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Serum sFlt-1 levels in Polish women during pregnancies complicated by hypertensive disorders

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Objective

The aim of the study was to determine serum concentrations of sFlt-1 in patients with pregnancies complicated by gestational hypertension and preeclampsia, and in women with physiological pregnancies and an attempt to determine the suitability of this parameter as predictor of these complications.

Methods

The study included 81 women with singleton pregnancies, hospitalized at the Pregnancy Pathology Unit, Department of Obstetrics, Gynecology and Gynecological Oncology, Nicolaus Copernicus University Medical College, Dr. J. Biziel University Hospital No. 2 in Bydgoszcz in 2014-2015. The study group included 45 women with gestational hypertension and 23 patients with preeclampsia. Control group was comprised of 36 women with physiological pregnancies. Serum concentrations of sFlt-1 were determined with commercially available ELISA-based diagnostic kits. The results were analyzed with PQStat ver. 1. 6 statistical package. Serum concentrations of sFlt-1 within the study groups were compared using Mann-Whitney U-test, Kruskal-Wallis test and Dunn post-hoc test. Associations between serum concentrations of sFlt-1 and pH of umbilical cord blood were analyzed based on Spearman's coefficients of rank correlation. Univariate and multivariate logistic regression models were used to predict the occurrence of pregnancy-induced hypertension and preeclampsia. The likelihoods of pregnancy-induced hypertension and preeclampsia were estimated using multivariate logistic regression models with serum concentration of sFlt-1 as an explanatory variable, and BMI, maternal age and parity as covariates. The effects of sFlt-1 concentrations on the occurrence of pregnancy-induced hypertension and preeclampsia were also verified on ROC analysis. Results of all the tests were considered significant at p<0. 05 and highly significant at p<0. 01.

Results

A significant difference was found in serum concentrations of sFlt-1 in women with gestational hypertension and in healthy controls (5797 pg/ml vs. 3532 pg/ml, p=0. 0014). Moreover, a highly significant difference was observed in serum levels of sFlt-1 in preeclampsia group and in the controls (6074 pg/ml vs. 3532 pg/ml, p<0. 0001). A model to predict gestational hypertension on the basis of sFlt-1 level turned out to be highly significant (ch^2=9. 8766, df=1, p=0. 0017), which implies that the higher the level of sFlt-1 the greater the risk of hypertension. A model predicting preeclampsia based on sFlt-1 level was highly significant as well (ch^2=35. 3072, df=1, p<0. 0001); an increase in sFlt-1 concentration was shown to be associated with greater risk for preeclampsia. A model predicting pregnancy-induced hypertension on the basis of sFlt-1 level, with BMI>30, patient age >35 years and primiparity as covariates, was highly significant (Ch^2=33. 7921, df=5, p<0. 0001). Serum concentration of sFlt-1 turned out to be a significant predictor in this model, as an increase in this parameter was associated with greater risk for gestational hypertension. Another highly significant predictor was BMI≥30, also associated with an increase in the risk for gestational hypertension. Also a model to predict preeclampsia on the basis of sFlt-1 level, with BMI≥30, patient age≥35 and primiparity as covariates, turned out to be highly significant (Ch^2=50. 6352, df=5, p<0. 0001). Serum concentration of sFlt-1 was identified as a significant predictor in this model, as an increase in this parameter turned out to be associated with greater risk for preeclampsia. Serum concentration of sFlt-1 turned out to be significant stimulant of gestational hypertension on ROC analysis. ROC analysis demonstrated that serum concentration of sFlt-1 was highly significant stimulant of preeclampsia.

Conclusion

Soluble fms-like tyrosine kinase 1 (sFlt-1) is a highly significant predictor of gestational hypertension and preeclampsia

and may play an important role in pathogenesis of these pathologies. High concentrations of sFlt-1 are associated with increased risk for gestational hypertension and preeclampsia. This justifies determination of sFlt-1 in pregnancy to predict and monitor gestational hypertension and preeclampsia. Determination of serum concentrations of sFlt-1 in pregnancy and inclusion of sFlt-1 concentrations in a set of parameters determined routinely in pregnant women might have an important role in both prediction and prevention of gestational hypertension and preeclampsia. Routine determination of sFlt-1 concentrations might become a useful diagnostic instrument for identification of pregnant women who are particularly predisposed to gestational hypertension and preeclampsia.