**Objective:** To investigate morphological changes of the placentas in pre-gravid overweight women during the first trimester using three-dimensional ultrasound.

**Methods:** This was a prospective observational study of the morphology of placentas in pre-gravid overweight (BMI ≥ 24 kg/m²) and normal weight (BMI < 24 kg/m²) women during the first trimester of pregnancy. Data on placental vascular indices (vascularization index (VI), flow index (FI), and vascularization flow index (VFI)), placental volume, uterine artery pulsatility index (PI), and neonatal outcomes were obtained during the first trimester and analyzed. Linear regression analysis was used to evaluate confounding factors between BMI and ultrasound indices.

**Results:** Of the 429 pregnant women enrolled, 68 (15.9%) were pre-gravid overweight. Placental VFI was significantly lower in the overweight group \((P = 0.037)\). Conversely, placental volume was significantly larger in the overweight group \((P = 0.044)\), and uterine artery PI was significantly higher in the overweight group \((P = 0.021)\). After adjustments for confounding factors, there were still significant differences in placental VFI (unstandardized coefficient (B) -0.666, 95% confidence interval (CI) -1.306, -0.025, \(P = 0.042\)), placental volume (B 2.458, 95% CI 0.071, 4.844, \(P = 0.044\)), and uterine artery PI (B 0.159, 95% CI 0.013, 0.304, \(P = 0.033\)) between the two groups.

**Conclusions:** Alterations in placental VFI, placental volume, and uterine artery PI occur as early as the first trimester in pre-gravid overweight women.