



Comparison of screening performance of first-trimester prediction algorithms for preeclampsia in an Asian population

Chaemsaihong P, Zheng M, Sahota D, Sun Q, Shaw SS, Chaityasit N, Koide K, Tokunaka M, Choolani M, Sekizawa A, Uerpaiojkit B, Ma R, Hu Y, Poon LC

The Chinese University of Hong Kong, Hong Kong, Hong Kong

Objective

To examine the screening performance of previously developed first-trimester prediction models for preeclampsia (PE) in an unselected Asian population.

Methods

This was a prospective, non-intervention, multicenter study in 3, 786 singleton pregnancies at 11-13 weeks in seven recruiting centers in China, Hong Kong, Japan, Singapore, Taiwan and Thailand during January 2017 until January 2018. We excluded 236 (6. 2%) because they had missing outcome data (n=175), or the pregnancies resulted in gestational trophoblastic disease (n=2) or miscarriage before 24 weeks of gestation (n=32), or were terminated (n=27). Maternal characteristics, and measurements of mean arterial pressure (MAP) by validated automated devices, mean uterine artery pulsatility index (UtPI) by transabdominal color Doppler ultrasonography and maternal serum placental growth factor (PIGF) concentration were recorded. Previously published algorithms based on European data were used for converting the measured values of MAP, UtPI, and PIGF into multiples of median (MoMs), adjusting for characteristics found to provide a substantive contribution to the log10 transformed value including the maternal factors in the prior history model. PIGF was adjusted for analyzers. Further, the biomarker MoM values were adjusted for regional differences. Two previously published algorithms (USA, Spain) were used for the calculation of patient-specific risk of PE in each patient. The detection rates and false positive rates for all-PE, PE with delivery at <37 (preterm-PE) and >37 weeks (term-PE) were estimated based on each algorithm.

Results

In the 3, 550 cases there were 70 (2. 0%) cases that developed PE, including 22 (0. 6%) and 48 (1. 4%) with delivery at <37 and >37 weeks, respectively. In pregnancies that experienced PE, the median MAP multiple of median (MoM) was increased (1. 07 vs. 0. 99; $p<0. 001$), and the median PIGF MoM was decreased (0. 73 vs. 1. 03; $p<0. 001$). The median UtPI MoM was not significantly different (1. 05 vs. 1. 01). For MAP and PIGF, the deviation from normal was greater for preterm-PE than term-PE. In combined screening by maternal factors, biophysical and biochemical markers, area under the receiver-operating characteristics curve (AUC) and detection rate at 10% false positive rate for preterm-PE using the algorithms from the USA and Spain were 0. 780 (95% confidence interval [CI] 0. 683-0. 876) and 55. 0%, and 0. 788 (95% CI 0. 674-0. 902) and 57. 9%, respectively. The AUCs and detection rate for the prediction of all-PE when applying the USA model were 0. 755 (95% CI 0. 691-0. 819) and 37. 0%. The respective values for term-PE with the use of the Spanish model were 0. 635 (95% CI 0. 551-0. 720) and 29. 2%.

Conclusion

First-trimester screening for PE can be achieved with the use of the USA and Spanish models.