

# ABSTRACT

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**Title of Thesis:** Metabolic parameters in women with gestational diabetes mellitus

**Introduction:** Gestational diabetes mellitus (GDM) is a glucose metabolism disorder of various degrees which occurs in pregnancy and resolves spontaneously in the puerperium. Due to the adverse effects of GDM on pregnancy outcomes, perinatal morbidity, and the development of chronic diseases later in life, increased attention is given to GDM.

**Aim of the thesis:** The aim of this thesis was to provide a basic overview of the types of diabetes mellitus together with a description of metabolic processes and some selected biomarkers, with the main focus on GDM. Another aim was to evaluate the consequences and assess the impact of selected parameters on the onset and development of GDM, changes in the monitored values during pregnancy and the consequences for mother and fetus.

**Methods:** The research subjects were 110 pregnant women diagnosed with GDM at the Diabetological Clinic of the 3rd Department of Internal Medicine-Metabolic Care and Gerontology of University Hospital Hradec Králové and subsequently at the Department of Obstetrics and Gynecology from November 1, 2019, to September 11, 2020. GDM was diagnosed in 23 women in the screening phase I (11-14 weeks of pregnancy) and in 87 women in the screening phase II (24-28 weeks of pregnancy). We monitored and statistically processed the following parameters and values: patient age, height, pre-pregnancy weight, pre-pregnancy BMI, pre-delivery weight, pre-delivery BMI, weight gain during pregnancy, glycemic values, glycosylated hemoglobin (HbA<sub>1c</sub>), thyrotropin (TSH) and free thyroxine (T<sub>4</sub>), therapy (diet, metformin, insulin), gestational age of the patient, method of termination of labor, complications during childbirth, neonatal weight and apgar score.

**Results:** In the theoretical part of the thesis, we focused on the issue of diabetes mellitus. We have described GDM in terms of historical, epidemiological, physiological, pathological, pharmacological, and clinical aspects. We also focused on the description of factors that accompany / predict insulin resistance in GDM.

In our research, a higher average age was found in women with a GDM diagnosis in the screening phase II. Values such weight before pregnancy and before childbirth, T4V and gestational age were lower in women diagnosed in the screening phase II, but HbA<sub>1c</sub> and TSH levels were higher compared to women diagnosed in the screening phase I.

The diagnosis of GDM in the screening phase I was established according to the WHO guideline based on two abnormal fasting blood glucose values (values did not exceed 6.4 mmol/l) or oral glucose tolerance test (oGTT). The abnormal blood glucose readings were found 120 minutes after administering a 75-g glucose solution to the subjects. The same applied to women diagnosed in the screening phase II. A statistically significant positive effect ( $p < 0.001$ ) between glycemia and factors associated with childbirth and the postpartum period was found. 13.0 % of women GDM diagnosed in the screening phase I underwent a caesarean delivery and 87.0 % a vaginal delivery, with the most common complications being a perineal tear (21.7 %), episiotomy (17.4 %) and vaginal injuries (17.4 %). 26.4 % of women diagnosed in the screening phase II underwent a caesarean section and 73.6 % a vaginal delivery, with episiotomy (31.0 %) as the most common complication. A (suspect) exacerbation after childbirth was observed only in 5 (4.5 %) of all women monitored. A statistically significant relationship was demonstrated between complications during childbirth and the postpartum condition ( $p < 0.001$ ).

In our study, macrosomia occurred in 4 children (17.4 %) of women diagnosed in the screening phase I and 9 children (10.3 %) of women diagnosed in the screening phase II. Higher neonatal weight had a statistically significant relationship with increasing BMI before pregnancy ( $p = 0.007$ ), increasing gestational age ( $p < 0.001$ ) and insulin treatment ( $p = 0.027$ ). We also found that with increasing age, pregnancy weight gain was lower in women diagnosed with GDM ( $p = 0.008$ ). In our study, 99.09 % of women maintained their weight gain relative to their pre-pregnancy BMI in the optimal range. The most women diagnosed in the screening phase I (25.0 %) had class III obesity (BMI  $\geq 40.0$ ) and the most women diagnosed in the screening phase II (33.0 %) were overweight (BMI 25.0-29.99).

A significant difference was found in T4V ( $\mu\text{mol/l}$ ) ( $p = 0.01$ ) and insulin treatment ( $p = 0.017$ ). In women diagnosed in the screening phase I, insulin was prescribed more frequently and the T4V levels was higher. As GDM treatment, dietary management was sufficient in up to 48.0 % of subjects diagnosed in the screening phase I, 26.09 % of subjects administered insulin and 26.09 % used metformin. In 85.0% of women diagnosed in the screening phase II, compensation was reached by dietary management, 9.0 % had to use insulin and 6.0 % metformin.

The research found a correlation between the mother's prepartum BMI and the birth weight of the child ( $k = 0.302$ ), gestational age and birth weight of the child ( $k = 0.522$ ), prepartum BMI and insulin treatment ( $k = 0.394$ ) and prepartum BMI and insulin treatment ( $k = 0.397$ ). The results also demonstrated a positive correlation between gestational age and the apgar score ( $k = 0.222$ ).

**Conclusion:** The incidence of glucose metabolism disorders in pregnancy is increasing and is associated with obesity and overweight of women in the population. The prevalence in the Czech Republic varies between 1-14 %. It is an asymptomatic disease. The results support the need to actively approach the search for asymptomatic cases in clinical practice and emphasize the careful education of pregnant women, since decompensated diabetes carries risks for the mother and fetus during pregnancy and after childbirth.

**Keywords:** gestational diabetes mellitus, insulin resistance, glucose intolerance, oral glucose tolerance test, glycated hemoglobin, BMI, insulin, glucose, glycemia, labor complications, gestational age, childbirth, apgar score.