Background Several studies have shown an association between low 25-hydroxy-vitamin D levels (25(OH)D) and increased prevalence of metabolic syndrome (MetS), total adiposity and insulin resistance in obese and patients with type 2 diabetes.

Objective The aim of this study was to investigate the association between 25(OH)D levels and insulin resistance markers in adolescents with polycystic ovary syndrome (PCOS) and to show changes in these parameters after 3 months treatment with 4000 IU/d vit D3.

Methods We determined body mass index (BMI), body fat percentage (BF%) and serum 25(OH)D, leptin/adiponectin ratio, HOMA-IR index, HDL, triglycerides, FSH, LH and free testosterone (FT) levels in 51 girls with PCOS (mean age 16.8 ± 1.1 year) at the admission and 3 months after vit D therapy.

Results All of the girls had insufficient levels of 25(OH)D (less than 25 mg/ml). 25(OH)D levels were negatively correlated with BMI (r = -0.262), BF% (r = -0.232), HOMA-IR (r = -0.195), leptin (r = -0.283) and triglycerides (r = -0.189), and positively correlated with adiponectin (r = 0.264), and HDL levels (r = 0.258), all p < 0.05.

3 months after therapy 25(OH)D levels increased from 17.3 ± 6.3 ng/ml to 39.1 ± 9.2 ng/ml (p = 0.029), HOMA-IR decreased from 4.98 ± 0.42 to 3.35 ± 0.45, leptin/adiponectin ratio from 7.39 ± 0.03 to 5.98 ± 0.03 and triglycerides levels from 2.32 ± 0.32 to 1.68 ± 0.27 (p = 0.009). There were no significant changes in BMI, BF%, HDL, FSH, LH and FT levels.

Conclusions There is a significant association between low 25(OH)D levels and insulin resistance markers in adolescents with PCOS. Correcting 25(OH)D levels improves insulin sensitivity but does not improve hyperandrogenism and LF/FSH ratio in adolescents with PCOS.