Height and breast cancer risk: results from the Black Women’s Health Study (United States)

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Abstract

Objectives: Numerous studies, but not all, have yielded positive associations between adult height and risk of breast cancer. There are few data on black women. We evaluated adult height in relation to breast cancer in data from the Black Women’s Health Study, a prospective cohort study of 64,530 African-American women aged 18–69 years at baseline in 1995.

Methods: A total of 910 cases of breast cancer were analyzed: 700 prevalent cases reported at baseline and 210 incident cases that occurred during the first 2 years of follow-up. A comparison group of controls frequency-matched on 5-year category of birth year was chosen from among participants who had not developed breast cancer. Odds ratios (OR) were calculated for various categories of adult height compared to a reference category of height less than or equal to 61 inches (155 cm), with control for current age, age at menarche, and years of education.

Results: Increased height was associated with an increased risk of breast cancer overall (p trend = 0.001); the OR for the highest category of height, >69 inches (175 cm), was 1.6 (95% confidence interval 1.1–2.3). The association was stronger among premenopausal women and women who had less than 16 years of education. Results were similar for prevalent and incident cases.

Conclusion: The present findings indicate that height is associated with breast cancer risk in African-American women.

Introduction

Numerous epidemiologic studies have assessed the relation of adult height to risk of breast cancer, and the majority have found weak positive associations [1–8]. Almost all of the women studied have been white North Americans or Europeans. There have been two studies of African-American women [9, 10] and one study of Nigerian women [11]. All three found an association of height with breast cancer. Several studies of height and breast cancer among Asian women have also indicated a positive association [12–14]. It is of interest to study this relation in different groups since the biologic rationale for the observed association has not been established. One theory is that childhood and adolescent nutrition, which is one determinant of height, may influence breast cancer risk [15]. Under this theory an association between height and breast cancer should be most apparent in those populations in which there is enough widespread nutritional deprivation that height can be considered to be a marker for early nutrition. In support of this theory, a case–control study of height and breast cancer risk in women born from 1910 to 1940 [6, 9], when a considerable proportion of African-Americans may have been nutritionally deprived, found a positive association among African-American women [9], but no association among white women [6]. In the present study we assess height in relation to breast cancer risk in a large cohort study of African-American women.

Materials and methods

The analyses were carried out in data from the Black Women’s Health Study, a large ongoing follow-up study of US black women. In 1995, 64,530 black women age
21–69 years were enrolled through questionnaires mailed to subscribers of Essence magazine (a magazine marketed to black women), members of several professional organizations, and friends and relatives of respondents. Among the participants, 28% were from the Northeast, 30% the South, 23% the Midwest, and 19% the West; 97% had at least a high school degree. The baseline questionnaire obtained information on many factors, including adult height, current weight, demographic characteristics, medical history, medication use, reproductive history, and smoking and alcohol consumption. Participants were asked if they had ever been diagnosed with breast cancer and, if so, the year in which it was diagnosed. A follow-up questionnaire was sent to participants in 1997, and 83% completed and returned it. The questionnaire asked about new occurrences of cancer, including breast cancer, and updated information on various exposures. The study protocol was approved by the Institutional Review Board of Boston University.

An attempt was made to obtain medical records for all participants who reported breast cancer on the 1997 questionnaire (incident cases) and a sample of participants who reported breast cancer on the 1995 questionnaire (prevalent cases). Records were sought only for prevalent disease that had occurred relatively recently, since medical records are kept for only 7 years at some institutions. To date, the records of 199 prevalent cases and 86 incident cases have been obtained and reviewed; all confirmed the diagnosis of breast cancer. A total of 225 were classified as invasive and 60 as in-situ. These results indicate that self-report of breast cancer by BWHS participants is acceptably accurate. Therefore, all cases reported on the 1995 and 1997 questionnaires were included in the present analysis. There were a total of 937 cases of breast cancer: 724 prevalent cases reported on the 1995 questionnaire and 213 incident cases which occurred during the 2-year interval between the 1995 and 1997 questionnaires.

A case–control analysis was carried out. Controls were selected from among participants who had not reported breast cancer. They were frequency-matched to the cases on 5-year age groups with a ratio of 5:1. Controls for prevalent cases were selected from all respondents to the 1995 questionnaire, and controls for incident cases were selected from respondents to the 1997 questionnaire. Twenty-seven cases and 150 controls had missing information on height and were excluded, leaving a total of 910 cases and 4535 controls for all analyses. Multiple logistic regression analysis [16] was used to estimate odds ratios for the association of height with breast cancer, with height treated as a categorical variable. Height categories were chosen to represent 2-inch increments in height through most of the distribution, with the upper and lower categories defined as less than 10% of the control distribution so as to represent extremes of the height while still having sufficient numbers for stable estimates. In tests for trend, height was considered as a continuous variable. Interaction tests were carried out by adding an interaction term to the logistic model.

All multivariate analyses controlled for age (5-year categories), age at menarche (<11, 11, 12, 13+), and years of education (≤12, 13–15, 16, and ≥17). Family history of breast cancer, age at first birth, parity, and alcohol consumption were not found to be confounders and thus were not included in final models. It was not possible to control for weight or history of mammography in the overall analysis because we did not have information on these factors before the diagnosis for prevalent cases. However, a separate analysis of incident cases was carried out. The logistic model for that analysis included terms for body mass index in 1995 and history of mammography before 1995 in addition to terms for age, age at menarche, and years of education.

Participants were asked about menopausal status, including age at menopause and the reason for cessation of periods (hysterectomy with or without bilateral oophorectomy, natural menopause) at both the 1995 and 1997 questionnaires. These data were used to classify cases and controls as premenopausal, postmenopausal, or unknown menopausal status (hysterectomy without bilateral oophorectomy or taking female hormone supplements when reaching menopause). We were not able to determine menopausal status at the time of diagnosis for 33% of prevalent cases, and they were excluded from menopause-specific analyses.

Results

Height was positively associated with year of birth and age at menarche in this sample of Black Women's Health Study participants (Table 1). The prevalence of short stature was 37.4% in the earliest birth cohort, women born from 1920 through 1929, as compared with 24.0% in the latest birth cohort, women born 1960–1970. Similarly, the prevalence of tall stature was 6.5% in the earliest cohort and 24.6% in the latest. Women with an early age at menarche tended to be shorter than women with a later age at menarche. Height was not materially associated with years of education.

Overall, there was a positive association of height with risk of breast cancer (p = 0.001). The odds ratio for height increments of 1 cm was 1.02 (95% confidence interval (CI) 1.01–1.03). The odds ratio for the tallest group of women (height 70 inches or more (>175 cm))