The Impact of Hormone Receptor Testing on Breast Cancer Treatment in Dar es Salaam, Tanzania

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Abstract

Background

Hormone receptor (HR) testing was not available for tailoring treatment of breast cancer in Tanzania until 2015. The aim of this study was to compare effect of introducing HR testing on breast cancer treatment in Tanzania.

Methods

This retrospective study included 2 groups of breast cancer patients treated at Ocean Road Cancer Institute (ORCI) before introducing HR (2007-2009 and 2014 – 685 patients), and after HR introduction (2015-2017 –765 patients). Demographic, epidemiologic and clinical data were abstracted from the medical records of patients. Chi-Square and Wilcoxon rank sum analyses were used to compare treatment in the two periods.

Results

Stage at diagnosis did not differ significantly by ER status (12.4% vs. 7.3%, stages I and II combined, 13.4% vs. 19.3% for stage III, and 30.7% vs 37.0% for stage IV with p-values of 0.08, 0.21, and 0.44, respectively). The proportion of patients who received both neoadjuvant chemotherapy alone (29.2% vs 28.1%) and adjuvant chemotherapy (53.5% vs 48.4%) did not differ significantly by ER status, (p=0.64 and p=0.29, respectively). After implementing ER testing, the proportion of patients who did not receive radiotherapy differed by ER status (43.6% vs 32.8%, p=0.04). Furthermore, approximately 13% of ER-negative patients received endocrine therapy, compared to 60% of ER positive patients (p < 0.0001).

Discussion

These finding suggest that there have been significant changes in breast cancer treatment practices since the introduction of hormone receptor testing. However, further research is needed to determine how hormone receptor status can be used to optimize standardized treatment protocols for patients diagnosed with breast cancer in Tanzania and other low-income countries that are taking steps to improve their breast cancer management practices and protocols.

Introduction

Breast cancer is the leading cause of cancer death among women, accounting for 11.6% of cancer deaths worldwide.[1] The incidence of breast cancer is higher in low- and middle-income countries (LMICs) but developing countries have higher mortality.[1] In many LMICs, there no screening programs for breast cancer and treatment options are limited.[2] As a result, women often waitto be diagnosed, resulting in late-stage presentation and limited treatment options.[6] In addition, treatment of late-stage breast cancer is often more expensive and less effective.[3] There is very little data on breast cancer incidence, mortality,

and survival in Sub-Saharan Africa.[3] The 2018 Tanzania's report on breast cancer indicated that breast cancer represented 8.12% of new cancers in the country.[4] Approximately 80% of those cases were stages III and IV.[5] Additionally, 17.5 per 100,000 breast cancer patients were diagnosed in 2012, and 7.8 in 100,000 died of the disease. [4]

The Ocean Road Cancer Institute (ORCI) is the only public cancer treatment center that provides both chemotherapy and radiotherapy in Tanzania. In Tanzania, early stage and locally advanced breast cancer undergo surgical resections first line of treatment which is performed at Muhimbili National Hospital (MNH) in Dar es Salaam with subsequent referral to ORCI for chemotherapy and radiotherapy.

Before 2015, the standard of care at ORCI was that breast cancer patients received tamoxifen, regardless of hormone receptor (HR) status. However, starting 2015, ORCI required that patients have HR results before starting treatment. Current trends of African American breast cancer patients indicate higher estrogen receptor (ER) negative and progesterone receptor (PR)negative tumors compared to other ethnicities.[6] Though these trends have not been studied extensively in representative samples in East Africa or Tanzania, ER- and PR-negative tumors have poor prognosis due to more aggressive tumor biology and lack of targeted therapy.[7, 8]

The aim of this study was to describe clinical characteristics of women diagnosed with breast cancer treated at ORCI before and after the introduction of HR testing. We also sought to determine the association between HR status and treatment among the study patients.

Methods

Study Design

This retrospective study included medical records of women with breast cancer treated at ORCI during two time periods. The time period before the introduction of HR included 685 patients treated from 2007–2009 and 2014, as records of patients from 2010–2013 were not available. The period after introduction of HR included 765 patients treated from January 2015 to December 2017.

Study Population

Patients seen at ORCI are registered in a logbook by cancer site. We used the logbooks to identify breast cancer patients treated during the study periods. Once patients were identified, corresponding medical records were retrieved and data were abstracted. All patients included in the study had primary breast cancers.

Data from the first time period before the use of ER were from our previous study Burson et al., [5] and it included 488 patients treated at ORCI from July 2007 to June 2009.[5] We also supplemented the first period with another dataset of primary breast cancer patients treated at ORCI between 2014 and 2015.

Data from the second time period after ER status were collected from 2015–2017. The number of patients in this period was 782, however, after reviewing the records, we determined that 35 patients did not have breast cancer. Additionally, records of 137 records were not available and 50 patients had duplicates that were excluded. The final number of patients of the second period was 765. Therefore, the final total sample for the two periods combined was 1450.

Data Collection

Data collected for the first period by Burson et al included demographic variables (age, sex, residence, body mass index (BMI)), reproductive factors (number of children, marital status, and menopausal status), clinical factors (family history of breast cancer, duration of symptoms, laterality, recurrence, stage at presentation, mass, ulceration, pain, nipple retraction, erythema, peau d'orange), pathology, and treatments (surgery and chemotherapy).[5] The second group included the same variables that comprised the first period as well as HR data and endocrine therapy.

Statistical Analysis

We sought to describe the demographic trends of patients who were treated at ORCI in the two time periods. For these analyses, we included data on patient characteristics including age at diagnosis, BMI, and number of children. We also collected data on risk factors such as contraceptive use, alcohol use, smoking status, HIV status, insurance status, family history of breast cancer, and residence. Wilcoxon rank sum test was used for continuous variables and chi-square tests for categorical variables.

We also reviewed treatment provided compared to the National Comprehensive Cancer Network (NCCN) Framework for Resource Stratification of Guidelines: Basic Resources and the first edition of the United Republic of Tanzania National Cancer Treatment Guidelines.[9,10] We used these guidelines as a standard to which we compared study results.. Based on both guidelines, we determined that HR status was an important part in the assessment of breast cancer for proper drug prescription. We conducted Fisher's exact tests to compare ER status by stage, age at diagnosis, and treatment received since these are the most important factors for determining treatment.

ER testing began at ORCI in 2015. When we reviewed the National Comprehensive Cancer Network (NCCN) Framework for Resources Stratification for NCCN Guidelines: Basic Resources[9], we found that ER testing is a necessity for characterizing breast cancer, and surgery is usually the first step in treatment of early stage breast cancer. Tanzania's National Cancer Treatment Guidelines, are in accordance with the NCCN guidelines: Basic Resources.[10] The guidelines recommend that women receive a core needle biopsy and immunohistochemistry be performed on tissue. Pre-operative staging is required for all patients to describe tumor size, extent of nodal involvement, and assess for symptoms and signs of metastases prior to undergoing surgery and aid in developing an appropriate treatment strategy. These guidelines also provide indications for radiation therapy, chemotherapy, and endocrine therapy based on pathology. The guidelines highlight the importance HR testing for proper drug utilization of tamoxifen for

pre-menopausal women and anastrozole for post-menopausal women. These are available, inexpensive therapies which have disease free survival and overall survival benefit.

We also wanted to determine if the introduction of hormone receptor testing in 2015 resulted in a significant change in treatments that patients received. We assessed this difference by categorizing our data by year into the time periods before and after HR introduction. We then compared patient symptoms at diagnosis, patient characteristics, diagnostic tests, staging, and treatment within these two categories using chi-square tests. The data were analyzed using SAS Statistical Analysis Software (version 9.4). This study was approved by the institutional review boards (IRBs) of the University of Arizona and the Ethics Committee of ORCI.

Results

Table 1 shows patient characteristics, risk factors, and place of residence before and after HR testing. After implementing HR testing, there was a statistically significant increase in BMI, contraception use, and women residing in Dar es Salaam. In addition, women had fewer children, were more likely to be HIV negative, and not have access to insurance.

Table 1
Demographics of the study population (n = 1450)

	Before HR testing		After HR testing		
	2007–2009, 2014 N = 685		2015–2017 N = 765		
	Mean ± SD	N (%)	Mean ± SD	N (%)	P [2]
Patient Characteristics [1]					
Age at diagnosis (years)	49.3 ± 13.14	556 (81.2)	50.4 ± 12.52	640 (83.7)	0.18
Body Mass Index (BMI)	26.47 ± 5.73	394 (57.5)	27.55 ± 5.93	566 (74.0)	0.003
Number of children carried to term	5 ± 12.4	588 (85.9)	3 ± 2.22	586 (76.8)	0.0009
Risk Factors (Total Counted, Sum Negative Cases) 2	**Yes (%)**		**Yes (%)**		**p**
Use of contraceptives [915, 338]	119 (17.3)		458 (59.8)		< 0.0001
Use of alcohol [1450, 680]	362 (52.8)		408 (53.3)		0.85
Smoking status [1450, 871]	283 (41.3)		296 (38.6)		0.31
HIV Positive [488, 450]	21 (3.0)		17 (2.2)		< 0.0001
Insurance [1450, 248]	659 (96.2)		543 (70.9)		< 0.0001
Family history [719, 626]	35 (5.1)		58 (7.5)		0.12
Place of Residence					
Resident of Dar es Salaam	123 (17.96)		197 (25.75)		< 0.0001
Residents of Other Areas and Zanzibar	249 (36.4)		449 (58.7)		< 0.0001

[1]P-value calculated using Wilcoxon Rank Sum test for continuous variables

[2]P-value calculated using Chi-Square analyses for categorical variables

Table 2 provides patient symptoms, exam findings, and diagnostic tests performed. From 2015–2017, women were more likely to present with a mass, swelling, or nipple discharge and less patients presented with pain, warmth, erythema, shiny skin, *peau d'orange*, or ulceration. In addition, there was an increase in the number having cytology and histology performed on tumor tissue, with the majority of patients diagnosed with invasive ductal carcinoma. Also, there was a decrease in number of women who only had mammography as part of their staging workup.

Table 2
Symptoms, and diagnostic tests (n = 1450)

	Before HR Testing	After HR Testing	
	2007–2009, 2014 N = 685	2015–2017 N = 765	
Patient Symptoms Total N, Total without symptoms	**Yes (%)**	**Yes (%)**	
Laterality			P [1]
Left	324 (47.2)	367 (47.9)	0.10
Right	320 (46.7)	346 (45.2)	0.31
Bilateral	35 (5.1)	28 (3.6)	0.37
Missing	6 (0.8)	24 (3.1)	0.001
Symptoms			
Mass only 1263, 106	540 (78.8)	617 (80.6)	< 0.0001
Redness only 1055, 957	72 (10.5)	26 (3.3)	< 0.0001
Peau d'orange only 1138, 790	196 (28.6)	152 (19.8)	< 0.0001
Ulceration only 1118, 796	168 (24.5)	154 (20.1)	0.0001
Nipple Retraction only 1145, 837	154 (22.4)	154 (20.1)	0.04
Mass + Redness 1450, 1358	67 (9.8)	25 (3.3)	< 0.0001
Mass + Peau d'orange 1450, 1150	170 (24.8)	130 (16.9)	0.02
Shiny 1053, 1020	20 (2.9)	13 (1.6)	0.02
Size			
Less than 5 cm	82 (11.9)	81 (10.5)	0.006
More than 5 cm	184 (26.8)	293 (38.3)	< 0.0001
Swelling 1265, 456	242 (35.3)	567 (74.1)	< 0.0001
Heat/ Warmth 1042, 1011	22 (3.2)	9 (1.1)	0.001
Discharge 750, 542	41 (5.9)	166 (21.6)	0.001

[1]P-value calculated using Chi-Square analyses for categorical variables

	Before HR Testing	After HR Testing	
Pain [1242, 714]	287 (41.8)	241 (31.5)	< 0.0001
Diagnostic Tests [Total N, Total without test]	**Yes (%)**	**Yes (%)**	**p**
Cytology Only [1450, 1263]	147 (21.4)	40 (5.2)	< 0.0001
Histology Only [1450, 1022]	266 (38.8)	162 (21.2)	< 0.0001
Cytology + Histology [1450, 957]	206 (30.0)	287 (37.5)	0.0028
Mammography Only [1020, 944]	44 (6.4)	32 (4.1)	< 0.0001
Breast Ultrasound [1381, 1323]	24 (3.5)	34 (4.4)	0.28
Abdominal Ultrasound [1373, 126]	559 (81.6)	688 (89.9)	< 0.0001
Chest X-Ray [1374, 385]	544 (79.4)	445 (58.1)	< 0.0001
Bone Scan [1389, 1204]	79 (11.5)	106 (13.8)	0.08
Mammography + Breast Ultrasound [1450, 1437]	7 (1.0)	6 (0.78)	0.78
Histological Types [Total N, Total without type]			
Carcinoma [1450, 1384]	46 (6.7)	20 (2.6)	0.0002
Invasive Ductal Carcinoma [1450, 890]	213 (31.1)	347 (45.4)	< 0.0001
Metastatic Carcinoma [1450, 1385]	49 (7.2)	16 (2.1)	< 0.0001
Medullary Carcinoma [1450, 1423]	10 (1.4)	17 (2.2)	0.28
Other [1350, 751]	334 (48.8)	265 (34.6)	0.69
[1]P-value calculated using Chi-Square analyses for categorical variables			

Table 3 presents endocrine therapy use before and after HR testing was utilized. Approximately 60% of women with ER positive breast cancer received tamoxifen, while 12% had ER negative breast cancer and were treated with tamoxifen as well. Due to sparse cell counts, ER status testing frequencies were not displayed by year. However, it is important to note that in 2015, the first year ER testing began, 46% of patients who were ER positive received tamoxifen. In 2016, 64% of patients who were ER-positive received tamoxifen. Finally, in 2017, 87% of patients who were ER positive received tamoxifen. Data for aromatase inhibitors were not available. There was also a significant proportion of missing ER status results in these years, at 58%, 48%, and 40%, respectively.

Table 3
Endocrine therapy stratified by ER status (n = 1450)

	Before HR Testing	After HR Testing		
	2007–2009, 2014 N = 685	2015–2017 N = 765		
Therapy Type [N missing, % missing]	ER Unknown N (%)	ER Positive N = 202 N (%)	ER Negative N = 192 N (%)	p
No Hormone Therapy [302, 82%]	254 (37.08)	75 (37.13)	162 (84.37)	< 0.0001
Tamoxifen [43, 12%]	261 (38.10)	120 (59.41)	23 (11.97)	< 0.0001
Herceptin [6, 2%]	3 (0.43)	2 (0.99)	2 (1.04)	1.00
Missing [20, 5%]	167 (24.37)	5 (2.47)	5 (2.60)	1.00

[1] P-values calculated using Chi-Square analyses, comparing proportions of ER + and ER- breast cancer patients between 2015 and 2017.

The number of ER positive and negative patients did not significantly differ by staging. See Table 4. However, prior to ER testing, the majority of patients were not staged. After starting ER testing, there was an increase in the number of patients staged. We conducted similar analyses comparing number of ER positive and negative patients by age at diagnosis (Table 5). The proportions were not significantly different by age group.

Table 4
Stage at diagnosis stratified by ER status (N = 1450)

	Before HR Testing	After HR Testing		
	2007–2009, 2014 N = 685	2015–2017 N = 765		P[1]
Stage N missing, % missing	ER Unknown N (%)	ER Positive N = 202 N (%)	ER Negative N = 192 N (%)	
Unknown Stage 201, 54%	668 (97.52)	88 (43.56)	70 (36.46)	0.15
Stage I – II 15, 4%	6 (0.88)	25 (12.38)	14 (7.29)	0.08
Stage III 35, 9%	7 (1.02)	27 (13.37)	37 (19.27)	0.21
Stage IV 120, 32%	4 (0.58)	62 (30.69)	71 (36.98)	0.44

[1] P-values calculated using Chi-Square analyses, comparing proportions of ER + and ER- breast cancer between 2015–2017.

Table 5
Age distribution stratified by ER status (n = 1450)

	Before HR Testing	After HR Testing		
	2007–2009, 2014 N = 685	2015–2017 N = 765		P [1]
Age N Missing, % missing	ER Unknown N (%)	ER Positive N = 202 N (%)	ER Negative N = 192 N (%)	
Missing Age 68, 9%	129 (18.83)	26 (12.87)	28 (14.58)	0.79
< 19–29 11, 3%	16 (2.33)	3 (1.49)	3 (1.56)	1.00
30–39 55, 15%	129 (18.83)	29 (14.36)	28 (14.58)	0.89
40–49 96, 26%	137 (20.00)	63 (31.19)	46 (23.96)	0.10
50–59 70, 20%	149 (21.75)	49 (24.26)	45 (23.44)	0.67
60–69 40, 47%	72 (10.51)	20 (9.90)	26 (13.54)	0.38
70 and older 31, 8%	53 (7.74)	12 (5.94)	16 (8.33)	0.45

[1] P-values calculated using Chi-Square analyses, comparing proportions of ER + and ER- breast cancer patients between 2015 and 2017.

Table 6 displays chemotherapy and radiation treatments before and after HR testing. There was a significant proportion of ER positive patients who did not receive radiation. However, 72% of patients who did not undergo radiation therapy were missing HR status data. In regards to chemotherapy, prior to ER testing, 75% of patients received neoadjuvant chemotherapy, which decreased to 15% after ER testing was implemented. There was a shift towards adjuvant chemotherapy. There was no difference in chemotherapy based on ER status, but 37% of patients, who received chemotherapy were missing HR status.

Table 6
Treatment interventions stratified by ER status (n = 1450)

	Before HR Testing	After HR Testing		
	2007–2009, 2014 N = 685	2015–2017 N = 765		P [1]
	ER Unknown N (%)	ER Positive N = 202 N (%)	ER Negative N = 192 N (%)	
Chemotherapy N Missing, % missing				
Neoadjuvant only 132, 36%	516 (75.33)	59 (29.21)	54 (28.13)	0.64
Adjuvant only 150, 40%	13 (1.89)	108 (53.47)	93 (48.44)	0.29
Palliative only 8, 2%	0 (0)	6 (2.97)	6 (3.13)	1.00
Neoadjuvant + Adjuvant 10, 2%	45 (6.57)	6 (2.97)	4 (2.08)	0.53
No Chemotherapy 35, 9%	36 (5.26)	11 (5.45)	18 (9.38)	0.19
Missing Chemotherapy 36, 10%	75 (10.95)	12 (5.94)	17 (8.85)	0.35
Radiotherapy N Missing, % missing				
Yes 86, 23%	192 (28.03)	112 (55.45)	126 (65.63)	0.36
No 268, 72%	263 (38.39)	88 (43.56)	63 (32.81)	0.04
Missing 17, 5%	230 (33.58)	2 (0.99)	3 (1.56)	0.65

[1] P-values calculated using Chi-Square analyses, comparing proportions of ER + and ER- breast cancer patients between 2015 and 2017.

Discussion

The study revealed three main interesting observations. First, we observed that significantly more patients were treated appropriately with an increase in tamoxifen use in ER positive breast cancers and decrease use in ER negative breast cancer. There were no statistically significant differences in stage at presentation or age by ER status. In regards to treatment, there was no statistical difference in chemotherapy by ER status. However, statistically, there were more patients with ER positive breast cancer who did not receive radiation. Second, the study showed statistically significant changes in demographic factors of breast cancer patients, including increase in BMI, use of contraceptives, and

residence in Dar es Salaam. We also found a decline in number of children and women living with HIV. Third, most common symptoms reported at presentation were breast mass, ulceration, and nipple retraction and very few patients had screening mammography before diagnosis.

Regarding the first finding related to changes in treatment after the introduction of HR testing, it is important to note that the policy of ORCI was to give tamoxifen to all breast cancer patients. However, our data indicate that less than 50% of the patients treated prior to HR testing received tamoxifen. Also, one-third of all patients received no endocrine therapy at all. One reason for this discrepancy is possibly that there was no standard treatment at this time, so physicians prescribed endocrine therapy based on their training, personal opinion, and experience. Another possibility is that the patients were seen at advanced disease stages and due to lack of standardized guidelines, they did not receive appropriate treatment. After HR testing was introduced, more than half of the patients with ER positive breast cancer received tamoxifen, however there were still a large number of patients with ER positive breast cancer who did not receive endocrine therapy (40%). Though most patients with ER negative breast cancer did not received hormone therapy, a very small proportion (12%), received tamoxifen. These patients would not have yielded benefit from tamoxifen and may have been exposed to unnecessary side effects.

There was no difference in stage at diagnosis by ER status. In addition to ER status, staging is another important factor for treatment. Based on the guidelines, this includes history and physical exam, diagnostic bilateral mammogram and ultrasound if needed, and determination of HR status. Though staging is recommended to be documented before patients undergo surgical resection, our study found that before ER testing only approximately 2% of patients were staged, which improved to 53% after ER testing was introduced. While the introduction of HR testing shows a significant increase in the proportion of patients who were staged at the start of treatment, these results still show that a significant number of patients not staged when they began treatment. Another possibility is the stage was not recorded in the medical records. Our findings are consistent with other LMICs studies that show a need for standardizing staging based on the NCCN and national guidelines for Tanzania.[9–12]

ER status did not affect staging and 87% of patients who had stage information were stages III and IV. This raises a concern about LMICs' breast cancer patients, since the majority of them are diagnosed at advanced stages.[13] A study from Nigeria found that on average, women waited 12.2 months after the onset of symptoms to seek treatment, and by the time these women were diagnosed, they were at an advanced stage.[14] The delay in seeking care may be due to limited ability to recognize symptoms, not believing that the symptoms are important, fear of dying from cancer, inability to access treatment, and other sociodemographic factors including age, level of education, and seeking alternative or herbal medicne.[3]

There was a marginally significant increase in the proportion of patients with ER negative breast cancer who received radiation therapy. Tanzania's national guidelines advocate that radiotherapy is indicated in patients who receive lumpectomy or mastectomy with lymph node-positive disease. However, due to patient referrals from other hospitals across Tanzania and lack of accessibility of records of patients

from remote areas, we were unable to collect the data necessary to determine which clinical factors influenced decision making for radiation therapy.

Finally, chemotherapy treatments did not differ by ER status and 83% of patients treated between 2015 and 2017 received chemotherapy. A large proportion of patients received chemotherapy regardless of ER status, possibly due to advanced stage, inherently high proportion of ER-negative tumors in Africa, and/or lack of access to gene expression profiles in predicting response to chemotherapy. Notably, in the time period before ER testing, most patients received neoadjuvant chemotherapy, however, in the time period after using HR testing, most of the patients received adjuvant chemotherapy. This could be due to the fact that chemotherapy can be used to downstage tumors before surgery. This could also represent a shift in practice or an increase in appropriate staging. However, we are unsure of what these findings suggest. Following national treatment guidelines would provide support to Tanzanian oncologists about when chemotherapy and radiotherapy would be beneficial for their patients and ensure that patients receive the best care available.

Regarding the changes in demographics, our study highlights the increase BMI and contraceptive use and decrease in pregnancies over the study period. The changes could be due the development and epidemiologic transition in low-income countries, including Tanzania.[15] One of the many barriers to accessing breast cancer treatment is distance from the treatment facility. Our results indicate that there was an increase in the proportion of patients who were residents of Dar es Salaam at the time of treatment. Before HR introduction, a larger proportion of patients travelled to ORCI to receive treatment for breast cancer, and since then, there has been an increase in breast cancer treatment services provided in the northern parts of the country, decreasing the necessity to travel to ORCI. This finding could also be due to an increase in the population of Dar es Salaam. Patients who seek treatment must overcome transportation, financial, and socioeconomic barriers to receive treatment.[13]

Our results also highlighted that the majority of patients presented with large breast masses, indicating advanced disease and limited screening mammography in Tanzania. This emphasizes the need for further education of signs and symptoms as well as screening services offered to the public at ORCI in order to detect breast cancer at earlier stages.

The strengths of the study are it is the first to evaluate the impact of HR testing on treatment in Tanzania, provides an accurate description of the clinical distribution and treatment over 10 years, and was conducted at the major cancer center in Tanzania.

The limitation of the study is missing data. Until 2018, all medical records at ORCI were hand-written records. As a result, the contents of the record varied widely by physician and by information that patients shared with the medical staff. The high proportion of missing data in HR status is the primary reason our statistical tests were unable to detect differences in stage at diagnosis, age at diagnosis, and treatment based on ER status. Additionally, we were unable to collect data on the prescription of aromatase

inhibitors and menopausal status for the patients treated at ORCI, which limits the scope of the analysis that could be conducted.

The introduction of HR testing to help determine breast cancer treatment in Tanzania is changing the paradigm of the disease. While the study results were impacted by inconsistencies in the availability of data, this study highlights the importance of implementing validated guidelines for breast cancer treatment which can serve to standardize treatment practices across physicians and decrease disparities in patient outcomes. Further research is needed to determine ORCI's compliance to breast cancer treatment guidelines, specifically relating to HR testing practices, prescribing appropriate endocrine therapy, utilizing electronic medical records to improve documentation, evaluating barriers to ER testing, and assessing the impact it has on patient outcomes.

Overall, the data supports the need to better implement ER testing and provide ER- positive patients with appropriate targeted endocrine therapy. This highlights the need for improvement in educating medical practitioners about aligning their treatment practices with national guidelines. Furthermore, in an effort to address the issues of missing information from handwritten medical records, ORCI recently transitioned to an electronic medical records system that is designed to assist medical staff in managing and documenting the various required aspects of treatment.[16] An area of further research could be to determine how effective the electronic system is at capturing patient data and treatment information. Long-term follow-up of patients with breast cancer was out of the scope for this study, however, there are guidelines now in place for addressing duration of endocrine therapy and surveillance.

Conclusions

This study found that there have been significant changes in breast cancer treatment in Tanzania over the last decade. These changes may be due to the introduction of hormone receptor status testing in 2015, however, these changes also reflect shifts in physician practices that were observed in the changes in tamoxifen prescription among women who were ER-positive. The results of this study also highlight significant shifts in important risk factors for breast cancer including increasing BMI, decreased parity, and increased oral contraceptive use. Future research will be needed in order to determine how these changes in population characteristics might influence breast cancer diagnoses over time. These findings demonstrate that further research into the current state of risk factors associated with and management of breast cancer in low-resource settings like Tanzania is needed in order to address the disproportionate cancer burdens these populations carry.

Abbreviations

HR
hormone receptor
ER
estrogen reception

ORCI
Ocean Road Cancer Institute

Declarations

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Ethical Approval. The work was approved by the Institutional Review Board of the University of Arizona and by the Ethical Review Board of Ocean Road Cancer Institute before research was conducted.

Consent for Publication. Not applicable.

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