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Long-term outcomes among African–American and white women with breast cancer: What is the impact of comorbidity?

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ABSTRACT

Objectives: We examined the association between comorbidity and long-term mortality from breast cancer and other causes among African–American and white women with breast cancer.

Methods: A total of 170 African–American and 829 white women aged 40–84 years were followed for up to 28 years with median follow-up of 11.3 years in the Health and Functioning in Women (HFW) study. The impact of the Charlson Comorbidity Score (CCS) in the first few months following breast cancer diagnosis on the risk of mortality from breast cancer and other causes was examined using extended Cox models.

Results: Median follow-up was significantly shorter for African–American women than their white counterparts (median 8.5 years vs. 12.3 years). Compared to white women, African–American women had significantly fewer years of education, greater body mass index, were more likely to have functional limitations and later stage at breast cancer diagnosis, and fewer had adequate financial resources (all $P < 0.05$). Proportionately more African–American women died of breast cancer than white women (37.1% vs. 31.4%, $P = 0.15$). A positive and statistically significant time-varying effect of the Charlson Comorbidity Score (CCS) on other-cause mortality persisted throughout the first 5 years of follow-up ($P < 0.001$) but not for its remainder.

Conclusions: Higher CCS was associated with increased risk of other-cause mortality, but not breast cancer specific mortality; the association did not differ among African–American and white women.

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Abbreviations and acronyms: HFW, Health and Functioning in Women study; CCS, Charlson Comorbidity Score; HR, hazard ratio; 95% CI, 95% confidence interval; MDCSS, Metropolitan Detroit Cancer Surveillance System; BMI, body mass index; kg, kilograms; m^2, meters squared; ICD, International Classification of Diseases; ACE, angiotensin-converting enzyme; LACE, Life after Cancer Epidemiology study.

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1. Introduction

Despite recent improvements in screening and adjuvant therapy use, substantial disparities continue to exist in the survival of African–American compared to white women diagnosed with breast cancer.[1–3] In the United States in 2009, the breast cancer-specific mortality rate was 21.65 per 100,000 for white women versus 30.49 per 100,000 for African–American women.[1] Multiple potential causes of disparity have been identified including biological variations in tumor characteristics,[4–7] healthcare access-related differences in screening[8] and treatment,[9–12] as well as cultural and psychosocial factors.[13,14]

Comorbidity, the presence of concurrent diseases in addition to the index condition, has been associated with survival disparities by race[15–18] but few studies comparing African–American with white breast cancer survivors have been able to examine 10-year mortality or longer.[15] Functional measures are associated with comorbidity and functional limitations at the time of breast cancer diagnosis and following initial treatment have been associated with a number of adverse outcomes among breast cancer survivors.[19–22] A recent study showed that functional limitations were significantly associated with non-breast cancer mortality in women with breast cancer and were more prevalent among African–American breast cancer survivors compared to their white counterparts.[23] In that study, functional decline predicted breast cancer-specific mortality.[23] Evidence from these studies suggests that functional limitations may confound the association of comorbidity with mortality. Current studies of comorbidity and mortality in biracial populations have not considered functional limitations and a wide range of lifestyle related factors in their assessment.[15] A better understanding of the role of comorbidity in breast cancer and other-cause mortality would provide opportunities to improve these outcomes through targeted interventions in high-risk populations.

Our study aimed to extend the literature by reporting whether the presence of comorbidity as reflected by the Charlson Comorbidity Score (CCS) in the first 6 months following breast cancer diagnosis is associated with increased risk of long-term mortality from breast cancer and other causes and whether the associations differ between African–American and white women.

2. Methods

2.1. Study Population

The Health and Functioning in Women (HFW) study used in the present analysis has been previously described.[24,25] Briefly, the HFW study was established in 1984 in the Detroit metropolitan area to assess the health, functional, and psychosocial status of women following breast cancer diagnosis. Two cohorts of eligible participants ages 40–84 with newly diagnosed, histologically confirmed, primary invasive breast cancer were identified through the Metropolitan Detroit Cancer Surveillance System (MDCSS) at the Michigan Cancer Foundation, now the Barbara Ann Karmanos Cancer Institute, within 4 weeks of diagnosis. The first cohort consisted of 571 participants ages 55–84 that were identified over a 7-month period between 1984 and 1985; of these, 463 (81.1%) were successfully interviewed between 2 and 4 months following diagnosis. A second cohort of 620 eligible cases, ages 40–54 and 74–84, was identified over a 7-month period between 1987 and 1988; 548 (88.4%) of these participants were successfully interviewed between 2 and 4 months after diagnosis. Participants were interviewed a second time approximately 9 months after the first interview. The two cohorts were combined and 170 (17%) African–American and 829 (83%) white women, for whom complete data were available on all key variables, were included in this analysis. This study was approved by the Committee on Human Research at the University of California, San Francisco. Additionally, the HFW study was approved at the time of its inception by the Human Subjects Committee at the Michigan Cancer Foundation.

2.2. Comorbidity Assessment

Medical abstractors from MDCSS reviewed medical records to identify the presence of any 18 conditions occurring during a 6-month period beginning at the time of breast cancer diagnosis.[24] Key health conditions for each subject were assigned weights based on their association with mortality. Myocardial infarction, peripheral arterial disease, other diagnosed heart problems, stroke, asthma, gastrointestinal disease, diabetes, arthritis, and liver disease were assigned a weight of 1. Typically, cirrhosis of the liver is assigned a weight of 3. Since data on liver disease severity were missing, we conservatively assumed that the 10 subjects with evidence of liver disease did not suffer from cirrhosis. Similarly, since data on the type of diabetes was missing, we conservatively assumed all subjects with evidence of diabetes suffered from type 2 diabetes. Renal disease, urinary tract disorders, and diagnosed cancers other than breast cancer were assigned a weight of 2. The CCS was calculated as the sum of the weights of the conditions present,[26] and in this analysis was used as a continuous variable.

2.3. Covariates

The covariates used in this analysis were socio-demographic, lifestyle-related, and clinical prognostic factors that, based on the existing literature and a priori reasoning, could potentially confound associations between comorbidities and mortality outcomes. The socio-demographic covariates included age at diagnosis, race, education and financial adequacy. Age at diagnosis was obtained from the MDCSS file, while other variables were obtained from interviews. In analyses, age was centered around its mean and used as a continuous variable. Information on the remaining socio-demographic and lifestyle-related factors was obtained from the first interview. Race was coded as either African–American or white. Years of education were recoded into 4 categories: less than high-school, high-school, college, and graduate. The dataset included a binary indicator of financial adequacy that was based on self-reported current financial resources and whether they met the participant's needs[24]; this variable was coded as 0 for inadequate, and 1 for adequate financial resources.

Lifestyle-related factors included body mass index (BMI) at diagnosis (calculated as weight in kilograms/height in meters

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