

# Vitamin D Deficiency Is Associated with Elevated AMH Levels in Individuals with PCOS

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## BACKGROUND

- Some studies suggest serum Vitamin D deficiency is associated with reduced fertility and may correlate with Anti-Müllerian Hormone (AMH) levels in reproductive-aged women.
- Polycystic Ovary Syndrome (PCOS) is often associated with pathologically elevated AMH.
- Evidence is mixed regarding association of Vitamin D supplementation with lessened effects of Polycystic Ovary Syndrome (PCOS), including improvement of pathologically elevated AMH.
- Investigating whether Vitamin D levels demonstrate differential association with AMH between women with PCOS may illuminate whether Vitamin D supplementation could help improve fertility in PCOS.

## OBJECTIVE

- This study aims to clarify whether an association between serum Vitamin D and AMH differs in individuals with PCOS compared with controls.
- The secondary aim is evaluating this across all Vitamin D levels as well as within commonly accepted categorical ranges of Vitamin D levels.

## METHODS

- Cross-sectional analysis of PCOS cases and matched controls
- Individuals with PCOS were identified using ICD codes, and manual chart review confirmed they met Rotterdam criteria.
- Serum 25-hydroxy-vitamin D and AMH values obtained within a 30-day period 01/2015-02/2025 were extracted.
- Pearson's product-moment correlation coefficients assessed association between serum Vitamin D and AMH in the population and within PCOS and control groups. A generalized linear model (GLM) was used, including cohort, Vitamin D level, AMH, and interaction term. Fisher scoring iterations were applied in model fitting. Statistical significance was defined as  $p < 0.05$ .
- Vitamin D levels were categorized as: severely deficient  $< 12$  ng/mL; deficient  $12 - < 30$  ng/mL; normal  $30 - 60$  ng/mL; elevated  $> 60$  ng/mL

**TABLE 1: SUMMARY OF VITAMIN D AND AMH LEVELS IN PCOS CASES AND CONTROLS**

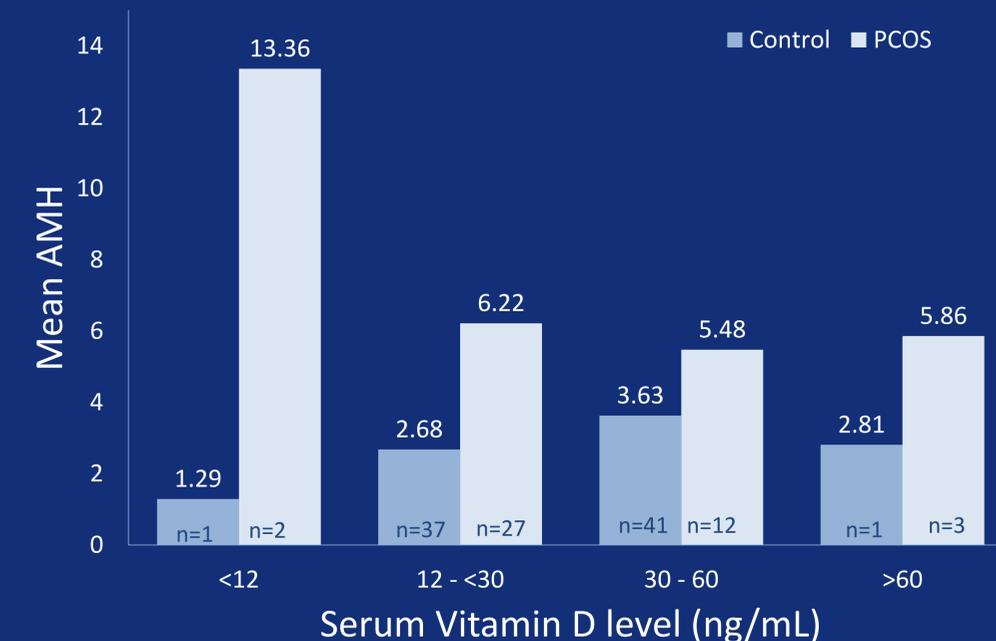
	Average	Minimum	Maximum	Range
Vitamin D (ng/mL)				
Control	32.04	5	74	69
Case	29.77	8	79	71
AMH (ng/mL)				
Control	3.16	0.01	21.97	21.96
Case	6.32	1.58	23.00	21.42

**TABLE 2: COMPARISON OF MEAN AMH LEVELS ACROSS VITAMIN D CATEGORIES**

	Severe deficiency ( $< 12$ )	Deficiency ( $12 - < 30$ )	Normal ( $30 - 60$ )	Elevated ( $> 60$ )
Difference in AMH (PCOS-Control)	12.07	3.6	1.84	3.05
P value	0.008**	$< 0.001$ **	0.129	0.473

\*\* Statistically significant  $p < 0.05$

**FIGURE 1: MEAN AMH HIGHER IN VITAMIN D-DEFICIENT PCOS CASES COMPARED TO CONTROLS**



## RESULTS

- 1,268 charts were reviewed, and 124 charts met criteria, including 80 controls and 44 PCOS cases
- Covariates race, ethnicity, age and BMI were not significantly associated with AMH; therefore, these were not included in statistical modeling.
- Mean AMH for controls 3.16, and mean AMH for PCOS was 6.32. Mean vitamin D for controls was 32.04, and mean vitamin D level for PCOS was 29.77.

## CONCLUSION

- The relationship between vitamin D and AMH did not differ overall between controls or individuals with PCOS.
- However, vitamin D deficiency and severe deficiency were associated with higher AMH in PCOS patients.
- This suggests vitamin D-deficient PCOS patients might lower AMH and improve fertility through supplementation.
- Further research is needed to characterize the effects of supplementation.