Polycystic ovary syndrome (PCOS) is a heterogeneous disorder characterized by hyperandrogenism, ovarian dysfunction, and polycystic ovarian morphology. Young patients with PCOS but no additional risk factors for cardiovascular disease have a significant impairment of endothelial structure and function. In particular, when compared with control subjects matched for age and BMI, patients with PCOS had abnormal brachial artery diameter at baseline and after reactive hyperemia and showed abnormal flow-mediated dilation and an increased intima-media thickness in their common carotid arteries. A subsequent clinical study showed that a 6-month course of biguanidine metformin improved these parameters of endothelial structure and function significantly, which suggested that metformin has a beneficial effect in reducing the long-term risk of cardiovascular disease in patients with PCOS. Moreover, in patients with type 2 diabetes, metformin has been demonstrated to increase serum levels of homocysteine. Increased concentrations of homocysteine are a well-known risk factor for coronary heart disease and stroke. The acute effect of metformin on insulin sensitivity could either increase serum homocysteine levels directly or induce malabsorption of vitamin B12 indirectly. Other unknown adjunctive mechanisms cannot be excluded.

Based on these considerations, the aim of the present study was to evaluate whether the administration of metformin exerts any effect on serum homocysteine levels in patients with PCOS and whether supplementation with folate enhances the positive effects of metformin on the structure and function of the vascular endothelium.

The procedures used during the study were in accordance with the guidelines of the Helsinki Declaration on human experimentation.

The data of the effect of monotherapy of metformin and combination therapy metformin with folate on the levels of homocysteine and folic acid in patients with PCOS was shows. Monotherapy has lead to a reduction a insulin resistance, index HOMA, has moderate antiandrogen effect and positive effect on lipid levels, while level of folic acid remained low and the concentration of homocysteine in the blood serum increased on 18.3%. Combination therapy is not increase the therapeutic effect on carbohydrate metabolism and hormonal parameters, but leads to increased of the folate concentration of 12.4% and lowers homocysteine levels by 14.3% in comparison with basal levels. Our findings demonstrated that the increase in plasma homocysteine concentrations that was attributable to metformin treatment was not associated with any significant effect on the level of serum folate or vitamin B12.