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Investigation of gestational diabetes mellitus and rate of pre-eclampsia

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Abstract
Introduction: Clinical manifestation of these diseases may disappear early with the termination of pregnancy, however, due to systemic pathological changes, women with a history of GDM or preeclampsia are at high risk for developing type 2 diabetes or chronic hypertension.
Materials and Methods: Patient's details and history were taken and general physical and local examination was conducted. Patients were put on treatment according to the blood glucose levels; they were treated either medical Nutrional therapy (or) combined (Insulin along with MNT).
Results: There were 15 subjects in GDM with PE and 22 in GDM without PE in primi, 10 in GDM with PE and without PE in 2nd gravida, 3 in GDM with PE and 6 in GDM without PE in 3rd and 2 in GDM with PE and 4 in GDM without PE in 4th and above gravida. The difference was significant ($P< 0.05$).
Conclusion: Due to such adverse outcomes mentioned in patients with borderline AFI and because there is no sufficient evidence and specific decision about delivery based on a borderline AFI, there should be a close observation and antepartum surveillance for them.

Keywords: Gestational, diabetes mellitus, pre-eclampsia

Introduction
Worldwide GDM is a significant public health problem. GDM both leads to adverse foetal health outcomes in the form of neonatal jaundice, stillbirths, macrosomia and also affects maternal health. The GDM leads to maternal complications such as pre-eclampsia, the need for caesarean section and respiratory distress. Even GDM mother's risk of developing diabetes is up by 10% immediately after delivery [1]. Evidence suggests that children born to GDM mothers are nearly four to eight times more likely to develop diabetes in later life compared with their siblings born to the same parent with no GDM [2].
Diagnostic criteria have been developed by numerous associations such as: O′ Sullivan; American Diabetes Association (ADA); Australian Diabetes in Pregnancy Society (ADIPS); Carpenter-Coustan (CC); International Association of the Diabetes and Pregnancy Study Groups (IADPSG); International Classification of Diseases (ICD) etc. [3]. These diagnostic criteria vary in terms of screening methods and screening threshold. Diagnosis of GDM primarily depends on the results of an oral glucose tolerance test (OGTT) [4]. The OGTT can be carried out via a 75-g two-hour test or a 100-g three-hour OGTT. The 75-g two-hour OGTT is a one-step approach, while the 100-g three-hour OGTT is usually implemented as the second step of a two-step approach [5]. A diagnosis of GDM is made when one glucose value is elevated for the 75-g two-hour OGTT.
Although preeclampsia and GDM may appear to be unrelated disease entities because their clinical manifestation and diagnostic criteria do not overlap, many studies have shown a correlation between preeclampsia and GDM. Miyakoshi *et al.* [6] described the perinatal outcomes of pregnant women with mild glucose intolerance or GDM and noted significantly higher rates of preeclampsia. Similarly, preeclampsia is thought to be linked to the degree of glucose intolerance [7-9]. Schneider *et al.* [10] recognized common risk factors between the two conditions, including increased maternal age, nulliparity, multiple gestation pregnancies, and an increased pre-pregnancy body mass index. The underlying pathophysiology the conditions share is assumed to be vascular endothelial dysfunction [11-13]. Clinical manifestation of these diseases may disappear early with the termination of pregnancy, however, due to systemic pathological changes, women with a history of GDM or preeclampsia are at high risk for developing type 2 diabetes or chronic hypertension [14].

These conditions both affect maternal health and any subsequent pregnancy as a corollary consequence.

Materials and Methods

The present study was conducted among 92 women with gestational diabetes confirmed. Patient's details and history were taken and general physical and local examination was conducted. Patients were put on treatment according to the blood glucose levels; they were treated either medical Nutrional therapy (or) combined (Insulin along with MNT). Routine blood work, blood pressure, and weight gain was checked during each visit. All women were asked to drink 75 g of anhydrous glucose dissolved in 300 mL of water over 5–10 min period. After 2 hours of glucose ingestion, we measured blood glucose levels using plasma calibrated glucometers. A blood sugar level equal to 140 mg/dL or higher indicates GD. Statistical analysis was performed using chi- square test. P value less than 0.05 was considered significant.

Results

Table 1 shows that there were 15 subjects in GDM with PE and 22 in GDM without PE in primi, 10 in GDM with PE and without PE in 2nd gravida, 3 in GDM with PE and 6 in GDM without PE in 3rd and 2 in GDM with PE and 4 in GDM without PE in 4th and above gravida. The difference was significant (*P*< 0.05).

Table 1: Distribution of subjects based on gravida and eclampsia

Gravida	GDM with pre-eclampsia	GDM without pre-eclampsia	P value
Primi	17	24	0.05
2nd	12	12	1
3rd	5	8	0.02
4th or above	4	6	0.02

Table 2 shows that GDM with PE and GDM without PE had 1st hour OGTT of 199.4 mg/dl and 175.3 mg/dl, 2 hours OGTT was 173.1 mg/dl and 160.2 mg/dl, weight gain was 18.3 Kilogram and 13.2 Kilogram and HbA1c levels was 8.63% and 8.03 respectively. The difference was significant (*P*< 0.05).

Table 2: Assessment of parameters in subjects

Parameters	GDM with pre-eclampsia	GDM without pre-eclampsia	P value
1st hour OGTT (mg/dl)	199.4	175.3	0.13
2 hours OGTT (mg/dl)	173.1	160.2	0.53
Weight gain	18.3	13.2	0.06
HbA1c levels (%)	8.63	8.03	0.18

Discussion

GDM is one of the leading causes of mortality and morbidity for both the mother and the infant worldwide. Mothers with GDM are at risk of developing gestational hypertension, preeclampsia and caesarean section [15]. Apart from this, women with a history of GDM are also at significantly higher risk of developing subsequent type 2 diabetes mellitus (T2DM) and cardiovascular diseases [16]. Babies born from GDM women are at risk of being macrosomic, may suffer from more congenital abnormalities and have a greater propensity of developing neonatal hypoglycaemia, and T2DM later in life [17]. The present study was conducted to assess cases of gestational diabetes mellitus.

We found that there were 72 subjects with GDM. 42 were having GDM with pre-eclampsia (PE) and 30 were having

GDM without pre- eclampsia (PE). Lee *et al.* [12] in their study eighty-four studies with STROBE score ≥ 14 were included. The pooled prevalence of GDM in Asia was 11.5% (95% CI 10.9–12.1). There was considerable heterogeneity (I2 > 95%) in the prevalence of GDM in Asia, which is likely due to differences in diagnostic criteria, screening methods and study setting. Meta-analysis demonstrated that the risk factors of GDM include history of previous GDM (OR 8.42, 95% CI 5.35–13.23); macrosomia (OR 4.41, 95% CI 3.09–6.31); and congenital anomalies (OR 4.25, 95% CI 1.52–11.88). Other risk factors include a BMI ≥25 kg/m2 (OR 3.27, 95% CI 2.81– 3.80); pregnancy-induced hypertension (OR 3.20, 95% CI 2.19–4.68); family history of diabetes (OR 2.77, 2.22–3.47); history of stillbirth (OR 2.39, 95% CI 1.68–3.40); polycystic ovary syndrome (OR 2.33, 95% CI1.72–3.17); history of abortion (OR 2.25, 95% CI 1.54–3.29); age ≥ 25 (OR 2.17, 95% CI 1.96–2.41); multiparity ≥2 (OR 1. 37, 95% CI 1.24–1.52); and history of preterm delivery (OR 1.93, 95% CI 1.21–3.07).

Several limitations of the present study require consideration. First, our data was not collected for research purposes but for cost claim issues, which consists of the incidence of preeclampsia and GDM based on insurance claims data from the KNHI Claims Database. Thus, loss of validity is the main limitation of our database. Especially, the prevalence of GDM in the second pregnancy is high. Unfortunately, studies validating data specifically for GDM and preeclampsia is lacking. However, studies have confirmed the accuracy of data from KNHI Claims Database of the HIRA, and many studies do use the data [18-20]. Moreover, we previously reported that the incidence of GDM increased from 3.86% in 2007 to 11.83% in 2010, with a continuous increase after adjustment for age [21]. Looking at increasing trend of the GDM incidence, we expect the prevalence will also continue to rise. Although the reason for this high incidence is unclear, there are several possible explanations. First, the increased incidence of GDM might reflect or contribute to the ongoing pattern of increasing rate of pregnant women with risk factor for GDM such as old age and obesity.[22] Moreover, the high incidence observed in this study may be attributed to changes in diagnostic criteria. Compared with NDDG criteria, the use of more inclusive CC criteria enabled an increased diagnosis of GDM by 30–50% [23, 24]. The Korean Society of Obstetrics and Gynecology recommends using either CC criteria or NDDG criteria when diagnosing GDM. Thus, the high incidence may be due to the shift in criteria from NDDG criteria to CC criteria. However, we could not access information on factors such as maternal BMI, lifestyle, and laboratory test results, and the criteria that are generally used by practitioners in Korea. Another, the high incidence may be attributed to the study design. The population under study was confined to pregnant women who already gave birth once before. Thus, the prevalence may seem higher than when it is compared to that of the all pregnant women. Further studies are needed to evaluate the cause for high prevalence of GDM.

In case of insulin treatment, Prescription is mandatorily required for every medication and thus prescription is automatically registered to KNHI Claims Database of the HIRA. Therefore, the data related to insulin treatment is complete and accurate.

Conclusion

Authors found that early detection of gestational diabetes with good antenatal care and strict glycemic control may decrease the chances of preeclampsia.

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