



## VITAMIN D DEFICIENCY AND PCOS; ASSOCIATION BETWEEN VITAMIN D DEFICIENCY AND PCOS IN FEMALES PRESENTING IN A TERTIARY CARE HOSPITAL.

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**ABSTRACT... Background:** Polycystic ovary syndrome (PCOS) is mainstream gynaecological problems in adult women. Vitamin D has been linked to propensity of developing PCO. As this hormones has certain effects on insulin sensitivity and restoration of reproductive capacity in women with PCOs. So, a study was planned to establish correlation of deficiency of vitamin D and PCOs. **Objectives:** To determine the correlation of deficiency of vitamin D with PCOs in patients reporting to a teaching hospital. **Study Design:** Case control study. **Setting:** Institute of Shaikh Zayed Hospital, Lahore, Gynae-Obst Department. **Period:** Six months from July 2015 to December 2015. **Material & Methods:** If serum level of vitamin D is < 25nmol/L then deficiency was labeled. Odds ratio was calculated between PCOs and vitamin D deficiency. **Results:** The mean age of the patients was  $26.91 \pm 6.09$  years. In this study, 70% females were married. The mean BMI of patients was  $22.59 \pm 2.48 \text{ kg/m}^2$ , and 76(76%) patients had normal BMI and 24(24%) patients were overweight. Vitamin D deficiency was observed in 47 cases in which 31 were from case group and 16 were from control group with significant association i.e.  $OR=3.47$ . **Conclusion:** Our study results concluded that there is more risk of vitamin D deficiency in females with PCOS as compared to females without PCOS.

**Key words:** Vitamin D Deficiency, Polycystic Ovarian Syndrome, PCOS, Females.

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### INTRODUCTION

Polycystic ovary syndrome (PCOS) is widespread problem in an adult women (found in upto 5 – 10%).<sup>1,2</sup> Vitamin D is a fat-soluble vitamin, not commonly found in food. However it can be supplemented. Vitamin D insufficiency is defined as a 25(OH) D level of 21 to 29ng/mL and vitamin D deficiency as a 25(OH) D level below 20ng/mL.<sup>3</sup>

Women with PCOS often have resistance to insulin. Study say that metabolic syndrome may be caused by deficiency of Vitamin D.<sup>4</sup> Women with PCOS have mostly insufficient vitamin D levels, and vitamin D replacement therapy may have a beneficial effect on IR in obese women with PCOS.<sup>5</sup> Additionally reproductive biology is highly affected by deficiency of vitamin D, however the pathophysiology is still unknown.<sup>6</sup>

A previously conducted case control study found that low 25-hydroxyvitamin D (<25nmol/L)

were found in 44.0% and 11.2% of subjects in PCOS and control groups, respectively ( $P = 0.047$ ).<sup>7</sup> However another study case control study showed that vitamin D deficiency in PCO cases was 92.1% while in control was 87.0% and difference was insignificant ( $P=0.560$ ). Authors concluded that no difference was found in the absolute level of serum vitamin D between PCOS patients and matched controls. Prevalence of vitamin D deficiency was equally common among both patients and controls. Additionally, no correlations was found between serum vitamin D level and clinical or metabolic profiles, suggesting that the role of vitamin D in the pathogenesis of PCOS is not yet clear.<sup>8</sup>

Rationale of our study is to determine the determine the correlation in between deficiency of vitamin D and PCOS in females presenting in a tertiary care hospital. The frequency of PCO is growing in local population particularly in young unmarried

females. In routine, it has been observed that most of females are vitamin D deficient but no evidence is available regarding the association of PCO with vitamin D deficiency. Moreover, previous literature has reported controversial results. So to confirm the association of PCO with vitamin D deficiency, we want to conduct this study. This will help us to improve our practice. Moreover, we would get local magnitudes as there was no local evidence observed in literature.

## OBJECTIVE

To establish correlation between deficiency of vitamin D and evidence of PCOs in patients reporting to a teaching hospital.

## MATERIALS AND METHODS

A case control study was run at OBGYN Dept, Shaikh Zayed Hospital, Lahore for 6 months. Sample size of 100 cases in each group was calculated with 80% power of test. 5% level of significance and taking expected percentage of vitamin D deficiency i.e. 44.0% in females with PCO and 11.2% in control group females presenting in a tertiary care hospital. All patients were include through non probability consecutive sampling as we include particular cases of PCOs. Females of age 18-40 years with complaint of lower abdominal pain and complaint of irregular bleeding (oligomenorrhea (cycles>35 days) or amenorrhea (fewer than 3 cycles in the past 6 months) and ultrasound scan showing 12 or more follicles measuring 2-9mm and LH/FSH ration>1 IU/L were included. In case group, females with PCO (ultrasonographic detection of PCOs (> 12 follicles measuring 2-9mm) along with LH/FSH ration >1 IU/L with oligomenorrhea (cycles > 35 days) or amenorrhea (fewer than 3 cycles in the past 6 months). In control group, females without PCO (normal females) were included. Controls will be selected as age matched females who come as attendants with the patients. Females with hypertension (BP> 140/90mmHg) abnormal ECG, liver problem (AST>40IU, ALT>40IU), renal insufficiency (creatinine >1.2mg/dl and bleeding disorders (PT>20sec, aPTT>15sec). diabetic females (BSR>186mg/dl). Pregnant females, females taking multivitamins or smokers were excluded. Blood sample was obtained by

using 5cc BD syringe. All samples were sent to the laboratory of the hospital for assessment of vitamin D level. If vitamin D level <2.5nmol/L, then vitamin D deficiency was labeled. All the information was collected on specially designed proforma. Data analysis was done by using SPSS version 17.0. Quantitative variables like, age, BMI and vitamin D level was measured in the form of mean + SD. Qualitative variables like marital status and vitamin D deficiency was measured in the form of frequency and percentage. Odds ratio was calculated to determine the association between PCO and vitamin D deficiency. OR>1 was considered as risk for association. P-value<0.05 was taken as significant. Frequency was calculated for parity.

## RESULTS

The mean age of cases was  $28.20 \pm 6.40$  years and mean age of controls was  $25.62 \pm 5.54$ . The mean height of cases was  $1.60 \pm 0.06$ m and control was  $1.61 \pm 0.06$ m. The mean weight of cases was  $57.92 \pm 6.13$ kg and control was  $57.86 \pm 4.94$ kg. The mean BMI of cases was  $22.67 \pm 2.52$ kg/m<sup>2</sup> and control was  $22.51 \pm 2.47$ kg/m<sup>2</sup>. Among cases, 39 females had normal BMI and 10 were overweight while among controls, 37 females had normal BMI and 13 were overweight. Among cases, 40 females were married and 10 were unmarried while among controls, 30 females were married and 20 were unmarried. The mean vitamin D level of cases was  $22.75 \pm 6.52$ nmol/L while mean vitamin D level of controls was  $28.75 \pm 9.10$ nmol/L (Table-I). Overall vitamin D deficiency was detected in 47% patients.

Deficiency of Vitamin D was observed in 31 cases and 16 controls. Statistically significant association established between vitamin D deficiency and PCOS. Among females with PCOS the chances of vitamin D deficiency was 3.47 times more as compared to females without PCOS (Table-II).

Effect of vitamin D deficiency was also observed in presence of other factors including age, BMI, and marital status on PCOS. Age did not show significant impact and was not included in the final regression model ( $P > 0.05$ ) and the final model included BMI, marital status and vitamin D

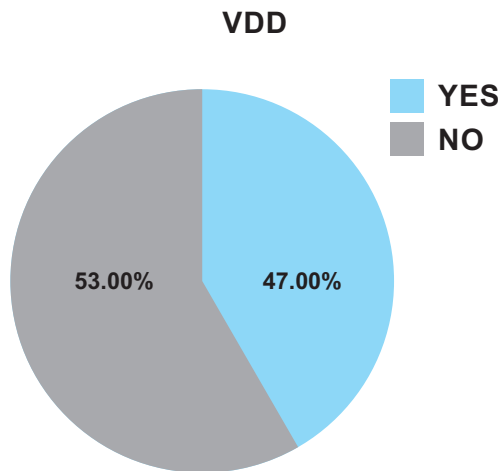
deficiency (Table-III) i.e.

$$PCOS = 4.157 - 0.511(BMI) + 1.711(\text{marital status}) + 4.848(\text{vitamin D deficiency})$$

|                          | Case       | Control     |
|--------------------------|------------|-------------|
| N                        | 50         | 50          |
| Age (years)              | 28.20±6.40 | 25.62±5.54  |
| Height (meters)          | 1.60±0.06  | 1.61±0.06   |
| Weight (Kg)              | 57.92±6.13 | 57.86±4.94  |
| BMI (Kg/m <sup>2</sup> ) | 22.67±2.52 | 22.51±2.47  |
| Normal BMI               | 39         | 37          |
| Overweight               | 11         | 13          |
| Married                  | 40         | 30          |
| Unmarried                | 10         | 20          |
| Vitamin D level          | 22.75±6.52 | 28.75±9.10* |

**Table-I. Characteristics of patients in both groups**

\* = significant difference in vitamin D level in both groups (p<0.001)



**Figure-1. Vitamin D deficiency**

|                      |     | Study groups |         | Total |
|----------------------|-----|--------------|---------|-------|
|                      |     | Case         | Control |       |
| Vitamin D deficiency | Yes | 31           | 16      | 47    |
|                      | No  | 19           | 34      | 53    |
| Total                |     | 50           | 50      | 100   |

**Table-II. Association of vitamin d deficiency with PCOS**

OR = 3.467 (95% CI; 1.521, 7.905, p-value=0.003)

|                      | B     | S.E.  | Wald   | df | Sig. | Exp(B)  |
|----------------------|-------|-------|--------|----|------|---------|
| Age                  | -.085 | .053  | 2.580  | 1  | .108 | .919    |
| BMI                  | -.511 | .179  | 8.127  | 1  | .004 | .600    |
| Marital status       | 1.771 | .770  | 5.298  | 1  | .021 | 5.879   |
| Vitamin D deficiency | 4.848 | 1.086 | 19.921 | 1  | .000 | 127.422 |
| Constant             | 4.157 | 3.614 | 1.323  | 1  | .250 | 63.886  |

**Table-III. Logistic regression to check the association of vitamin D deficiency with PCOS in presence of different factors**

**DISCUSSION**

Vitamin D deficiency is frequently found in women having PCOs.<sup>9</sup> Various studies ascertained association between deficiency vitamin D and metabolic derangement seen in women with PCOs. It's fairly common for were with PCOs. that concomitant deficiency of vitamin D results in resistance to insulin, development of raised BP and biochemical derangements in Total Cholesterol, CRP, level of TG and LDL and HDL in blood.<sup>7,10</sup>

PCOs is a complex of disorders with anovulation and signs and symptoms of hyperandrogennism development of a state of hyperinsulnism. It has been reported to have a prevalence of 6-12%.<sup>11</sup> In our study the vitamin D deficiency was found in 47% patients in which 31 (62%) were cases and 16 (32%) were controls. The cases in our study had Statistically 3.47 times increased risk of vitamin D deficiency as compared to control odds ratio i.e. 3.47.

A previous study demonstrated PCOs is associated with development of impaired tolerance to glucose, type-II DM and metabolic syndrome (reference quote).<sup>12</sup>

Another study showed PCOs women had more predilection to cardiovascular disease than non PCOs control (reference quote).<sup>13</sup>

Where as one study showed vitamin D higher in PCOs than in controls.<sup>14</sup>

One meta analysis failed to prove low levels of vitamin D in PCOs than non PCO control group.<sup>15</sup> A study by Mazloomi et al showed PCOs itself was associated with decreased vitamin D levels independent of other risk factors.<sup>16</sup>

In our study cases were 5.08 times more deficient in vitamin D than control group in normal BMI patients i.e. or 5.08.

There was one study that compared normal weight BMI (19-24.99) with PCOs and over weight BMI 25-29.99 with PCOs; levels of vitamin D were found in both groups. Statistically significant P value <0.05 and 0.01. Hence proved PCOs is associated with decreased vitamin D levels.<sup>17</sup>

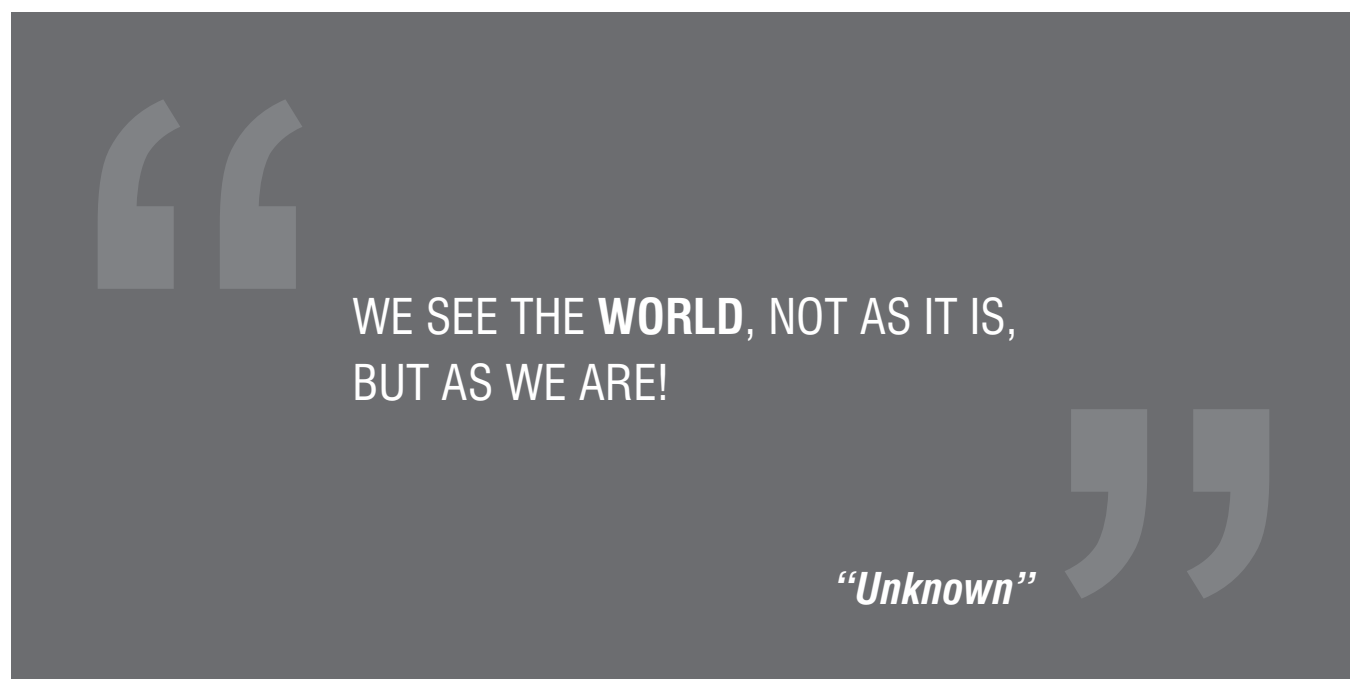
## CONCLUSION

Our study found significant deficiency of vitamin D in female with PCOs as compared to females without PCOs that females most probably are vitamin D deficiency and vitamin D therapy with help in resolution PCOs as well.





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## REFERENCES

- Wehr E, Moller R, Horejsi R, Giuliani A, Kopera D, Schweighofer N, et al. **Subcutaneous adipose tissue topography and metabolic disturbances in polycystic ovary syndrome.** Wien Klin Wochenschr 2009; 121(7-8):262-9.
- Wehr E, Trummer O, Giuliani A, Gruber H-J, Pieber TR, Obermayer-Pietsch B. **Vitamin D-associated polymorphisms are related to insulin resistance and vitamin D deficiency in polycystic ovary syndrome.** Eur J Endocrinol 2011; 164(5):741-9.
- Ross AC, Manson JE, Abrams SA, Aloia JF, Brannon PM, Clinton SK, et al. **The 2011 report on dietary reference intakes for calcium and vitamin D from the Institute of Medicine: What clinicians need to know.** J Clin Endocrinol Metab 2011; 96(1):53-8.
- Wehr E, Pilz S, Schweighofer N, Giuliani A, Kopera D, Pieber TR, et al. **Association of hypovitaminosis D with metabolic disturbances in polycystic ovary syndrome.** Eur J Endocrinol 2009 Oct; 161(4):575-82.
- Selimoglu H, Duran C, Kiyici S, Ersoy C, Guclu M, Ozkaya G, et al. **The effect of vitamin D replacement therapy on insulin resistance and androgen levels in women with polycystic ovary syndrome.** J Endocrinol Invest 2010; 33(4):234-8.
- Luk J, Torrealday S, Perry GN, Pal L. **Relevance of vitamin D in reproduction.** Hum Reprod 2012; 27(10):3015-27.
- Li HWR, Brereton RE, Anderson RA, Wallace AM, Ho CK. **Vitamin D deficiency is common and associated with metabolic risk factors in patients with polycystic ovary syndrome.** Metabolism 2011; 60(10):1475-81.
- Kim JJ, Choi YM, Chae SJ, Hwang KR, Yoon SH, Kim MJ, et al. **Vitamin D deficiency in women with polycystic ovary syndrome.** Clin Experiment Reprod Med 2014; 41(2):80-5.
- Thomson RL, Spedding S, Buckley JD. **Vitamin D in the aetiology and management of polycystic ovary syndrome.** Clin Endocrinol 2012; 77(3):343-50.
- Wehr E, Pilz S, Schweighofer N, Giuliani A, Kopera D, Pieber T, et al. **Association of hypovitaminosis D with metabolic disturbances in polycystic ovary syndrome.** Eur J Endocrinol 2009; 161(4):575-82.
- Wojciechowski P, Lipowska A, Rys P, Ewens K, Franks S, Tan S, et al. **Impact of FTO genotypes on BMI and weight in polycystic ovary syndrome: a systematic review and meta-analysis.** Diabetologia 2012; 55(10):2636-45.
- Moran LJ, Misso ML, Wild RA, Norman RJ. **Impaired glucose tolerance, type 2 diabetes and metabolic syndrome in polycystic ovary syndrome: a systematic review and meta-analysis.** Hum Reprod Update 2010; 16(4):347-63.
- Dekkers O, Thio B, Romijn J, Smit J. **Acne vulgaris: Endocrine aspecten.** Nederlands tijdschrift voor geneeskunde 2006; 150(23):1281.
- Mahmoudi T, Gourabi H, Ashrafi M, Yazdi RS, Ezabadi Z. **Calcitropic hormones, insulin resistance, and the polycystic ovary syndrome.** Fertil Steril 2010; 93(4):1208-14.
- He C, Lin Z, Robb SW, Ezeamama AE. **Serum Vitamin D Levels and Polycystic Ovary syndrome: A Systematic Review and Meta-Analysis.** Nutrients 2015; 7(6):4555-77.
- Mazloomi S, Sharifi F, Hajihosseini R, Kalantari S, Mazloomzadeh S. **Association between hypoadiponectinemia and low serum concentrations of calcium and vitamin D in women with polycystic ovary syndrome.** ISRN endocrinology 2012; 2012.
- Yılmaz SA, Altınkaya ÖS, Kebabçılar A, Kerimoğlu ÖS, Pekin AT, Abuşoğlu S, et al. **The relationship between polycystic ovary syndrome and vitamin D levels.** Studies 2014; 20:14.



**AUTHORSHIP AND CONTRIBUTION DECLARATION**

| Sr. # | Author-s Full Name | Contribution to the paper       | Author=s Signature  |
|-------|--------------------|---------------------------------|---|
| 1     | Maryam Bashir      | Data collection + Data analysis |  |
| 2     | Shafqat Mukhtar    | Proof reading + Interpretation. |  |
| 3     | M. Ikram           | Drafting Supervision.           |  |
| 4     | Amna Javed         | Data analysis, References.      |  |