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PREGNANCY PLANNING FOR WOMEN WITH TYPE 2 DIABETES IN NUKUS CITY (2022-2023)

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Introduction: The incidence of diabetes mellitus (DM) is rapidly increasing in all countries of the world due to the prevalence of obesity, sedentary lifestyle and poor diet. According to the International Diabetes Federation (IDF), in 2021, 735 million patients with diabetes are registered in the world; by 2040, the projected number of patients will increase to 1042 million. It should be noted that the actual prevalence of type 2 diabetes in most countries of the world is 2 –3 times higher than the registered one [1]. The negative impact of decompensated diabetes mellitus on a woman's reproductive system is known.

On the other hand, type 2 diabetes is usually detected in people over 35 years of age who have excess body weight and numerous concomitant pathologies that can aggravate the course of pregnancy and negatively affect its outcome. Over the past 10 years, according to our center, the number of pregnant women with type 2 diabetes has increased 4 times. Obesity occurs in 60–80% of patients with type 2 diabetes, arterial hypertension and dyslipidemia - in 70% of patients [2]. The development of all these diseases is based on insulin resistance. In the second half of pregnancy, severe insulin resistance develops, aggravating the course of diabetes mellitus.

The combination of type 2 diabetes and pregnancy poses a great threat to the health of both mother and fetus. Numerous studies on pregnancy planning in women with type 1 diabetes confirm the effectiveness of preconception preparation, while there are no data on pregnancy planning in women with type 2 diabetes in the domestic literature. According to our data, the number of planned pregnancies with type 2 diabetes in Nukus does not exceed 12–15% (with type 1 diabetes this percentage is 15–18%) [3].

Once ideal compensation for diabetes has been achieved and diabetic microvascular complications and concomitant diseases have stabilized, contraception is discontinued. If pregnancy does not occur within a year, a thorough examination of the couple is carried out, and

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in the case of male infertility or tubo-peritoneal factor, assisted reproductive technologies may be carried out.

In order to evaluate the effectiveness of preconception preparation in women with type 2 diabetes, we conducted a study.

Material and methods: The course and outcome of pregnancy was analyzed (retro- and prospectively) in 80 women with type 2 diabetes observed in the Nuku region from 2022 to 2023. 20 women applied for pregnancy planning, which was 25%. It should be noted that these were women with a burdened obstetric history (perinatal losses) or planning to use assisted reproductive technologies. The remaining women (60) visited a specialized center during pregnancy (time of visit varied from 5 to 33 weeks), the average time of visit was 22.0 ± 1.6 weeks. All patients underwent a general clinical examination, correction of carbohydrate metabolism, and training at a diabetes school.

Diabetes compensation was assessed by the level of glycated hemoglobin, which was determined using a method certified in accordance with the National Glycogemoglobin Standardization Program and standardized in accordance with the reference values accepted in the DccT study (Diabetes control and complications Trial), and according to glycemic level (self-monitoring at least 6 times a day). The severity of vascular complications of diabetes before and during pregnancy, identification and treatment of concomitant pathologies were also assessed. To assess the degree of obesity, the criteria of the World Health Organization and pregravid body mass index, calculated using Quetelet's formula, were used.

The severity of gestosis was determined using the Goecke scale as modified by G.M. Savelyeva [2]. Ultrasound examination of the fetus with Doppler measurements of blood flow in the vessels of the fetoplacental complex was carried out using a Voluson E6 device (GE Healthcare, USA). For timely diagnosis of diabetic fetopathy and fetal cardiomyopathy, dynamic fetometry and echocardiography were performed. Also, for antenatal assessment of the fetal condition, cardiotocography was performed from the 30th week of pregnancy.

After delivery, the condition of the newborn was assessed by a neonatologist using the Apgar score in the first and fifth minutes of life, further along the course of the early neonatal period. Statistical processing of the results was carried out using methods of parametric and nonparametric statistics using Statistica for Windows V. 8.0 software.

Results and discussion: Most patients had a burdened obstetric history (non-developing pregnancies, spontaneous miscarriages, birth injuries, antenatal fetal death). In the group of women with a planned pregnancy, this figure was 40%, in the group of women in which there was no planning - 20%. The groups were comparable in age, duration of diabetes, presence of diabetic microvascular complications and arterial hypertension.

The vast majority of patients (80%) in both groups were obese. The severity of obesity (second and third) in the group of women with an unplanned pregnancy was significantly higher than in the group of women with a planned pregnancy. This can be explained by a clinically significant decrease in body weight before pregnancy in women who came to the center to plan pregnancy. At the stage of preconception preparation, all women reduced their weight from 6 to 25 kg (over 6–9–12 months), which amounted to 10–15–20% of the initial one.

Before pregnancy, all women who came to the center to plan pregnancy managed to achieve the target levels of glycated hemoglobin A1c. Most women received metformin (65%) before pregnancy; 6 women (30%) were switched to insulin therapy from the planning stage.

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Metformin was discontinued before conception. In the group of women who contacted the center during pregnancy, diabetes was subcompensated and decompensated in the majority (70%).

When seeking specialized help during pregnancy, 25 women (41.7%) received oral hypoglycemic drugs - metformin, sulfonylureas, dipeptidyl peptidase-4 inhibitors; insulin therapy - 3 women (5%) and the rest only diet therapy (53.3%). In the group of women with a planned pregnancy, 75% during pregnancy received insulin therapy in bolus and basal-bolus regimens and 25% received diet therapy. In the group of women in which there was no preconception preparation, 84% of women were transferred to insulin therapy during pregnancy, the rest (16%) received diet therapy. The dynamics of glycated hemoglobin during pregnancy are presented in Figure 1.

Diabetes mellitus was compensated during pregnancy in all women who received preconception preparation. In the group of women with an unplanned pregnancy in the first trimester, diabetes was compensated in 40% of patients, decompensated in 17%, and subcompensated in 43%; in the second trimester it was compensated in 67%, subcompensated in 28% and decompensated in 5%; in the third trimester it was compensated in 73%, subcompensated in 24%, decompensated in 3% (in two women who first visited the center after the 30th week of pregnancy). Before pregnancy, 25% of women in both groups had arterial hypertension.

All women who contacted the center for the purpose of planning pregnancy were at this stage switched to drugs approved for use during pregnancy (methyldopa and calcium channel blockers). In the group of women with unplanned pregnancy, the majority of women (67%) did not receive antihypertensive therapy before pregnancy, two women received angiotensin-converting enzyme inhibitors and three women received β-blockers. Preeclampsia complicates the course of pregnancy in 40–80% of patients with diabetes mellitus [3, 4].

Risk factors are the duration of diabetes, the presence of arterial hypertension before pregnancy, the severity of microvascular diabetic complications (especially diabetic nephropathy), and unsatisfactory compensation of diabetes in the first half of pregnancy. The incidence of gestosis in our study was 60% in the group of women with a planned pregnancy and 87% in the group of women in which there was no preconception preparation. According to the literature, there is a direct correlation between the level of average daily glycemia in the first half of pregnancy and the severity of gestosis [4].

Indeed, in our study, severe preeclampsia was not detected in the group of women with a planned pregnancy, while in women who did not undergo preconception preparation and in the majority of patients with diabetes in the first half of pregnancy, diabetes was decompensated and subcompensated, its frequency was 25%, which in most cases required early delivery by cesarean section.

The rate of premature birth in this group of women was 38.3%; in the group of women with a planned pregnancy, this percentage was lower (15%). Fetoplacental insufficiency was detected in 20% of women in both groups. The rate of operative delivery was higher in the group of women with a planned pregnancy (70%) compared to the rate (53.3%) in the group of women with an unplanned pregnancy. Apparently, this is due to the fact that in this group the majority of women had a history of perinatal failures and in 20% of women, pregnancy occurred as a result of the use of assisted reproductive technologies.

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In the group of women who received preconception preparation, 20 children were born in satisfactory condition (Apgar scores at the first and fifth minutes were 8 points or higher). The average weight of newborns was 3280 ± 133 g, macrosomia was detected in three children (15%) and malnutrition in two newborns (10%). No congenital malformations were identified. Hypertrophic cardiomyopathy and neonatal hypoglycemia were absent. According to the literature, perinatal mortality in type 2 diabetes is 2.5–6.7% [5, 6]. In our study, there was no perinatal mortality in the group of women who received preconception preparation.

In the group of women with an unplanned pregnancy, in one case there was antenatal fetal death at 33/34 weeks and in one case, termination of pregnancy at 24/25 weeks of pregnancy due to the lack of effect of the therapy for severe gestosis. Perinatal mortality in this group was 3.4%. 59 children (1 twin) were born: 54% of newborns were in satisfactory condition, 37% had mild asphyxia, 9% had moderate and severe asphyxia. Fetal hypotrophy was detected in 10% of cases, macrosomia - in 22% of cases.

According to the literature [5, 7, 8], macrosomia occurs in 30–60% of children from mothers with diabetes and is a common cause of surgical delivery, trauma during childbirth, perinatal mortality and neonatal morbidity. In the future, these children have a high risk of developing obesity, diabetes, and arterial hypertension. Macrosomia was assessed using centile tables of G.M. Dementieva in accordance with height and weight indicators for gestational age (> 75th percentile). Mothers who gave birth to low birth weight babies had severe gestosis due to hypertension. The frequency of congenital malformations of the fetus in the presence of pregestational diabetes in the mother reaches 6–12% compared to population values of 2–3% [9, 10].

Up to 50% of all congenital malformations of the fetus during pregnancy complicated by pregestational diabetes are malformations of the cardiovascular system: septal defects, transposition of the great vessels of the heart and coarctation of the aorta. In our study, congenital malformations were found in two newborns (3.4%) - defects of the cardiovascular system (in one case an atrial septal defect and in one case a ventricular septal defect).

Hypertrophic cardiomyopathy was diagnosed in two newborns (3.4%). Six newborns (10%) required transfer to other hospitals for further treatment and observation.

Conclusion: In recent years, due to the increasing incidence of type 2 diabetes in the world, the number of pregnant women with this pathology has increased. The incidence of fetal congenital malformation, miscarriage, macrosomia and perinatal mortality in type 2 diabetes is 3 times higher than the population level. The results of the study suggest that the widespread introduction of preconception preparation in patients with type 2 diabetes will significantly improve the course and outcome of pregnancy.

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