Progress in Prevention


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Cardiovascular disease (CVD) is the leading cause of death in women older than 50 years. Risk factors related to an increase in CVD in postmenopausal women include increasing abdominal obesity, dyslipidemia, insulin resistance, and hypertension. A new set of risk factors added to the 2011 American Heart Association’s Effectiveness-Based Guidelines for the Prevention of Cardiovascular Disease in Women are a history of pre-eclampsia, gestational diabetes (GDM), or pregnancy-induced hypertension. These pregnancy-related factors highlight the unique cardiovascular and metabolic stress of pregnancy. They provide an opportunity to better estimate lifetime CVD risk as well as monitor and control risk factors accordingly, in the years after pregnancy.

Hypertensive disorders of pregnancy (HDPs) include chronic hypertension, gestational hypertension, and preeclampsia. These disorders of pregnancy have increased during the past 20 years and may be related to an increase in obesity rates and maternal age. The increased incidence of CVD risk factors mirrors the incidence of HDPs. The National Health and Nutrition Examination Surveys conducted from 1988 to 2004 indicate increased prevalence of metabolic syndrome and its clinical correlates in US women of childbearing age. The clinical correlates of metabolic syndrome are abdominal obesity, hypertension, dyslipidemia, and impaired fasting glucose; according to the National Health and Nutrition Examination Surveys, approximately 60% of women aged 18 to 44 years have one or more of these potentially modifiable cardiometabolic risk factors.

Elevated blood pressure in pregnancy and subsequent CVD risk were the subject of a large population-based prospective study based in Northern Finland. A 1966 cohort (n = 10,314) was followed for 39.4 years, demonstrating an association between HDPs and subsequent CVD including hypertension, ischemic heart disease, ischemic stroke, thromboembolic disease, heart failure, chronic kidney disease, diabetes mellitus, and arrhythmias. Importantly, this study was the first to demonstrate the risks associated with new-onset, isolated systolic or diastolic hypertension during pregnancy and subsequent CVD. Approximately 17% (n = 1608) of the women in the cohort were observed to have new-onset isolated elevation in systolic or diastolic blood pressure during pregnancy, and an estimated 30% (513) of them had a cardiovascular event in their mid-60s; 3% (36) died of myocardial infarction.

Preeclampsia occurs in approximately 3% of pregnancies. It is defined by onset of hypertension (≥140/90 mm Hg) and proteinuria (0.3 g for 24 hours) after 20 weeks of gestation. It abates with delivery of the placenta and is most common in the first pregnancy. Preeclampsia shares several pathophysiologic features with atherosclerosis including endothelial dysfunction, activation of the coagulation cascade, insulin resistance, and dyslipidemia (elevated low-density lipoprotein cholesterol, elevated triglyceride, and low high-density lipoprotein cholesterol). It is more common and severe in African American women and in those with lower socioeconomic status.

Bellamy and colleagues reviewed epidemiologic data from more than 2 million women, followed for a mean of 13 to 15 years, and demonstrated that preeclampsia, regardless of severity, resulted in a 2.6-fold increased risk for fatal myocardial ischemic events. Preeclampsia with a preterm delivery compared with a term delivery was associated with...
an 8-fold increase in cardiovascular mortality. In this large systematic review and meta-analysis, women with a history of preeclampsia had an increased relative risk (RR) for subsequent hypertension (RR, 3.70), ischemic heart disease (RR, 2.16), stroke (RR, 1.81), and venous thromboembolic events (RR, 1.79). The relative risk (RR) is the probability that a member of an exposed group will develop a disease relative to the probability that a member of an unexposed group will develop that same disease.

A Danish registry (1978–2007) of more than 1 million birth records was used to examine subsequent CVD risk factors in women with HDPs.8 The risk for subsequent hypertension increased by 5.3 times in women with gestational hypertension, 3.6 times in women with mild preeclampsia, and 6.07 times in women with severe preeclampsia. Risk for subsequent diabetes increased by 3.12 times with gestational hypertension and 3.68 times with severe preeclampsia.

The Heart Failure and Dysrhythmia after Maternal Placental Syndromes: HAD MPS study9 was a large retrospective study that followed 5242 women with gestational hypertension or preeclampsia in Ontario, Canada, for a median duration of 7.8 years. Ray and colleagues9 found a significant increased risk (61%) for heart failure or atrial arrhythmias in these women, and the increased risk correlated with the severity of hypertension or preeclampsia. The effect persisted after adjusting for pre pregnancy CVD, hypertension, and metabolic syndrome; however, there was no reported increase in ventricular arrhythmia.

Why does preeclampsia predict future risk? Some suggest that preeclampsia unmask risk factors known to be associated with CVD. For example, dyslipidemia, hypertension, diabetes, and obesity before pregnancy are associated with increased risk for preeclampsia. HDPs and CVD share the same risk factors: obesity, insulin resistance, diabetes, dyslipidemia, inflammation, endothelial dysfunction, oxidative stress, and hypercoagulability (increased platelet aggregation). One working hypothesis suggests that preeclampsia causes residual damage to the cardiovascular system, predisposing a woman to CVD later in life.10,11

Gestational diabetes, which complicates approximately 4% of all pregnancies in the United States, is associated with a 17% to 63% increased risk for diabetes later in life.12 Factors that increase the risk for GDM are obesity and metabolic syndrome, family history of type 2 diabetes mellitus, and race/ethnicity (greater prevalence in minority populations). Features that increase the risk for developing GDM are notably associated, characterized by insulin resistance, postprandial hyperglycemia, dyslipidemia, and increased inflammation. The stress imposed by GDM on an already compromised metabolic profile can potentially convert a usually transient state into a more permanent condition that subsequently increases the risk for CVD development.

The relationship between parity and future CVD risks has been studied extensively, but the results are inconsistent. In their review of the literature, de Kleijn and colleagues13 determined that there was a reduced CVD risk with up to 2 pregnancies but an increased CVD risk in later life for women who had 3 or more pregnancies. Alternatively, breastfeeding seems to decrease CVD risk. Data from the long-running Women’s Health Initiative found that breastfeeding for 12 or more months resulted in a 72% decrease in CVD. A dose-response relationship was noted in that longer lactation was associated with lower CVD risk.14

Taken together, the results of these studies underscore the need for preventive interventions for women who present with risk factors of CVD during pregnancy and in the postpartum period. Evidence-based clinical guidelines that provide clinicians with protocols for early identification of risk status as well as follow-up and treatment of women with pregnancy-related CVD risk factors are warranted. Until such guidelines exist, the following recommendations are offered: (1) a pregnancy history should be an integral component of CVD risk evaluation for women (see Table); (2) women with prior preeclampsia, HDPs, and GDM should receive counseling regarding their increased CVD risk and screening as early as 1 year post partum; and (3) lifestyle counseling and intensive coronary risk intervention aimed at primary prevention should occur early and regularly during the years after pregnancy, to help reduce future CVD risk in this high-risk population.

Nurses and nurse practitioners are often the first and most consistent healthcare contact for patients in hospitals, primary care settings, and community health settings. As such, they play an important role in identifying women at risk for CVD, including those with known pregnancy-related risk factors. As experts in providing health education, lifestyle counseling, and patient education, cardiovascular nurses are key to helping women make necessary changes to

<table>
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<tr>
<th>TABLE Pregnancy History Questions</th>
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<tbody>
<tr>
<td>1. How many pregnancies have you had?</td>
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<td>2. How many miscarriages?</td>
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<td>3. After how many miscarriages did you breastfeed?</td>
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<td>4. Were any of your babies born early (&gt;3 weeks before due date)?</td>
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<td>5. Did you have preeclampsia in any of your pregnancies? Which pregnancies?</td>
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<td>6. Did you have high blood pressure in pregnancy?</td>
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<td>7. Did you have GDM? Treated with insulin?</td>
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significantly reduce their future CVD risk.

REFERENCES


