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<td>Thys-Jacobs et al</td>
<td>Single Arm</td>
<td>13 PCOS</td>
<td>USA</td>
<td>1500mg calcium carbonate daily and 50,000 IU Vitamin D₂ (ergocalciferol) weekly or biweekly</td>
<td>6 months</td>
<td>Restoration of menstrual cycles (7/13), improvement of acne (3/13) and pregnancy outcome (2/13)</td>
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| Rashidi et al     | RCT          | 60 PCOS 3 groups (n=20) | Iran    | **Group 1**: 1000mg calcium and 400 IU Vitamin D per day  
**Group 2**: 1000mg calcium and 400 IU Vitamin D and 1500mg metformin per day  
**Group 3**: 1500mg metformin per day | 3 months treatment and 3 months follow up | Improvement of folliculogenesis and menstrual regularity in Group 2 | Not provided | 72        |
| Firouzabadi et al | RCT          | 100 PCOS 2 groups (n=50) | Iran    | **Group 1**: 1500mg metformin per day  
**Group 2**: 1500mg metformin/day plus 100mg calcium/day plus 100,000 IU Vitamin D/month | 6 months | Improvement of menstrual abnormalities, follicle development and infertility in Group 2 (non-statistically significant) | RIA                      | 73        |
| Asadi et al       | RCT          | 110 PCOS 2 groups (n=55) | Iran    | **Group 1**: 300,000 IU cholecalciferol once  
**Group 2**: Placebo | 2 months | Endometrial thickness (thicker) in Group 1  
No significant difference in pregnancy outcome between the two groups | Not provided | 74        |
| Wehr et al        | Single arm   | 46 PCOS      | Austria | 20,000 IU cholecalciferol per week | 24 weeks | Decrease of fasting and stimulated glucose, C-peptide levels, TG, estradiol levels  
Improvement of menstrual frequency (50%)  
Increase of total cholesterol and LDL | Enzyme immunoassay          | 75        |
| Selimoglu et al   | Single arm   | 11 PCOS      | Turkey  | 300,000 IU Vitamin D, orally, single dose | 3 weeks | Decrease in HOMA-IR  
No significant change in DHEAS, total and free testosterone, androstendione | RIA                      | 76        |
| Pal et al         | Single arm   | 12 PCOS      | USA     | Vitamin D₂ 2000 IU daily and Vitamin D₃ 50,000 IU monthly (modified to 50,000 IU weekly) and calcium 530mg/day | 3 months | Reduction in total testosterone and androstendione levels  
Reduction in BP  
No change in IR parameters | RIA                      | 77        |
| Razavi et al      | RCT          | 60 PCOS 2 groups (n=30) | Iran    | **Group 1**: Vitamin D 200 IU, Vitamin K 90 μg, Calcium 500mg twice a day  
**Group 2**: Placebo | 8 weeks | Reduction in serum free testosterone, DHEAS in Group 1 | ELISA                    | 78        |
| Kotsa et al       | Single arm   | 15 PCOS      | Greece  | 1 μg alphacalcidol/day | 3 months | Increase in first phase insulin secretion  
Increase in HDL and decrease in TG | RIA                      | 79        |

AMH: anti-Mullerian hormone; APO-A1: apolipoprotein A1; BP: blood pressure; DHEAS: dehydroepiandrosterone sulfate; FG: Ferriman-Gallwey score; HDL: high-density lipoprotein; HOMA-IR: homeostasis model assessment–insulin resistance; IR: insulin resistance; LDL: low-density lipoprotein; PCOS: polycystic ovary syndrome; PTH: parathyroid hormone; QUICKI: quantitative insulin-sensitivity check index; RCT: randomized controlled trial; RIA: radioimmunoassay; sENG: soluble endoglin; sRAGE: soluble form of receptor for advanced glycation end-products; TG: triglycerides; TGF-β1: transforming growth factor beta 1; VLDL: very low-density lipoprotein.
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| Ardabili et al | RCT          | 50 PCOS      | Iran    | Group 1: 50.000 IU Vitamin D<sub>3</sub>/20 days  
Group 2: Placebo orally | 2 months | Reduction in TG, total cholesterol, VLDL, PTH in Group 1  
No change in HOMA-IR, QUICKI, insulin levels  
No change in HDL-C, LDL-C, Apo-A1 | Chemoluminescence Immunoassay | 80/82 |
| Raja-Khan et al | RCT          | 28 PCOS      | USA     | Group 1: 12.000 Vitamin D<sub>3</sub>/day  
Group 2: Placebo orally | 12 weeks | No change in HOMA-IR, QUICKI, insulin levels | RIA | 81 |
| Asemi et al   | RCT          | 104 PCOS     | Iran    | Group 1: 1000 mg/day calcium plus Vitamin D placebo  
Group 2: 50.00 IU/week Vitamin D plus calcium placebo  
Group 3: 1000mg calcium/d plus 50.000 IU/week Vitamin D  
Group 4: calcium placebo plus Vitamin D placebo | 8 weeks | Decrease in insulin levels, HOMA-IR, TG, VLDL and increase in QUICKI in Group 3 | ELISA | 83 |
| Garg et al    | RCT          | 32 PCOS      | India   | Group 1: Metformin (500mg ×2 for weeks and 500mg ×3 for 6 weeks) plus Vitamin D<sub>3</sub> (120.000 IU once monthly)  
Group 2: Metformin (500mg ×2 for weeks and 500mg ×3 for 6 weeks) plus placebo | 6 months | No significant difference in HOMA-IR and insulin secretion | Chemiluminescence Immunoassay | 84 |
| Irani et al   | RCT          | 16 PCOS      | USA     | 50.000 IU of Vitamin D<sub>3</sub> orally once weekly | 8 weeks | Increase in serum sRAGE levels and decrease in serum AMH levels in PCOS | Immunoassay | 92 |
| Irani et al   | RCT          | 68 PCOS      | USA     | Group 1: 50.000 IU Vitamin D<sub>3</sub> orally once weekly  
Group 2: Placebo | 8 weeks | Increase in serum sENG and decrease in TGF-β1 bioavailability (TGF-β1/sENG ratio) in Group 1  
Decrease in FG score, TG, menstrual interval in Group1 | Immunoassay | 93 |

**TABLE 2. Vitamin D and PCOS – INTERVENTIONAL STUDIES.**

AMH: anti-Mullerian hormone; APO-A1: apolipoprotein A1; BP: blood pressure; DHEAS: dehydroepiandrosterone sulfate; FG: Ferriman-Gallwey score; HDL: high-density lipoprotein; HOMA-IR: homeostasis model assessment–insulin resistance; IR: insulin resistance; LDL: low-density lipoprotein; PCOS: polycystic ovary syndrome; PTH: parathyroid hormone; QUICKI: quantitative insulin-sensitivity check index; RCT: randomized control trial; RIA: radioimmunoassay; sENG: soluble endoglin; sRAGE: soluble form of receptor for advanced glycation end-products; TG: triglycerides; TGF-β1: transforming growth factor beta 1; VLDL: very low-density lipoprotein.