

The Effect of Parental Transmission of Diabetes on the Development of Gestational Diabetes Mellitus

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Gestational diabetes mellitus (GDM) is defined as carbohydrate intolerance of variable severity that begins or is first recognized during pregnancy [1]. Results of numerous studies have led researchers to conclude that maternal hyperglycemia was associated with an increased frequency of adverse perinatal outcomes, such as large for gestational age, primary Cesarean section delivery, preeclampsia, hypertension, preterm delivery, neonatal hypoglycemia, hyperbilirubinemia, and intensive neonatal care [2]. Furthermore, GDM is an important risk factor for future development of type 2 diabetes mellitus (T2DM). The two disorders share the same pathophysiology, characterized by increased insulin resistance and insulin secretory impairment. These diseases are also affected by the same environmental and genetic risk factors [3]. Therefore, the epidemiology suggested by GDM study findings is useful not only to investigate the pathophysiology of GDM, but also to understand T2DM, particularly in younger populations.

A family history of T2DM is a traditional, well-known risk factor associated with the development of GDM. However, the debate about whether maternal or paternal family history is the most important risk factor for the development of GDM diabetes is ongoing. Most of data have shown that maternal factors are predominantly associated with GDM and T2DM. Harder et al. [4] reported that a family history of T2DM in women with GDM was more frequent in the maternal and grand-maternal line than in the paternal and grand-paternal line. However, this study was limited because a control group with normal glucose tolerance was not included, the number of

study participants was small, and the diagnostic criterion used was outdated [5].

Recent studies that compared study subjects with GDM to a control group demonstrated that maternal history of diabetes and a history of diabetes in the maternal line were stronger predictors of GDM than paternal history. In one of these studies, screening for GDM was carried out using a 75-g oral glucose tolerance test (OGTT), according to World Health Organization (WHO) criteria, and an age-matched control group. After adjustment for body mass index (BMI) as a potential risk factor for GDM, the effect of maternal history persisted. Because the study subjects were exclusively Caucasian women, the relationship between family history of T2DM and development of GDM among other ethnic groups is still unknown [6]. Possible mechanisms that may explain the importance of maternal history are genetic factors, intrauterine nutritional status, and shared environmental factors. Genetic factors include mitochondrial DNA mutations or deletions inherited entirely from the mother and some nuclear genes inherited preferentially from the mother.

The intrauterine nutritional environment and environmental factors, such as dietary habits, physical activity, and life-style patterns, may also contribute to the link between maternal and offspring diabetes [7]. Two potential hypotheses are related to environmental factors and an increased risk of GDM in the Asian/Pacific Islander ethnic group. First, food with a high glycemic index, such as rice, is consumed at higher rates among Asian/Pacific Islanders than in Western populations [8]. Additionally, new evidence points to excess visceral adipose tissue accumulation among Asian/Pacific Islanders compared with individuals of European ancestry

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for a given BMI range [9].

Some studies have reported no difference in the prevalence of diabetes between fathers and mothers of GDM women compared with controls. In one case-control study in 262 Chinese subjects, the prevalence of diabetes in mothers of patients with GDM was not significantly different from the prevalence in fathers of those patients (9.41% vs. 8.24%) [10]. Another study found a similar statistically significant increase in the risk of GDM for patients with a maternal-only and for those with a paternal-only family history (odds ratio = 2.0 vs. 2.3) [11].

It is well known that Asian women have a particularly high prevalence of GDM [12]. However, epidemiologic studies on prevalence and familial predominance are still insufficient, particularly among Korean people. In Korea, the prevalence of GDM ranges from 2% to 5% and is increasing persistently. A family history is also an important risk factor for the development of GDM in Korean patients [13]. However, no data have been reported that validate the relationship between the prevalence of GDM and familial clustering of T2DM.

Based on the findings of a well-designed clinical study by Rhee et al., a family history of T2DM in first-degree relatives was associated with an increased risk for development of GDM, yet there was no difference between the effects of a maternal and a paternal history of T2DM on the risk of GDM in Korean women with GDM. This result is meaningful because it is the first study to demonstrate a parental predominance of GDM in Korean participants. However, there are some limitations. First, the number of study subjects was too small, and this was a single center study. Second, no control group with normal glucose tolerance was used. Third, recall bias was present, similar to other epidemiologic studies.

In conclusion, the debate about the relationship between parental predominance and the development of GDM continues. This controversy may only be resolved by gathering more evidence from large, population-based cohort and intervention studies. (**Korean J Intern Med 2010;25:237-238**)

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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