Obesity, Comorbidities, and Treatment Selection in Black and White Women With Early Breast Cancer

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BACKGROUND: This study investigates obesity and comorbidity in Black and White women with early breast cancer (stages I-III) and their potential impact on treatment decisions for patients with hormone receptor–positive (HR+)/human epidermal growth factor receptor 2–negative (HER2–) tumors. **METHODS:** In this retrospective chart review, comparisons of frequencies for Black and White patients were calculated with the Fisher exact test. Log binomial regression was used to estimate prevalence ratios (PRs) with 95% confidence intervals for total and individual comorbidities, and multivariable modeling was used to estimate PRs adjusted for age and body mass index (BMI). **RESULTS:** In a sample of 548 patients, 26% were Black, and 74% were White. Sixty-two percent of Black patients and 32% of White patients were obese (BMI ≥ 30 kg/m^2; $P < .0001$). Seventy-five percent of Black patients and 87% of White patients had HR+ tumors ($P = .001$). Significant intergroup differences were seen for 2 or more total comorbidities (62% of Blacks vs 47% of Whites; $P = .001$), 2 or more obesity-related comorbidities (33% vs 10%; $P < .0001$), hypertension (60% vs 32%; $P < .0001$), diabetes mellitus (23% vs 6%; $P < .0001$), hypercholesterolemia or hyperlipidemia (28% vs 18%; $P = .02$), and hypothyroidism (4% vs 11%; $P = .012$). In women with HR+/HER2– tumors, there were no intergroup differences in treatment decisions regarding the type of surgery, chemotherapy regimen, radiation, or endocrine treatment despite significant differences in the prevalence of obesity and comorbidities. **CONCLUSIONS:** This study documents significant disparities between Black and White women with early breast cancer with regard to high rates of obesity, overall comorbidities, and obesity-related comorbidities, and it highlights the prevalence of competing risks that may complicate outcomes in breast cancer. ***Cancer* 2021;127:922-930**. © *2020 American Cancer Society*.

KEYWORDS: breast cancer, comorbidities, disparities, race.

INTRODUCTION

Obesity rates started rising notably in the United States in the 1980s, and the Black community and especially Black women were disproportionately affected.[1] At the same time, rates of breast cancer increased rapidly, especially for hormone receptor–positive (HR+) disease.[2] A high body mass index (BMI) is a known risk factor for HR+ breast cancer in postmenopausal women[3] and thereby contributes to rising breast cancer incidence trends along with lower parity and increased detection through mammography screening.[4] Notably, rates of HR+ breast cancer increased more rapidly in Black women than White women, and this led to a convergence in overall breast cancer incidence rates.[5]

At the same time that breast cancer incidence rates were converging between Black and White women, mortality trends were moving in the opposite direction. In the mid-1970s, breast cancer mortality rates were about the same for Black and White women; however, by 2015, mortality rates had diverged dramatically to the point where they are now 40% higher for Black women than White women.[6] Even with highly treatable stage I to III HR+/human epidermal growth factor receptor 2–negative (HER2–) cancers, Black women have a 31% higher chance of dying in comparison with White women.[7]

Many factors contribute to survival disparities in women with breast cancer.[8-18] By some estimates, tumor biology, treatment, sociodemographics, and neighborhood factors combined account for 50% of the Black-White disparity.[13,19] Another study found that insurance coverage alone explained 50% of the survival disparity.[20] These findings are illuminating but leave much to be explained by other factors. Specifically with regard to overall survival, the impact of both obesity and comorbidities on breast cancer outcomes is an important consideration. For example, obesity has been associated with underdosing of women receiving chemotherapy for early breast cancer,[21,22] and comorbidities can influence the receipt of guideline-concordant

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treatment[23,24] and in turn affect prognosis and survival.[25,26] Tammemagi et al[27] reported worse competing cause survival in Black women versus White women with breast cancer (hazard ratio, 1.27; 95% CI, 1.00-1.63), and they concluded that "effective control of comorbidity in breast cancer patients should help improve life expectancy and lead to a reduction in survival disparities."

As advances in treatment options continue to improve outcomes for women with early breast cancer, women with highly treatable early-stage HR+ tumors are more likely to die of causes other than their early breast cancer.[28] A recent study showed that among women with breast cancer who died 10 or more years after their diagnosis, 60.9% died of noncancer causes, whereas 23.6% and 15.5% died of breast cancer and other cancers, respectively.[29] Even within the 5 to 10 years after the diagnosis, 48.4% died of noncancer causes, and regardless of the time since diagnosis, Black women had higher standardized mortality ratios for individual noncancer causes of death.[29] Noncancer causes include chronic diseases that, like cancer, are associated with advancing age, and many are obesity-related: heart disease, stroke, diabetes mellitus, kidney disease, and hypertension.[30]

Notably, among women with HR+ breast cancer, the hazard ratio for breast cancer death was 4.39 (95% CI, 1.76-10.9; $P = .001$) for Black women versus White women after adjustments for stage, grade, and treatment.[31] In that study, the proportion of women with a BMI > 30 kg/m^2 was 48% for Black women and 27% for White women ($P < .0001$), and the conclusion was that BMI was associated with breast cancer death at 5 years.[31] Further evidence of the potential impact of unhealthy weight was seen in a meta-analysis showing that among women with HR+ tumors, the pooled hazard ratio for overall survival was 1.31 (95% CI, 1.17-1.46) for women with obesity versus women without obesity.[32]

In the current study, we investigate prevalence rates for obesity and comorbidities in Black and White women with early breast cancer (stages I-III) seen in current clinical practice. We estimate the prevalence ratios (PRs) for individual comorbidities, total comorbidities, and obesity-related comorbidities by race with adjustments for age and BMI. We also investigate whether obesity, age, and comorbidities at diagnosis affect treatment decisions in women with HR+/HER2– tumors, which account for 69% of new cases in non-Hispanic White women and 55% in non-Hispanic Black women in the United States[6] and have the greatest disparity in outcomes.[33] Our hypothesis is that to the extent that Black and White women differ with regard to obesity, age, and comorbidities at breast cancer diagnosis, this may differentially affect treatment decisions in Black and White women with HR+/HER2– tumors.

MATERIALS AND METHODS

Breast Cancer Sample

This is a retrospective chart review of women seen in breast cancer clinics at a single institution, as described in previous studies.[34] To build the database, the electronic medical record was reviewed for women aged 18 years or older with stage I to III breast cancer who had no evidence of breast cancer recurrence, progression, or metastasis and had weight data for 2 years after their primary treatment. To ensure sufficient numbers of analyzable women with triple-negative or HR–/HER2+ tumors, we also included women enrolled in the Neoadjuvant Database of the University of North Carolina Lineberger Comprehensive Cancer Center (LCCC9815, IRB 01-1154) who met the inclusion criteria. The years of diagnosis were 1992-2004 (8%), 2005-2009 (23%), and 2010-2014 (69%). Women aged 50 years or older at diagnosis were assumed to be postmenopausal. The study was approved by the institutional review board of the University of North Carolina at Chapel Hill (IRB 15-1523).

Measures

Data pertaining to participant demographics, breast cancer diagnoses and treatments, and comorbidities at diagnosis were extracted from the electronic medical record (Epic@UNC). Age was dichotomized at 65 years or older, which is the age of Medicare eligibility (which could affect insurance coverage). Weight and height measures at breast cancer diagnosis were taken by nursing staff during routine clinic visits and were recorded in the electronic medical record; in our analysis, BMI was dichotomized at ≥30 kg/m^2, which is the cut point for obesity. The 16 comorbidities of interest are shown in Table 1. Obesity-related comorbidities were defined as hypertension, heart disease, and diabetes.

Statistical Considerations

Descriptive statistics were used to characterize patient demographics, breast cancer diagnoses and treatments, and comorbidities at diagnosis. Comparisons of frequencies for Black and White subjects were calculated with the Fisher exact test. Log binomial regression was used to estimate PRs with 95% confidence intervals (CIs) for individual comorbidities. Multivariable modeling was used to estimate adjusted PRs while we controlled for age and BMI. All analyses were performed with SAS statistical software (version 9.4; SAS, Cary, North Carolina).

TABLE 1. Study Participants (N = 548)

	Blacks (n = 144 [26%])	Whites (n = 404 [74%])	*P*
Demographics			
Age, mean (SD) [range], y	55 (11.6) [25-83]	57 (12.5) [24-92]	
Age, No. (%)			.01
<65 y	118 (82)	289 (72)	
≥65 y	26 (18)	115 (28)	
BMI, No. (%)			<.0001
<25 kg/m^2	21 (16)	149 (38)	
25-30 kg/m^2 (overweight)	30 (22)	119 (30)	
≥30 kg/m^2 (obese)	83 (62)	123 (32)	
Comorbidities at breast cancer diagnosis			
Total No. of comorbidities, No. (%)			.003
<2	54 (38)	215 (53)	
2-4	78 (54)	171 (42)	
>4	12 (9)	18 (5)	
Obesity-related comorbidities, mean (SD) [range][a]	1.18 (0.96) [0-4]	0.60 (0.80) [0-4]	<.0001
Most prevalent comorbidities at breast cancer diagnosis, No. (%)			
Hypertension	**86 (60)**	**131 (32)**	**<.0001**
Hypercholesterolemia or hyperlipidemia	40 (28)	74 (18)	.02
Diabetes mellitus	**33 (23)**	**25 (6)**	**<.0001**
Stomach or intestinal disorders	31 (22)	62 (15)	.09
Arthritis or rheumatism	23 (16)	68 (17)	.90
Depression	20 (14)	72 (18)	.30
Mental health (other than depression)	10 (7)	48 (12)	.15
Heart disease	**8 (6)**	**11 (3)**	**.12**
Liver or kidney disease	5 (4)	11 (3)	.58
Hypothyroidism	6 (4)	45 (11)	.01
Circulation disorders	4 (3)	7 (2)	.49
Glaucoma	4 (3)	9 (2)	.75
Emphysema	1 (1)	9 (2)	.47
Lymphedema	1 (1)	3 (1)	1.0
Osteoporosis	1 (1)	13 (3)	.13
Stroke	2 (1)	12 (3)	.38
Breast cancer diagnosis, No. (%)			
Breast cancer stage			.96
I	41 (30)	138 (32)	
II	60 (43)	190 (44)	
III	37 (26)	101 (23	
Tumor grade			.08
1	22 (16)	88 (22)	
2	48 (36)	156 (41)	
3	65 (48)	141 (37)	
HR (ER/PR)			.001
Negative	36 (25)	53 (13)	
Positive	106 (75)	345 (87)	
HER2			.59
Negative	121 (86)	331 (84)	
Positive	20 (14)	65 (16)	
Phenotype			.004
HR–/HER2–	30 (21)	38 (10)	
HR–/HER2+	7 (5)	15 (4)	
HR+/HER2–	91 (65)	293 (74)	
HR+/HER2+	13 (9)	50 (13)	

Abbreviations: BMI, body mass index; ER, estrogen receptor; HER2, human epidermal growth factor receptor 2; HR, hormone receptor; PR, progesterone receptor.
[a]Obesity-related comorbidities included hypertension, heart disease, and diabetes mellitus.
P values in bold print are significant at $P < .05$.

RESULTS

In a sample of 548 women, 26% were Black, and 74% were White; the mean age was 55 years (range, 25-83 years) for Black women and 57 years (range, 24-92 years) for White women (Table 1). Sixty-two percent of Black patients and 32% of White patients were obese ($P < .0001$). Sixty-five percent of Black women and 74% of White women had HR+/HER2– tumors ($P = .004$).

Comorbidities

Figure 1 presents rates of comorbidities in Black and White patients (full sample). Statistically significant differences were seen for 2 or more total comorbidities at

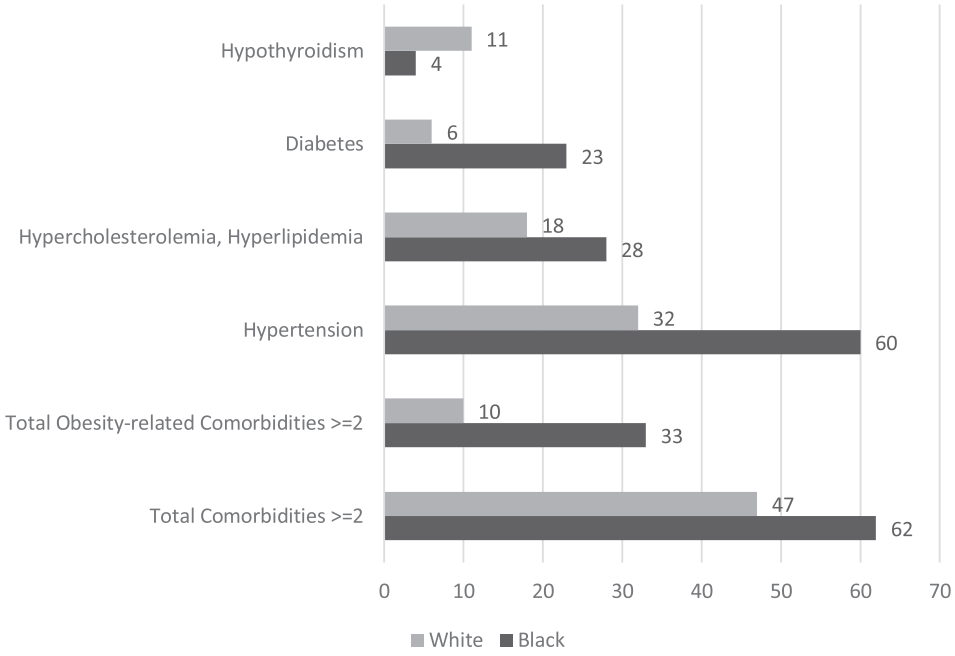

Figure 1. Comorbidities by race ($P \leq .05$). The data are shown as percentages.

diagnosis (62% of Blacks vs 47% of Whites; $P = .001$), 2 or more obesity-related comorbidities (33% vs 10%; $P < .0001$), hypertension (60% vs 32%; $P < .0001$), diabetes (23% vs 6%; $P < .0001$), hypercholesterolemia or hyperlipidemia (28% vs 18%; $P = .02$), and hypothyroidism (4% vs 11%; $P = .012$). There were no significant differences between Black and White patients for arthritis (overall 17%), stomach/intestinal disorders (17%), depression (17%), other mental health disorders (11%), heart disease (9%), osteoporosis (3%), kidney or liver disease (3%), stroke (3%), emphysema (2%), glaucoma (2%), circulation problems (2%), or lymphedema (1%). In a multivariable analysis adjusted for age and BMI (Table 2), Black women had higher frequencies of hypertension (PR, 1.45; 95% CI, 1.19-1.75; $P = .0002$), hypercholesterolemia or hyperlipidemia (PR, 1.43; 95% CI, 1.01-2.02; $P = .044$), and diabetes mellitus (PR, 1.44; 95% CI, 1.02-2.03; $P < .0001$).

Treatment Decisions: HR+/HER2– Patients

In light of observed disparities in comorbidities at diagnosis and disparities in outcomes,[33] we investigated whether preexisting conditions (obesity and comorbidities) at diagnosis influenced treatment decisions in patients with HR+/HER2– tumors (Table 3). We focused our analysis on this subtype because there can be some flexibility in treatment plans in comparison with patients with other subtypes, for whom chemotherapy is the sole option (eg, triple-negative tumors), endocrine treatment is not an option (HR– tumors), or anti-HER2 therapy is essential (HER2+ tumors). Patients with the HR+/HER2– subtype composed 72% of our sample: 65% of Black patients and 74% of White patients. Within this subtype, there were between-group differences in age (Black patients were younger [$P = .03$]), BMI (Black patients had a higher proportion with obesity [$P < .0001$]), comorbidities (Black patients had more total comorbidities [$P = .05$] and obesity-related comorbidities [$P < .0001$]), and individual comorbidities. There were no intergroup differences in breast cancer stage ($P = .95$) or grade ($P = .72$). With regard to treatment decisions, there were no significant differences between Black and White women in the type of surgery (lumpectomy vs mastectomy), chemotherapy timing (neoadjuvant vs adjuvant) or type (anthracycline-based vs not anthracycline-based), receipt of radiation treatment, or endocrine treatment.

In a multivariable analysis adjusted for age and BMI (Table 4), comorbidity PRs for women with HR+/HER2– tumors were higher in Black women for 2 or more obesity-related comorbidities (PR, 1.95; 95% CI,

TABLE 2. Prevalence Ratios for Comorbidities at Breast Cancer Diagnosis: Race Adjusted for Age and BMI (N = 548)

Comorbidity	Univariate	*P*	Adjusted for Age ≥ 65 y	*P*	Adjusted for BMI ≥ 30 kg/m^2	*P*	Adjusted for Both Age and BMI	*P*
All comorbidities (≥2)	1.34 (1.13-1.57)	.0005	1.40 (1.21-1.61)	<.0001	1.12 (0.95-1.31)	.18	1.11 (0.96-1.28)	.15
Obesity-related comorbidities (≥2)[a]	3.21 (2.22-4.6)	<.001	3.34 (2.40-4.97)	<.0001	2.05 (1.40-2.98)	.0002	1.15 (0.96-1.39)	.12
Hypertension	1.84 (1.52-2.24)	<.0001	1.88 (1.58-2.23)	<.0001	1.49 (1.21-1.83)	.0002	1.45 (1.19-1.75)	.0002
Heart disease	1.52 (1.09-2.12)	.01	1.64 (1.18-2.28)	.003	1.34 (0.94-1.90)	.10	1.44 (1.02-2.03)	.23
Hypercholesterolemia or hyperlipidemia	1.52 (1.09-2.12)	.015	1.64 (1.18-2.28)	.003	1.33 (0.93-1.89)	.11	1.43 (1.01-2.02	.044
Hypothyroidism	3.70 (2.28-6.01)	<.0001	4.20 (2.60-6.80)	<.0001	3.03 (1.79-5.13)	<.0001	3.34 (1.90-5.86)	.39
Diabetes mellitus	1.52 (1.09-2.12)	.01	1.64 (1.18-2.28)	.003	1.34 (0.94-1.90)	.10	1.44 (1.02-2.03)	<.0001

Abbreviation: BMI, body mass index.
[a]Obesity-related comorbidities included hypertension, heart disease, and diabetes mellitus.
Values in parentheses are 95% Confidence Intervals.

1.26-3.03; $P = .003$), hypertension (PR, 1.44; 95% CI, 1.16-1.78; $P = .0009$), and diabetes mellitus (PR, 2.97; 95% CI; 1.59-5.54; $P = .0007$).

Our sample was too small for similar analyses of HR–/HER2+ and HR+/HER2+ patients. We did analyze the triple-negative patients and found no significant differences between Black and White patients with respect to age, BMI, comorbidities, breast cancer stage or grade, treatment plan, or treatment-related adverse events (data not presented).

DISCUSSION

A high BMI at breast cancer diagnosis is common in early-stage breast cancer: approximately 30% of newly diagnosed women are overweight (BMI = 25-29 kg/m^2), and 30% are obese (BMI ≥ 30 kg/m^2).[35,36] Moreover, many gain weight after they have completed their primary treatment.[37,38] Black women generally have a higher BMI at breast cancer diagnosis in comparison with other racial and ethnic groups.[39] In our study, the rate at which women had BMIs ≥ 30 kg/m^2 was twice as high among Black women in comparison with White women. We found that racial disparities in the prevalence of comorbidities in general and obesity-related comorbidities specifically were significant. However, in women diagnosed with the most common type of early breast cancer (HR+/HER2– tumors), these disparities did not affect surgery, chemotherapy regimen, radiation treatment, or endocrine treatment decisions. In early breast cancer, patients with the HR+HER2– subtype have some discretion in treatment options in comparison with patients with other tumor subtypes. The decision to offer chemotherapy and the specific type of chemotherapy regimen are based on tumor stage and phenotype and the treating clinician's view that the patient is "fit" for chemotherapy. This judgment of fitness can include the severity and management of existing comorbidities. The lack of disparities in treatment plans observed in our HR+/HER2– sample may, in part, reflect that our patients were from 1 site that is a university-affiliated cancer center. It would be important and informative to test our findings in a sample of patients seen in community-based settings and in larger samples of women with other breast cancer subtypes.

Our study corroborates findings from a previous study reporting disparities between Black and White women with breast cancer in rates of hypertension (48.4% vs 21.1%), diabetes mellitus (17.1% vs 3.8%), and cardiovascular disease (8.4% vs 5.5%).[40] Another study similarly identified Black-White disparities in the total number of comorbidities (2.25 vs 1.83; $P < .001$), diabetes without complications (23% vs 8%; $P < .001$), and hypertension (63% vs 36%; $P < .001$).[27] Importantly, our findings pertaining to disparities in comorbidities were adjusted for age and BMI, both of which are independent predictors of chronic diseases, to identify the independent association of race and comorbidities at diagnosis.

To the extent that comorbidities do not influence treatment decisions in women with early-stage HR+/HER2– tumors, as we have reported in our study, they will have less of an impact on breast cancer–specific survival and potentially more of an impact on overall survival. In the MA.14 study, it was noted that other chronic diseases pose joint mortality risks, especially in women with a high BMI and an older age (≥70 years).[41] In the TEAM trial, it was reported that the probability of dying of competing causes (49% of deaths) was almost equal to that of dying of breast cancer (51%).[42] Clinical trials have limitations for competing death analysis to the extent that patients with certain comorbidities are excluded

TABLE 3. Study Participants With HR+/HER2– Breast Cancer (N = 384)

	Black (n = 91)	White (n = 293)	*P*
Demographics			
Age, mean (SD) [range], y	56 (11.9) [25-83]	59 (12.5) [28-92]	.03
BMI, No. (%)			<.0001
<25 kg/m^2	11 (13)	113 (40)	
25-30 kg/m^2 (overweight)	17 (20)	82 (29)	
≥30 kg/m^2 (obese)	56 (67)	89 (31)	
Comorbidities at breast cancer diagnosis, No. (%)			
Total No. of comorbidities			.05
<2	35 (38)	148 (51)	
≥2	56 (62)	144 (49)	
Obesity-related comorbidities[a]			<.0001
<2	60 (66)	258 (88)	
≥2	31 (34)	34 (12)	
Most prevalent comorbidities at breast cancer diagnosis, No. (%)			
Hypertension	60 (66)	105 (36)	<.0001
Hypercholesterolemia or hyperlipidemia	26 (29)	63 (22)	.20
Diabetes mellitus	21 (23)	22 (8)	.0002
Stomach or intestinal disorders	22 (24)	43 (15)	.05
Arthritis or rheumatism	15 (16)	50 (17)	1.00
Depression	11 (12)	50 (17)	.32
Mental health (excluding depression)	4 (4)	30 (10)	.09
Heart disease	5 (6)	9 (3)	.34
Liver or kidney disease	2 (2)	8 (3)	1.00
Hypothyroidism	4 (4)	32 (11)	.06
Circulation problems	2 (2)	7 (2)	1.00
Glaucoma	1 (1)	9 (3)	.46
Emphysema	1 (1)	7 (2)	.69
Lymphedema	0 (0)	1 (1)	1.00
Osteoarthritis	0 (0)	13 (4)	.04
Stroke	1 (1)	11 (4)	.31
Breast cancer diagnosis, No. (%)			
Breast cancer stage			.95
I	34 (39)	105 (37)	
II	34 (39)	114 (40)	
III	19 (22)	64 (23)	
Tumor grade			.72
1	21 (24)	73 (27)	
2	40 (47)	132 (49)	
3	25 (29)	67 (25)	
Breast cancer treatment, No. (%)			
Surgery			.69
None	0 (0)	2 (1)	
Lumpectomy	49 (54)	141 (49)	
Mastectomy	42 (46)	147 (51)	
Radiation			.79
No	25 (27)	76 (26)	
Yes	66 (72)	215 (74)	
Timing of chemotherapy			.72
None	43 (47)	126 (43)	
Neoadjuvant	21 (23)	79 (27)	
Adjuvant	27 (30)	87 (30)	
Chemotherapy regimen II			.54
Anthracycline-based	30 (71)	114 (77)	
Not anthracycline-based	12 (29)	35 (23)	
Chemotherapy regimen			.85
AC-T	29 (62)	111 (67)	
AC-TC	1 (2)	3 (2)	
TC	12 (26)	35 (21)	
TCH	n/a	n/a	
Any endocrine treatment	91 (100)	288 (99)	.58
Specific endocrine treatment			.62
Tamoxifen	20 (24)	68 (26)	
Aromatase inhibitor only	51 (61)	144 (55)	
Tamoxifen followed by aromatase inhibitor	13 (15)	51 (19)	
Dose delay: yes	9 (20)	29 (18)	.83
Dose reduction: yes	4 (9)	15 (9)	1.00
Early treatment discontinuation: yes	1 (2)	7 (4)	1.00

Abbreviations: AC-T, doxorubicin/cyclophosphamide plus paclitaxel; AC-TC, doxorubicin/cyclophosphamide plus paclitaxel/carboplatin; BMI, body mass index; HER2, human epidermal growth factor receptor 2; HR, hormone receptor; TC, docetaxel/cyclophosphamide; TCH, docetaxel/carboplatin plus anti-HER2 therapy.
[a]Obesity-related comorbidities included hypertension, heart disease, and diabetes mellitus.

TABLE 4. Prevalence Ratios for Comorbidities in HR+/HER2– Breast Cancer: Race Adjusted for Age and BMI (N = 384)

Comorbidity	Univariate	*P*	Adjusted for Age ≥ 65 y	*P*	Adjusted for BMI ≥ 30 kg/m^2	*P*	Adjusted for Both Age and BMI	*P*
All comorbidities (≥2)	1.25 (1.02-1.52)	.03	1.40 (1.21-1.61)	<.0001	1.12 (0.95-1.32)	.16	1.08 (0.92-1.27)	.36
Obesity-related comorbidities (≥2)	2.93 (1.91-4.48)	<.0001	3.46 (2.40-4.97)	<.0001	2.04 (1.40-2.97)	.0002	1.95 (1.26-3.03)	.003
Hypertension	1.83 (1.48-2.27)	<.0001	1.88 (1.58-2.23)	<.0001	1.52 (1.23-1.86)	<.0001	1.44 (1.16-1.78)	.0009
Heart disease	1.78 (0.61-5.18)	.29	2.19 (0.89-5.37)	.09	1.64 (0.65-4.12)	.30	1.36 (0.45-4.12)	.58
Hypercholesterolemia or hyperlipidemia	1.32 (0.90-1.96)	.16	1.64 (1.18-2.28)	.003	1.33 (0.93-1.89)	.11	1.16 (0.77-1.75)	.47
Hypothyroidism	0.40 (0.15-1.10)	.08	0.38 (0.17-0.88)	.02	0.38 (0.16-0.90)	.03	0.41 (0.15-1.17)	.41
Diabetes mellitus	3.06 (1.77-5.31)	<.0001	4.20 (2.60-6.80)	<.0001	3.01 (1.78-5.09)	<.0001	2.97 (1.59-5.54)	.0007

Abbreviations: BMI, body mass index; HER2, human epidermal growth factor receptor 2; HR, hormone receptor.

from participation in the trials, and those who participate are likely to be highly compliant with treatment. In a community-based study of women with stage I to IV breast cancer seen in a large comprehensive health system who were followed for a median of 10 years, it was estimated that 49% of the overall survival disparity and 77% of the competing cause death disparity between Black and White women were explained by total comorbidities (specifically diabetes and hypertension).[27] In another study, hypertension alone was estimated to account for 30% of Black-White disparities in overall survival.[43] A limitation of the latter study is that the breast cancer diagnosis years were 1985-1990, that is, before the widespread introduction of anti-HER2 therapy. In light of treatment regimens in current clinical practice and the role of comorbidities in the death of women who survive beyond 5 and 10 years,[29] it is time to revisit the impact of individual comorbidities on disparities in overall survival, especially in women with early HR+/HER2– or HR+/HER2+ breast cancer.

Our study has some limitations. The sample was developed largely for the purposes of analyzing weight trajectories in women with early breast cancer from diagnosis through 2 years after their primary treatment. To avoid confounding, the sample excluded women with disease recurrence, progression, or metastasis, which could affect their weight. This exclusion decision limits the generalizability of our findings to women who are free of disease 2 years after their primary treatment. Other than age and BMI, we did not have information on factors that may affect obesity-related and other comorbidities, such as diet and exercise or genetics. Our sample was drawn from just 1 institution in 1 state, and this potentially limits the generalizability to other treatment sites around the country.

A strength of our study is that the sample is large and consists of women receiving treatment regimens commonly used in current clinical practice. We provide prevalence information on 16 comorbidities with adjustments for race, age, and BMI. We also explore the question of whether disparities in comorbidities and BMI affect treatment decisions, specifically in women with HR+/HER2– tumors.

There are 2 important takeaways from our study. One is the importance of managing comorbidities in women newly diagnosed with early breast cancer to reduce their chances of mortality due to competing causes.[44] We have shown in our study that this is especially important in Black patients, who have a significantly higher prevalence of comorbidities even after adjustments for age and obesity. Before their breast cancer diagnosis, some women may not have been aware of their comorbidities because they were not receiving routine care from a primary care physician or other clinician who could have diagnosed the condition. The breast cancer diagnosis presents an opportunity to refer these patients to appropriate specialists concurrently with their cancer treatment. These patients need to understand that their long-term overall health and survival depend as much on the effective management of their comorbidities as they do on the successful completion of cancer treatment. Further research is needed on how to frame this dialogue with patients, with separate and focused attention paid to racial and ethnic nuances.

A related takeaway is that patients with excess weight at diagnosis and those who experience clinically significant weight gain after their primary treatment have added risks from obesity and obesity-related diseases that, in turn, may affect their survival.[45] For these high-risk patients, there is a need for oncology clinicians to explain how an elevated BMI or weight gain, in and of itself, can affect their overall health. This conversation can be as minimal as the oncology clinician expressing support for behavioral change and as much as providing referrals to

exercise and nutrition programs or specialists. This can take a special effort on the part of the oncology team, but it is feasible,[46,47] and for many patients, it may help them to understand the crucial importance of healthy lifestyles and engaging in daily exercise. The timing for these actions will be most impactful during the first 2 years after primary treatment when routine clinic visits provide an opportunity to reinforce the message and provide ongoing support for behavioral change. Guidelines provided by the American Society of Clinical Oncology and others support these actions as safe and important for most adults diagnosed with cancer.[48,49] Again, it is essential for these conversations to be patient-centered and culturally appropriate[50,51] and for people-first language to be used to avoid the stigma that many people with obesity perceive in patient-clinician encounters.[52,53]

In conclusion, this study documents significant disparities between Black and White women with early breast cancer with regard to high rates of obesity as well as overall comorbidities and obesity-related comorbidities, many of which are independent of age and obesity itself, and it highlights the prevalence of competing risks that may complicate outcomes in breast cancer.

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CONFLICT OF INTEREST DISCLOSURES

The authors made no disclosures.

AUTHOR CONTRIBUTIONS

Kirsten A. Nyrop: Primary author (original draft, review, and editing), conceptualization, and project administration. **Emily M. Damone:** Statistical analysis. **Allison M. Deal:** Statistical analysis conceptualization and oversight. **Lisa A. Carey:** Editing and critical appraisal of content. **Michael Lorentsen:** Editing and critical appraisal of content. **Shlomit S. Shachar:** Editing and critical appraisal of content. **Grant W. Williams:** Contributions to the original draft, review, and editing; verification of methods; and critical appraisal of content. **Addison (Tucker) Brenizer:** Data quality and statistical analysis. **Amy Wheless:** Editing and critical appraisal of content. **Hyman B. Muss:** Senior author; contributions to the original draft, review, and editing; verification of methods; and critical appraisal of content.

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