Relations between perinatal outcomes and gestational diabetes

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Abstract

Objectives. *The aim of the study is to compare the outcomes of infants born to diabetic mothers with those born to non-diabetic mothers, to analyze the effects of gestational diabetes early diagnosis upon avoiding complications, to establish a relation between maternal glycaemia values and perinatal distress.* ***Methods.*** *We conducted an observational research on 52 diabetic and 216 non-diabetic mothers and their infants during 2011-2012.* ***Results.*** *In the present study, 7.69% of the infants born to diabetic mothers were low-weight and 28.85% macrosomic compared to 6.81% and 19.44% respectively in the non-diabetic mothers group. About 15.38% of diabetic mothers delivered prematurely compared to 10.18% non-diabetic women. Only 88.46% of the infants born by diabetic mothers had Apgar score 8 to 10 compared to 90.74% of the infants born by non-diabetic mothers.* ***Conclusions.*** *Gestational diabetes represents a risk for perinatal complications (premature delivery, macrosomic or low-weight fetus, low Apgar score) that may lead to adverse outcomes for both mother and child. The severity of these complications depends of mothers' previous health status and constant glycemic control during pregnancy.*

Keywords: *gestational diabetes mellitus, glucose intolerance, perinatal outcomes*

Introduction

Diabetes has increasingly become a very serious problem in Europe over the last decades. According to World Health Organization (WHO) statistics, 280 million persons are currently diagnosed with diabetes mellitus in the whole world while 55.2% of them are living in Europe[(1)].

In Romania the prevalence of diabetes was of 1.98% in 2003 and grew to 2.12% in 2004 and 2.23% in 2005 with a total of 482.250 diabetics in 2005. The incidence of new cases was of 246 for 100.000 inhabitants in 2005 as is stated in the Health Ministry communicate[(2)].

The Eurodiab study performed onto the whole juvenile European population (0-14 years) mentions an incidence of 3/100.000 persons in Romania, regarded as one of the smallest in Europe[(3)].

Gestational diabetes mellitus is defined as glucose intolerance that determines hyperglycemia of variable severity diagnosed during pregnancy and includes not only diabetes with onset during pregnancy but also prior diabetes with first recognition in this period. Gestational diabetes registers frequencies that vary between 2 and 12% and recent studies appreciate a percentage of 60% for type I diabetes and 40% for type 2 diabetes[(4)].

The aim of the current study is to compare the outcomes of infants born to diabetic mothers with those born to mothers without diabetes, to analyze the effects of gestational diabetes early diagnosis upon pregnancy monitoring and avoiding complications, and to further establish a relation among maternal glycaemia values and perinatal sufferance.

Methods

The present study was an observational research performed on pregnancies and infants born by 52 mothers with gestational diabetes and 216 non-diabetic mothers with similar medical condition except diabetes that agreed to be enroll in our analyse performed on a two years period (2011-2012). All pregnancies were surveyed and all births took place at "Cuza Voda" Obstetrics and Gynecology Hospital from Iasi, Romania.

Inclusion criteria for diabetic mothers included first term clinical evaluation, oral glucose tolerance test (OGTT) at 24 till 28 weeks' gestation and prior diagnosed diabetes.

Diabetes and type of diabetes were diagnosed according to International Classification of Diseases.

In mothers' case we analyzed the presence and the type of diabetes, cardiac disease, chronic hypertension, pregnancy induced hypertension, previous macrosomic infant (birth weight superior to 4000 g), previous preterm or small infant, previous fetal loss, renal disease, tobacco and alcohol use.

The variables used for analyzing perinatal outcomes were low-weight at birth (inferior to 2500 g), presence of macrosomia, gestational age, Apgar score, complications of labor and/or delivery, presence of congenital anomalies, abnormal conditions of the newborn.

Study group design and analysis were performed according to the current Romanian medical legislation. Informed consent for inclusion and surveillance was obtained in all present cases.

All data were analysed using Statistical 8.0 program. Frequencies were run on all variables; Chi

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Square, T test, ANOVA and correlation tests were used to compare the diabetic to the non-diabetic group in respect to perinatal outcomes.

Results

Twenty-four of the 52 diabetic mothers were diagnosed with diabetes prior to current pregnancy (3 type I diabetes and 21 type II diabetes) while the rest of 28 mothers were diagnosed with gestational onset diabetes. Maternal age at birth was between 15-46 years for non-diabetic women (mean age of 22.15±6.7) while the diabetic group had a range of 13-48 years (mean age of 24.32±7.5). Twenty-one of the 52 diabetic women are primiparous (40.38%) compared to 75 non diabetic women (34.72%), revealing a significant statistical difference ($p < 0.01$).

In the diabetic group mothers there was registered a higher percentage of low-weight or macrosomic infants compared to non-diabetic mothers as shown in Table 1.

Therefore, 15.38% of diabetic mothers delivered premature infants compared to 10.18% of the non-diabetic women. There were significant ($p=0.002$) differences of the Apgar score in the two groups, 88.46% of the infants born by diabetic mothers having an Apgar score between 8 and 10.

Due to the small number of infants born with congenital malformations, a statistical significant comparison was not possible.

Related with the type of delivery, cesarean section was more frequently used in the group of diabetic mothers.

As shown in Figure 1, a higher percentage of diabetic mothers revealed cardiac diseases and pregnancy induced or chronic hypertension compared to non-diabetic mothers ($p=0,012$).

As concerning tobacco and alcohol use, there was no significant difference between the two groups.

Discussion

Any type of diabetes (type 1, type 2 or pregnancy onset diabetes) is associated with an increased risk of macrosomic fetuses, consideration supported also by the current research. As far as we know, several possible explanations for excessive fetal growth included maternal pre-pregnancy weight, maternal weight gain during pregnancy, maternal glucose level, maternal amino-acid and lipid levels as well as an increase in infant insulin production secondary to increased maternal glucose levels[5,6].

Macrosomic infant might be associated with delivery complications such as shoulder dystocia, birth injuries, and asphyxia, more commonly when an infant is larger than normal for gestational age[7,8]. This might explain the high percentage of cesarean sections (30.77% compared to 19.9% for non-diabetic mothers). However, we could not find any significant correlation between cesarean deliveries and pregnancy complications.

The results from Table I showed a significant difference between diabetic and non-diabetic mothers concerning infants' Apgar score, birth weight, premature birth and frequency of cesarean section.

According to Harvard and Thoenen, type 1 and type 2 diabetes are linked to several pathologies such as renal diseases, retinopathy, cardiovascular diseases and hypertension[7-10].

The results of our study show that this condition increased the risk of poor gestation outcomes both for infants and mothers. Some guidelines (i.e. The American Diabetes Association's Position Statement on Gestational Diabetes Mellitus) suggesting that in order to prevent the outcomes of this condition, pre-pregnancy screening should be the first important step while the second step should be an optimal glycemic control[11].

The current research analysed the hypothesis of the linkage of gestational diabetes and adverse perinatal

Table 1 Perinatal findings diabetic versus non-diabetic mothers

Perinatal findings	Diabetic (52)	Non-diabetic (216)	Significance (p)
Apgar score (0-10) 0-4 5-7 8-10	 1 (1.92%) 5 (9.62%) 46 (88.46%)	 3 (1.39%) 17 (7.87%) 196 (90.74%)	p <0.01
Birth weight <2500 g >4000 g	 4 (7.69%) 15 (28.85%)	 14 (6.81%) 42 (19.44%)	p <0.01
Congenital malformations	1	3	Not applicable
Premature birth	8 (15.38%)	22 (10.18%)	p < 0.01
Cesarean section	16 (30.77%)	43 (19.9%)	0.02
Perinatal mortality	1	2	Not applicable

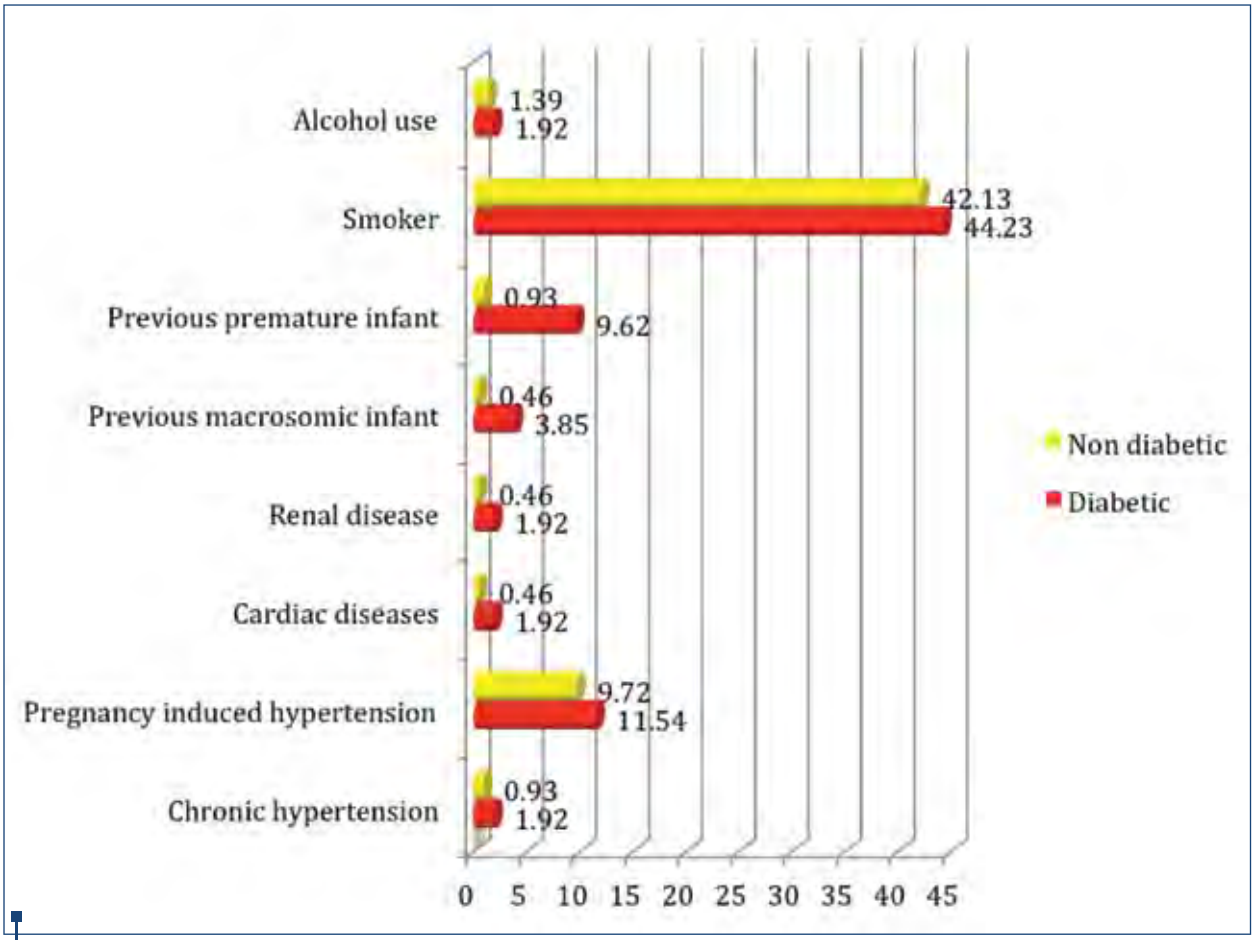

Figure 1. Percentage of maternal risk factors diabetic versus non-diabetic mothers

outcomes such as macrosomia, delivery problems, maternal perigestational complications (renal disease, cardiovascular disease, and so on).

Analysis of the Apgar scores revealed a significant higher percentage of low-Apgar score in new-bon population born by diabetic mothers, similar to other studies. Reeder and contributors explain the Apgar score difference having in the view the rating of health at birth that includes several factors such as heart rate, respiratory effort, muscle tone, reflex irritability and color, highly affected by the transplacentary glucose levels[9,12].

During the present study we registered several limitations due to the methods used for collecting data (subjectivity induced by anamnesis report) but also due to the social economic status of women enrolled in the analysis.

Conclusions

Diabetes during pregnancy represents a risk for perinatal complications such as premature delivery, macrosomic or low-weight fetus, low Apgar score, necessity of cesarean section that may lead to adverse outcomes for both mother and infant.

The risk level and severity of these complications depends upon several factors such as previous health status and the constant and periodic glycemic control of the mother during pregnancy. ■

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