

Abstract

The Women's Circle of Health Study-1 (WCHS) is a population-based case-control study in New Jersey and New York City designed to evaluate risk factors for early/aggressive breast cancer. As part of the study, African American (AA) and white women diagnosed with breast cancer during 2005-2011 and residing in seven NJ counties were identified through rapid case ascertainment by NJ State Cancer Registry (NJSCR) staff. Data collection involved in-person interviews and collection of saliva samples. To evaluate whether the study participants differed from the general eligible case population, 1093 NJ breast cancer patients who participated in the study were compared to all NJSCR breast cases meeting eligibility criteria from the same area. Univariate statistics were used to compare demographic and clinical characteristics between the groups, stratifying by race. The study participants were significantly younger than the total case population among both AA and white patients ($p < 0.0001$). Among white women, census tract poverty level (CTPL) was significantly different between the participants and the case population, with a higher proportion of participants residing in the wealthiest census tracts (71% vs. 61%). CTPL was not significantly different between AA participants and the AA case population. The distribution of stage at diagnosis differed significantly between AA participants and all AA cases, with a higher proportion of local stage (47% vs. 39%) and lower proportion of distant stage cancers (3% vs. 9%) in the participants. A similar association among white patients was observed, but was of borderline significance. In terms of other clinical factors, the WCHS participants had a significantly higher proportion of estrogen receptor positive and progesterone receptor positive tumors than the eligible case population. These findings may help in the interpretation of results from WCHS analyses, as well as help formulate better recruitment strategies in future studies.

Introduction

Women's Circle of Health Study-1 (WCHS):

- Population-based breast cancer case-control study in New Jersey (NJ) and New York City (NYC)
- Collaboration between Roswell Park Cancer Institute, Cancer Institute of New Jersey, and New Jersey State Cancer Registry (NJSCR)
- Patients identified through rapid case ascertainment by NJSCR staff in NJ (on-going) and hospital-based ascertainment in NYC (completed in 2008)
- Data collection through in-person interviews and collecting saliva samples.
- Eligible NJ patients include African American (AA) or white women diagnosed with histologically confirmed invasive breast cancer or ductal carcinoma *in situ* during 2005-2011
 - Resident of 7 counties in NJ at time of diagnosis
 - Age 20-75 years at diagnosis
 - No prior cancers other than non-melanoma skin cancers
 - NJSCR staff attempted to contact all eligible AA patients and a sample of randomly selected eligible white patients, matched to AA patients by county of residence at diagnosis
- Question of how representative study participants are of the study population in epidemiologic studies
- We used NJSCR data to compare 1,093 WCHS participants with all NJSCR breast cases meeting study eligibility criteria from the same counties who were not participants.

Methods

- Used Link Plus (v 2.0) to match WCHS participants to NJSCR records by first & last name, date of birth, social security number, and street address
 - 71 WCHS participants whose records were not in the NJSCR at time of linkage were excluded.
- Census tract poverty level (CTPL)
 - proportion of residents in the census tract with incomes below the poverty level in 1999
 - categorized into 4 groups: <5%; 5-<10%; 10-<20%; ≥20%
- Univariate statistics to compare demographic & clinical characteristics between the groups, stratifying by race
 - Chi square tests for categorical variables
 - T test for continuous variables
- Multivariate logistic regression to compute odds ratios (OR) and 95% confidence intervals (CI) adjusting for age and stage at diagnosis
- All statistical analyses were conducted using SAS version 9.3 (Cary, NC).

Results

Univariate analyses

- WCHS participants significantly younger than total case population
 - AA patients (mean age =52.6 vs. 55.6, $p < 0.0001$)
 - white patients (mean age =53.5 vs. 55.8, $p < 0.0001$)
- Among white women, a significantly higher proportion of study participants resided in the wealthiest census tracts, as compared to the total white case population.
- CTPL was not significantly different between AA participants and the AA case population.
- Among the AA women, stage at diagnosis was significantly different, with a higher proportion of WCHS participants diagnosed with local stage cancer as compared to the AA case population.
- Grade was significantly associated with study participation among white patients, but not among AA patients.
- WCHS participants had a significantly higher proportion of ER+ and PR+ tumors than the eligible case populations.

Distribution of Characteristics of New Jersey Patients Participating in WCHS and total eligible case population

	African American			White		
	WCHS (N=577) N (%)	Total Cases (N=2042) N (%)	Chi-square <i>p</i> -value	WCHS (N=516) N (%)	Total Cases (N=7687) N (%)	Chi-square <i>p</i> -value
CTPL*			0.67			<0.0001
< 5%	116 (20.1)	385 (18.9)		368 (71.3)	4652 (60.5)	
5-<10%	111 (19.2)	370 (18.1)		81 (15.7)	1565 (20.4)	
10-<20%	168 (29.1)	627 (30.7)		49 (9.5)	1042 (13.6)	
≥20%	177 (30.7)	650 (31.8)		18 (3.5)	410 (5.3)	
Unknown	5 (0.9)	10 (0.5)		0 (0.0)	18 (0.2)	
Stage			<0.0001			0.06
<i>In situ</i>	92 (15.9)	368 (18.0)		93 (18.0)	1502 (19.5)	
Local	269 (46.6)	800 (39.2)		257 (49.8)	3719 (48.4)	
Regional	187 (32.4)	627 (30.7)		149 (28.9)	2002 (26.0)	
Distant	18 (3.1)	190 (9.3)		14 (2.7)	338 (4.4)	
Unknown/ unstaged	11 (1.9)	57 (2.8)		3 (0.6)	126 (1.6)	
Grade			0.06			<0.001
1	45 (7.8)	173 (8.5)		92 (17.8)	1094 (14.2)	
2	190 (32.9)	628 (30.8)		214 (41.5)	2792 (36.3)	
3	261 (45.2)	848 (41.5)		147 (28.5)	2671 (34.8)	
4	4 (0.7)	18 (0.9)		4 (0.8)	74 (1.0)	
Unknown	77 (13.3)	375 (18.4)		59 (11.4)	1056 (13.7)	
ER* status			0.02			<0.0001
Positive/ elevated	385 (66.7)	1255 (61.5)		427 (82.8)	5758 (74.9)	
Negative	150 (26.0)	552 (27.0)		70 (13.6)	1253 (16.3)	
Borderline	4 (0.7)	14 (0.7)		2 (0.4)	20 (0.3)	
Unknown	38 (6.6)	221 (10.8)		17 (3.3)	656 (8.5)	
PR* status			<0.01			<0.0001
Positive/ elevated	332 (57.4)	1053 (51.6)		375 (72.6)	4928 (64.1)	
Negative	200 (34.7)	739 (36.2)		120 (23.3)	2002 (26.0)	
Borderline	7 (1.2)	23 (1.1)		4 (0.8)	82 (1.1)	
Unknown	38 (6.6)	227 (11.1)		17 (3.3)	675 (8.8)	

*CTPL= Census tract poverty level. The <5% group is the wealthiest group (with the lowest poverty level). ER= estrogen receptor, PR=progesterone receptor.

Logistic Regression

- Among white but not AA women, CTPL was significantly associated with study participation, adjusting for age and stage at diagnosis
- Stage at diagnosis was significantly associated with study participation among AA but not white women in multivariate models, with a lower proportion of late stage cancers among the AA study participants.
- Significant differences between white WCHS participants and total white cases in grade, ER, and PR status

Results (2)

Association between WCHS participation and selected demographic and clinical characteristics, stratified by race

	African American (N = 2551)		White (N = 8074)	
	OR*	95% CI**	OR*	95% CI**
CTPL**				
<5%	Ref		Ref	
5-<10%	0.99	0.73-1.34	0.65	0.50-0.83
10-<20%	0.92	0.70-1.21	0.58	0.43-0.79
≥20%	0.99	0.75-1.29	0.56	0.34-0.90
Stage^				
Early	Ref		Ref	
Late	0.76	0.63-0.93	1.00	0.83-1.21
Grade				
1	Ref		Ref	
2	1.13	0.78-1.63	0.88	0.68-1.14
3	1.16	0.81-1.67	0.60	0.45-0.79
4	0.93	0.30-2.92	0.61	0.22-1.72
Unknown	0.81	0.53-1.22	0.68	0.48-0.96
ER** Status				
Positive/elevated	Ref		Ref	
Negative	0.87	0.70-1.09	0.72	0.56-0.94
Borderline	0.83	0.27-2.55	1.32	0.31-5.66
Unknown	0.61	0.41-0.89	0.39	0.24-0.64
PR** Status				
Positive/elevated	Ref		Ref	
Negative	0.87	0.71-1.06	0.79	0.64-0.98
Borderline	0.95	0.40-2.24	0.65	0.24-1.79
Unknown	0.58	0.39-0.85	0.37	0.23-0.61

*OR=odds ratio. Odds ratios were adjusted for age at diagnosis (continuous) and stage at diagnosis: late (regional/distant) vs. early (*in situ*/local). 197 patients with unknown/unstaged stage at diagnosis were excluded from the analyses.
**CTPL= Census tract poverty level. The <5% group is the wealthiest group (with the lowest poverty level).
CI=confidence interval, ER= estrogen receptor, PR=progesterone receptor.
^Odds ratio adjusted for age at diagnosis only.

Discussion

- Among white breast cancer patients, census tract poverty level was significantly different between WCHS participants and the total case population, with a higher proportion of participants residing in the wealthiest census tracts, but CTPL differences were not observed between the AA study participants and the total AA cases.
 - Possibly different effects of socioeconomic factors on willingness to participate in studies between white and AA women
 - Community recruitment of controls in the AA population may have increased awareness of the study and willingness to participate among AA cases in both areas of high poverty and low poverty
- Differences between the 7 WCHS counties and the state of New Jersey
 - Higher proportion of persons who spoke a language other than English at home (40% vs. 29%)*
 - Higher proportion of foreign born persons (29% vs. 21%)*

*Source U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, American Community Survey, Census of Population and Housing, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits, Consolidated Federal Funds Report
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Conclusions

- Early stage at diagnosis and younger age were significant predictors of study participation among AA female breast cancer patients, while low census tract poverty level, younger age, lower grade, positive ER, and positive PR status were significant predictors among the white patients.
- Findings may help in interpretation of results from WCHS analyses, as well as help formulate better recruitment strategies in future studies.

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