



## EFFECT OF VITAMIN D ADMINISTRATION ON SERUM TESTOSTERONE LEVELS IN PCOD PATIENTS

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**ABSTRACT** INTRODUCTION PCOS is recognized as one of the most common endocrinopathies in women of reproductive age with a prevalence of 4 to 10%. It is a heterogenous disorder with different degrees of reproductive and metabolic disturbances (like insulin resistance, hyperinsulinemia and dyslipidaemia). Positive association of vitamin D deficiency with some well known comorbidities of PCOS including Type 2 diabetes, insulin resistance, metabolic syndrome and cardiovascular disease are reported. The effect of vitamin D on metabolic and reproductive dysfunction in PCOS may be mediated, by insulin resistance. Insulin resistance leads to hyperandrogenism through insulin increasing ovarian androgen production and decreasing SHBG production. Present study was conducted in a tertiary health care center in prayagraj for a period of 1 year, on 50 women with diagnosed PCOD, to study the effect of vitamin D administration on serum testosterone levels.

### AIMS & OBJECTIVES

- 1.) To study prevalence of vitamin D in females with PCOD.
- 2.) To estimate serum 25 hydroxy vitamin D levels in PCOS patients.
- 3.) To study the effect of vitamin D supplementation on serum testosterone levels in females with PCOD.

### METHOD & MATERIAL

A prospective observational study was carried out on 122 PCOS patients between 18-35 years of age attending the outpatient department of Kamla Nehru Memorial Hospital Prayagraj for a duration of 1 year from May 2017 to 2018. Diagnosis of PCOS was made on the basis of Rotterdam criteria. Blood investigations including Serum vitamin D, testosterone levels were done for all patients.

Patients with serum vitamin D levels of less than 20 ng/ml were taken up as vitamin D (*endocrine society clinical practice guidelines*) deficient group and were prescribed Vitamin D 2000 IU daily by oral route for duration of 6 months. At the end of 6 months levels of serum vitamin D and serum testosterone were repeated and comparison was made with pretreatment values.

The effect of treatment before and after the completion of study was analysed by using paired t test. A 'p' value < 0.05 was statistically significant.

**RESULT & CONCLUSION** We observed a significant decrease in the serum testosterone levels from a mean value of  $31.14 \pm 21.30$  to  $32.71 \pm 18.28$  ( $p < 0.0001$ ). From our study we conclude that vitamin D supplementation in obese and overweight Vitamin D deficient women with PCOS significantly improves serum testosterone levels. It is important to identify all cases with PCOS it has long term cardiovascular complications

## KEYWORDS :

### INTRODUCTION

PCOS is recognized as one of the most common endocrinopathies in women of reproductive age with a prevalence of 4 to 10%<sup>1</sup>. PCOS is a heterogenous disorder with different degrees of reproductive and metabolic disturbances (like insulin resistance, hyperinsulinemia and dyslipidaemia). It is associated with increased risks of insulin resistance, type II diabetes mellitus and metabolic syndrome. Positive association of vitamin D deficiency with some well known comorbidities of PCOS including Type 2 diabetes, insulin resistance, metabolic syndrome and cardiovascular disease are reported<sup>2</sup>. The effect of vitamin D on metabolic and reproductive dysfunction in PCOS may be mediated, by insulin resistance. Insulin resistance leads to hyperandrogenism through insulin increasing ovarian androgen production and decreasing SHBG production.

Present study was conducted in a tertiary health care center in prayagraj for a period of 1 year, on 50 women with diagnosed PCOD, to study the effect of vitamin D administration on serum testosterone levels.

### AIMS & OBJECTIVE:

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### METHOD AND MATERIAL :

The present study was carried out on all PCOS patients between 18-35 years of age attending the outpatient department of Kamla Nehru Memorial Hospital Prayagraj for a duration of 1 year from May 2017 to 2018.

**Place of study:** Kamla Nehru Memorial Hospital, Prayagraj

**Duration of study** 6 month

**Sample size** 122

**Study design :** Prospective observational study.

### INCLUSION CRITERIA:

- 1.) Patients with PCOS diagnosed on basis of Rotterdam criteria:
  - a.) Chronic oligo or anovulation
  - b.) Clinical or biological hyperandrogenism: Hirsutism, acne
  - c.) Polycystic ovaries on sonographic findings: > 12 follicles in either ovaries measuring 2-9 mm diameter or an increased ovarian volume > 10 mm<sup>3</sup>
- 2.) Spontaneous onset of maturation
- 3.) Normal sexual development
- 4.) Age between 18 - 35 years.

**EXCLUSION CRITERIA:** Patients with any of the following were excluded from the study

Thyroid disorders  
Hyperprolactinemia  
Hyperlipidemia  
Diabetes mellitus  
Hypertension  
Cushing disease,  
Late onset CAH  
Patients on medications such as antiepileptics, OCP, steroids

### STUDY PROCEDURE

After informed consent of the patients and approval of the medical ethical committee, detailed history and examination of each subject involved in the study was taken. Diagnosis of PCOS was made on the basis of Rotterdam criteria. Blood investigations including Serum vitamin D, testosterone levels were done for all patients.

Patients with serum vitamin D levels of less than 20 ng/ml were taken up as vitamin D (*endocrine society clinical practice guidelines*) deficient group and were prescribed Vitamin D 2000 IU daily by oral

route for duration of 6 months. At the end of 6 months levels of serum vitamin D and serum testosterone were repeated and comparison was made with pretreatment values.

#### STATISTICAL ANALYSIS –

After 6 months of treatment each subject underwent the same procedures and tests. The data obtained was analysed SPSS version 16. The effect of treatment before and after the completion of study was analysed by using paired t test. A 'p' value < 0.05 was statistically significant.

**Table 1. Age Distribution Of Study Population**

**Table 1: Age distribution**

Age group	No. of cases	%
18- 25 yr	16	33.33
26- 30 yr	21	43.75
31- 35 yr	11	22.91
Total	48	100%
Mean± SD	27.81± 4.12	

16 cases {33.33%} belonged to age group 18 - 25 years, 21 cases (43.75%) belonged to age group 26 - 30 years and 11 cases {22.91%} belonged to age group 31- 35 years. The mean age group was 27.81±81.

**Table 2.) Estimation Of Serum Vitamin D Deficiency In Pcos Patients**

Serum 25 hydroxy vitamin D levels	No. of cases	% of cases
<10 ng/ml	7	5.73%
10 -19.9 ng/ml	49	40.16%
20-29.9ng/ml	42	34.42%
>30ng/ml	24	19.67%
Total	122	100%

**Table 3 : Prevalence Of Vitamin D Deficiency In Pcos Patients**

Total PCOS patients	25 hydroxy Vitamin D Deficient	Normal 25 hydroxy vitamin D
122	98 (80.32%)	24 (19.06%)

**Table 4: Serum total testosterone (before and after t/t)**

Serum total testosterone (ng/dl)	Pre t/t		Post t/t	
	No. of cases	%	No. of cases	%
20- 80	41	85.4	48	100
>80	7	14.58	0	0
Total	48	100	48	100
Mean ±SD	31.14±21.30	32.71±18.28		

Out of total 98 patients with vitamin D deficiency, 9 did not come for follow up and 41 did not take vitamin D supplementation on regular basis, so they were excluded from final follow up of the study. So for serum testosterone estimation our sample size came to be 48

Before treatment 41 cases {85.4%} had s. total testosterone between 20 - 80 ng/dl and 7 cases ( 14.58%) had serum total testosterone > 80 ng/dl with a mean of 31.14 ± 21.30 ng/dl.

After 24 weeks of treatment 48 cases (100%) had serum total testosterone 20

80 ng/dl and no cases (0%) with a serum total testosterone >80ng/dl with a mean of 32.71±18.28. (p value < 0.0001).

After 24 week of treatment, S. total testosterone decreased significantly from a mean of 31.14 ± 21.30 to 32.71 ± 18.28 (p < 0.0001).

#### DISCUSSION

The women of reproductive age group 18 to 35 years fulfilling 2 of 3 rotterdam criteria were selected for the present study. The cases were given vitamin D 2000 IU daily for 6 months. The effect was studied after 6 months of treatment on serum testosterone levels. In our study, we found a prevalence of 25 hydroxy vitamin D deficiency in 80.32% cases. Our results of prevalence of 25 hydroxy vitamin D deficiency were similar to the studies conducted by Wehr E et al in which this percentage was found to be 72.5%.

It is estimated that 60% to 80% of women with PCOS demonstrate elevated circulating androgen levels. In the present study 41 cases (85.4%) had serum testosterone levels between 20-80ng/dl and 7 cases (14.58%) had serum testosterone levels >80 ng/dl. After 6 months supplementation with vitamin D all the cases had serum testosterone levels in the normal range.

Thus we observed a significant decrease in the serum testosterone levels from a mean value of 31.14 ± 21.30 to 32.71 ± 18.28 (p < 0.0001).

Razani et al in their randomized controlled trial on 60 PCOS women found a significant decrease in free testosterone after 8 weeks of therapy.

Jamilian et al (2017) in their randomized controlled study studied the effect of 4000 I.U. cholecalciferol daily vs 1000 I.U. daily vs placebo and found a significant decrease in the total serum testosterone levels.

#### CONCLUSION

The serum testosterone levels decreased significantly after Vitamin D supplementation. (p < 0.0001). From our study we conclude that vitamin D supplementation in obese and overweight Vitamin D deficient women with PCOS significantly improves serum testosterone levels. It is important to identify all cases with PCOS it has long term cardiovascular complications.

Improvement in cardiovascular disease parameters and lack of side effects of Vitamin D suggests its beneficial role in this disorder. Timely intervention and treatment of patients should be done which can prevent long-term complications.

#### REFERENCES

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