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Screening of first trimester competing risk model prediction for small for gestational age

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Objective

To examine the external validity of the new Fetal Medicine Foundation (FMF) competing risk model for the prediction of small for gestational age (SGA) at 11-14 weeks of gestation in Asian population.

Methods

This is a secondary analysis of a multicenter prospective cohort study in 10,120 women with singleton pregnancies undergoing routine assessment at 11-14 weeks of gestation. We applied the FMF competing risk model for the first-trimester prediction of SGA combining maternal characteristics and medical history with measurements of mean arterial pressure (MAP), uterine artery pulsatility index (UtA-PI), and serum placental growth factor (PlGF). We obtained risks for different cut-offs of birth weight percentile and gestational age at delivery. We examined the predictive performance in terms of discrimination and calibration.

Results

The predictive performance of the competing risk model for SGA was similar to that reported in the FMF study. Specifically, the combination of maternal factors with MAP, UtA-PI, and PlGF yielded the best performance for the prediction of preterm SGA <10th percentile (SGA<10th) and preterm SGA <5th percentile (SGA<5th), with the areas under the curves (AUCs) of 0.765 (95% confidence interval [CI], 0.720-0.809) and 0.789 (95%CI, 0.736-0.841), respectively. Combining maternal factors, MAP, and PlGF yielded the best model for predicting preterm SGA <3rd percentile (SGA<3rd), with an AUC of 0.797 (95%CI, 0.744-0.850). After excluding preeclampsia (PE) cases, the combination of maternal factors with MAP, UtA-PI, and PlGF yielded the best performance for the prediction of preterm SGA<10th and SGA<5th, with AUCs of 0.743 (95%CI, 0.691-0.795) and 0.762 (95%CI, 0.700-0.824), respectively. However, the best model for predicting preterm SGA<3rd without PE was the combination of maternal factors and PlGF, with an AUC of 0.786 (95%CI, 0.723-0.849). The FMF competing risk model including maternal factors, MAP, UtA-PI, PlGF achieved DRs of 42.2%, 47.3%, and 48.1%, at the fixed FPR of 10%, for the prediction of preterm SGA with birth weight <10th, 5th and 3rd percentiles, respectively. The calibration of the new model was satisfactory.

Conclusion

The screening performance of the new FMF first trimester competing risk model for SGA in an independent large cohort of Asian women is comparable to that reported in the original FMF study on a mixed European population. The FMF SGA prediction model can be implemented as part of routine prenatal care by using existing healthcare infrastructure for preeclampsia screening.