

Obstetric and Neonatal Outcomes of Pregnancies with Mild Gestational Hyperglycemia Diagnosed at Gestational Diabetes Mellitus Screening

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ABSTRACT

OBJECTIVE: The aim of this study was to evaluate the obstetric and neonatal outcomes of pregnancies with mild gestational hyperglycemia diagnosed at gestational diabetes mellitus screening.

STUDY DESIGN: Between September 2016 and August 2017, the pregnant women diagnosed as normal glycaemia or mild gestational hyperglycemia according to the results of gestational diabetes mellitus screening with 50 g oral glucose challenge test, and 100 g oral glucose tolerance test were compared [Normal glycaemia: Blood glucose value <140 mg/dL 1 hour after 50 g oral glucose challenge test].

RESULTS: The following results were obtained in the normal glycaemia and mild gestational hyperglycemia groups respectively: Mean gestational age at birth, 38.9±1.6 and 39±1.9 weeks; preterm, term, post-term birth rates, 6%, 86.2% 7.8% and 6.8%, 86.4% and 6.8%; cesarean delivery rate, 30.9% and 34.9%; birth weight 3227.9±394.9 and 3241.05±418.5 g; small for gestational age, 4.4% and 2.3%; large for gestational age 4.6% and 7%; without any significant difference between the groups. Five minute Apgar scores were significantly lower in the mild gestational hyperglycemia group compared to the normal glycaemia group.

CONCLUSION: There was no significant increase in adverse pregnancy outcomes such as preterm birth, post-term birth, increased cesarean delivery rate, small for gestational age and large for gestational age, except for a significant decrease in 5 minute Apgar scores in the mild gestational hyperglycemia group compared to the normal glycaemia group in our study.

Keywords: Gestational diabetes mellitus screening, Mild gestational hyperglycemia, Obstetric and neonatal outcomes

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Introduction

Gestational diabetes mellitus (GDM) is one of the major complications of pregnancy which affects approximately 2-5% of pregnancies and causes fetal macrosomia, shoulder dystocia, polyhydramnios, operative delivery, preeclampsia, in-

creased cesarean rates and poor neonatal outcomes (1-2). Adverse pregnancy outcomes in GDM are associated with maternal hyperglycemia (3). For this reason, it is important to prevent the development of complications by establishing early diagnosis and controlling the maternal hyperglycemia. The American College of Obstetricians and Gynecologist recommends GDM screening with a 50 g oral glucose challenge test (OGCT) in all pregnant patients between 24-28th gestational weeks (4-5). GDM is diagnosed when blood glucose value is ≥ 200 mg/dL 1 hour after 50 g OGCT or when two or more abnormal glucose values are observed at 100 g oral glucose tolerance test which is the second step of the GDM screening program (6). Pregnancies with the diagnosis GDM must undergo a specific follow-up and treatment program. On the other hand, those with positive 50g OGCT (≥ 140 and < 200 mg/dL) but < 2 abnormal glucose values at 100g OGTT, not meeting the criteria for the diagnosis of GDM, are defined as mild gestational hyperglycemia (MGH) and are not subjected to treatment (7). However, several recently conducted studies showed an increase in adverse pregnancy outcomes in MGH (7-9).

The aim of our study was to evaluate obstetric and neonatal outcomes of pregnant women diagnosed as MGH at GDM screening.

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Material and Method

This study was designed retrospectively upon approval obtained from the ethics committee. Singleton pregnancies subjected to 50g OGCT at 24-28th weeks of gestation, between September 2016 and August 2017 in Health Sciences University Gazi Yasargil Training and Research Hospital, were included in the study. Information about pregnancies was obtained by reviewing the hospital medical records. In all cases, obstetric ultrasound (OB-USG) was performed before OGCT. The gestational week was determined by comparing the OB-USG results with the last menstrual period and the first trimester OB-USG result. The pregnant women with 1st hour blood glucose value lower than 140 mg/dL after 50 g OGCT were considered normal; 100 g OGTT was performed in those with a value between 140-199 mg/dL; and those with 1st hour blood glucose value ≥ 200 mg/dL were considered as GDM. In pregnant women submitted to 100 g OGTT, the diagnosis of GDM was established when two or more out of the four blood glucose values measured were abnormal (fasting ≥ 95 mg/dL, 1st hour ≥ 180 mg/dL, 2nd hour ≥ 155 mg/dL and 3th hour ≥ 140 mg/dL) according to the Carpenter-Coustan Conversion criteria (6). The pregnant women with 1st hour blood glucose value lower than 140 mg/dL after 50 g OGCT were defined as the normal glycaemia (NG) group. The rest, after excluding those meeting the criteria of GDM, were defined as the MGH group. NG and MGH groups were compared with respect to maternal characteristics and obstetrics and neonatal outcomes; namely, maternal age, gravida, parity, type of delivery (vaginal and cesarean delivery), gestational age at birth, birth weight, 5th minute Apgar score, rates of 5th minute Apgar score < 7 ,

preterm birth (at < 37 gestational weeks), term birth, post-term birth (at ≥ 42 gestational weeks), small for gestational age (SGA) newborns (birthweight $< 10^{\text{th}}$ percentile according to the gestational age) (10) and large for gestational age (LGA) newborns (birthweight $> 90^{\text{th}}$ percentile according to the gestational age) (11). Multiple pregnancies, patients with pregestational Diabetes Mellitus, pregnancies with other chronic diseases (asthma, corticosteroid use and chronic hypertension) and known fetal anomalies were not included into the study.

Results

Two thousand six hundred twenty-three singleton pregnancies screened for GDM with the two step screening program (50 g OGCT and 100 g OGTT) at 24-28th gestational weeks, between September 2016 and August 2017, were included in this study. The distribution of NG, MGH and GDM were 77.2% (n=2024), 18% (n=473) and 4.8% (n=126) respectively. The comparison of maternal characteristics as well as obstetrics and neonatal outcomes of the NG and MGH groups are shown in table I. Mean maternal age and the ratio of multiparous women were significantly higher in the MGH group ($p < 0.05$). Mean 5th minute Apgar score was significantly lower and the rate of 5th minute Apgar score less than 7 was significantly higher in the MGH group ($p < 0.05$).

Discussion

Some recent studies have shown that there is an increase in the rate of adverse pregnancy outcomes (such as LGA, preterm delivery, cesarean delivery) in pregnancies with MGH

Table I: Distribution of characteristic features of pregnancies with normal and mild gestational hyperglycemia

	Normal Glycaemia n=2024	Mild Gestational Hyperglycemia n=473	p value
Maternal age year],[mean\pmSD]	26.6 \pm 5.4	33.4 \pm 6.4	<0.001³
Multipara (parity >1), n (%)	1459 (72.1)	396 (83.7)	<0.001¹
Gestational age (wk), [mean]	38.9 \pm 1.6	39 \pm 1.9	0.554 ²
-preterm birth (<37wk), n, (%)	121 (6.0)	32 (6.8)	0.479 ¹
-term birth (37wk-41wk6d), n (%)	1745 (86.2)	409 (86.4)	0.234 ¹
-post-term birth (≥ 42 wk), n (%)	158 (7.8)	32 (6.8)	0.621 ¹
Type of delivery, n, (%)			
-vaginal delivery, n (%)	1398 (69.1)	308 (65.1)	0.113 ¹
- cesarean delivery, n (%)	626 (30.9)	165 (34.9)	0.103 ¹
Birth weight, g, [mean\pmSD]	3227.9 \pm 394.9	3241.05 \pm 418.5	0.546 ³
5 min. Apgar [mean\pmSD]	9.2 \pm 0.6	9.1 \pm 0.5	<0.001³
5 min. Apgar <7, n, (%)	21 (1.0)	0 (0.0)	<0.001¹
SGA, n (%)	90 (4.4)	11 (2.3)	0.049 ¹
LGA, N (%)	95 (4.6)	33 (7.0)	0.049 ¹

SGA: Small for gestational age, LGA: Large for gestational age, GDM: Gestational diabetes mellitus, wk: week, min: minute, g: gram, Chi-Square¹, Kruskal Wallis², Mann-Whitney U³

to those with NG (7-9). In our study, unlike these studies, there was no significant increase in adverse pregnancy outcomes such as preterm birth, post-term birth, cesarean delivery, SGA and LGA compared to NG pregnancies, but there was a significant decrease in 5th minute Apgar scores. There were no neonates with 5 minute Apgar scores less than 7 among pregnancies diagnosed as MGH whereas the rate was 1% in NG cases.

Insulin resistance and impaired glucose tolerance are common in elderly people (12). In addition, postprandial blood glucose levels are significantly higher in elderly people who do not have diabetes than in young people due to increased insulin resistance, and this elevation continues for a longer period (13). In our study, the mean age of pregnancies diagnosed with MGH was found to be significantly higher than that of NG, and this increase may be due to insulin resistance increasing with age (13). At the same time, in their study, Kaymak et al found that the mean age of the women with MGH was significantly higher than that of the NG group, which is similar to the result of our study (8).

In our study, the rate of multiparous women was found to be significantly higher in the MGH group compared to the NG group. However, Kaymak et al have reported no difference in the rates of multiparous women in their study (8). In our study, the mean age of the patients diagnosed as MGH was 33.4 while it was 26.6 in the NG group and the age difference between the two groups was 6.8 years. However, the age difference between the groups was much lower in the study of Kaymak et al (8). This higher age difference in our study compared to the study of Kaymak et al., might explain the higher rate of multiparous women in our MGH group, as the number of births may increase with age.

There was no significant difference between NG and MGH groups in terms of preterm delivery rates in our study. In their study, Nordin et al (14) and Corrado et al (15) found no significant increase in the preterm delivery rate in the MGH group, as in our study. However, Kaymak et al (8) and Jensen et al (9) reported a significant increase in the preterm birth rate in the MGH group in their studies.

No significant increase was found in our study in terms of cesarean delivery rates in the MGH group. In the literature, there are studies with results similar to ours (16-17) as well as studies showing a significant increase in caesarean delivery rates in the MGH group (8,14). The absence of increase in cesarean rates in our study may be associated with similar birth weight and LGA rates between MGH and NG groups. However, in studies where cesarean delivery rates were found to be significantly high MGH, LGA rates were also found to be significantly high among pregnancies with MGH (8,14).

Although the birth weight and LGA rates in our study were higher in the MGH group compared to the NG group, the dif-

ference was not found to be statistically significant. These results differ from the results of various studies in the literature (8,16,19). On the other hand, Fassett et al (19) stated that MGH does not require blood glucose monitoring and strict diet, and that the outcomes of these pregnancies are similar to those with NG (19). Our results showing no significant difference in terms of birth weight and LGA rates among the groups may be considered in consistence with the results of the study conducted by Fassett et al (19).

The limitations of this study are its retrospective aspect and the impossibility to access to more detailed information from patient file records. On the other hand, the fact that it is a large series of selected cases, excluding the pregnancies with chronic diseases which may be considered as risk factors for GDM, makes it valuable.

As a result, there was no significant increase in adverse pregnancy outcomes such as rates of preterm birth, post-term birth, cesarean delivery, SGA and LGA, in pregnancies with MGH, except for a significant decrease in 5 minutes Apgar scores, compared to the NG group in our study. However, several studies in the literature reveal that MGH is an important entity and can affect obstetric and neonatal outcomes. For this reason, prospective studies involving detailed, extensive series are needed in order to be able to handle the subject more objectively.

✉: *Conflict of interest: The authors declare that there is no conflict of interest.*

Authors contributions: SA: Writing, concept, design, MSB: Literature search, data collection or processing, analysis or interpretation.

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