

Maternal serum free- β -chorionic gonadotrophin, pregnancy-associated plasma protein-A and fetal nuchal translucency thickness at 10–13⁺⁶ weeks in relation to co-variables in pregnant Saudi women

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Objective To establish normative values and distribution parameters of first-trimester screening markers, namely, fetal nuchal translucency (NT), maternal serum free β -human chorionic gonadotrophin (β -hCG) and pregnancy-associated plasma protein-A (PAPP-A), at 10 to 13⁺⁶ weeks of gestation in Saudi women and to evaluate the effect of co-variables including maternal body weight, gravidity, parity, fetal gender, twin pregnancy, smoking and ethnicity on these markers.

Methods A cohort of Saudi women (first cohort $n = 1616$) with singleton pregnancies prospectively participated in the present study, and fetal NT together with maternal serum free β -hCG and PAPP-A were determined at 10 to 13⁺⁶ weeks of gestation. The distribution of gestational age-independent multiples of the median (MoM) of the parameters was defined and normative values were established, and correction for maternal body weight was made accordingly. The influence of various co-variables was examined using the data collected from the first and the second ($n = 1849$) cohorts of women and 62 twin pregnancies, and compared with other studies.

Results All markers exhibited log-normally distributed MoMs. Gestational age-independent normative values were established. Maternal body weight was corrected, particularly for maternal free β -hCG and PAPP-A using standard methods. Fetal NT showed a negative relationship with increasing gravidity ($r = -0.296$) or parity ($r = -0.311$), whereas both free β -hCG and PAPP-A exhibited a significant positive relationship. There was a significant increase in the MoM of free β -hCG in female fetuses. Smoking decreased MoM values of free β -hCG (by 14.6%; $P < 0.01$) and PAPP-A (by 18.8%; $P < 0.001$). Twin pregnancy showed significant increases in MoM values of free β -hCG (by 1.87-fold) and PAPP-A (by 2.24-fold), with no significant changes in fetal NT MoM values. Fetal NT MoM values were lower in Africans and Asians but higher in Orientals, as compared to Saudi women ($P < 0.05$; in each case). MoM values (body weight-corrected) of free β -hCG were 25.2% higher in Africans and 19.4% higher in Orientals but 6.8% lower in other Arabian and Asian (by 5.8%) women as compared to Saudi women ($P < 0.05$; in each case).

Conclusions The normative values and distribution parameters for fetal NT, maternal serum free β -hCG and PAPP-A were established in Saudi singleton pregnancies, the maternal body weight together with smoking, twin pregnancy and ethnicity being important first-trimester screening co-variables. Gravidity, parity and fetal gender are also considered to influence one or more of the first-trimester markers examined. Copyright © 2007 John Wiley & Sons, Ltd.

KEY WORDS: first trimester; fetal nuchal translucency; maternal serum screening; co-variables

INTRODUCTION

Recent studies have shown that screening for trisomy 21 using a combination of maternal serum biochemical

markers, namely, free β -chorionic gonadotrophin (free β -hCG) and pregnancy associated plasma protein-A (PAPP-A) together with fetal nuchal translucency (NT) thickness, can achieve detection rates of about 77 to 90% in the first trimester of pregnancy with false-positive detection (FPD) rates ranging from 3.3 to 5.2% (Orlandi *et al.*, 1997; De Biasio *et al.*, 1999; Krantz *et al.*, 2000; Niemimaa *et al.*, 2001; Bindra *et al.*, 2002; Crossley *et al.*, 2002; Schuchter *et al.*, 2002; Spencer

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