

Risk Factors for Breast Cancer in Black Women^{1,2}

Arthur Schatzkin, M.D., D.P.H.,^{3,4} Julie R. Palmer, M.P.H.,⁵ Lynn Rosenberg, Sc.D.,⁵
Susan P. Helmrich, M.S.,⁵ Donald R. Miller, M.S.,⁵ David W. Kaufman, Sc.D.,⁵
Samuel M. Lesko, M.D., M.P.H.,⁵ and Samuel Shapiro,⁵ M.B., F.R.C.P. (E)⁵

ABSTRACT—Risk factors for breast cancer were examined in black women in a hospital-based case-control study of 529 black women with breast cancer and 589 controls. Late age at menarche was associated with a reduced risk of breast cancer. Women having 5 or more children had a reduced risk relative to that of women with fewer or no children. Late age at first birth was associated with an elevated risk of breast cancer. Among postmenopausal black women, obesity [as measured by body mass index (BMI)] was associated with an increased risk; among premenopausal women, there was no association of breast cancer with BMI. Women whose menopause occurred at or after age 50 were at increased risk relative to those whose menopause occurred earlier. There was no association between number of years of education and breast cancer in black women. History of benign breast disease and history of breast cancer in mother or sisters both were risk factors. The risk factor profile for breast cancer in black women was similar to that observed in whites.—*JNCI* 1987; 78: 213-217.

In the United States 3,000 black women die each year of breast cancer, and the mortality rate of black women is now virtually the same as that among whites (1). Although the incidence rate of breast cancer is still somewhat lower in black than in white women, the gap has been narrowing (1, 2). Among women less than 40 years of age, the incidence in blacks now exceeds that in whites (1, 3). In spite of the magnitude of the problem of breast cancer among black women, there have been few epidemiologic studies of breast cancer focusing explicitly on this group, and it is not established whether the standard risk factors apply. To examine risk factors for breast cancer in black women, we conducted a case-control study.

SUBJECTS AND METHODS

The present study is based on data collected in a case-control drug surveillance system conducted by the Drug Epidemiology Unit (4, 5). Women who had been admitted for breast cancer (cases) or for a wide range of other conditions (controls) to hospitals mainly in Boston, New York, Philadelphia, and Baltimore were administered a standard questionnaire designed to elicit information on personal characteristics, relevant medical history, and history of drug use. After discharge, primary and other diagnoses were abstracted from the hospital record. About 5% of the potential participants refused to be interviewed.

Data on parity, gravidity, and age at first pregnancy were collected since the study began in 1976. For the analysis of age at first birth and the analysis of parity,

we considered only women for whom the age at first birth was known (77% of cases and 74% of controls). Information on the occurrence of breast cancer in mothers and sisters has been recorded since 1979.

Race was determined by the nurse-interviewer's observation. Only women designated as "black" were eligible. The present study is based on data obtained from 1976 to November 1985. The subjects included black women from a previous study of breast cancer based on data collected before 1981 in which 90% of the subjects were white (6).

Cases.—Eligible cases were all black women less than 70 years of age with a diagnosis of breast cancer recorded in the discharge summary or pathology report that had been made within 6 months before the current admission and who had no other primary cancer or history of cancer. There were 529 black cases. The median age of cases was 49, and 11 (2.1%) were below 30 years of age.

Controls.—Potential controls comprised all black women less than 70 years of age who did not have a history of cancer and who were admitted for benign conditions judged to be unrelated to any of the established or suspected risk factors for breast cancer. Osteoporosis, for example, was excluded because of the possibility that this condition might be related to hormonal events also linked to breast carcinogenesis. Controls

ABBREVIATIONS USED: BMI=body mass index; CI=confidence interval; RR=relative risk.

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³Cancer Prevention Studies Branch, Division of Cancer Prevention and Control, National Cancer Institute, National Institutes of Health, Public Health Service, U.S. Department of Health and Human Services, Bethesda, MD 20892.

⁴Address reprint requests to Dr. Schatzkin, Blair Building, Room 6A-01, National Institutes of Health, Bethesda, MD 20892.

⁵Slone Epidemiology Unit, Boston University School of Medicine, Brookline, MA 02146.

under the age of 25 were excluded because there were no cases less than 25 years of age. The final control series consisted of 589 black patients; the median age was 40 years, and 91 (15.4%) were below 30 years of age.

Primary diagnoses among the controls were as follows: trauma (mostly fractures and sprains) (173 patients); nontraumatic orthopedic conditions (low back pain and disc disorders) (122); surgery (mostly herniorrhaphy and appendectomy) (90); and infections and other conditions (including respiratory, gastrointestinal, dental disorders) (204).

Analysis.—RR estimates were aggregated across strata of age and other factors by the Mantel-Haenszel method (7). Miettinen's test-based method was used to compute 95% CIs (8). Inasmuch as the control patients were younger than the breast cancer patients, half-decade of age was controlled in all analyses. Multiple logistic regression analysis was used to simultaneously control for several potential confounding factors (9). The regression equations included categorical terms for age (half-decade), years of education (<12, 12, ≥12 yr), geographic area, history of fibrocystic breast disease, history of breast cancer in the mother or sister(s), marital status, lifetime number of hospital admissions (0, 1-2, 3-4, ≥5), consumption of alcoholic beverages (current drinker, nondrinker), age at first birth (<20, 20-24, 25-29, ≥30), parity (0, 1-2, 3-4, ≥5), age at menarche (<11, 11-12, 13-14, ≥15), menopausal status (premenopausal, menopause at <40 yr, at 40-49, at ≥50), and BMI (weight/height²). RR estimates derived from the regression analysis varied from the Mantel-Haenszel estimates in some instances and therefore are presented throughout the paper.

RESULTS

Age at menarche (table 1).—Since the relation of age at menarche to breast cancer risk has been shown to

TABLE 1.—Distribution of 523 cases and 575 controls according to age at menarche and menopausal status^a

Menopausal status	Age at menarche, yr			
	≤10	11-12	13-14	≥15
Premenopausal				
Breast cancer	22	79	89	34
Controls	37	113	138	58
RR estimate ^b	1.4	1.3	1.2	(1.0) ^c
95% CI	(0.7-3.1)	(0.8-2.4)	(0.7-2.1)	
Multiple logistic RR	1.8	1.2	1.0	(1.0) ^c
95% CI	(0.8-3.9)	(0.6-2.3)	(0.5-1.8)	
Postmenopausal				
Breast cancer	13	109	131	46
Controls	26	81	72	50
RR estimate ^b	0.7	1.4	1.9	(1.0) ^c
95% CI	(0.3-1.6)	(0.8-2.3)	(1.1-3.3)	
Multiple logistic RR	0.7	1.6	2.5	(1.0) ^c
95% CI	(0.3-1.9)	(0.9-2.8)	(1.4-4.4)	

^a 6 cases and 14 controls had unknown age at menarche.

^b Allowance was made for half-decade of age by means of the Mantel-Haenszel procedure for all RR estimates.

^c Reference category.

TABLE 2.—Distribution of 407 cases and 433 controls according to parity^a

Specification	Parity			
	0	1-2	3-4	≥5
Breast cancer	97	147	98	65
Controls	97	153	113	70
RR estimate ^b	1.8	2.2	1.3	(1.0) ^c
95% CI	(1.1-3.0)	(1.4-3.6)	(0.8-2.1)	
Multiple logistic RR	1.9	1.6	1.4	(1.0) ^c
95% CI	(1.1-3.5)	(0.9-2.8)	(0.8-2.4)	

^a Analysis was restricted to women whose age at first birth was known.

^b Allowance was made for half-decade of age by means of the Mantel-Haenszel procedure for all RR estimates.

^c Reference category.

differ according to menopausal status, we examined age at menarche separately for premenopausal and postmenopausal women. Among premenopausal women, the multiple logistic RR estimate was 1.8 (95% CI, 0.8-3.9) for onset of menarche at ≤10 years relative to onset of menarche at age ≥15; the estimates for ages of onset 11-14 were close to 1.0. Among postmenopausal women, the association between age of menarche and risk was inconsistent, with logistic estimates ranging from 0.7 (for ages ≤10) to 2.5 (for ages 13-14).

Parity (table 2).—Relative to parity ≥5, the logistic RR estimates for parity 1-2 and 3-4 were 1.6 (95% CI, 0.9-2.8) and 1.4 (0.8-2.4), respectively. The estimate for nulliparous women was 1.9 (1.1-3.5).

Age at first birth (table 3).—The RR estimates were elevated for later age at first birth relative to age at first birth before 20 years, with logistic estimates of 2.0 (1.0-3.9) in the age group 25-29 and 1.7 (0.7-4.4) in the 30 and older age group. The RR for nulliparous women was 1.9 (1.1-3.5) in the logistic analysis.

BMI (table 4).—Because the association of BMI to breast cancer has been observed to differ according to menopausal status (6, 10), we assessed the association between BMI and breast cancer separately for premenopausal and postmenopausal women. For postmenopausal women, the logistic estimate for women in the highest BMI category (≥30) was significantly elevated (RR = 2.5, 1.5-4.4) in relation to those with an index ≤24. The RR estimates were approximately 1.0 for each of the BMI categories among premenopausal women.

Menopausal status (table 5).—Women undergoing menopause before age 50 were at reduced risk of breast cancer relative to premenopausal women: The multiple logistic estimates were 0.6 (0.4-1.0) for menopause before age 40 and 0.6 (0.3-1.1) for menopause between ages 40 and 49. Women undergoing menopause at age 50 or later, however, had a risk comparable to that of premenopausal women, the multiple logistic RR being 1.0 (0.4-2.1).

Education (table 5).—In comparison to women with 11 or fewer years of education, the multivariate RR estimates were slightly less than 1.0 for those with 12 or more years.

TABLE 3.—Distribution of 407 cases and 433 controls by age at first birth^a

Specification	Never pregnant	Age at first birth, yr			
		<20	20-24	25-29 ^b	≥30 ^b
Breast cancer	96	137	98	52	24
Controls	97	191	105	29	11
RR estimate ^c	1.5	(1.0) ^d	1.4	2.5	2.2
95% CI	(1.0-2.3)		(1.0-2.1)	(1.4-4.3)	(1.0-5.0)
Multiple logistic RR	1.9	(1.0) ^d	1.2	2.0	1.7
95% CI	(1.1-3.5)		(0.8-1.9)	(1.0-3.9)	(0.7-4.4)

^a Analysis was confined to women whose age at first birth was known.

^b The RR estimate for combined categories 25-29 and ≥30 was 2.4, 95% CI (1.5-3.9). The multiple logistic RR for this combined category was 1.9 (1.1-3.4).

^c Allowance was made for half-decade of age by means of the Mantel-Haenszel procedure for all RR estimates.

^d Reference category.

TABLE 4.—Distribution of 521 cases and 567 controls according to BMI and menopausal status^a

Menopausal status	BMI, kg/(cm) ² × 1,000		
	≤24	25-29	≥30
Premenopausal			
Breast cancer	93	61	67
Controls	155	95	84
RR estimate ^b	(1.0) ^c	0.7	0.9
95% CI		(0.5-1.2)	(0.6-1.5)
Multiple logistic RR	(1.0) ^c	0.9	1.2
95% CI		(0.5-1.5)	(0.7-2.1)
Postmenopausal			
Breast cancer	94	109	107
Controls	96	85	52
RR estimate ^b	(1.0) ^c	1.4	1.9
95% CI		(0.9-2.2)	(1.2-3.0)
Multiple logistic RR	(1.0) ^c	1.3	2.5
95% CI		(0.8-2.2)	(1.5-4.4)

^a 8 cases and 22 controls had unknown BMI.

^b Allowance was made for half-decade of age by means of the Mantel-Haenszel procedure for all RR estimates.

^c Reference category.

Benign breast disease (table 5).—Women with a history of fibrocystic breast disease, in relation to those not having such a history, had a logistic RR estimate of 3.5 (1.9-6.2).

Family history (table 5).—The RR estimate for those women whose mother or sisters had breast cancer was 2.8 (1.2-6.9).

DISCUSSION

In this study the risk factors for breast cancer in black women are similar to those reported by this group and other investigators for breast cancer in white or predominantly white women (6, 11, 12). Late age at first birth, high BMI (in postmenopausal women), late age at menopause, history of benign breast disease, and positive family history were all factors associated with elevated RR estimates in black women. Late age at menarche (in premenopausal women) and high parity were associated with a reduced risk, but the result for age at menarche was not statistically significant. In the

TABLE 5.—Distribution of cases and controls according to various factors

Specification	Breast cancer	Controls	RR estimate ^a	95% CI	Logistic RR estimate	95% CI
Menopausal status						
Premenopausal	225	347	(1.0) ^b		(1.0) ^b	
Postmenopausal <40 yr old	92	122	0.4	(0.3-0.6)	0.6	(0.4-1.0)
Postmenopausal 40-49 yr old	110	81	0.5	(0.3-0.8)	0.6	(0.3-1.1)
Postmenopausal ≥50 yr old	96	29	0.4	(0.1-1.5)	1.0	(0.4-2.1)
Years of education						
<12	163	173	(1.0) ^b		(1.0) ^b	
12	202	226	1.3	(1.0-1.9)	0.8	(0.5-1.2)
>12	156	183	1.4	(1.0-2.0)	0.9	(0.5-1.9)
History of fibrocystic breast disease						
No	450	540	(1.0) ^b		(1.0) ^b	
Yes	72	43	2.2	(1.5-3.4)	3.5	(1.9-6.2)
Family history of breast cancer in mothers or sisters						
No	494	575	(1.0) ^b		(1.0) ^b	
Yes	35	14	2.8	(1.5-5.3)	2.8	(1.2-6.9)

^a Allowance was made for half-decade of age by means of the Mantel-Haenszel procedure for all RR estimates.

^b Reference category.

only published case-control study (127 cases) of breast cancer in black women of which we are aware, Austin, Cole, and Wynder found late age at first birth, low parity, and late age at menopause to be risk factors (13). Kelsey et al. also allude to a protective effect of early age at first birth in black women (14). The similar set of risk factors reported here provides additional confirmation of the epidemiologic characterization of breast cancer that has emerged in recent years and at the same time supports the commonality of pathobiologic processes among women designated as "black" and "white."

Among white women, years of education and other indicators of socioeconomic status have generally been found to confer a small excess risk of breast cancer (6, 10), although there is evidence that this socioeconomic gradient has diminished over time (16). Austin, Cole, and Wynder observed an increased risk for black women with more than 12 years of education compared to those with less than 12 years (13). In a correlational study by Devesa and Diamond, however, the association between years of education and breast cancer was considerably weaker in black than in white women (15). We found that black women with breast cancer were not more educated than the controls. Although it is likely that in white women differences in education are proxies for differences in specific socioenvironmental exposures, such as dietary patterns, among black women differences in education may not be accompanied by comparable differences in dietary or other exposures. Income, for example, which can be a potent determinant of dietary consumption pattern, has been shown to be lower for blacks than for whites with comparable levels of education (17). In future studies, the use of socioeconomic indicators other than education may be more informative (18).

Our results suggest that high BMI was associated with breast cancer in postmenopausal black women. This is consistent with results from several previous studies of white or predominantly white women (6, 10). This result is at odds, however, with the study by Austin, Cole, and Wynder, which showed no association between Quetelet's index and breast cancer (13). We did not find the inverse association between BMI and breast cancer in premenopausal women that has been demonstrated in some investigations (6, 14, 19, 20, 21).

A few studies have shown that early age of menarche is a risk factor for breast cancer only among premenopausal women (3, 6, 22, 23), but this particular effect modification has not been demonstrated consistently (19, 20). In this study, we found that early age of menarche conferred increased risk for premenopausal women. There was no consistent association, however, between age of menarche and breast cancer in the postmenopausal black women.

No information was available to us on histopathology or hormone receptor status of cases. Data from the Surveillance, Epidemiology, and End Results (SEER) Program (Baquet C: Personal communication) and other studies (24, 25) indicate that the distributions of histopathologic tumor types were generally similar among

black and white patients. However, an excess of medullary carcinoma [(24); Baquet C: Personal communication] and poorly differentiated tumors (25, 26) in black relative to white cases has been reported. In two studies the percentage of estrogen-receptor-positive tumors was observed to be lower in black than in white patients (24, 26), but this finding was not confirmed in a third investigation (25). It is important to recognize, however, that racial differences in tumor characteristics need not reflect intrinsic "biological" differences between black and white women but could plausibly stem from differences in both predisease and postdisease exposures. It would be useful in future studies to examine risk factors in light of histologic type and hormone receptor status.

In summary, the risk factors for black women in the present study are similar to those reported for white women. Further studies of breast cancer in both black and white women would benefit from the inclusion of information on additional socioeconomic indicators, dietary factors, histologic type, and hormone receptor status.

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