

External validation of the new model for prediction of small for gestational age neonate from biophysical and biochemical markers at 11–14 weeks' gestation

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Objective

To test the performance of the Fetal Medicine Foundation (FMF) competing risks new model for prediction of small for gestational age (SGA) neonate from biophysical and biochemical markers at 11–14 weeks' gestation, in a Mexican population.

Methods

A cohort study of singleton pregnancies attending at a Fetal Medicine Centre in Mexico City for routine first trimester combined test. Maternal characteristics were measured according to the FMF definition. Gestational age (GA) was established by crown-rump length. Mean arterial pressure (MAP), uterine artery mean pulsatility index (UtAmPI) and pregnancy-associated plasma protein A (PAPP-A) were measured according to FMF standardization. Birth weight Z-scores (Z) were calculated from FMF reference values. Exclusion criteria were pregnancies with birth defects, and any termination of pregnancy < 24 weeks' gestation. A standalone program was created to calculate the a priori personalized joint probability distribution f (Z, GA) for any selected region R2, and the posttest Bayes' probability from the respective likelihoods of the biological markers, according to the folded-plane FMF regression models. The performance of the model was tested for all SGA < 10th centile neonates.

Results

A total of 1180 pregnancies were included with 79 (7%, CI95: 5 - 8) neonates < 10th centile, and 50 (4%, 3 - 5) deliveries with PE. The best performance resulted from the model centered at 37 weeks and 3rd centile. The area under the receiver operator characteristic curve was 0.77 (0.70 - 0.84) for all SGA < 10th centile neonates. At respective 5%, 10% and 20% of false positive rates (FPR), the detection rates (DR) were 28%, 45% and 62%, with cut-off points of 1 in 23, 1 in 30 and 1 in 40.

Conclusion

The new FMF calculator based on biophysical and biochemical markers, centered at 37 weeks and 3rd centile, performed better than expected for all SGA < 10th centile neonates. Further research in strata of deliveries with and without PE is warranted. The effect of adapting the model to the reference values of the target population, remains to be investigated.

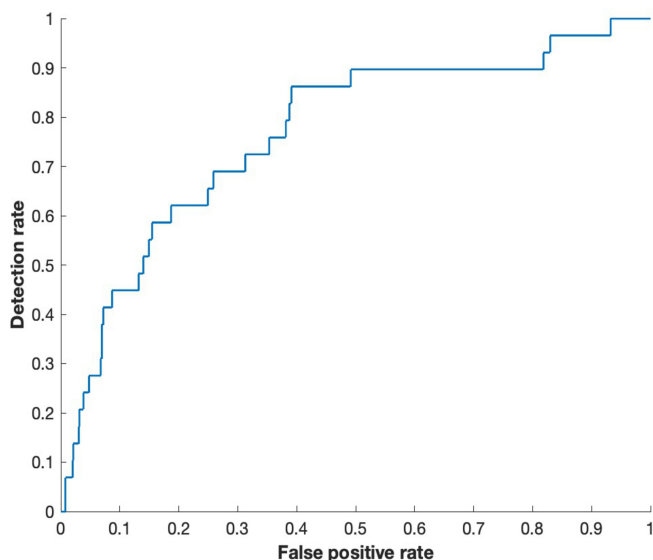


Figure 1. Receiver-operator characteristic curve of the Fetal Medicine Foundation competing risks new model for prediction of small for gestational age neonate < 10th centile from biophysical and biochemical markers at 11–14 weeks' gestation, in a Mexican population. The best model was centered at 37 weeks and 3rd centile.