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MATERNO-FETAL MEDICINE

Early post-partum diabetes mellitus screening rates in patients with history of gestational diabetes

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Abstract
Introduction Patients with history of gestational diabetes (GDM) are at high risk for developing diabetes mellitus (DM) after pregnancy. This study investigates the rate of GDM patients who received screening and the prevalence of DM in the early post-partum period.
Materials and methods This study included 78 patients diagnosed and treated for GDM between January 2005 and December 2007. They were evaluated whether or not they were screened with 75 g oral glucose tolerance test (OGTT) or fasting blood glucose measurement at post-partum 6–12-week period. The rates of DM and impaired glucose tolerance (IGT) were determined.
Results Of 78 GDM patients only 10 (12.8%) patients were screened with OGTT and 27 (34.6%) patients were screened with fasting blood glucose (FBG) measurement. 41 (52.6%) patients did not receive any post-partum screening. Insulin treated patients during pregnancy underwent OGTT more frequently ($p = 0.008$). We found that 61% of the patients who did not receive any screening test were seen by a doctor for any reason during this period. DM was diagnosed in 50% of patients who underwent OGTT and 7.4% of patients who underwent FBG measurement during early post-partum period ($p = 0.013$).
Conclusion Despite the fact that GDM is generally strictly and carefully monitored during pregnancy, it is usually neglected in the post-partum period. Insulin treated patients during pregnancy should be informed better for post-partum screening with OGTT. OGTT appears to be a better way of screening to diagnose DM.

Keywords Gestational diabetes mellitus · Post-partum screening

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Introduction

Gestational diabetes mellitus (GDM) is defined as glucose intolerance with onset or first recognition during pregnancy and the prevalence of GDM ranges from 1 to 14% depending on the population screened [1, 2]. Pregnancy itself is a diabetogenic period. After delivery, most of these women return to a euglycemic state, but they are at increased risk for overt type 2 diabetes in the future. Conversion of GDM to type 2 diabetes varies with ethnicity and length of follow-up [3].

Diabetes mellitus (DM) is a progressive chronic disease which disturbs patient's quality of life. The prevalence of DM continues to rise worldwide and it is very important to identify high-risk populations to take preventive measures for the development of DM and its complications [4]. Patients with history of GDM must be informed about the risk of future development of DM and importance of early diagnosis. The American Diabetes Association recommends reassessment of maternal glycemic status at least 6 weeks after delivery in women diagnosed with GDM with 75 g oral glucose tolerance test (OGTT) [1].

In this study, we aimed to investigate the rate of GDM patients who received screening only by fasting blood glucose (FBG) measurement or OGGT and the prevalence of DM detected by these screening tests in early post-partum period.

Materials and methods

The study was approved by the ethics committee of our hospital. We screened for GDM in all nondiabetic pregnancies using a two-step standard protocol. Universal screening for GDM was performed at 24–28 weeks of pregnancy. All pregnant women without previously diagnosed diabetes were offered screening for GDM with a 50-g 1-h glucose challenge test (GCT) during a routine prenatal visit. Patients with a GCT of 140 mg/dl or higher underwent a 100-g 3-h diagnostic OGTT. GDM was diagnosed when two or more glucose values during the diagnostic OGTT met or exceeded the criteria for a positive test, as recommended by the NDDG (plasma glucose thresholds: fasting 95 mg/dl, 1-h 180 mg/dl, 2-h 155 mg/dl, 3-h 140 mg/dl) [5].

Hospital information system records were reviewed retrospectively for the study. Of 335 GDM patients who were diagnosed and also hospitalized for glucose regulation between 2005 and 2007, only 109 patients were reached by phone and informed about the study. We chose GDM patients who were hospitalized during their pregnancy because they are informed better about their disease and risk of development of DM in future. Seventy-eight patients accepted and were included in the study. They were questioned whether or not they applied for post-partum screening between 6 and 12 weeks and type of screening was only FBG measurement or OGGT. Patients who were screened with OGTT, FBG measurement and the ones who did not receive any screening were evaluated according to age, family history of diabetes, educational level, insulin requirement during pregnancy, reasons of not undergoing OGTT and whether or not they applied to any doctor other than screening purposes. Our criteria for the diagnosis of DM were 2 h postload glucose $\geq$ 200 mg/dl with 75 g OGTT or fasting plasma glucose $\geq$ 126 mg/dl, for the impaired glucose tolerance (IGT) was 2 h postload glucose between 140 and 199 mg/dl and impaired fasting glucose (IFG) was fasting plasma glucose between 100 and 125 mg/dl. The rates of DM and IGT/IFG were evaluated.

Statistical analyses were performed using SPSS version 10.0 (SPSS, Chicago, IL, USA). Categorical variants were expressed as percentage (%) of observation number. Kruscall Wallis and Pearson Chi square test were used to compare the groups. $p < 0.05$ was considered significant.

Results

Forty-one (52.6%) patients out of 78 reported that they did not receive any post-partum screening for diabetes up to 12 weeks. Only 10 (12.8%) of the patients underwent OGTT and 27 (34.6%) of the patients got measured FBG.

When we compared the patients who underwent post-partum evaluation with OGTT, FBG measurement and the ones who did not receive any screening according to age, parity, history of diabetes in their first degree relatives, we could not find any difference. Insulin treated patients during pregnancy and higher educated patients received OGTT more frequently ($p = 0.008$, $p = 0.046$, respectively). 33.3% of the FBG measured patients and 43.9% of no screening group revealed that they were uninformed or unaware of necessity of post-partum screening with OGTT (Table 1).

DM was diagnosed in 50% of patients who received OGTT, 7.4% of patients who received FBG measurement and IGT/IFG was diagnosed in 20% of patients who received OGTT, and in 40.7% of patients who received FBG measurement during early post-partum period ($p = 0.013$) (Table 1).

Discussion

We found that only 12.8% of patients with history of GDM received screening with OGGT up to 12 post-partum weeks; however, this rate was increased to 47.4% when screening with fasting blood glucose was included. Different rates of post-partum screening rates were reported varying according to the population and the methods used [6–11]. In 2005, Smirnakis et al. reported a 37% screening rate of patients with 75 g OGTT recommended by the American Diabetes Association. They stated that the rate of screening was increased to 67% when random glucose testing was included [7]. Gallardo et al. reported rate of screening by OGGT was 55.2% and Schaefer-Graf reported 46% consecutively which are more than our post-partum screening rate by OGTT [7, 8].

One of the important point is that most of the patients with the history of GDM were uninformed or unaware of the necessity of the screening during post-partum period. Our study cases were GDM cases who were hospitalized for glucose regulation during their pregnancy, had a chance to spend more time with doctors and nurses and detailed information were given about their disease and its long-term effect. As a hospital protocol, we recommend post-partum 75 g OGTT every GDM patients as recommended by the American Diabetes Association [1]. Since 61.9% of patients in no screening group and 70.9% of patients in FBG measurement group were seen by a doctor for any reason at least once during the post-partum weeks 6–12, we thought that the reason had not been the eligibility of health care center and the opportunity for the post-partum glycemic evaluation of these patients could have been used better. Since most of the patients who did not undergo any investigation were unaware of the necessity of post-partum

Table 1 Demographic characteristics and results of screening tests

	Evaluated with 75 g OGTT ($n = 10$)	Evaluated with fasting blood glucose ($n = 27$)	No post-partum screening ($n = 41$)	*P* value
Maternal age (years) median (interquartile range)	37 (5.8)	35 (4)	35 (7.5)	0.69
Primiparous *n* (%)	1 (10)	5 (17.9)	8 (19.5)	0.779
Positive family history of DM in first degree relatives *n* (%)	9 (90)	16 (59.3)	23 (56.1)	0.136
Treatment during pregnancy				
Only diet *n* (%)	–	13 (48.1)	22 (53.7)	0.008
Insulin added *n* (%)	10 (100)	14 (51.9)	19 (46.3)	
Educational level (years)				
Primary	1 (10)	15 (55.6)	18 (43.9)	0.046
High school and university	9 (90)	12 (44.4)	23 (56.1)	
The reasons why the GDM patients did not underwent 75 g OGTT				
Unaware or uninformed	–	9 (33.3)	18 (43.9)	0.702
Informed about but thought that the test could harm her baby	–	10 (37.0)	11 (26.8)	
Informed but did not take it serious	–	8 (29.7)	12 (29.3)	
Applied to a doctor for any reason 6–12 weeks	6 (60)	19 (70.4)	25 (61.0)	
Examination of baby	4 (40)	9 (33.3)	15 (36.6)	
Gynecological examination	1 (10)	9 (33.3)	7 (17.1)	
Contraceptive purposes	1 (10)	1 (3.7)	3 (7.3)	
Results of the screening tests				
Normal	3 (30)	14 (51.9)	–	0.013
IGT/IFG	2 (20)	11 (40.7)	–	
DM	5 (50)	2 (7.4)	–	

evaluation, we reevaluated our strategies and services for patient education about post-partum evaluation.

There are some discrepancies about screening time during post-partum period and methods of screening to detect development of DM. The American Diabetes Association advised screening early in the post-partum period [1], while others claim that screening is unnecessary in this early period [12]. Our findings of 50% rate of DM and 20% rate of IGT/IFG with OGTT during early post-partum period supported the importance of early screening. OGGT, as advised by the American Diabetes Association, has been reported to have higher sensitivity compared to fasting blood glucose [1, 13] but OGTT is time consuming, expensive and inconvenient; so fasting blood glucose is usually preferred for the patients. Although in our study OGTT group was made up of only cases who required insulin treatment during pregnancy which could have affected the results, we diagnosed 50% of patients in OGTT group and 7.4% in FBG measurement group which was statistically significant. Our results should be supported by prospective studies.

Despite the fact that GDM is generally strictly and carefully monitored during pregnancy, it is usually neglected in the post-partum period. We conclude that early post-partum screening gives a chance to diagnose DM early and to take preventive measures in order to prevent future diabetes complications. Patients should be educated about the importance of OGTT to prevent underdiagnosis of DM.

Conflict of interest statement None.

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