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Measurement of biomarkers for first-trimester preeclampsia screening in Asia

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Objective

To (i) evaluate potential differences in biomarker values for preeclampsia (PE) screening in an Asian population in comparison to an European population; and (ii) assess quality assurance of the biomarker measurements between centers across seven regions in Asia.

Methods

This was a prospective, non-intervention, multicenter study in 7, 493 singleton pregnancies at 11-13 weeks in 12 recruiting centers in China, Hong Kong, India, Japan, Singapore, Taiwan and Thailand. The women were screened for PE between January 2017 and March 2018 and gave written informed consent to participate in the study. Maternal factors were recorded, mean arterial pressure (MAP) was measured by validated automated devices according to a standardized protocol, transabdominal color Doppler ultrasound was used to measure the left and right uterine artery pulsatility index (UtPI) and the average value was recorded, and serum placental growth factor (PlGF) concentration was measured by an automated device. All operators undertaking the Doppler studies had received the appropriate Certificate of Competence from the Fetal Medicine Foundation. Previously published algorithms based on European data were used for converting the measured values of MAP, UtPI, and PlGF 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. In addition, PlGF was adjusted for analyzers.

Results

In the total screened population, the median (interquatile range) MoM values of MAP, UtPI, and PlGF were 0. 961 (0. 906-1. 023), 1. 095 (0. 916-1. 299) and 0. 805 (0. 624-0. 899), respectively. In addition, despite correction for gestational age at screening, there was a linear reduction in the MAP MoM and UtPI MoM with increasing gestation; suggesting a larger physiological reduction in the biophysical markers with gestation in Asian women (MAP: slope -0. 001, p<0. 001; UtPI: slope -0. 002; p=0. 027). Following hands-on training, all except two centers demonstrated that the UtPI data were within 10% of the expected measurement distributions, whilst all centers demonstrated that the MAP data were within 10% of the expected measurement distributions. However, differences in MAP MoM and UtPI MoM between centers were observed with the median MoM values at 0. 927-0. 970 and 0. 993-1. 110, respectively (ANOVA: p<0. 001 for both).

Conclusion

Owing to the anthropometric differences in Asian women, significant changes in the biomarkers for PE screening have been observed and should be adjusted for normalization of data prior to incorporation for patient-specific risks calculation.