

# Pregnancy Outcomes in Women with Strictly Controlled Type 1 Diabetes Mellitus

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## Abstract

**Objective:** To evaluate the pregnancy outcomes in mothers with controlled Type 1 diabetes mellitus (T1DM). **Materials and Methods:** Thirty seven pregnant patients with controlled T1DM were included in the study. **Results:** Twenty (54%) out of 37 patients had preterm delivery (<37 weeks of gestation). The type of delivery was induced vaginal delivery in 9 (24.3%) patients and cesarean section in 27 (72.9%) patients. Preeclampsia developed in 6 (16.2%) patients. Macrosomia was found in 9 (24%) patients. Two antenatal death occurred. **Conclusion:** Even in the most favorable conditions, the pregnant patients with T1DM would have a great risk for preterm delivery and cesarean section, moderate risk for macrosomia, preeclampsia, and an undefined risk for antenatal death.

**Keywords:** Blood glucose monitoring, pregnancy, type 1 diabetes mellitus

## INTRODUCTION

The prevalence of diabetes in pregnancy has been increasing worldwide.<sup>[1]</sup> The majority is gestational diabetes mellitus (GDM) with the remainder divided between pregestational type 1 diabetes and type 2 diabetes which is called pre-gestational diabetes mellitus (pre-GDM). Both pre-gestational type 1 diabetes and type 2 diabetes have significantly greater risk than GDM.

Before the discovery of insulin, pregnancy in diabetic women was a catastrophic event. Nearly 60% of pregnant women were dying due to severe ketoacidosis and >90% of infants were stillborn or died in the first hours after birth.<sup>[2]</sup> Insulin therapy and multidisciplinary approach reduced the complications during the pregnancy and improved the pregnancy outcomes. Preconceptional care and controlled blood glucose levels during pregnancy are the key points for the management of pre-GDM.<sup>[3]</sup> In the preconceptional examination, investigation of the vascular complications have a great importance. Existence of the vascular complications may predict the outcomes of the pregnancy. Patients without vascular complications and controlled glucose levels are good candidates for pregnancy.

Here we analyze the pregnancy outcomes of the pregnant patients with non-complicated T1DM with controlled blood glucose levels.

## MATERIALS AND METHODS

A descriptive cross-sectional research design was used in this study. The study was conducted on pregnant women with T1DM who were admitted to obstetrics unit of a training and research hospital, a maternity hospital and a special clinic in Turkey, between 2008 and March 2015.

Pregnant women with uncomplicated T1DM who were treated by insulin therapy were included in the study. The patients had regular antenatal visits at obstetrics and endocrinology polyclinics. The fasting blood glucose levels were <100 mg/dL and the 1<sup>st</sup> hour post meal blood glucose levels of the patients were <180 mg/dL. The patients with uncontrolled blood glucose levels and HbA1c >7% were excluded from the study. Retinopathy, nephropathy, and neuropathy were accepted as exclusion criterias. The patients with chronic illness except diabetes mellitus were also accepted as exclusion criteria. The demographic characteristics, perinatal mortality, congenital anomalies, preterm delivery, route of delivery, cesarean

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10.4103/ijem.IJEM\_139\_18

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**How to cite this article:** Uzun Çilingir IG. Pregnancy outcomes in women with strictly controlled Type 1 diabetes mellitus. Indian J Endocr Metab 2018;22:798-800.

indications, cord pH, Apgar scores, neonatal results, and maternal results of the patients were analyzed.

At the end of the study, the Statistical Package for Social Sciences (SPSS) 16.0 program (SPSS inc, Chicago, USA) was used to assess the data. Number, percentage, average, and standard deviation were used from the descriptive statistics for information describing the pregnant women with T1DM.

## RESULTS

Thirty-seven pregnant patients with uncomplicated T1DM with controlled blood glucose levels were analyzed. The mean maternal age of the patients was 30.2 years. The fasting blood glucose levels of the patients were between 57 mg/dL and 98 mg/dL. The 1<sup>st</sup> hour post meal blood glucose levels were between 122 mg/dL and 176 mg/dL. Two patients had perinatal death. An unexplained death after 27 weeks of gestation occurred in one patient. The blood glucose levels of the patient was between normal ranges. Patient and patient's family denied the autopsy. The other patient had perinatal death at 24 weeks of gestation during delivery. The type of delivery was induced abortion due to hypoplastic left ventricle.

Twenty (54%) out of 37 patients had preterm delivery (<37 weeks of gestation). Eighteen (48.6%) patients had delivery between 32 and 37 weeks of gestation. Two (5.4%) patients were delivered before 32 weeks of gestation.

The type of delivery was induced vaginal delivery in 9 (24.3%) patients and cesarean section in 27 (72.9%) patients. The most common indication for cesarean section was repeated cesarean section [Table 1].

Preeclampsia developed in 6 (16.2%) patients. None of the patients were with chronic hypertension. All of the patients with preeclampsia were normotensive before the pregnancy. Macrosomia was found in 9 (24%) patients. Eight (21%) patients were with polyhydramnios.

Four infants had delivered with an arterial cord blood pH >7.2 and/or with an Apgar score >6. Three out of four patients were premature and the remaining one was delivered by cesarean section with an indication of fetal distress. Only one patient had congenital anomaly. The diagnosis was hypoplastic left ventricle and the pregnancy was terminated at 24<sup>th</sup> weeks of gestation [Table 2].

## DISCUSSION

T1DM has got many risks during pregnancy. Specific risks of diabetes include fetal anomalies, preeclampsia, macrosomia, intrauterine fetal demise, neonatal hypoglycemia, and neonatal hyperbilirubinemia, among others.<sup>[4,5]</sup>

The frequency of hypertension in pregnancy and preeclampsia in diabetic women is 2–4 times more frequent than in non-diabetic population.<sup>[6]</sup> In our study, frequency of preeclampsia was 16.9%, which is more frequent than reported 12% in other studies.<sup>[7,8]</sup> It has been reported that preeclampsia

**Table 1: Cesarean indications**

Repeated cesarean	28%
Maternal request	18%
Makrosomia	12%
Arrested labor	5%
Fetal distress	2.8%
Unsuccessful induction	2.8%
Footling breech presentation	1.3%
Fetal anomaly	1.3%
Pl. previa accreta	1.3%
Transvers presentation	0.9%
Multiple pregnancy	2.4%
Severe preeclampsia	1.3%
Ablatio placenta, cord presentation, maternal height, oligohydramnios, etc.	

**Table 2: Pregnancy outcomes**

	Pregnant patients with type 1 DM (%)
Preterm delivery <32 weeks of gestation	2 (5)
Preterm delivery 32-36 weeks of gestation	18 (48.6)
Induced labor	9 (24.3)
Instrumental delivery	0
Cesarean section	27 (72.9)
Preeclampsia	6 (16.2)
Eclampsia	0
Macrosomia	9 (24.3)
pH >7.2 and/or 5 min apgar >6	12 (32.4)
Congenital anomaly	1 (2)

DM: Diabetes mellitus

developed in 19.1% of patients without vasculopathy and 49.1% of the diabetic patients with vasculopathy.<sup>[9]</sup> Our preeclampsia cases were not with chronic hypertension. In the cases with chronic hypertension the preeclampsia ratio would be much more higher. It is clear that preeclampsia is more common in T1DM patients than in general population, normotensive, and in non-vasculopathic diabetic patients. The incidence of premature labor during the study period was 54%. It is much more frequent than reported before.<sup>[9,10]</sup>

Women with T1DM have higher rates of cesarean section in general. Its frequency has been reported between 60% and 78%.<sup>[9,11,12]</sup> The cesarean ratio was 72% in our cases. Even in the most favorable conditions, a pregnant patient with T1DM is likely to deliver by cesarean section. Macrosomia is one of the leading cause of the high rate of cesarean section. Nine (24%) out of 37 patients were macrosomic in our study. This ratio is lower than reported before. The macrosomia ratio was 54% in the non-vasculopathic group.<sup>[9]</sup> The most common indication of cesarean section was repeated cesarean section [Table 1].

Four infants had positive criterias for neonatal asphyxia. Three out of four infants were premature, and the remaining one was delivered by cesarean section due to fetal distress. All infants had predisposing factors for neonatal asphyxia. Antenatal death

with unknown cause occurred in one patient. One patient had congenital anomaly.

The coincidence of diabetes mellitus and pregnancy predisposes the mother and fetus to a lot of serious risks. Preconceptional care and prenatal follow up has great importance. Vasculopathy is the main factor for predicting the pregnancy outcome. It is necessary to plan the pregnancy in a period of optimum metabolic compensation of DM.<sup>[13,14]</sup>

In our study we have included the non-complicated diabetic patients with optimum prenatal and antenatal care. Macrosomia, preterm delivery, preeclampsia, and cesarean delivery were significantly higher than in general population. One antenatal death at the third trimester occurred without any apparent cause.

## CONCLUSION

Prenatal care, glucose regulation, and regular antenatal visits are the mainstays of the management of diabetic pregnant patients. We offer and inform the diabetic patients about these management protocols before planning the pregnancy. It is clear that these protocols could decrease all of the adverse outcomes of the pregnancy especially ketoacidosis, abortus, and congenital anomalies. According to our results even in the most favorable conditions, the patient would have a great risk for preterm delivery and cesarean section, moderate risk for macrosomia, preeclampsia, and an undefined risk for antenatal death. These facts should be kept in mind for informing the diabetic patients about pregnancy during prenatal counselling.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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