



COURSE AND OUTCOME OF PREGNANCIES COMPLICATED WITH GESTATIONAL DIABETES

Obstetrics & Gynaecology

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ABSTRACT

Introduction: Gestational diabetes mellitus (GDM) is the most common complication in pregnancy. Patients with GDM have a higher risk for hypertensive pregnancy disorders, giving birth to a macrosomic newborn and developing polyhydramnios that can cause premature birth. **Aim:** The study aimed to examine the course and outcome of pregnancies complicated with GDM. **Material and methods:** This study included 41 pregnant women with monofetal pregnancies treated due to GDM at the Clinic for Gynecology and Obstetrics of the University Clinical Center of Serbia during a three months period. GDM was confirmed by an oral glucose tolerance test after 24th week of pregnancy. **Results:** Average age of patients was 32.5 ± 5.55 years. The mean body weight was 87.32 ± 16.22 kg while women in average gained 9.86 ± 3.9 kg during pregnancy. Body Mass Index did not impact pregnancy outcome. Pathological glycemic values were recorded in 51.2% women even on antidiabetic diet. Out of 18 cases of accelerated fetal growth, 77.8% were of pregnant women with pathological values of postprandial glycemia ($p = 0.03$). Still average Apgar score of examined children was mostly good (8.78 ± 4.54). Significantly more children (66.7 %) that needed prolonged hospitalization after birth were of mothers who had pathological PPG ($p = 0.41$). **Conclusion:** Pregnancies with GDM require intensive monitoring of the mother and fetus, more frequent inpatient treatment, prevention of complications and a timely decision for delivery, in the interest of the best possible metabolic health of the mother and newborn.

KEYWORDS

GDM, oral glucose tolerance test, fetal macrosomia, polyhydramnios.

INTRODUCTION

Gestational diabetes mellitus (GDM) is the most common (14%) complication of pregnancy which can be defined as any degree of glucose intolerance that occurs during pregnancy (1). The American Diabetes Association (ADA) defines GDM as diabetes that is diagnosed for the first time in the second or third trimester of pregnancy (2). Risk factors for GDM include excess body weight and/or excessive weight gain during pregnancy, older maternal age, a positive family history of diabetes, as well as insulin resistance or polycystic ovary syndrome (PCOS) before pregnancy, previous fetal macrosomia (birth weight over 4000 g) or spontaneous abortions and intrauterine fetal death, essential or gestational hypertension (1, 2). Women with GDM have an increased risk for hypertensive disorders. There is also a risk of polyhydramnios, which can cause premature birth. Acceleration of fetal growth compared to gestational age can lead to intrapartum complications such as fetal trauma, shoulder dystocia, complications with the umbilical cord, as well as neonatal hypoglycemia, all of which together increase perinatal morbidity (1).

Although GDM frequently resolves spontaneously after delivery, it can often have long-term consequences, including increased risk for DM2 and cardiovascular diseases of the mother and the child. Currently, there are different methods of regulating gestational diabetes, with primarily a hygienic-dietary nutrition or additional medical treatment. The main therapeutic procedure, in addition to lifestyle changes (antidiabetic diet and exercise), is also based on glycemic control. In addition, insulin therapy is prescribed, taking into account possible previously diagnosed insulin resistance, which is often present (2).

The study aim was to examine the course and outcome of pregnancies complicated with GDM.

MATERIAL AND METHODS

This study included pregnant women with clinically confirmed GDM treated at the Clinic for Gynecology and Obstetrics of the University

Clinical Center of Serbia in the period from October 2019 to November 2021. The inclusion criteria were monofetal pregnancies, regardless of the method of conception, in which GDM was confirmed by an oral glucose tolerance test (OGTT) after the 24th week. OGTT was performed with 75 g of glucose. The criterion for inclusion in the study was a blood glucose value over 5.1 mmol/l, i.e. over 10 mmol/l after 60 minutes and a value over 8.5 mmol/l after two hours from the start of the test (1). Exclusion criteria from the study were multiple pregnancies and having type 1 diabetes mellitus.

We collected patients data like age, personal and family history of diabetes, parity history, menstrual history with an emphasis on previous insulin resistance or PCOS, and body mass index (BMI) was calculated. Body weight gain during pregnancy was measured and controlled.

All women were prescribed an antidiabetic diet based on low caloric and carbohydrate intake. In addition, postprandial glycemia (PPG) levels were measured (first in the morning and then two hours after each meal) to examine the ability for independent glycoregulation. Values over 6.7 mmol/l were considered pathological. Glycosylated hemoglobin (HbA1c) was also measured. The presence of ketonuria, glucose and protein in the urine was also regularly monitored as predictors of glycoregulation and condition deterioration. Biochemical parameters such as cholesterol, triglycerides, and thyroid hormones, were also controlled. Regular blood pressure measurements were also performed.

Ultrasonographic examinations with fetal biometrics were performed monthly. The amount of amniotic fluid was expressed as the amniotic fluid index (AFI) and the appearance and thickness of the placenta, as well as the evaluation of the fetal condition, were also observed.

The course of pregnancies, the number of hospitalizations, all complications, as well as the outcome of pregnancies, ie. method of delivery and the Apgar score were registered. Newborns weight at

delivery was noted and referral range of adequate weight was 2500 to 4000gr. It was also recorded whether the pregnant women were discharged home with the child or whether the child remained in the hospital for further monitoring and possible treatment.

Female patients were divided into two categories: those with pathological values of postprandial glycemia and those with high BMI values (above 30). In these two groups of patients, the course and outcome of pregnancy were monitored separately.

Obtained data were statistically analyzed. The statistical significance of the difference of tested parameters was examined with the Chi-Square test. The IBM SPSS 26.0 software package was used for the analysis.

RESULTS

Study included 41 pregnant women with clinically confirmed GDM. The average age of female patients was 32.5 ± 5.55 years, and the largest number of female patients (56%) was in the age group of 31 to 40 years. The average number of hospitalizations during pregnancy was 3.95 ± 1.51 .

There were 19.5% women with previous chronic diseases, out of which bronchial asthma was the most common. Family history for DM2 was positive in 34.1%. Among examined women 34.1% consumed tobacco both before and during pregnancy.

Majority of women (85%) had regular menstrual cycles. Previous pregnancies were achieved in 46%, out of which 68.4% had natural delivery and 31.6% caesarean section. GDM in the previous pregnancy was registered in 42.1% of women. There were 36.5% women with previous miscarriages while thrombophilia, as a risk factor for GDM, was diagnosed in 17% of patients.

The mean BMI of examined women was 30.64 ± 5.66 kg/m². The average value of body weight gain during pregnancy was 9.86 ± 3.90 kg.

Hypertension in pregnancy as a risk factor for GDM was established in 24.3% of patients, while hypothyroidism as an accompanying diagnosis was established in 12.2%.

PPG levels on antidiabetic diet were normal in 48.78% cases, while 51.2% had pathological glycemic spikes. Analysis of urine showed ketonuria in 24.4% of women. Elevated serum cholesterol and triglyceride values were noted in 21.9%. Fetal growth was accelerated in 43.9% of women, while increased amount of amniotic fluid was found in 34.14%.

When it comes to pregnancy outcome, 80.4% of women gave birth at term. Delivery was natural in 70.7% of cases, 17% of patients gave birth by elective caesarean section, while 12.3 had emergency caesarean section. Average Apgar score of examined children was 8.78 ± 4.54 . The average weight of the newborns was 3.05 ± 0.81 kg. Considering neonatal complications 21.9% of children had prolonged hospitalization due to further observation and treatment.

Women with pathological PPG compared to those with normal glycemic values did not have increased amount of amniotic fluid more often, but had fetal growth acceleration ($p = 0.03$). Of the 18 total cases of fetal growth acceleration that we registered in our study, 14 of them were of pregnant women with pathological PPG (77.8%). Moreover, significantly more children (66.7%) that had to be hospitalized for prolonged time after birth were of mothers who had pathological PPG ($p = 0.41$).

There were no significant differences in parameters of pregnancy course and outcome when we compared women with high BMI and normal BMI.

DISCUSSION

The older age of pregnant women is a growing trend in the world and a risk factor for various complications in pregnancy, including GDM (3). Through this research, we showed that the largest number of women with GDM belonged to the age group of 31 to 40 years, with an average age of 32.5 years, which confirms that the age of the mother is a risk factor for the occurrence of GDM. Data from a multicenter study showed that the largest number of pregnant women with GDM

belonged to the age category of 29.2 to 32.5 years, which is in agreement with the results of our study (4).

Most patients with GDM are obese (5). Our study showed that the mean BMI value of examined women was 30.64. One meta-analysis showed that the risk of developing GDM was 2.14 times higher in overweight women, 3.56 times higher in obese women, and 8.56 times higher in extremely obese women compared to women of normal body weight (6). The conclusions drawn on 23,000 women in the HAPO (Hyperglycemia Adverse Pregnancy Outcome) study showed that the prevalence of fetal macrosomia in women who were not obese and did not have GDM was 6.7%, in obese women without GDM the prevalence was 10.2%, while in obese women with GDM, the prevalence was 20.2% (7).

Baby growth is a complex process that depends on many factors, such as the genetic potential for growth that the fetus inherits from both parents, the mother's nutritional habits, metabolism, possible diseases of the mother or the fetus, as well as placental function disorders. Many prenatal factors such as the severity of GDM, its control and treatment can affect the growth of the child. GDM is one of the most important risk factors for accelerated fetal growth (macrosomia) which is caused by maternal hyperglycemia (8).

In the HAPO study, researchers showed that the frequency of macrosomia in GDM was increased by 50% compared to non-GDM pregnant women who were obese (7). A large prospective study by Ricart et al. showed that an excessive increase in the mother's BMI caused 23% of fetal macrosomia compared to pregnant women who had a BMI within normal limits (9). Although, out of 41 babies, only two had present macrosomia at birth, growth acceleration was shown by ultrasound in 18 babies during pregnancy.

Given that after 37 weeks of gestation the fetus continues to grow about 230 g per week, induction of labor before term can prevent fetal macrosomia and its complications (5). In our study, this was the case with 8 pregnancies that ended before 36 weeks, but in conditions of adequate prenatal assessment of fetal maturity. One study compared the pregnancy outcomes of mothers with suspected or expected macrosomia who had pregnancies at term versus elective induction of labor. The caesarean section rate was found to be very high (up to 57%) in those assigned to the electively induced group (10). In our study, 7 pregnancies were terminated by elective caesarean section. It has been proven in many studies that caesarean section for patients with GDM and acceleration of fetal growth can prevent birth trauma for both the mother and the fetus (11).

CONCLUSION

Pregnancies complicated with gestational diabetes carry a significant risk for the development of perinatal morbidity. In our study, the frequency of gestational diabetes was higher among pregnant women between the ages of 31 and 40, as well as among obese pregnant women. The effect of maternal hyperglycemia reflected on the fetal growth as determined by ultrasonographic indicators of fetal growth acceleration and increased amniotic fluid. The association of these complications with evident pathological postprandial glycemia was confirmed in our study. Pregnancies with glyceregulation disorders require intensive monitoring of the mother and fetus, more frequent inpatient treatment, prevention of complications and a timely decision on the way and time to end the pregnancy, in the interest of the best possible metabolic health of the mother and newborn.

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