Evaluation of diabetes as a risk factor for pre-eclampsia

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Objective
To determine whether GDM increases the risk for pre-eclampsia independently of other risk factors.

Methods
The study was designed as a case-control study. It was based on the review of the medical charts of the subjects. The cases are women that are presented with diabetes during pregnancy. Diagnosis is based on the finding of fasting plasma glucose levels higher than 120 mg/dl or postprandial glucose levels higher than 180 mg/dl. We excluded subjects with chronic HTA, chronic renal disease and prior hepatic disease. The cases are patients that have been present in the pregnancy pathology clinic in our hospital from 2005 to 2012. The control group is made up of pregnant women with no diabetes. We excluded subjects with chronic HTA, chronic renal disease and prior hepatic disease. The controls have been present in the department of pregnancy pathology and obstetrics in the same period 2005-2012 (random selection).

Statistical analysis: The following variables were taken into consideration: Maternal age, residence, education, parity, gestational age, blood glucose level, HbA1c measurement, personal history of diabetes, maternal birth weight, presence of polyhydramnios, previous history of stillbirth and incidence of preeclampsia. Data were analyzed using univariate analysis. The variables were divided and organized according to the objectives. The descriptive analysis of continuous variables consists of the number of observations, mean value, standard deviation, median value and minimal and maximal values. To explore the distribution of continuous variables we used standard graphic presentations like the histogram. To explore the distribution of the observations according to the categories, individual and cumulative frequencies were determined. Bivariate analysis was used to describe and test the association of different variables. Association of categorical variables was analyzed using the χ2 and Fisher’s exact test. The difference between the mean values of the continuous variables according to the categories was analyzed using the Student’s test. Confidence intervals were calculated based on the binominal distribution. To quantify the effect of a variable on another variable we used the odds homogeneity test. Score’s test for odds trend was used to test the association of two variables. To take into consideration the effect of confounding factors (parity, maternal age and maternal birth weight) on the association of diabetes with preeclampsia we used logistic multivariate analysis. Statistical analysis was performed using Intercooled STATA 9.1.

Results
GDM occurred in 89 patients (3%) of all pregnancies (n=3218). There was a higher rate of pre-eclampsia in the GDM group than in the group without GDM (6.1 and 2.8%, respectively). The study recruited an equal number of cases and controls (89). The subjects in the case group (pregnant women with gestational diabetes) and the control group, (pregnant women without diabetes) were randomized with no significant differences. The potential confounders, maternal age, parity, chronic hypertension, were included in the analysis. It is evident that the majority of the cases reside in urban areas (89%). This finding is consistent with the higher prevalence of diabetes in urban areas. Another finding is that a greater number of cases have attended only the 8th grade of school compared with the controls (53% vs. 28%). This difference is statistically significant. There was no statistically significant difference of the parity between the two groups. Approximately 87% of the cases have a plasma glucose level higher than normal. All subjects with pre-eclampsia are at a gestational age of more than 20 weeks, 21% in the second trimester and 79% in the third trimester. HbA1c, which is considered a very important indicator of the glucose metabolism was absent for the majority of the subjects (70%). The average birth weight is significantly different (p>0.01 with the student test) in the case group (3715 g) and control group (3242 g). Stillbirths are reported more often in diabetic subjects with pre-eclampsia (55%) compared with non-diabetic subjects with pre-eclampsia (29%). Polyhydramnios is encountered in 14% of the control group and 11% of the cases. Pre-eclampsia is present in 24% of the cases and only 9% of the controls (p=0.01). Diabetic pregnant women are 3.9 times more likely to develop pre-eclampsia compared with non-diabetic pregnant women (95% confidence interval = 1.2-9). Subjects with pre-eclampsia belong to the age-group younger than 35 yrs (79%). From the parity point of view, in non-diabetic women (control group), pre-eclampsia is more frequent in their first or second pregnancy. In diabetic women (cases group), pre-eclampsia is more frequent in their first pregnancy (42%).

Conclusion
The present study has demonstrated an independent and strong significant association of GDM with pre-eclampsia. Furthermore, obesity is proved to be a main confounding factor but it could not explain the total excess risk. This increased pre-eclampsia rate may contribute to an increased rate of perinatal complications among GDM women. Pregnant women with diabetes are 3.9 times more likely to develop pre-eclampsia compared with pregnant women without diabetes. All pregnant women should be subject to systematic screening to detect diabetes during pregnancy. Pregnant women diagnosed with diabetes should be followed up for an early diagnosis of pre-eclampsia.