FIRST TRIMESTER COMBINED PRE-NATAL SCREENING: EVALUATION OF NINE YEARS AS FMF CERTIFIED LABORATORY

M.J. Sousa, MD; R. Ribeiro, BIOCH; G. Cruz, BIOCH; M. Albuquerque, MD; J.G. Sousa, MD; G. Sousa, MD

Centro Medicina Laboratorial Dr. Germano de Sousa

ABSTRACT

After eight years as Fetal Medicine Foundation Certified Laboratory (FMF-CL), the authors want to demonstrate the importance of using correct technology and correct procedures that allow detecting the highest number of True Positive Cases of Trissomy 21, 18 and 13, and lowering the unnecessary amniocentesis.

In biochemical analysis measurements the use of a technique which provides automated, precise and reproducible results, is critical . The biochemical markers are Free Beta-hCG and PAPP-A for First Trimester Screening. All the procedures recommended by FMF: quality control, technology used for biochemistry markers and the ultrasonographic data that the laboratory is working with (an essential component of Prenatal screening) for accurate dating of the pregnancy by ultrasound (otherwise the detection rate is reduced by about 10%), allow us to give very accurate risks, and decrease the number of amniocentesis in women aged 35 or more. We purpose also, to evaluate the correlations between Free Beta-hCG/PAPP-A MoMs and several maternal characteristics, including racial origin, weight, smoking and method of conception.

METHODS

Screening analysis was performed between June 2005-2013. The FMF-CL uses a immunoassay analyser with Time-Resolved-Amplified-Cryptate-Emission (TRACE technology) – KRYPTOR (BRAHMS). The biochemical markers are Free βhCG and PAPP-A for First Trimester Screening, from BRAHMS. The three level Internal Quality Control are analysed on a daily basis, with a Coeficcient Variation less than 3%. The Certified Laboratory participates in UK-NEQAS for First Trimester Downs Syndrome Screening. For statistics evaluations the laboratory uses a ANOVA with 95% of Confidence Interval, and descriptive statistics performed on Minitab Software.

RESULTS

FIGURE 1. FBhCG MoMs and PAPP-A MoMs Population distribuition and characterization

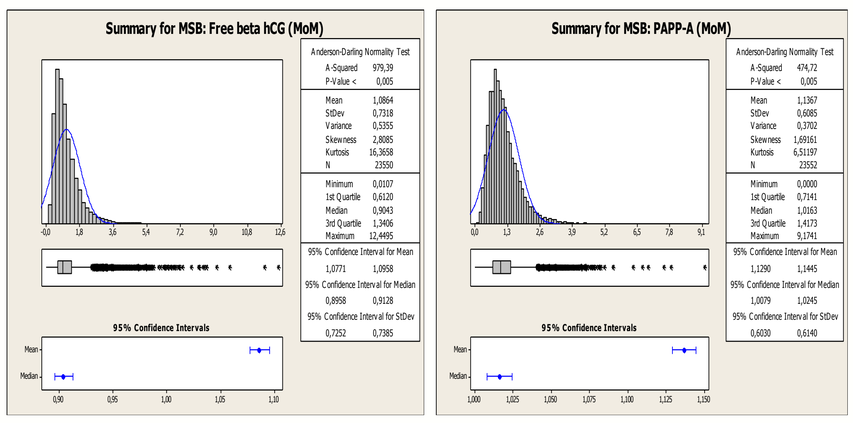

FIGURE 2. Ethnicity and smoking effect in FBhCG MoMs and PAPP-A MoMs

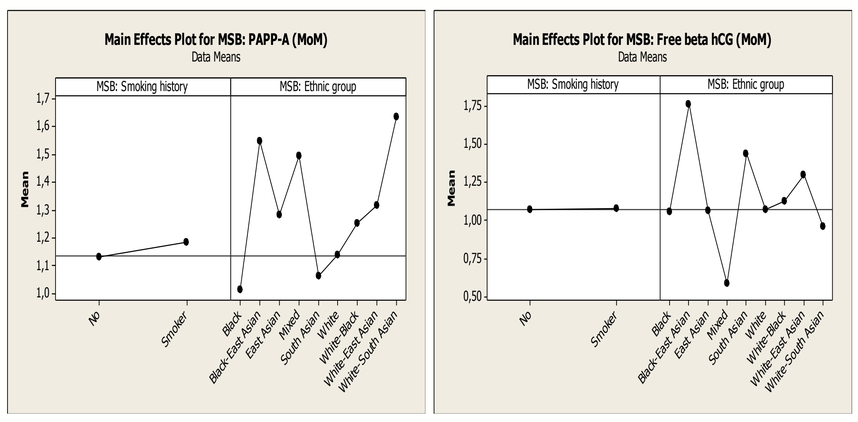

FIGURE 5. On basis of the maternal age distribution it is expected that the population contains 56 cases of Trissomy 21.

		Karyotype		
n=	23587	Normal	Abnormal	
Prenatal Screening	Neg	22644	6	22650
	Pos	902	35	937
		23546	41	23587

FIGURE 3. Conception and pregnancy complications effects in FBhCG MoMs and PAPP-A MoMs

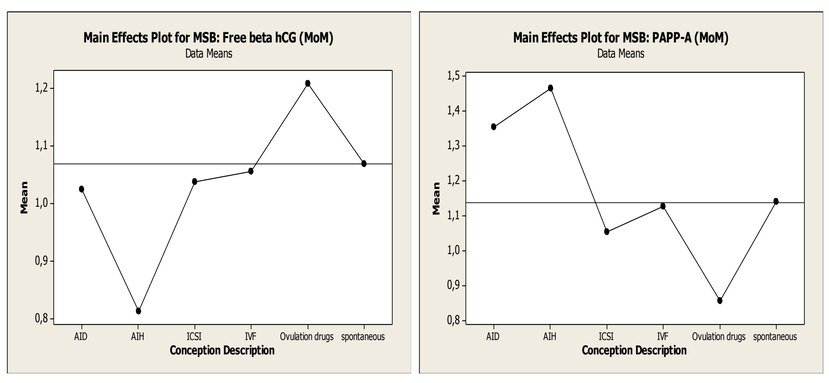

FIGURE 4. Conception and pregnancy complications effects in Birth weight

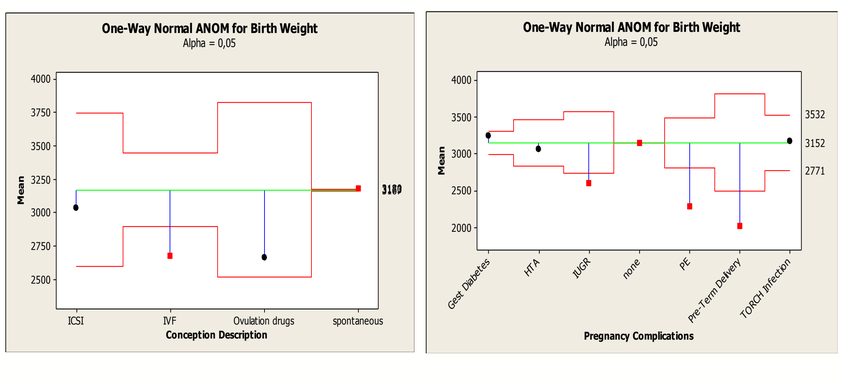

FIGURE 6. Performence details of FMF Prenatal Screening

False Positive Rate (FPR)	3,82%
False Negative Rate (FNR)	0,03%
Sensibility	85,37%
Specificity	96,17%
Positive Pretictive Value (PPV)	3,74%
Negative Predictive Value (NPV)	99,97%

DISCUSSION

We evaluate in our population the correlations between Free Beta-HCG/ PAPP-A MoMs and several maternal characteristics, including racial origin, weight, smoking and method of conception, being evident an increase in PAPP-A MoMs in smokers and in no spontaneous gestations and decrease in diabetic patients. We analyze the cross-effect of the smoke and diabetes in both biochemical variables. In both we verify the potentiating effect of both these factors, that are not as evident when only one is present. We interpret the results between PAPP-A-MoMs and birth weight, and compare with other bibliography.

In this period 23587 patients were examined. The median maternal age at term was 33 years, and there were 23% aged 35 or more. The risk estimated was 1:300 or higher in 3,97% fetuses. Techinal variations with more than 4% of Coeficient Variation in the determination of Free βHCG and PAPP-A, can give variations in the calculation of the risk over 25% [*Spencer, 2003, DS News*]. Laboratories that do no follow the FMF criteria can present False Positive Rates (FPR) of 30% and over. Our FRP is 3,82%. Regarding FMF the FPR maximum expected is 5%. The smoker variable and diabetes are effectively important parameters when combined risk is performed, and the decision action is taken based on FMF criteria and their accurated risks.