

Breast Cancer and Racial Disparity Between Caucasian and African American Women, Part 1 (BRCA-1)

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Abstract: Breast cancer is a commonly diagnosed malignancy and the second leading cause of cancer-related death among American women today. Despite the lower incidence of breast cancer among African American women, they are more likely to die from the disease each year than their white counterparts. We present a retrospective cohort study of the tumor registry data from electronic medical records of patients diagnosed with breast cancer at the University of Florida Health, Jacksonville from 2000 to 2005. A total of 907 patients were diagnosed with breast cancer; 445 patients with invasive breast cancer had complete medical records and were selected for this review. Much like previously published research, we found that African American patients presented with a more advanced stage and aggressive subtype of breast cancer than white patients, and were less likely to have health insurance. However, we have yet to determine if universal health care insurance can lead to improved health care access, better breast cancer awareness, and an enhanced attitude toward breast cancer screenings. Such factors would ultimately lead to an earlier diagnosis and better outcomes in both African American and white patients. We plan to investigate this critical issue in a follow-up study (BRCA-2; Breast Cancer and Racial Disparity Between Caucasian and African American Women, Part 2), which will begin a few years after the complete implementation of the universal health care law enacted by President Obama in 2010. The higher frequency of aggressive tumor subtypes in African American women warrants more attention. We suggest further research to determine whether decreasing the initial age for screening or increasing the frequency of mammograms in African American women would improve breast cancer outcomes. This study underscores the importance of identifying and preventing obstacles in routine breast cancer screening, as well as increasing breast cancer awareness.

Keywords

Early molecular response, tyrosine kinase inhibitor

Introduction

In recent decades, there has been a decline in the number of total deaths associated with breast cancers¹⁻³; however, several studies have shown that the mortality from this disease has not only remained higher in African American women, but the rate of decline has been slower in these patients when compared with white patients.⁴⁻¹² Despite their lower incidence of breast cancer, African American women are also more likely than white women to die of the disease.¹ Review of breast cancer statistics from 1972 to 2002 by the National Cancer Institute (NCI) not only validated these findings, but also found that the 5-year breast cancer survival rate was significantly lower in African American women (77.2%), compared with white women (90.5%).¹ Another analysis by the Southwest Oncology Group (SWOG) also demonstrated that African American patients fared worse than white patients with respect to disease-free survival (DFS), overall survival (OS), and cause-specific survival when adjusted for age, receptor status, number of positive lymph nodes, tumor size, socioeconomic status, and body mass index.¹³ Compared with white women, African American women presented with more advanced-stage and higher-grade disease, and had more estrogen receptor (ER)-negative disease.¹⁴

This retrospective cohort study of breast cancer patients aims to investigate the possible reasons for poor outcomes of breast cancer among African American patients at our inner city university hospital. We examined possible factors, such as breast cancer stage at diagnosis, type of breast cancer (eg, triple-negative), health insurance status, and menopausal status. Socioeconomics has historically played a significant role in this racial disparity; however, our study design predates universal health care coverage under the Patient Protection and Affordable Care Act of 2010. We have yet to establish whether or not the implementation of these measures will actually lead to improved access to health care, enhanced breast cancer awareness, and an improved patient attitude toward breast cancer screenings. We wish to determine this in a follow-up study (BRCA-2) a few years after the complete implementation of the universal health care law enacted by President Obama during his first term in office.

Methods and Patient Population

We present a retrospective cohort study of the tumor registry data from electronic medical records of African American and white women diagnosed with breast cancer at the University of Florida Health in Jacksonville. We looked at medical records from 2000 through 2005, which were further supplemented with information from patients' medical charts.

Patients were diagnosed with either invasive or noninvasive breast cancer, and only invasive cancers were included in this study analysis. Details regarding disease stage, tumor profile, patient demographics, menopausal status, and insurance status were obtained from the tumor registry data from the University of Florida Health, Jacksonville.

Aggressive breast cancer was defined as triple-negative (ER-, progesterone receptor [PR]-, and human epidermal growth factor receptor 2 [HER2]-negative) or HER2-overexpressing tumors. Indigent insurance was defined as having charity or no insurance, while nonindigent insurance was defined as either having private health insurance or Medicare. Advanced-stage breast cancer was defined as stage IIB or higher. Menopausal status was determined by patients aged greater than 50 years, no menstrual period for the last 1 year, or bilateral oophorectomy.

Statistical Methods

Chi-square test was used to compare breast cancer stage at diagnosis, type of breast cancer (eg, triple-negative), health insurance status, and menopausal status among white and African American patients.

Results

A total of 907 patients were diagnosed with breast cancer between 2000 and 2005; out of these, only 445 women had complete medical records available and met our criteria for invasive breast cancer. In this retrospective cohort study, 191 patients (43%) were African American and 254 patients (57%) were white. The mean age for African American patients was 58 years, with a range and standard deviation of 29–91 and 14.1, respectively. The mean age for white patients was 60 years, with a range and standard deviation of 27–89 and 13.9, respectively. All patients were residing in the metropolitan area of Jacksonville. Patient characteristics are listed in Table 1.

Advanced-stage breast cancer was present in 43% of African American patients (95% confidence interval [CI], 35–49) and in 28% of white patients (95% CI, 22–33). The *P*-value was .0007.

ERs and PRs were positive in 60% of African American women (95% CI, 52–66) and in 72% of white women (95% CI, 66–77), with a *P*-value of .006 (Figure 1). HER2 was overexpressed in 30% of African American women (95% CI, 22–39) and in 21% of white women (95% CI, 15–27), with a *P*-value of .075 (Figure 2). Aggressive breast cancer (triple-negative) was present in 12% of African American women (95% CI, 7–16) and in 7% of white women (95% CI, 3–10), with a *P*-value of .074 (Figure 3).

Table 1. Patient Characteristics

	White (254) 57%	African American (191) 43%	P Value
Mean Age	60 (27–91) SD ± 13.9	58 (29–89) SD ± 14.1	N/A
Menopausal Status			
Premenopausal	(75) 30%	(59) 31%	.75
Postmenopausal	(179) 70%	(132) 69%	
Insurance Status			
Insured	193 (76%)	125 (65%)	N/A
Not Insured	61 (24%)	66 (35%)	
Tumor Stage at Presentation			
Advanced	(70) 28%	(82) 43%	.007
Nonadvanced	(184) 72%	(109) 57%	
Hormonal Status			
ER-/PR-Positive	(205) 81%	(130) 68%	.006
HER2-Positive	(37) 15%	(35) 18%	.075
Triple-Negative	(17) 7%	(22) 12%	.074

ER=estrogen receptor; HER2=human epidermal growth factor receptor 2; N/A=not available; SD=standard deviation.

At the time of diagnosis, 30% of white patients (95% CI, 23–35) and 31% of African American patients (95% CI, 24–37) were premenopausal ($P=.75$). Seventy-six percent of white patients and 65% of African American patients had health insurance at the time of diagnosis (Figure 4).

Our findings were consistent with other reports. Except for age and menopausal status, African American patients were more likely to present with advanced-stage, triple-negative, and HER2-positive breast cancers compared with white patients, and were less likely to have health insurance.

Discussion

The trend toward poor outcomes in African American women with breast cancer has been attributed to numerous variables, including aggressive tumor biology, poor socioeconomic status, and more advanced-stage disease at the time of diagnosis.¹⁴⁻¹⁹ The tumor characteristics with prognostic significance for breast cancer outcomes include tumor stage, grade, ER/PR status, and HER2 status.

Our data are consistent with previous findings, which showed that African American patients have larger tumor size, more triple-negative, and more HER2-overexpressing

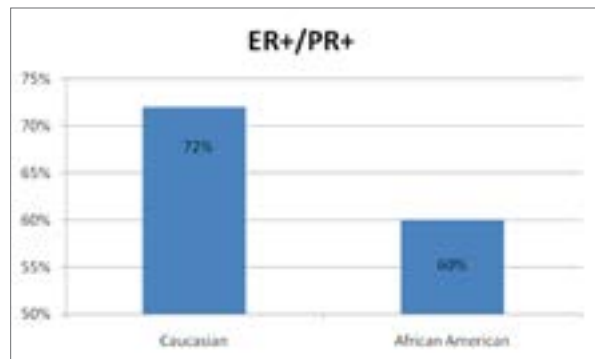


Figure 1. Receptor status (estrogen- and progesterone-receptor positivity) in African American versus white women.

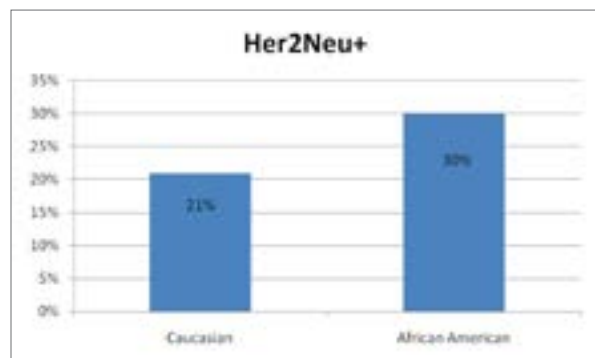


Figure 2. Human epidermal growth factor receptor 2 (HER2) proto-oncogene status in African American versus white women.

breast cancers than white patients.¹⁴⁻¹⁹ HER2-overexpressing breast cancer is aggressive and carries a poor prognosis if it is not treated with chemotherapy and targeted agents, such as trastuzumab (Herceptin, Genentech) and lapatinib (Tykerb, GlaxoSmithKline).²⁰ Studies have reported that African American patients are more likely to have triple-negative breast cancer compared with white patients, and these tumors are more aggressive and carry a worse prognosis.²¹⁻²⁶ Although targeted and hormonal therapies have successfully improved outcomes for hormone receptor-positive and HER2-overexpressing breast cancers, they have no beneficial effects on triple-negative breast cancer.²⁰

Other possible reasons for the increased breast cancer mortality rate in African American women include the lack of access to health care systems and breast cancer screening initiatives, mistrust in the efficacy of screening procedures, delay in seeking care, and also a lack of breast cancer awareness.²⁷ Thanks to early detection by yearly screening mammograms, breast cancer mortality rates have been reduced.²⁹ However, each year, an unknown number of women with breast cancer are missed because of limited access to screening mammograms, owing to a lack of health insurance. Studies have shown that access to health insurance is associated with breast cancer detection at an

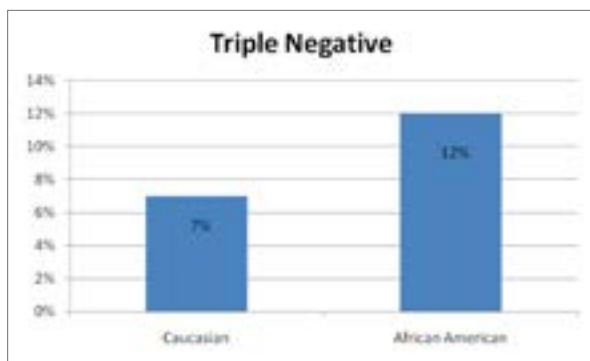


Figure 3. Triple-negative breast cancers in white versus African American women.

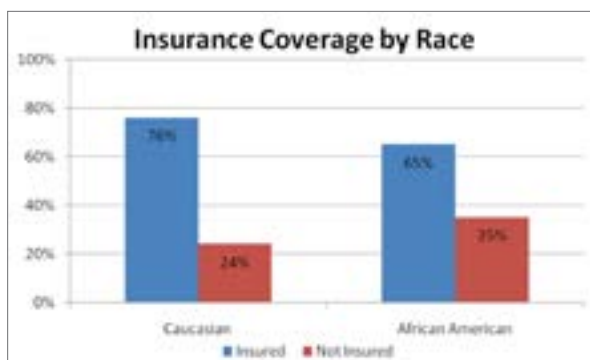


Figure 4. Insurance coverage among white and African American women.

earlier stage, while those without health insurance are often diagnosed at a later, more advanced stage of disease.²⁸

Our retrospective cohort research study also revealed that African American patients were 1.5 times more likely to have advanced-stage breast cancer at the time of diagnosis compared with white patients, and this is consistent with data pooled from other cohort studies discussed above.¹⁴ When asked about the delay in seeking medical attention, patients at our institute most often cited lack of awareness about breast cancer, nonavailability of funds including health insurance, and limited access to health care as the most important factors. Our institution serves a large indigent population of patients who are often uninsured. Without health insurance, indigent patients are unable to afford regular physician visits and screening mammograms. Based on research, in most cases medical attention was sought only when a breast lump was detected by the patient, at which point the breast cancer may have already progressed to a more advanced stage.

The data analyzed in BRCA-1 were from 2000 through 2005, a time when discussions about universal health care coverage were not part of such a vigorous political domain as they are now. With new health care laws being implemented, we wish to conduct a follow-up

retrospective cohort study—namely BRCA-2—a few years after the complete implementation of the Patient Protection and Affordable Care Act of 2010, to study the effects of universal health care on our patient population. We have yet to establish whether the implementation of these measures will actually lead to improved access to health care, enhanced breast cancer awareness, and a heightened patient attitude toward breast cancer screenings. This is the critical piece of the puzzle that we wish to solve with BRCA-2.

In addition to the aforementioned socioeconomic factors, data pooled from studies discussed earlier have also shown that the biology of breast cancer is different between African American and white women. Aggressive histology, such as triple-negative and HER2-overexpressing breast cancers, is also more prevalent in African Americans than in white patients, and carries a poorer prognosis.¹⁴⁻¹⁹ In BRCA-1, approximately 42% of African American patients either had a triple-negative or HER2-overexpressing breast cancer subtype, compared with only 30% among white patients. This could be another possible reason for poorer prognosis of breast cancer in African American women compared with their white counterparts. Contrary to previous studies, our data did not show any significant difference in age or menopausal status at the time of diagnosis between the 2 groups.

Conclusions

BRCA-1 is the first of our 2-part series on the particular types of (and reasons behind) racial disparities among African American and white women. In BRCA-1, our findings were consistent with data collected from previous research studies, and revealed that African American patients presented with more advanced and aggressive subtypes of breast cancer than white patients, and were less likely to have health insurance. However, it is not yet known whether universal health care insurance will lead to improved health care access, better breast cancer awareness, and an improved attitude toward breast cancer screenings. Since all of these factors can ultimately lead to an earlier diagnosis and better outcomes in both African American and white patients, we will investigate this issue further in BRCA-2 (the follow-up to BRCA-1) a few years after the complete implementation of universal health care coverage under the Patient Protection and Affordable Care Act enacted by President Obama in 2010.

The higher frequency of aggressive tumor subtypes in African American women warrants further research in order to determine whether decreasing the initial age for screening or increasing the frequency of mammograms in African American women would improve the prognosis and mortality rates associated with breast cancer. This study also underscores the importance of identifying and preventing obstacles in routine breast cancer screening, as well as increasing breast cancer awareness.

Study Limitations

Our study was limited owing to the retrospective nature of the data collected and by the small sample size available. Additionally, the geographic population under examination may not represent the general population at large. We also did not have data on the frequency of screening mammograms performed prior to the diagnosis of breast cancer in this study population.

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