**Introduction**
To evaluate the performance of three-dimensional (3D) placenta volume (PV) and 3D power Doppler indices at first trimester of pregnancy in the prediction of preterm delivery.

**Methods**
A prospective cohort study including women with single pregnancies who underwent sonogram between 10-12 weeks of gestation. PV and 3D Doppler indices including vascularization index (VI), flow index (FI) and vascularization flow index (VFI) were measured using 3D power Doppler imaging and the VOCAL technique. Preterm delivery is defined as a spontaneous delivery before 37 weeks of gestation with labor or premature rupture of membrane. Cases of preeclampsia was excluded. The predictive ability of each variable was evaluated using receiver-operating characteristic (ROC) curves.

**Results**
Results: Of 342 women included, 300 women were followed until delivery and preterm delivery was occurred in 35 women. Low Z-value of PV, VI, FI, and VFI were significantly associated with preterm delivery by Mann-Whitney U-test. (p= 0.002, 0.025, 0.029 and 0.013, respectively). Multivariate analysis showed that these factors were significantly associated with preterm delivery.

**Conclusion**
The study suggests that low 3D PV between 10-12 weeks of gestation is associated with subsequent spontaneous preterm delivery.