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Experiences of Racism and the Incidence of Adult-Onset Asthma in the Black Women's Health Study

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Background: **Chronic stress resulting from experiences of racism may increase the incidence of adult-onset asthma through effects on the immune system and the airways. We conducted prospective analyses of the relation of experiences of racism with asthma incidence in the Black Women's Health Study, a prospective cohort of black women in the United States followed since 1995 with mailed biennial questionnaires.**

Methods: **Among 38,142 participants followed from 1997 to 2011, 1,068 reported incident asthma. An everyday racism score was created based on five questions asked in 1997 and 2009 about the frequency in daily life of experiences of racism (eg, poor service in stores), and a lifetime racism score was based on questions about racism on the job, in housing, and by police. We used Cox regression models to derive multivariable incidence rate ratios (IRRs) and 95% CIs for categories of each racism score in relation to incident asthma.**

Results: **The IRRs were 1.45 (95% CI, 1.19-1.78) for the highest compared with the lowest quartile of the 1997 everyday racism score (*P* for trend < .0001) and 1.44 (95% CI, 1.18-1.75) for the highest compared with the lowest category of 1997 lifetime racism. Among women who reported the same levels of racism in 1997 and 2009, the IRRs for the highest categories of everyday and lifetime racism were 2.12 (95% CI, 1.55-2.91) and 1.66 (95% CI, 1.20-2.30), respectively.**

Conclusions: **Given the high prevalence of experiences of racism and asthma in black women in the United States, a positive association between racism and asthma is of public health importance.**

CHEST 2014; 145(3):480–485

Abbreviations: BWHS = Black Women's Health Study; IRR = incidence rate ratio

The burden of asthma in the United States is high, with the prevalence rising from 3.1% in 1980 to 8.2% in 2009.[1] In 2009, the annual incidence rate of adult-onset asthma was 3.8 in 1,000, and 17.5 million adults were affected by the disease.[1] The established risk factors for adult-onset asthma include obesity[2,3] and certain occupational exposures.[4] Sedentariness,[5,6] smoking,[5,7] female hormone supplements,[8] acetaminophen,[9] and short stature[5,6,10] have also been implicated.

In various studies, war-related stress,[11] perceived stress,[12] and abuse during childhood[13] have been associated with an increased risk of adult-onset asthma. Racism is a source of stress for blacks,[14-18] and experiences of racism have been associated with several adverse health outcomes, including hypertension,[19]

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Manuscript received March 19, 2013; revision accepted June 18, 2013.

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Funding/Support: This work was funded by grants from the National Heart, Lung, and Blood Institute [R01 HL107314] and the National Cancer Institute [R01 CA058420].

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DOI: 10.1378/chest.13-0665

preterm birth,[20,21] sleep disturbance,[22] and obesity.[23] A stress pathway has been hypothesized to explain the association between experiences of racism and adverse health outcomes.[15] The physiologic response to chronic stress, particularly its effects on the immune system and the airways,[24-26] may be relevant to asthma.

The objective of the current analysis was to test the hypothesis that experiences of racism are positively associated with adult-onset asthma incidence. The data were derived from 14 years of follow-up of a large cohort study of black women.

Materials and Methods

Establishment of the Black Women's Health Study

The Black Women's Health Study (BWHS) is a prospective cohort study established in 1995, when 59,000 black women aged 21 through 69 years enrolled by completing health questionnaires.[27] The baseline questionnaire elicited information on demographic and lifestyle factors, reproductive history, and medical conditions. The cohort is followed biennially by mailed questionnaires to update exposures and ascertain incident disease. Follow-up of the original cohort through seven completed questionnaire cycles is 80%. The study protocol was approved by the institutional review board of Boston University School of Medicine (H-31125). Participants indicate consent by completing and returning the questionnaires.

Diagnosis of Asthma

On all questionnaires from 1997 through 2011, participants were asked whether they had been diagnosed with asthma in the previous 2-year interval, the year in which they had first been diagnosed, and if they used "inhalers or pills" for asthma at least 3 days per week. Adult-onset asthma was defined as an initial physician diagnosis of asthma made after 1997 through 2011, with concurrent use of asthma medication. In a subset of 43 women who met the case definition and who gave permission to contact their physicians, 39 (91%) were confirmed by the physician as having asthma.

Ascertainment of Racism

The 1997 follow-up questionnaire contained eight questions on experiences of racism adapted from an instrument developed by Williams et al.[16] Five questions about everyday racism asked about the frequency in daily life of the following experiences: "You receive poorer service than other people in restaurants or stores," "People act as if they think you are not intelligent," "People act as if they are afraid of you," "People act as if they think you are dishonest," and "People act as if they are better than you." Response options were "never," "a few times a year," "once a month," "once a week," and "almost every day," coded as 1 through 5. An everyday racism score was created by averaging subjects' responses to the five questions. Three questions ascertained lifetime racism by asking whether the participant was ever "treated unfairly due to your race" on the job, in housing, and by the police. Response categories were "yes" and "no." A lifetime racism score summed the positive responses (0, 1, 2, or 3). The racism questions were asked again on the 2009 questionnaire and scored in the same way.

Covariates

Data on weight, height, and education were obtained at baseline in 1995; weight was updated on each subsequent follow-up questionnaire. Data on smoking, alcohol consumption, hours/week spent in vigorous physical activity, and use of female hormone supplements were ascertained at baseline and updated at every questionnaire cycle. In 1997, respondents were asked about exposure to secondhand tobacco smoke at ages 0 to 10 years (home), 11 to 20 years (home), 21 to 30 years (home and work), 31 to 40 years (home and work), and currently (home and work), with exposure defined as being "in the same room with a smoker for at least an hour a day for 12 consecutive months or more." Follow-up questionnaires also obtained information on asthma in the participant's mother or father and whether the participant had health insurance and a regular doctor (ascertained in 1997), household income (ascertained in 2003), whether the participant was abused as a child (ascertained in 2005), and whether the participant's mother smoked when pregnant with her (ascertained in 2009).

Analytic Cohort

Follow-up for the current analysis was 1997 through 2011. Of 51,070 women who completed the 1997 questionnaire and at least one follow-up questionnaire, we excluded those who did not answer all of the racism questions (n = 4,381), had prevalent lung cancer (n = 41), were missing information on smoking (n = 27), reported childhood asthma (n = 866), or reported prevalent asthma as of 1997 (n = 4,987). We also excluded 1,110 women who reported a diagnosis of asthma but no concurrent asthma medication use, 1,430 women who reported asthma medication use but no diagnosis of asthma, and 86 women who met the case criteria but who disconfirmed having asthma on a supplemental questionnaire. After exclusions, 38,142 women remained in the analytic cohort, of whom 1,068 met the case criteria.

Statistical Analysis

We used Cox proportional hazards regression models to estimate incidence rate ratios (IRRs) and 95% CIs for incident asthma. Participants contributed person-time from 1997 until diagnosis of asthma, death, loss to follow-up, or end of follow-up, whichever came first. In an initial model, we adjusted only for age and questionnaire cycle (time period). In a multivariable model, we added covariates that may be risk factors for adult-onset asthma: BMI, weight in kg/height^2 in m (<25.0, 25.0-29.9, 30.0-34.9, 35.0-39.9, ≥ 40.0); pack years of smoking (0, 1-4, 5-14, 15-24, ≥ 25); current smoking (yes, no); exposure to secondhand smoke at each of ages 0-10, 11-20, 21-30, and 31-40 years and currently (yes, no); vigorous exercise in hours/week (0, <5, ≥ 5); female hormone use (never, <5 years, ≥ 5 years); parental history of asthma (yes, no, unknown); mother's smoking status (yes, no, unknown); education in years (≤ 12, 13-15, 16, ≥ 17); household income ($\leq$ \$25,000, \$25,001-50,000, \$50,001-100,000, $>$ \$100,000); and alcohol consumption in drinks/week (never, past any amount, current 1-3, 4-6, 7-13, ≥ 14). Alcohol consumption was a risk factor for asthma in a large Danish study[28] and was associated with asthma incidence in the BWHS. The addition of indicators for having health insurance and a regular doctor, and the presence of childhood abuse (associated with asthma incidence in the BWHS),[13] did not change the results. Missing values were modeled as separate categories. We tested for trend by including the everyday and lifetime racism scores in the model as ordinal variables.

Results

Women in the analytic cohort were followed for an average of 13 years, for a total of 227,651 person-years. At baseline in 1997, compared with women in the lowest quartile of the everyday racism score, those in