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A biophysical index versus maternal age for preeclampsia risk classification at 11-14 weeks' gestation in a developing country population

Rivas-Dow A, Carrasco-Blancas ER, Cortes-Martinez MA, Cervantes-Ricaud AJ, Vivanco-Garin I, Moreno-Bonilla F, Oviedo-Cruz H.
Hospital Sociedad de Beneficencia Española: Hospital Español, Mexico City, Mexico

Objective

To assess the effects of maternal age (MA), body mass index (BMI), and mean arterial pressure (MAP) at the first trimester on the outcome delivery with pre-eclampsia in a Mexican population.

Methods

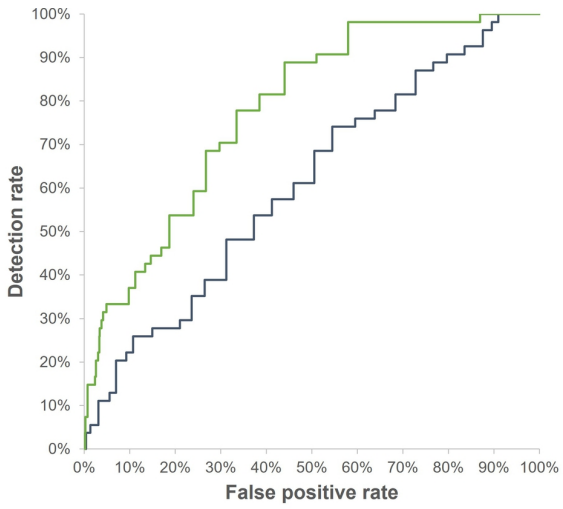
A cohort study was conducted in singleton pregnancies. All predictive variables were measured at 11 to 14 weeks' gestation according to a standardized methodology. MAP was obtained from the basal state of the women, and the absolute values in mmHg were used. Pre-eclampsia was defined according to the International Society of Hypertension criteria. The outcome was defined as pre-eclampsia at delivery, following the competing risks approach. Statistical analysis included performance, multiple logistic regression, and multivariate normal distribution likelihood ratio (LR); all assumptions were secured.

Results

A total of 1117 pregnancies were included, with 54 (4.8%, CI95 3.7 - 6.0) deliveries with pre-eclampsia. MA > 35 years had a detection rate (DR) of 38.9% (27.1 - 50.7) and 31.2% of false positive rate (FPR). In the multivariable analysis, MA was removed (p = 0.130), and an interaction between MAP and BMI was observed (p = 0.009). The correlation between MAP and BMI differed between the outcome groups; then a bivariate normal distribution model with distinct covariance matrices was constructed. Each calculated LR was treated as a biophysical index or classifier. At 10% of FPR, the biophysical index was 2.0 with a DR of 35.2% (23.6 - 46.8) and a predictive negative value (PNV) of 96.5% (95.4 - 97.5). At 3% of FPR, the biophysical index was 4.0 with a predictive positive value (PPV) of 25.6% (13.7 - 37.4).

Conclusion

A biophysical risk index performed better than MA because of a lower FPR and a high PNV. This may be of value for primary care services in developing countries. A higher cut-off point can optimize the referral to tertiary centers. The association between MA and pre-eclampsia was of the confounder type with respect to the biophysical variables.



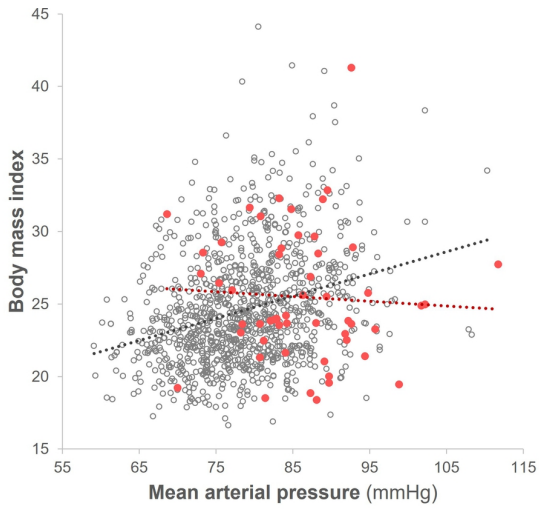


Figure 1.

a. Receiver-operator characteristic curve for pre-eclampsia at delivery by maternal age (gray), and by a developed biophysical index (green) at 11-14 weeks' gestation.

b. Scatterplot between mean arterial pressure and body mass index at 11-14 weeks' gestation by outcome groups (gray, no pre-eclampsia at delivery; red, pre-eclampsia at delivery).