

Racial Differences in the Association between Parity and Incident Stroke: Results from the REasons for Geographic and Racial Differences in Stroke Study

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Background: Circulatory and vascular changes across consecutive pregnancies may increase the risk of later-life cerebrovascular health outcomes. *Methods:* The association between parity and incident stroke was assessed among 7674 white and 6280 black women, aged 45 years and older, and enrolled in the REasons for Geographic and Racial Differences in Stroke Study from 2003 to 2007. Parity was assessed at baseline, and incident stroke was ascertained from physician-adjudicated medical records through September 2014. Cox proportional hazards models were used to estimate hazard ratios (HR) for the association between parity and stroke, adjusting for baseline measures. *Results:* At baseline, 12.7% of white women and 16.2% of black women reported 1 live birth, while 8.2% and 19.0%, respectively, reported 5 or more live births. Mean follow-up time was 7.5 years (standard deviation = 2.8); there were 447 incident strokes. A significant interaction between race and parity was detected ($P = .05$). Among white women, those with 5 or more live births had a higher stroke risk than those with 1 live birth (HR = 1.57; 95% confidence interval [CI] .93-2.65). However, the association was eliminated after adjustment for baseline characteristics (HR = 1.00, 95% CI .59-1.71). For black women, those with 5 or more live births had the highest stroke risk compared with those with 1 live birth (HR = 1.91, 95% CI 1.25-2.93), but the association was attenuated and no longer statistically significant after adjustment for confounders (HR = 1.40, 95% CI .89-2.18). *Conclusions:* In adjusted models, no statistically significant

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associations were observed between parity and stroke risk in a diverse cohort of U.S. women. Further studies are needed to elucidate the role of lifestyle and psychosocial factors in the race-specific associations that were observed. **Key Words:** Women—parity—pregnancy—stroke—race—cohort—prospective.

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Introduction

Cerebrovascular disease is a leading cause of morbidity and mortality among women in the United States. Each year, approximately 425,000 U.S. women experience a new or recurrent stroke,¹ and 77,600 die from stroke.² Women have a higher lifetime risk of stroke than men, which is likely due to their longer life expectancy.³ They also have a higher prevalence of selected stroke risk factors, such as hypertension, diabetes, migraine, atrial fibrillation, depression, and psychosocial stress.⁴

There are several factors unique to women that may be associated with stroke, including lactation,⁵ menopause,⁴ postmenopausal hormonal use,⁴ and oral contraceptive use.⁴ Pregnancy has also been found to impact the prevalence and characteristics of cerebrovascular disease.⁴ Women experience several changes during pregnancy, including decreased vascular resistance, insulin resistance, dyslipidemia, weight gain, and inflammation.¹⁻³ Although most of these changes are temporary, some could persist⁴ and accumulate across successive pregnancies.^{1,5,6} Women are also at risk of developing pregnancy complications, such as preeclampsia, that are associated with a higher risk of stroke during pregnancy and the postpartum period,⁶⁻⁸ as well as adverse cerebrovascular health outcomes in later life.⁹⁻¹¹ Physiological adaptations and complications occurring across consecutive pregnancies may be associated with an even higher risk of later-life adverse cerebrovascular events.¹²⁻¹⁴

Only a handful of previous studies have examined the association between number of pregnancies (i.e., gravidity) or live births (i.e., parity) and stroke, and the results are inconsistent.¹²⁻¹⁶ In addition, these studies have been limited by study populations that were predominantly of Asian^{12,13} or Swedish^{15,16} descent and a lack of information on stroke subtypes (i.e., ischemic and hemorrhagic).^{13,16} Only 1 prior study published nearly 20 years ago has been conducted in the United States.¹⁴ To our knowledge, no studies have examined racial differences in these associations. However, racial differences may exist as black women in the United States have a higher incidence of stroke,¹⁷ and they report higher birth rates and larger family sizes than their white counterparts.¹⁸

Understanding racial differences in the impact of parity on the risk of stroke in a large and biracial population is important for informing preventive efforts

to reduce the incidence of stroke among women. Our objective was to examine the association between parity and incident stroke among women enrolled in the REasons for Geographic and Racial Differences in Stroke (REGARDS) Study. Based on findings from previous studies suggesting that parity may be associated with cardiovascular disease outcomes, including stroke, in a J-shaped fashion,^{19,20} we hypothesized that women with no live births and those with multiple live births would have a higher incidence of stroke than women with 1 live birth. We also aimed to explore racial differences in this association.

Materials and Methods

Study Population

The REGARDS Study is a population-based, longitudinal cohort study with oversampling of blacks and residents from the stroke belt region of the United States, the southeastern part of the United States, because these 2 groups have the highest rates of stroke mortality in the United States.²¹ Between January 2003 and October 2007, men and women aged 45 years and older were recruited for participation (n = 30,239). Participants completed a baseline telephone interview and self-administered questionnaires with information collected about demographics, behavioral characteristics, and medical history. An in-home examination was conducted to collect physical measurements, blood and urine samples, resting electrocardiogram, and medication information. After baseline, participants were contacted biannually by telephone to identify stroke symptoms, hospitalizations, and general health status. More detailed information about the REGARDS study is published elsewhere.²² This study was approved by the University of Alabama at Birmingham Institutional Review Board, and each participant provided informed consent.

For this analysis, individuals were excluded if they were male (n = 13,551), missing baseline in-home visit forms (n = 56), or missing data for parity (n = 31), follow-up time (n = 269), or covariates included in the models (n = 1,426). We further excluded individuals who reported at baseline that they had a history of stroke (n = 952). The final sample included 13,954 women without a history of stroke and with complete data on all measures pertinent to the study.

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