2022. A total of 60 women with PCOD were selected from Gynaecology OPD, these were taken as cases. Similar age matched healthy fertile women were selected as controls. Diagnosis of PCOD was made according to the revised Rotterdam criteria 2003 **(13)**. Those with at least two of the following criteria were defined as PCOD patients:

(I) Oligo-anovulation
(ii) Hyperandrogenism
(iii) Polycystic ovaries(>12 follicles measuring 2-9mm in diameter)

Inclusion criteria

All women in reproductive age group (18-44 years) satisfying Rotterdam criteria were included.

Exclusion criteria

- Subjects having diabetes mellitus, renal/liver disease or other endocrine disorders
- H/o drug intake i.e. vitamin D or calcium supplements, contraceptive pills etc
- Pregnancy

5mL blood sample was taken in a plain vial from both cases & controls, sample collected was allowed to clot for 20 minutes and then centrifuged at 4000 rpm for 10 minutes, and then serum was separated. Estimation of Serum Calcium was done by System pack Arsenezo kit method in ERBA EM200 fully autoanalyser machine. Vitamin D estimation was done by Chemiluminescence immunoassay(CLIA) in Maglumi X3 fully automated machine by Snibe diagnostics in Clinical Biochemistry department of Varun Arjun Medical College. SPSS version 20.0 is used for statistical analysis & all values were shown as mean and standard deviation.

RESULT

Data was collected from 60 PCOD cases and 60 control healthy female group. Mean age was 25.6 $\pm$ 5.8 in PCOD group and 25.1 $\pm$ 6.1 in control group. Table 1 shows distribution of cases according to age group with maximum number of cases seen in 24-28 age group (i.e 46.6%). Levels of vitamin D was considered as <10ng/mL as deficient, 10-30 ng/mL as insufficient and > 30ng/mL as sufficient. Out of 60 cases a total of 30 (50%)PCOD cases were observed as vitamin D deficient , 27 (45%) were seen to be having insufficient vitamin D and only 3 (5%) were in the range of sufficiency. Whereas in control group 19 (31.6%) were deficient, insufficiency was seen in 29 (48.3%) women and 12 (20%) were in the range of sufficiency.

Table 1: Age wise distribution of cases

Age	No. of cases	Percentage
18-23	12	20%
24-28	28	46.6%
29-33	13	21.6%
34-40	7	11.6%

Table 2: Distribution of cases & control according to Vitamin D levels

Vitamin D(ng/mL)	PCOD cases(n=60)	Control group(n=60)
Deficient (<10 ng/mL)	30	19
Insufficient(10-30 ng/mL)	27	29
Sufficient (> 30 ng/mL)	3	12

Table 2 shows mean values of Vitamin D and Calcium in Polcystic ovarian disease patients and control group. The mean value of Vitamin D is 18.2 $\pm$ 6.2 in PCOD subjects as compared to 26.3 $\pm$ 8.3 in healthy control and this difference was statistically significant. Whereas mean of Calcium was 8.0 $\pm$ 0.9 in PCOD cases as compared to 8.5 $\pm$ 1.1 in healthy controls and this difference was also seen to be statistically significant. Both the measured parameters were showing statistical significance (p value<0.05) when compared with age matched healthy controls.

Table 3: Comparision between two studied groups(Mean $\pm$ SD)

Parameter	PCOD patients(n=60)	Control group(n=60)	p value
Age	25.6 + 5.8	25.1+ 6.1	>0.05
Vitamin D	18.2 + 6.2	26.3 + 8.3	<0.05
Calcium	8.0 + 0.9	8.5 + 1.1	<0.05

DISCUSSION

PCOD is a disorder characterised by chronic anovulation, hyperandrogenism and multiple small cystic follicles in the ovary, mainly affects 4% - 16% women in reproductive age group**(14)**.The biological actions of vitamin D are exerted through a soluble protein — the vitamin D receptor (VDR). VDR can be found in various tissues including both the nuclei and cytoplasm of granulosa cells (GC) of human ovaries which indicates that it is responsible for the physiologic functions of 1,25(OH)2D3 in ovarian follicles**(15)**. Hypovitaminosis D is connected to the onset of chronic diseases and that it's deficiency may interfere with the normal physiology of the human body**(16)**, we anticipated the women with PCOD in our study would have lower vitamin D levels compared with the control group. In many PCOD cases, high prevalence of vitamin D deficiency is seen as compared to control group**(17)**. Our study shows significantly low level of vitamin D when compared with control group, which is consistent with many observational studies which showed low vitamin D concentration in women with PCOD**(18)**.

Clinical manifestations of PCOD include obesity, metabolic syndrome and chronic inflammation, which are related to vitamin D deficiency**(19-21)**. In our study we found low serum calcium level in PCOD cases which is also consistent with other studies**(22-24)**. . Low plasma level of vitamin D results in hypocalcemia, low calcium levels have been associated with inhibition of folliculogenesis in PCOD cases. This low concentration of vitamin D results in menstrual irregularities and fertility impairment**(25,26)**. Li et al., **(27)** and Wher et al., **(28)** also reported lower vitamin D level in PCOD patients contrasted to control healthy women which is comparable to our study result. Mazloomi S et al., **(29)** reported low levels of vitamin D in women with PCOD, with average vitamin D levels between 11-31 ng/mL, and the majority having values <20 ng/mL (67–85%). This result is also comparable to our study. A study was done on 80 newly diagnosed PCOD women with mean age (23 to 33 years). Many Items were assessed in this study which includes the following items FBS, Calcium, phosphorus, vitamin D. Results of PCOD and matched healthy Women were compared. Women with PCOD have low level of vitamin D in comparison to the healthy controls and there obvious difference with age and BMI**(30)**. In agreement with us He CL et al.**(31)** has confirmed that PCOD is associated with vitamin D deficiency, the study confirm that approximately 67–85% of PCOS women have vitamin D level below 20 ng/mL.

CONCLUSION

Our case control study concludes that both Vitamin D and Calcium is low in PCOD cases when compared with normal control group. Though our study has certain limitation due to small sample size. By taking more sample size we can ascertain the beneficial effect of vitamin D and calcium supplementation in these PCOD cases.

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