Relationship between Glycated Hemoglobin in Early Type2 Diabetic Pregnancy and Adverse Pregnancy Outcomes

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Introduction

The prevalence of type 2 diabetic pregnancy has increased worldwide in the past decade with the increasing prevalence of type 2 diabetes[1]. Hyperglycemia during pregnancy is associated with many adverse pregnancy outcomes such as spontaneous abortion, malformation, cesarean delivery, preeclampsia, macrosomia and neonatal hypoglycemia morbidity[2]. Elevated glycated hemoglobin (HbA1c) in the 1st trimester of type1 diabetic pregnancy is related to adverse pregnancy outcomes such as malformation[3]. However, the relationship between HbA1c level and adverse outcomes in type2 diabetic pregnancy reminds unclear. This study aim to find out whether HbA1c level in the 1st trimester is relate to adverse pregnancy outcomes and whether HbA1c in the 1st trimester has predictive value towards adverse pregnancy outcomes.

Materials and Methods

384 pregnant women with pre-gestational type2 diabetes in Peking University First Hospital from Jan 2005 to Jan 2017 were recruited. Baseline characters were collected such as maternal age, gestational age, maternal body mass index (BMI) before pregnancy, in the second trimester and before delivery, HbA1c level in three trimesters, fasting plasma glucose (FPG) level in the first trimester, pregnancy outcomes such as fetal birth weight, cesarean delivery, neonatal complications (Table1). Adverse pregnancy outcomes observed in this study are preterm birth (< 37 weeks), cesarean delivery, complicated with preeclampsia, small for gestational age (SGA), large for gestational age (LGA)[4], neonatal hypoglycemia, intensive neonatal care (NICU) admission and stillbirth. Relationship between HbA1c in the three trimesters, BMI and adverse pregnancy outcomes were analyzed by t-test. ROC curve was analyzed to observe the predictive value of BMI values, HbA1c and FBG levels towards adverse outcomes.

Table 1 Baseline characters of type2 diabetic pregnancy women

	DM (n=384)
Maternal age (years)	32.5±4.1
Gestational age at birth (weeks)	38.1±1.7
Maternal BMI before pregnancy (kg/m^2)	26.2±5.4
Maternal BMI in the 2nd trimester (kg/m^2)	28.6±5.6
Maternal BMI before delivery (kg/m^2)	30.3±4.4
FPG in the 1st trimester (mmol/L)	6.4±1.9
HbA1c in the 1st trimester(%)	6.7±1.2
HbA1c in the 2nd trimester(%)	5.8±0.7
HbA1c in the 3rd trimester(%)	5.9±0.6
Fetal birth weight (g)	3239.4±556.5

Results

HbA1c in the 1st trimester was related to preterm birth, LGA, NICU admission (P<0.01) and neonatal hypoglycemia (P<0.05). FPG in the 1st trimester was related to LGA and NICU admission (P<0.05). HbA1c in the 3rd trimester was related to SGA (P<0.01). BMI were not related to adverse pregnancy outcomes. 3(0.7%) cases of stillbirth (>29 weeks) and 1(0.2%) case of malformation (25 weeks) was observed in the study without correlation to BMI or glucose level. After analyzed with ROC curve, we found that HbA1c in the 1st trimester has a predictable value towards preterm birth, LGA (P<0.01) and NICU admission (P<0.05) with a cut-off value of 6.45%, while the cut-off value to predict neonatal hypoglycemia (P<0.01) was 6.65%. The area under ROC curve is listed in Figure 1. FPG and HbA1c in the 3rd trimester was not predictable towards adverse pregnancy outcomes in this study.

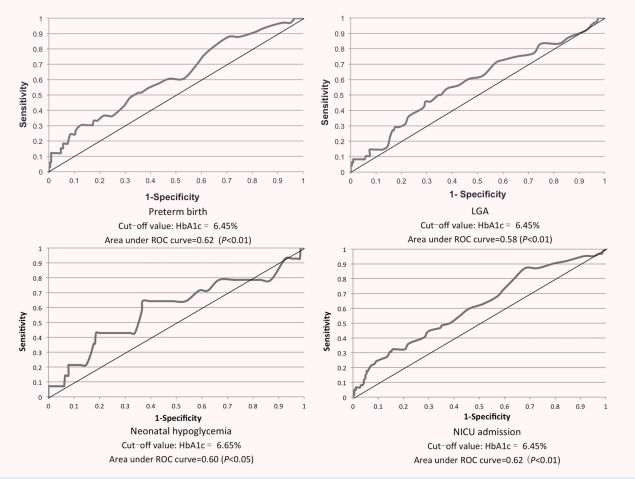

Figure 1 ROC curve of HbA1c and adverse pregnancy outcomes

Conclusions

Elevated HbA1c and FPG level in the 1st trimester was associated with adverse pregnancy outcomes in type 2 diabetic pregnancy. HbA1c level in the 1st trimester has a predictable value towards some adverse pregnancy outcomes. With a HbA1c level above 6.45% in the 1st trimester suggested increased risk of preterm birth, LGA, neonatal hypoglycemia and NICU admission. Effective plasma glucose level control during the pre-gestational period is essential to the type 2 diabetes women to reduce adverse pregnancy outcomes.

References

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