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Risk of Subsequent Hypertension and Diabetes in Women With Hypertension During Pregnancy and Gestational Diabetes

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Abstract

Objective: To assess risks of postpartum hypertension and diabetes mellitus (DM) for women with hypertension during pregnancy (HDP) with and without gestational DM (GDM).

Patients and Methods: From insurance data of 15- to 44-year-old women with pregnancy in 2000-2011, we established an HDP/GDM cohort (n=1270), an HDP/non-GDM cohort (n=5077), and a comparison cohort without either disorder (n=12,594), frequency matched by age and year of pregnancy. Postpartum hypertension and DM were assessed before 2012.

Results: The postpartum hypertension incidence increased with age in all cohorts, with overall rates of 13.1, 8.82, and 0.79 per 1000 person-years in the HDP/GDM, HDP/non-GDM, and comparison cohorts, respectively. The adjusted hazard ratios (aHRs) of hypertension were 16.8 (95% CI, 11.8-24.1) for the HDP/GDM cohort and 11.2 (95% CI, 8.19-15.2) for the HDP/non-GDM cohort relative to the comparison cohort. The corresponding incident DM rates were 41.9 and 8.06 vs 2.55 per 1000 person-years in the 3 cohorts, respectively, with aHRs of 16.2 (95% CI, 13.2-19.9) for the HDP/GDM cohort and 3.15 (95% CI, 2.55-3.89) for the HDP/non-GDM cohort relative to the comparison cohort. Incident DM in the HDP/GDM cohort was 44% greater in 15- to 29-year-old women vs 40- to 44-year-old women (49.1 vs 34.2 per 1000 person-years), with aHRs of 39.2 (95% CI, 24.5-62.7) and 5.52 (95% CI, 2.92-10.4), respectively, relative to comparisons of respective age groups.

Conclusion: Subsequent hypertension and DM risks are greater in women with HDP/GDM than in women with HDP only compared with women without these complications. Younger women with HDP/GDM should be particularly cautious.

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After conception, pregnant women who undergo hemodynamic and metabolic changes, such as hypertension and diabetes mellitus (DM), may further develop cardiovascular and endocrinologic complications.[1-4] Approximately 5% to 10% of pregnant women may develop hypertension in the second or third trimester of pregnancy.[5,6] This gestational hypertension (GHT) may progress into preeclampsia with proteinuria or eclampsia with tonic-clonic seizures, conditions dangerous to both the infant and expectant mother. Women with hypertension during pregnancy (HDP), preeclampsia, or eclampsia are at elevated risk for preterm delivery, small for gestational age and stillbirth, and low-birth-weight infants.[5,7] Approximately 1% to 14% of pregnant women may have a high blood glucose level diagnosed for the first time during pregnancy.[8,9] This gestational DM (GDM) can not only impose risks of growth abnormality on the baby but also increase the risk of pregnancy-induced hypertension.[10,11] Both HDP and GDM are generally short-term disorders for most healthy pregnant women.

A recent study reported that women with HDP have a 10.8-fold increased risk of chronic kidney disease and a 14.8-fold increased risk of end-stage renal disease.[12] It is possible that women with HDP are at elevated risk for subsequent hypertension

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and DM before developing end-stage renal disease. Gestational DM may predispose a woman to a higher risk of progressing to preeclampsia and postpartum DM.[1,13,14] A study in New York found that women with GDM have an extremely high short-term risk of postpartum DM and cardiovascular complications.[1]

Few women may experience both HDP and GDM. However, few studies have investigated the risks of postpartum maternal and fetal complications for women with these 2 conditions.[14-16] Most studies investigated the postpartum outcomes associated with HDP only or GDM only.[17-20] With the advantage of large population claims data from Taiwan's National Health Insurance (NHI) program, we conducted a retrospective cohort study to investigate the postpartum risk of hypertension and DM for women with HDP alone and women with both HDP and GDM.

PATIENTS AND METHODS

Data Source

The NHI program of Taiwan has covered more than 99% of its 23 million inhabitants and contracted with more than 95% of its hospitals and clinics since 1999.[12] We obtained the reimbursement claims data from the National Health Research Institutes, which manages the NHI databases. For this study, we used 2 sets of claims data. One data set included all the inpatient claims data for all insured females (N=14,079,089). The other data set comprised claims data for 1,000,000 people randomly selected from all insured individuals with similar distributions in sex and age. All the data can be linked with surrogate

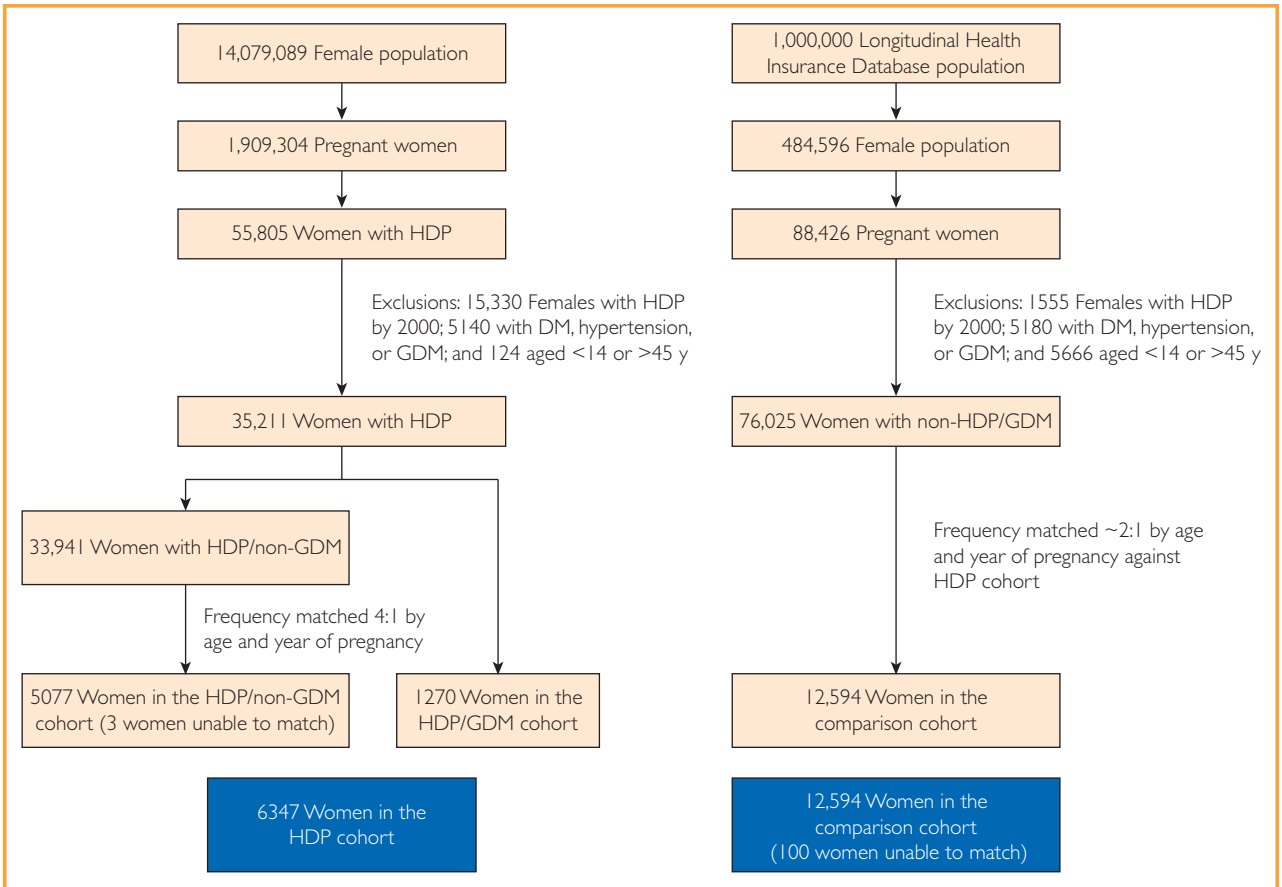

FIGURE 1. Flowchart of the study cohorts. DM = diabetes mellitus; GDM = gestational diabetes mellitus; HDP = hypertension during pregnancy.