Original Article

Factors influencing the use of palliative external beam radiotherapy for advanced breast cancer patients in the University College Hospital, Ibadan

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Abstract

Background: PRT (palliative RT [PRT]) has been proven as an effective treatment modality for symptom relief in advanced breast cancer patients; however, access to this treatment in Nigeria is determined by some demographic factors.

Materials and Methods: We retrospectively collected data from records of patients treated with PRT for advanced breast cancer between January 1, 2005, and December 31, 2009, at the University College Hospital Ibadan, Nigeria. Patients' Socio-demographic factors, tumor characteristics and RT treatment received were evaluated. Data obtained were analyzed using Statistical Package for Social Sciences version 20.0 (Chicago, IL, USA) statistical software. National population data on 2006 census were used to determine age-corrected values for metastatic sites and socioeconomic status (SES) of the patients.

Results: Five hundred and eighty-four patients' data between 2005 and 2009 were considered eligible and reviewed. Their ages ranged between 20 and 89 years, with a mean age of 45 years, with only 0.7% being male patients. The commonly affected age groups demanding for PRT were between 40 and 59 years, which accounted for 7.6 persons/100,000 populations. Breast cancer predominantly metastasizes to the bone, affecting 11.4 persons/100,000 populations, within the age range of 50–79 years. Pain associated with other symptoms accounted for more than half (66.6%) of the presenting complaints that demand the use of PRT for effective relief. Majority of the patients referred for PRT were from low SES and fell within the age range of 30–49 years, with 7.02 persons/100,000 populations.

Conclusion: Age is a predictive factor of pattern of breast cancer metastasis and rate of PRT utilization. Majority of the affected age groups (40–59 years) demanding for PRT were of low- and middle-SES. Therefore, there is a need for more RT machines in the country with effective national health insurance coverage on cancer patients to aid affordability.

Keywords: Advanced breast cancer, demographic factors, palliative radiotherapy

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INTRODUCTION

Breast cancer is the most common female malignancy, with a worldwide incidence of 25.1% of all cancers.[1] It accounts for 41.2%, 60.3%, and 47.9% of all malignancies managed in Lagos University Teaching Hospital; University of Nigeria Teaching Hospital, Enugu; and Usmanu Danfodiyo University Teaching Hospital, Sokoto, respectively.[2,3] Campbell *et al.* reported that it is the most common cancer seen among females in University College Hospital (UCH), Ibadan, Nigeria, with <1% occurring in the male sex.[4] Majority of the patients present with advanced-stage disease ranging from 62% to 80% at many tertiary centers across the country.[5-7] These group of patients were offered palliative care in the form of surgery, chemotherapy, and radiotherapy (RT) as appropriate, aimed at controlling life-threatening symptoms and improving their quality of life.

The history of palliative care in UCH, Ibadan, dated back to 1981 and became an established unit in 2005 as a result of growing demands for such care from orthopedic and cancer patients. The common indications for palliative RT (PRT) to breast cancer patients include metastatic bone pain, hemoptysis, tumor pressure symptoms, and neurologic complications. In some cases, absence of PRT treatment could result in death or irreversible organ damages; these include spinal cord compression, severe acute lower-airway obstruction, superior vena cava obstruction, and hemorrhage. Despite numerous proofs on the effectiveness of PRT for symptom control,[8-12] accessibility to this treatment modality in Nigeria had been prohibited by many factors unrelated to patients' need. As of 2005 and 2009 (study periods), only four centers were available in the country, private centers inclusive (Zaria, Lagos, and Ibadan); three out of the four centers were all located in the South Western Nigeria (Lagos and Ibadan). Moreover, the only center that functions regularly during that time was the Ibadan center; therefore, all the remaining geopolitical zones referred their patients to Ibadan for RT. Nigeria with a population of over 170 million people and increasing cancer cases, the limited RT facilities in the country were grossly inadequate. Therefore, long waiting times were undeniable and is a pointer to an imbalance between availability and demand, which had been ascribed to the decrease use of RT.[13] Five centers were subsequently established (Abuja, Sokoto, Benin, Enugu, and Gombe) and some started working in 2013. All the centers are within the major cities of the country with inadequate facilities and frequent breakdowns of machines. The map of Nigeria [Figure 1] shows the distribution of RT centers in the country. Inadequate standard radiation treatment facilities and centralization of few available ones in the major cities in a country with higher population of poor
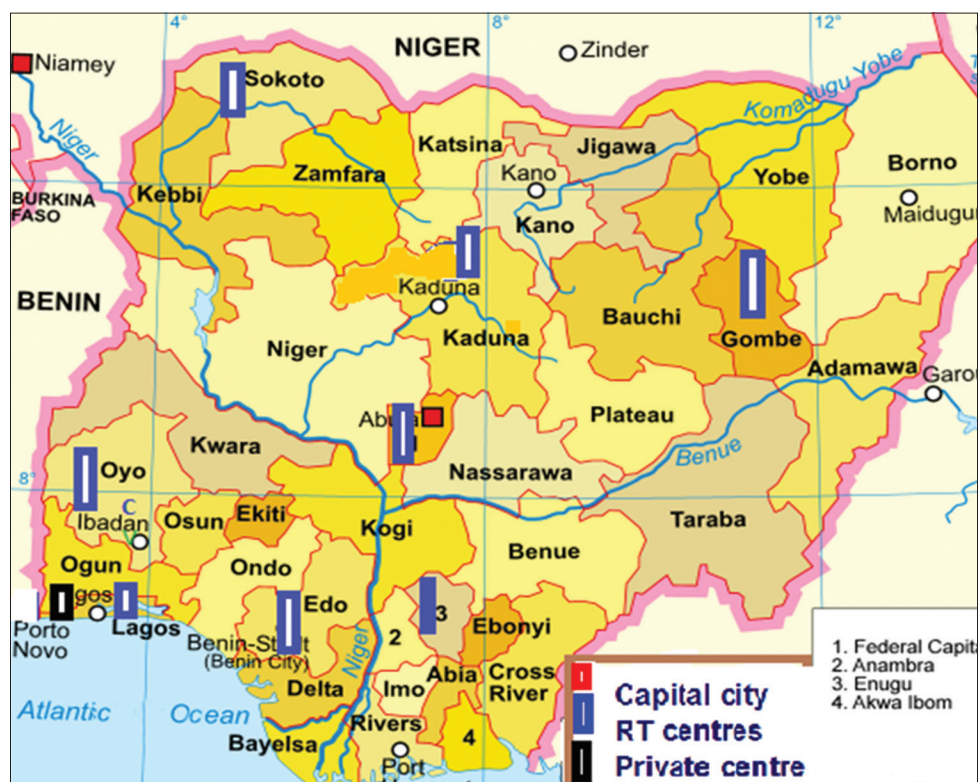

Figure 1: Distribution of radiotherapy centers in Nigeria

people and increasing incidence of advanced breast cancer cases need investigation for future plan.

MATERIALS AND METHODS

Patients and methods
All available RT case notes and external beam RT treatment records of patients treated for advanced breast cancer between January 1, 2005, and December 31, 2009, were retrieved from the departmental medical record unit. Data extracted for evaluation included patients' sociodemographics, presenting symptoms, treated sites, and RT doses used.

Patient evaluation
Clinical diagnosis of breast cancer made from patient evaluation was confirmed with fine-needle aspiration cytology or incisional biopsy in ulcerated tumors. Staging of breast cancer was based on the International Union Against Cancer criteria. Other investigations performed included full blood count, serum urea and electrolytes, and liver function test. Chest radiograph and abdominopelvic ultrasound were performed in appropriate cases.

Treatment policy
The center is equipped with only a cobalt-60 teletherapy machine with an average photon energy of 1.25 MV. External beam RT was delivered with radical intent at a dose of 50 Gy in 25 fractions over a 5-week period after mastectomy to the chest wall and supraclavicular lymph node regions. A similar dose was delivered to the axillary lymph nodes if they were not excised surgically. In palliative situations, a dose of 20–30 Gy in ten fractions was given to either the breast or the metastatic lesions. There are a lot of variations in the palliative radiation doses depending on site and patients' performance status.

Socioeconomic status (SES) was categorized using the Social Class Stratification method by Boroffka and Olatawura.[14] This system classifies individuals based on their occupations into social Class I (highly skilled professionals such as doctors and lawyers), social Class II (intermediate-skilled professionals such as technicians and nurses), social Class III (low-skilled respondents such as junior clerks, drivers, and junior military), social Class IV (unskilled respondents such as petty traders, and messengers), and social Class V (unemployed respondents). Distance to the RT center was calculated using an online distance calculator and grouped into short (0–250 km), intermediate (251–501 km), and long distance (>502 km) from the residence of patients to the treatment center in Ibadan.

Statistical methods
Descriptive statistic was used to report age-corrected values for metastatic sites and SES of the patients. Figures from 2006 national population census conducted in Nigeria were used to calculate the age-corrected values. Statistical Package for Social Sciences version 20.0 (Chicago IL, USA) was used for the analyses. Results were reported in figures and tables.

RESULTS

Five hundred and eighty-four patients were reviewed between 2005 and 2009. Their ages ranged between 20 and 89 years, with a mean age of 45 years and a standard deviation of ± 1.1 with only four (0.7%) male patients. Majority of the patients referred for PRT were of low (55.8%) and middle (32.7%) SES [Table 1]. Pain associated with other symptoms accounted for 66.6% of all the presenting symptoms [Table 2]. The range of radiation dose (16–25 Gy) accounted for 76.4% of all the doses used for palliative treatment, and 4–6# (73.3%) were the most common range of fractionation numbers

Table 1: Demographic characteristics of 584 patients with advanced breast cancer

Patients characteristics	Number of patients (%)
Age	
20-29	7 (1.2)
30-39	205 (35.1)
40-49	190 (32.5)
50-59	106 (18.2)
60-69	42 (7.2)
70-79	26 (4.5)
80-89	8 (1.4)
Gender	
Female	580 (99.3)
Male	4 (0.7)
SES of patients	
Low SES	326 (55.8)
Middle SES	191 (32.7)
High SES	67 (11.5)

SES – Socioeconomic status

Table 2: Presenting symptoms and sites of metastasis among 584 breast cancer patients

Symptoms/sites of metastasis	Number of patients (%)
Symptoms	
Bone pain/sensory and/or motor deficits	376 (64.4)
Multiple systemic symptom	30 (5.1)
Chest wall pain/masses/ulcers	75 (12.8)
Cough/hemoptysis and dyspnea	66 (11.3)
Headache/blurring of vision/vomiting	26 (4.5)
Right hypochondrial pain and/or jaundice	11 (1.9)
Sites of metastasis	
Bones	376 (64.4)
Liver	11 (1.9)
Chest wall ulcers/masses	75 (12.8)
Brain	26 (4.5)
Lung	66 (11.3)
Multiple organs	30 (5.1)

used for PRT, followed by ≥7 fractions (18.7%) and 8% for 1–3 fractions [Table 3]. Patients referred for PRT due to metastatic disease accounted for 16.7 persons/100,000 populations, and majority were within the age range of 40–59 years which constituted about 7.6 persons/100,000 populations, and younger age groups between 20 and 39 years were less affected with 2.4 persons/100,000 populations [Table 4]. Nonvisceral metastasis (bone and soft tissues only) constituted the highest presentation of 13.1 persons/100,000 populations, whereas visceral metastasis alone accounted for only 1.7 persons/100,000 populations [Table 5]. Majority of the patients referred for PRT were from low SES and fell within the age range of 30–49 years with 7.02 persons/100,000 populations; only 3.2 persons/100,000 populations were of high SES and out of it, 2.9 persons/100,000 populations were from the age range of 50–89 years [Table 6].

DISCUSSION

There are conflicting results when analyzing the effect of age on the pattern of breast cancer metastasis. Some studies have shown that breast cancer patients who develop mainly bone metastasis tend to be older than those who relapse with both visceral and/or bone metastasis.[15] In this study, breast cancer in younger age groups (20–39 years) had more predilection for visceral metastasis (0.9/100,000 populations). However, as age advances (40–89 years), we observed a trend from visceral to more predilection for bone and soft tissues (8.8 persons/100,000 populations). A retrospective German multicentric study reported similar finding of 1.5-fold increased risk of developing bone metastasis in patients older than 65 years at diagnosis when compared to that of younger women.[16] Differences in the definitions of age may be responsible for the conflicting results. However, other studies seem to report a surprising inverse relation between age at diagnosis and the risk of developing distant metastasis irrespective of the site of metastasis.[17,18] On the other hand, age at diagnosis failed to be independently associated with sites of metastasis.[19] Majority of the patients demanding for PRT were between the age range of 40 and 59 years and accounted for 7.6 persons/100,000 populations. However, as age advances (70–89 years), the referral for PRT declined (4.1 persons/100,000 populations). Numerous studies confirmed the prohibitive effect of advancing age to the use of PRT.[8,13,20-23] Paszat et al. reported that patients older than 80 years were 0.08 as less likely to receive RT as compared to patients ≤40 years of age.[24] This supported the significant finding of our result which shows that the use of PRT declined with advancing age. Tyldesley et al. conducted a study which shows that decline in the rate

Table 3: Palliative radiotherapy treatment characteristics among 584 cancer patients

Characteristics	Number of patients (%)
Range of PRT doses in Gy	
5-15	79 (13.5)
16-25	446 (76.4)
26-35	59 (10.1)
Range of fractionation	
1-3#	47 (8)
4-6#	428 (73.3)
≥7#	109 (18.7)

PRT – Palliative radiotherapy

Table 4: Age corrected of patients with metastatic breast cancer

Age (years)	Number of patients (a)	2006 National population (b)	Age corrected (c)=a/b × d
20-29	7	13,874,498	0.050452
30-39	205	8,632,974	2.363033
40-49	190	5,090,748	3.732261
50-59	106	2,761,759	3.838134
60-69	42	1,609,679	2.547092
70-79	26	817,031	2.937465
80-89	8	662,577	1.207407
Total	584	33,449,266	16.675844

d=100,000

Table 5: Age corrected for metastatic sites

Age groups	Age corrected for metastatic sites using 2006 National population census					
	Bone	Chest wall	Lung	Liver	Brain	Multiple system
20-29	0	0.007207	0.014415	0	0.021622	0.007207
30-39	0.67184	0.335921	0.49809	0.12741	0.2085	0.53284
40-49	1.96434	0.628591	0.235722	0	0.078573	0.82502
50-59	2.93291	0.28967	0.253462	0	0.036209	0.32587
60-69	2.23647	0.186373	0	0	0	0.18637
70-79	2.69267	0.122394	0.122394	0	0	0.24478
80-89	0.90555	0.150926	0.150926	0	0	0
Total	11.40378	1.7210082	1.275009	0.12741	0.344904	1.792173

Table 6: Age corrected for socioeconomic status of metastatic breast cancer patients

Age	Number (age corrected)		
	Low SES	Middle SES	High SES
20-29	5 (0.036037)	1 (0.007207)	1 (0.007207)
30-39	182 (2.10819)	21 (0.24325)	2 (0.023166)
40-49	103 (2.02327)	79 (1.55183)	8 (0.15714)
50-59	12 (0.4345)	61 (2.20873)	33 (1.19489)
60-69	10 (0.62124)	15 (0.93186)	17 (1.05611)
70-79	11 (1.34633)	10 (1.22394)	5 (0.61197)
80-89	3 (0.45277)	4 (0.6037)	1 (0.15092)
Total	326 (7.022337)	191 (4.561787)	67 (3.201403)

SES – Socioeconomic status

of RT was not justified by a decline in functional status in the elderly.[25] However, a contrary view concerning the prohibitive effect of old age alone with the use of PRT had been reported, with a perception that PRT has a beneficiary effect on elderly people.[26] The reason for the decline in the use of PRT in this study may be attributed to low life expectancy in our environment[27] and challenges

of transporting them to RT centers. Radiation oncologists remain juries to themselves on decisions concerning the use of PRT in elderly patients.

SES of patients had been consistently reported to influence the use of PRT treatment. It had been demonstrated that residents of the poorest communities were 0.83 times as likely to receive treatment when compared to residents of the richest communities.[24] We reported a contrary finding of no influence of SES and use of PRT among our patients. Majority of the patients referred for PRT to our center were of low SES (7 persons/100,000 populations) and were within the age group of 40–59 years that were commonly referred for PRT (7.6 persons/100.000 population) as against patients of high SES with 3.2 persons/100,000 populations. This is supported by the report of the National Bureau of Statistics in 2004 which shows that 68.7 million Nigerian people were poor,[28] and the poverty gap is still widening with more poor people than the rich.[29] Another reason could be that rich individuals in Nigeria seek their medical attention abroad, leaving behind a large number of poor people competing among themselves for the limited RT facilities in the country. The data collected for this study were before the establishment of four new regional centers (Enugu, Benin, Sokoto, and Gombe). The impact of those centers might have changed some of our findings; therefore, future study is recommended.

CONCLUSION

Age of patients at the time of PRT can predict the pattern of breast cancer metastasis, with younger age groups (20–39 years) showing predilection for visceral metastasis, and older patients (40–89 years) showing predilection for bone and soft-tissue involvement. Majority of patients demanding for PRT were of low SES. The two factors (age and SES) provide the health-care professionals and policy-makers for feature treatment plans and how to strategize toward prevention of future metastasis or easy access to PRT for some selected patients.

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Conflicts of interest
There are no conflicts of interest.

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