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PERFORMING SCREENING OF GLUCOSE TOLERANCE DISORDERS FROM THE VIEWPOINT OF PREGNANT WOMEN IN THE ZLÍN REGION OF THE CZECH REPUBLIC

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Abstract

Introduction: In the Czech Republic, screening of glucose tolerance disorders is performed in all pregnant women in two stages: measuring glycaemia in a fasting patient within 14 weeks of pregnancy, and between the 24th and 28th weeks by performing an oral glucose tolerance test (oGTT). Goal: To determine how the oGTT is performed from the point of view of pregnant women.

Materials and Methods: A total of 134 women in their 35th–44th week of pregnancy completed a non-standardized questionnaire. The research was carried out at workplaces in Zlín.

Results: Only three respondents knew how many grams of glucose are drunk for an oGTT and one stated that it is necessary to fast for 8 hours before an oGTT. Capillary blood was taken in 22 cases, which is unacceptable in relation to recommendations.

Conclusions: Inadequate knowledge concerning the preparation and performance of the oGTT may lead to distorted laboratory results.

Key words: Pregnancy, oGTT, performance, common practice

Introduction

Gestational diabetes mellitus (GDM) is defined as any glucose intolerance corresponding to the criteria for diabetes mellitus, increased glycaemia in a fasting patient, or disrupted glucose tolerance, which is first diagnosed during pregnancy. GDM usually passes after childbirth, but it might also be the first interception of diabetes, mainly in the case of its early interception (before the 20th week of pregnancy). Untreated GDM poses a whole range of short-term and long-term risks for both the mother and the foetus: the risk of preeclampsia, premature childbirth, Caesarean section birth, foetal macrosomia, hyperbilirubinemia, newborn hypoglycaemia, shoulder dystocia, and the necessity of intensive neonatal care (the HAPO study – Hyperglycaemia and Adverse Pregnancy Outcome – performed on a sample of over 23,000 pregnant women). Untreated GDM also poses long-term risks of obesity, metabolic syndrome, type-2 diabetes mellitus, and the risk of intellect damage in offspring. Randomized studies have proved the efficacy of GDM treatment that results in a decrease in the occurrence of preeclampsia and risks for newborn babies. A woman with GDM in her medical history has a higher risk of developing DM later in life [1,2,3].

Currently, screening of glucose tolerance disorders (GTD) is indicated in all pregnant women except those already diagnosed with prediabetes (Impaired Fasting Plasma Glucose or Impaired Glucose Tolerance) or diabetes. Screening is ensured by the attending gynaecologist and is performed in two stages. According to the Czech Society for Gynaecology and Midwifery (ČGPS) and the Czech Medical Society of Jan Evangelista Purkyně (ČLS JEP), all pregnant women must undergo the first screening stage in the 14th week of pregnancy. They undergo a glycaemia examination on an empty stomach in venous plasma using a standard laboratory method. All women whose test in the first trimester was negative undergo the second screening stage between the 24th and 28th weeks of pregnancy; the so-called 3-point 75g oGTT [1,3].

3 days prior to testing, pregnant women adhere to their usual diet (unlimited intake of sugars and no increased physical effort one day prior to testing). The test itself is performed in the morning after fasting for at least 8 hours (they are only allowed to drink clear water). All samples must be taken from a vein. Capillary blood from a finger is not permitted. An individual glycaemia must be determined using a standard method no later than one hour after taking the sample. For this whole period, the women are kept physically calm in the laboratory. They are not allowed to smoke before or during the testing. Regular doses of medicines with anti-insulin effects (namely hydrocortisone, thyroxin, beta sympathomimetics, progesterone, etc.) can be applied on testing day only on completion of the test. Diagnostic procedure: glycaemia is first established on an empty stomach and is then proceeded based on the level of fasting glucose.

If glycaemia on an empty stomach is below 5.1 mmol/l the woman undergoes a 75 g oGTT. She then drinks a solution of 75 g of glucose dissolved in 300 ml of water, which should take no more than 3–5 minutes. Another blood sample is taken 60 and 120 minutes later, respectively, after glucose load. With glycaemia on an empty stomach ≥ 5.1 mmol/l, it is necessary to repeat glycaemia as soon as possible, but not on the same day. With repeated glycaemia on an empty stomach < 5.1 mmol/l, the woman undertakes a 75 g oGTT. If there is repeated glycaemia on an empty stomach ≥ 5.1 mmol/l, the woman has GDM. Such a woman does not undergo an oGTT.

Result evaluation and further procedure: if all glycaemia results are normal (that is, on an empty stomach < 5.1 mmol/l; in 1 hour after load < 10.0 mmol/l, in 2 hours after load < 8.5 mmol/l), it is a negative screening and standard care continues. GDM diagnosis is determined if at least one value in the test is pathological. If it is GDM, the woman is sent to the department of diabetology.

Until now—both globally and in the Czech Republic—there was an inconsistency in the criteria for performing screening, which led to misinterpretations of how to correctly perform PGT screening.

Goal: To determine how the oral glucose tolerance test is performed in practice between the 24th and 28th weeks, from the perspective of pregnant women.

Materials and Methods

A total of 134 women in the 35th – 44th week of pregnancy completed a non-standardized questionnaire. The research was carried out at workplaces in Zlín.

Basic data on the test subjects is shown in Tab. 1 (the number of respondents, average age, week of pregnancy in which the women completed the questionnaire, and the week when they underwent the oGTT). This research project was approved by the managers of the relevant workplaces.

Table 1. Basic data on pregnant women who completed the questionnaire

N	Age [years] [$\bar{x}$] (min-max)	Completing the questionnaire – week of pregnancy	Undergoing oGTT [$\bar{x}$] (min-max)	First-time pregnant women	Second-time pregnant women	Third-time-plus pregnant women
134	31 years (16–42)	38th month	25th week (23–28)	69	41	24

Legend: n – number of days in the group, $\bar{x}$ – arithmetical mean

Results

134 pregnant women took part in the survey. 69 (52%) first-time pregnant women, 41 (31%) second-time pregnant women, and 24 (18%) third-time-plus pregnant women took part in the research. The group consisted of 63 women with completed high school graduation (47%), and 42 (31%) with a college degree. Only 3 women had only elementary education, and 26 (19%) had high school education without a graduation examination.

The respondents mentioned that they had undergone an oGTT in the 25th week of pregnancy on average for the following reasons: a) it was their doctor's wish – in 69 cases; b) because diabetes was diagnosed in the family – in 23 cases; c) no explanation was given – in 17 cases; in 17 cases, an increased level of sugar was measured.

Only three respondents knew how many grams of glucose are drunk for an oGTT. Only one stated that it was necessary to fast for 8 hours before an oGTT. They mostly stated a shorter (40%) or longer (37%) period of fasting, or did not clearly express themselves regarding the fasting period (22%). In 22 cases (16%), they stated that blood had been taken during an oGTT. In 48 cases (38%), the respondents stated that they felt bad after consuming the sweet liquid; mostly they felt sick. Despite the respondents' confirmed ignorance regarding the preparation and performance of the oGTT, they were extremely or very satisfied with the process of being informed (57%).

Discussion

The average age of the pregnant women corresponds to the current trends (31 years). According to ČSÚ (2013), in all European countries including the Czech Republic, people tend to postpone parenthood to a later age. In the Czech Republic, the average age of the mother at the time of giving birth to her first child increased from 22.5 years in 1990 to 27.9 years in 2012. It is, among others, caused by a high occurrence of parents with a college degree.

GDM affects genetically predisposed women, with many risk factors affecting its manifestation. GDM is largely caused by insulin resistance, which starts occurring in the second trimester and progresses in the third. [4] There is no international consensus regarding the timing of the screening method and the optimal cut-off points for diagnosis and intervention of GDM. [5]. The Czech Republic adheres to the recommendations of ADA/IADPSG for screening women at risk of diabetes. In Poland, the diagnosis of GDM is based on the recommendations of the Polish Gynaecological Society (PTG) and is usually performed by obstetricians in compliance with international recommendations. [6].

In the Czech Republic, as in Poland, screening of glucose tolerance defects (GTD) is done in two stages: a fasting glucose test is taken in the 14th week of

pregnancy and between the 24th and 28th weeks by performing the oral glucose tolerance test (oGTT). [7].

It is very positive that on average the respondents had the test in the 25th week of pregnancy. However, 16 of them stated that they did not know in what week they had the test, and 10 refused to have it. A large number of respondents 69 (52%) stated that they had undergone the oGTT based on their doctor's wish. In 17 cases, no reason was stated. Women should be fully informed that they undergo the test to ensure healthy development of the foetus, not simply for their doctors. In 17 cases, a higher level of sugar was measured, and in 2 cases the respondents stated that they had been diagnosed with diabetes mellitus. As far as the procedure itself is concerned, there are big information gaps. Only three respondents knew how many grams of glucose are administered during an oGTT. Only 1 stated that it was necessary to fast for 8 hours prior to the oGTT, which means that they were not adequately prepared for the examination itself. In 22 cases (16%), they stated that blood had been drawn from their fingers during an oGTT, which is unacceptable in accordance with both Czech and international recommendations. Again, such examinations were thus distorted. Despite confirmed ignorance on the part of the respondents regarding the preparation for and performance of the oGTT, 57% were satisfied or even very satisfied with the information being conveyed to them. The Polish study (Moleda P, Fronczyk A., et al.)—where the aim of the study was to assess practical implementation of PTG standards of GDM screening and diagnosis in 351 pregnant women who consulted a diabetologist—consisted of 102 patients between 2008 and 2010 (PTG guidelines of 2005), and 249 patients between 2011 and 2013 (PTG guidelines of 2011). Adherence to the diagnostic guidelines for 2008–2010 was 42.2%. The most common errors were incorrect time of the oGTT (36.4%) and wrong interpretation of glycaemia (34.1%). Between 2011 and 2013, incorrect diagnostic testing was detected in 78.3% of affected women. The most common deviation was a lack of oGTT at the beginning of pregnancy in women with GDM risk factors (91.3%) [6].

Untreated DM can cause many short-term and long-term risks for both the pregnant woman and the foetus. In pregnant women with pre-existing diabetes, we can observe a tendency to develop complications, e.g. progression of diabetic retinopathy, diabetic nephropathy, and diabetic cardiomyopathy. Based on the aforementioned facts, there are counter-indications for pregnant women, which, however, need to be assessed in their full complexity and in respect to the overall clinical condition and laboratory results [8,9,10].

Conclusions

We assume that inadequate information both on the part of healthcare professionals and the pregnant women themselves regarding the preparation and perfor-

mance of the oGTT may lead to distorted laboratory results, and thus late diagnostics of GDM. We will continue in our research using the qualitative method.

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