



Applying the FMF 2012 algorithm for PE screening to Brazilian population: The effect of ethnicity on screening for PE

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Objective

To evaluate the effect of black ethnicity on the performance of PE screening using The Fetal Medicine Foundation (FMF2012) algorithm on Brazilian population.

Methods

This is a cross-sectional study approved by the Research Ethics Committee. The secondary evaluation of data collected from 1531 first trimester screening tests of singleton pregnancies. This study took place in Maternidade Escola da Universidade Federal do Rio de Janeiro (ME / UFRJ) between October 2010 and December 2015. The ethnicity was characterized as white, mixed or black. This information was collected from 1st trimester screening reports. The risk for PE development was calculated using the predictive model of FMF2012 algorithm. The FMF2012 is a free algorithm that estimates the likelihood of developing PE using maternal factors which includes, ethnicity, age, weight, height, history of diabetes, chronic hypertension, autoimmune diseases and use of assisted reproduction techniques), together with biophysical markers such as mean arterial blood pressure and uterine arteries pulsatility index. The diagnosis of early PE was based on the onset of systolic blood pressure ≥ 140 mmHg and / or diastolic ≥ 90 mmHg and proteinuria > 300 mg / 24h after 20 weeks of gestation, which requires delivery before 34 weeks (PE <34 or early PE) or before 37 weeks (PE <37 or preterm PE). The test is considered positive when the risk value for early PE is greater than 1/200 or when the risk for preterm PE is greater than 1/57. In order to reach our purpose, the following steps were followed: (1) identification of pregnant women characterized as black ethnicity / skin color; (2) determination of early PE and preterm PE prevalence in the studied sample; (3) calculation of early PE and preterm PE risk by FMF2012 algorithm, in these pregnant women, reclassifying them as white / mixed, representing the baseline risk; (4) correlation of the original risk values with the "new risk"; (5) construction of the receiver operator characteristic (ROC) curve; (6) calculation of the area under the curve (AUC), sensitivity and false positive rate and respective 95% confidence intervals (CI); (7) comparison of the AUC, sensitivity and false positive of the original risk with the "new risks" by chi-square test, and the differences were considered significant if $p < 0.05$.

Results

We identified 296 (19, 3%) patients as black. The sample had 11 (0.72%) cases which developed of early PE and 26 (1.7%) cases which developed preterm PE. Out of these 3 cases of early PE and 6 cases of preterm PE occurred in pregnant women were black. The comparison of FMF2012 predictive model performance for PE <34 and PE <37 among the studied population by considering the originally estimated risks, with pregnant women of black skin color classified as black ethnicity and the estimated "new risks", which considers all patients as white/mixed race (baseline risk) are described as follows: (1) detection rates for PE <34 : 63%(95%CI: 35-92) and 54% (95%CI: 25-89), $p=0.66$ and for PE <37 : 46%(95%CI: 27-65) and 38% (95%CI: 20-57), $p=0.57$; (2) false positive rate for PE <34 : 13, 9%(95%CI: 12, 2-15, 5) and 11, 5% (95%CI: 10-13), $p=0.05^*$ and for PE <37 : 13, 9%(95%CI: 12, 2-15, 7) and 11, 5% (95%CI: 10-13), $p=0.04^*$; (3) AUC for PE <34 prediction: 0, 84(95%CI: 0, 71-0, 97) and 0, 80 (95%CI: 0, 65-0, 96), $p=0.17$; and for PE <37 prediction: 0, 77(95%CI: 0, 68-0, 86) and 0, 76 (95%CI: 0, 65-0, 85), $p=0.36$. The small number of early PE cases in the studied sample, quantified a significant improvement on the false positive rate, decreasing it and there was no significant difference on the sensitivity and on the AUC, what sintetizes the diagnosis test performance. This also repeated on the performance of the preterm PE screening, besides the twice number of cases.

Conclusion

The present study proposed a new strategy to use the predictive model of PE - FMF2012, applied on the first trimester of

gestation, in Brazilian women, in order to optimize its application while a customized model for our population is not available yet. The study has value for increasing the understanding on the effect of black ethnicity in our sample and testing an alternative approach that can bring more prospects to prenatal follow-up and improvement in health indicators. Black ethnicity classification of brazilian pregnant women increases the false positive rate of FMF2012 PE screening test, when applied on the first trimester of gestation.

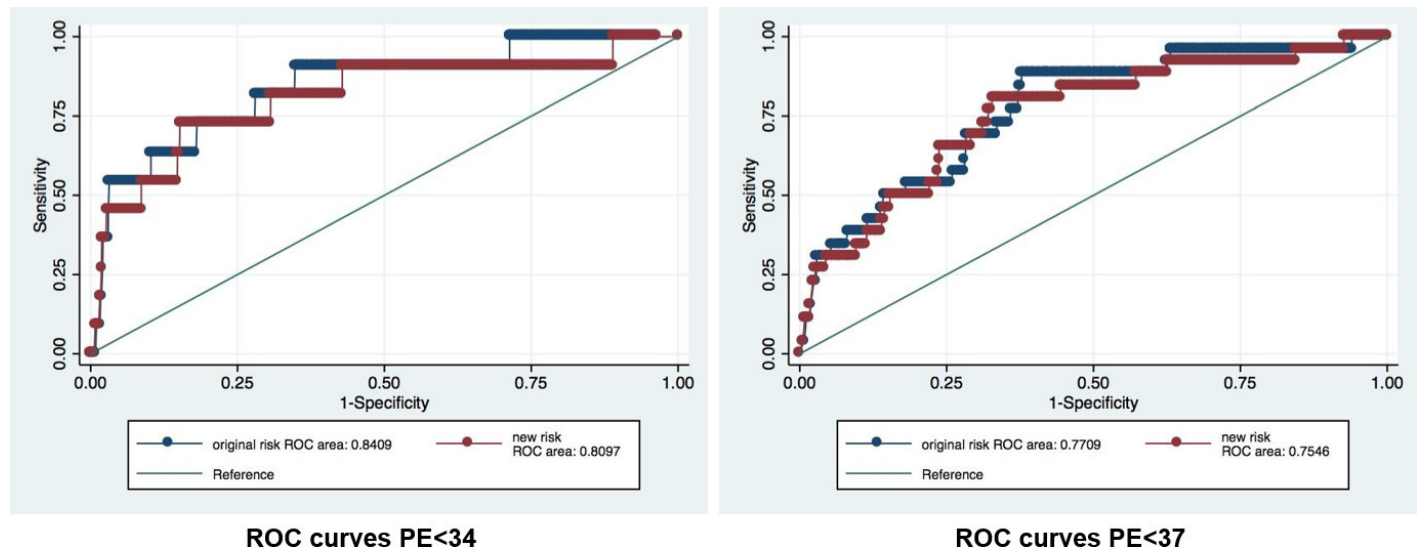


Table 1. Results of the evaluation of the performance of the FMF2012 predictive model.

		Sensitivity (IC95%)	<i>p</i>	False positive (IC95%)	<i>p</i>	AUC	<i>p</i>
PE<34	original risk	63% (35-92)	0,66	13,9% (12,2-15,6)	0,05*	0,84 (0,71-0,97)	0,17
	"new risk"	54% (25-89)		11,5% (10-13)		0,80 (0,65-0,96)	
PE<37	original risk	46% (27-65)	0,57	13,9% (12,2-15,7)	0,04*	0,77 (0,68-0,86)	0,36
	"new risk"	38% (20-57)		11,5% (10-13)		0,76 (0,65-0,85)	