

First trimester screening for early and late preeclampsia based on maternal characteristics, biophysical parameters and angiogenic factors

Crovetto F, Figueras F, Triunfo S, Crispi F, Rodriguez-Sureda V, Dominguez C, Llurba E, Gratacos E
Barcelona Center for Maternal-Fetal and Neonatal Medicine, Barcelona, Spain

Objective

To develop the best first trimester screening model for the prediction of preeclampsia (PE) based on combination of maternal characteristics with biophysical parameters and angiogenic factors in a low-risk Mediterranean population.

Methods

A nested case-control study drawn from a prospective first trimester cohort of singleton pregnancies (2007-2012). Logistic regression-based predictive models were developed for the prediction of early and late PE, using as a cut-off the 34th week of gestation of delivery. The model included the a priori risk (maternal characteristics), mean arterial pressure (MAP) and uterine artery (UtA) Doppler (11-13 weeks), and the measurement of the angiogenic factors (8-11 weeks), placental growth factor (PlGF) and soluble Fms-like tyrosine kinase-1 (sFlt-1), normalized by logarithmic transformation.

Results

Of the 9,462 enrolled participants, 57 (0.6%) developed early PE and 246 (2.6%) late PE. For early PE, significant contributions were black ethnicity, chronic hypertension, renal disease, nulliparous women or multiparous women with previous PE, together with MAP, UtA Doppler, PlGF and sFlt-1. A model including these predictors achieved detection rates (DR) of 88% and 91% for 5% and 10% false positive rates (FPR), respectively (AUC: 0.98 [95%CI: 0.97-0.99]), and PlGF improved it by 11%. For late PE, significant contributions were provided by white ethnicity, chronic hypertension, nulliparous women or multiparous women with previous PE, smoking status, together with MAP, UtA Doppler, PlGF and sFlt-1. The model including these factors achieved DR of 68% and 76% at 5% and 10% of FPR, respectively (AUC: 0.87 [95%CI: 0.84-0.90]), and PlGF/sFlt-1 improved it by 20%.

Conclusion

The best model for first trimester screening for PE in a Mediterranean population was achieved combining maternal characteristics, MAP, UtA Doppler and angiogenic factors. Angiogenic factors substantially improved the prediction early and late PE.