CLINICOPATHOLOGICAL CHARACTERISTICS OF BREAST CANCER PATIENTS WHO PRESENTED AT A SOUTHWESTERN NIGERIAN RADIATION ONCOLOGY CLINIC

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ABSTRACT

Background: Breast cancer is the commonest female cancer in Nigeria and is also the commonest cause of cancer mortality among Nigerian females. Although the incidence is not as high as the average worldwide incidence rate, the mortality of breast cancer patients in Nigeria is high.
Objective: We analysed the sociodemographic and clinicopathological characteristics of breast cancer patients who presented at the Radiation Oncology Clinic, University College Hospital, Ibadan, Nigeria.
Methods: This was a retrospective cross-sectional study. Sociodemographic and clinicopathological details were obtained from the case notes of breast cancer patients who presented at the Radiation Oncology Clinic, University College Hospital, Ibadan, from January 2008 to December 2017.
Results: A total of 605 patients were included. There were 8 men. The age of patients ranged from 28 to 90 years, with a mean age of 48.2 ± 9.2 years. Most were middle-aged and had semi-skilled employment. A considerable proportion had early menarche, high parity, and prolonged breastfeeding. Clinically, most patients presented with left-sided disease at an advanced stage (stage III or IV). Invasive ductal carcinoma (most commonly moderately differentiated) was the most common histological subtype. Among those who had immunohistochemistry done, triple-negative and HER2-enriched subtypes were most frequent.
Conclusion: These findings underscore the need for early detection strategies and expanded access to diagnostic tools like immunohistochemistry. Addressing these gaps is essential to improving treatment outcomes and survival in breast cancer patients in Nigeria.
KEYWORDS: breast neoplasms, immunohistochemistry, clinicopathology, sociodemographic factors, radiotherapy department, pathology, delayed diagnosis, Nigeria

INTRODUCTION

Breast cancer is one of the most common cancers globally, particularly affecting the female population. It has an annual incidence of 46.8 cases per 100,000 women.[1] It is also associated with significant mortality, accounting for almost 13 deaths per 100,000 population.[1] The burden of breast cancer continues to rise, particularly in low- and middle-income countries (LMICs) like Nigeria, which often lack the expertise and facilities required for early diagnosis and adequate treatment.

In Nigeria, breast cancer is the most commonly diagnosed malignancy among women. In 2022, there were approximately 32,000 new breast cancer cases, with 16,332 resulting in death.[2] Consequently, breast cancer is the leading cause of cancer mortality among Nigerian women.[2] Although the incidence rate in Nigeria is lower than the average worldwide figures, the mortality rate is overly high. This disparity is not unrelated to delayed presentation, poor access to screening and diagnostic services, and limited treatment options, a pattern consistent with other underdeveloped countries.[3]

Notably, breast cancer in Nigerian women tends to present at a younger age, often affecting women under the age of 40. The disease also tends to be more aggressive in Africans, including Nigerians. Contributory factors include genetic predispositions, environmental influences, and reproductive behaviours. Moreover, studies have shown a predominance of triple-negative and HER2-enriched subtypes in African women, both of which are associated with poor prognosis.[4] Furthermore, sociocultural and economic factors may influence patterns of health-seeking behaviour and access to screening, and lead to delays in diagnosis. Several reproductive and hormonal factors, including early menarche, late menopause, nulliparity, late age at first childbirth and lack of breastfeeding, are linked to breast cancer.[5–7] Also, obesity in postmenopausal women, alcohol intake, tobacco use, and high mammographic density increase risk.[8–17] Genetic predisposition plays a role, particularly with BRCA1/2 and other genetic mutations.[12,18]

Histologically, breast cancer is a heterogeneous disease, classified by morphology and molecular subtypes.[18–21] Gene expression profiling has identified five intrinsic subtypes: luminal A, luminal B, HER2-enriched, basal-like, and normal-like.[22–24] These can be approximated by immunohistochemistry (IHC) using Oestrogen receptor (ER), Progesterone receptor (PR), Human Epidermal Growth Factor Receptor – 2 (HER2), Ki67, and other biomarkers.[20,25–28] In resource-limited settings like Nigeria, where gene expression profiling is largely unavailable, IHC serves as a practical surrogate.

Evidence suggests that aggressive subtypes such as triple-negative and HER2-enriched cancers are more prevalent in Nigerian women.[4,29] This may contribute to the poorer outcomes observed and underscores the need for context-specific data on presentation patterns and tumour biology to guide interventions.

Comprehensive clinicopathological characterization therefore, has dual importance in LMICs like Nigeria: it clarifies

local disease patterns and guides rational allocation of scarce resources (e.g., prioritising HER2-targeted therapy or intensified screening of young women). There are not many Nigerian studies that integrate sociodemographic data, conventional pathology, and IHC subtype distribution within the same cohort.

Against this background, this study aimed to describe the sociodemographic and clinicopathologic characteristics of breast cancer patients seen at the Radiation Oncology Clinic, University College Hospital (UCH), Ibadan, Nigeria, a major radiation oncology centre in South-West Nigeria. By providing data from a large cohort over a 10-year period, it contributes to understanding breast cancer patterns in this region and highlights opportunities for improving early detection and diagnostic services.

MATERIALS AND METHODS

Study Design and Setting

A retrospective study was conducted in the Department of Radiation Oncology, UCH, Ibadan, Nigeria. UCH is a premier tertiary hospital and a national referral centre, serving patients from across South-West Nigeria and neighbouring regions.

Study Population

The study population comprised all histologically confirmed breast cancer patients who presented to the Radiation Oncology Department between 1st January, 2008 and 31st December, 2017.

Inclusion Criteria

- Histologically confirmed breast cancer diagnosis
- Presentation within the study period

Exclusion Criteria

- Absence of histological confirmation
- Incomplete or missing clinical records

Data Collection

Data were abstracted from patient case files and radiotherapy records using a structured proforma. Information collected included: Sociodemographic variables such as age, sex, education, occupation; their reproductive history (menarche age, parity, age at first childbirth, breastfeeding duration), clinicopathologic features (tumour laterality, histological subtype, tumour grade, TNM staging, and immunohistochemical status (ER, PR, HER2)).

IHC subtypes were categorized as: Luminal A: ER+ and/or PR+, HER2-; Luminal B: ER+ and/or PR+, HER2+; HER2-enriched: ER-, PR-, HER2+; and Basal-like (triple negative): ER-, PR-, HER2-. Triple-negative breast cancer (TNBC) was defined as tumours negative for ER, PR and HER2 on immunohistochemistry. Because cytokeratin-5/6 and EGFR staining were not performed, we could not further sub-classify TNBC into basal-like and non-basal phenotypes; therefore, all ER-/PR-/HER2- tumours are reported here as TNBC.[28]

Ethical Approval

Approval was obtained from the Joint University of Ibadan/UCH Ibadan Ethical Review Committee (UI/EC/0420).

Data Analysis

Data were analysed using SPSS version 21. Descriptive statistics (means, standard deviations, and proportions) were calculated.

Chi-square tests were used to examine associations between clinicopathologic features and sociodemographic variables, with statistical significance set at $p < 0.05$.

RESULTS

Sociodemographic Characteristics

Among the 605 patients who met the study criteria, 8 were males (M:F ratio = 1:74.6). The mean age was 48.2 ± 9.2 years (range: 28–90 years), with majority (69.4%) aged 40–60 years. About 33.2% attained tertiary education, while almost half were involved in semi-skilled occupations (see Table 1).

Table 1: Sociodemographic factors of the study population

Variable		N	%
Gender	Female	597	98.7
	Male	8	1.3
Age range (Years)	<40	123	20.7
	40-60	420	69.4
	>60	60	9.9
Educational level	No formal education	131	21.7
	Primary	59	9.8
	Secondary (Up to JSS3)	83	13.7
	Secondary (Up to SS3)	131	21.7
	Tertiary	201	33.2
Occupation	Skilled	111	18.3
	Semi-skilled	296	48.9
	Unskilled	195	32.2
	Other	3	5

Reproductive History

Of 597 female patients, 61.3% had menarche at ≤13 years, 91.5% had their first childbirth before age 30. About 90.3% breastfed for ≥1 year, 67% were premenopausal, and 81.8% had a parity of 3–5 (see Table 2).

Medical History

Family history of breast cancer was present in 13.4% of the patients. About 32.1% had comorbidities—primarily hypertension (16.4%). Alcohol and tobacco use were reported in 13.1% and 7.1%, respectively (see Table 3).

Table 2: Reproductive factors of the study population

Variable		N (597)	%
Menarche	≤13years	367	61.4
	>13years	230	38.6
	Missing	8	
Age at first birth	≤30y	495	91.5
	>30y	46	8.5
	Missing	64	
Duration of breastfeeding	≤12	539	90.3
	>12	58	9.7
	Total	597	100
	Missing	8	
Menopausal status	Premenopausal	400	67.0
	Postmenopausal	197	33.0
	Missing	8	
Parity	<3	69	11.4
	3-5	487	81.8
	>5	37	6.8
	Missing	10	

Table 3: Past medical factors of the study population

Variable		N	%
Family history	Positive	81	13.4
	Negative	524	86.6
Hypertension	Present	99	16.4
	Absent	506	83.6
Diabetes Mellitus	Present	77	12.7
	Absent	527	87.1
HIV	Present	11	1.8
	Absent	594	98.2
Peptic ulcer	Present	37	6.1
	Absent	568	93.9
Asthma	Present	11	1.8
	Absent	594	98.2
	Total	605	100
All Comorbidities	Present	194	32.1
	Absent	411	67.9
Tobacco	Ever smoked	43	7.1
	Never smoked	562	92.9
Alcohol intake	Ever drank	79	13.1
	Never drank	526	86.9

Clinicopathologic Features

Left-sided breast cancer was more common (57.9%). Most patients presented with stage III (59.9%) or IV (31.5%) disease; only 9.6% had early-stage disease (stage I or II). Invasive ductal carcinoma was predominant (94.7%), and 56.9% had moderately differentiated tumours (see Table 4).

Only 218 patients had IHC testing: ER/PR positivity was observed in 28% and HER2 positivity in 43.6%. Intrinsic subtype distribution was as follows: Luminal A (13.3%), Luminal B (14.7%), HER2-enriched (28.9%) and Basal-like (triple negative) (43.1%) (see Table 4).

No significant association was observed between intrinsic subtypes and stage or grade (as shown in Table 5).

Table 4: Clinicopathological features of the study population

Variable		N	%
Laterality	Left	350	57.9
	Right	239	39.5
	Both	16	2.6
	Total	605	100
Group staging	I	10	1.7
	II	47	7.9
	III	349	58.9
	IV	187	31.5
	Total	593	100
	Missing	12	
Combined staging	Early (I & II)	57	9.6
	Locally advanced	349	58.9
	Metastatic	187	31.5
	Total	593	100
	Missing	12	
Grade	Well differentiated	121	20.0
	Moderately differentiated	344	56.9
	Poorly differentiated	140	23.1
	Total	605	100
Histological group	Group A (invasive ductal carcinoma)	574	94.9
	Group B (Metaplastic carcinoma)	2	0.3
	Group C (invasive lobular carcinoma)	19	3.1
	Malignant phyllodes	10	1.7
	Total	605	100
Oestrogen receptor	Negative	157	72.0
	Positive	61	28.0
	Total	218	100

	Missing	387	
Progesterone receptor	Negative	157	72.0
	Positive	61	28.0
	Total	218	100
	Missing	387	
HER2 receptor	Negative	123	56.4
	Positive	95	43.6
	Total	218	100
	Missing	387	
Intrinsic subtype	Luminal A	29	13.3
	Luminal B	32	14.7
	HER2-enriched	63	28.9
	Triple negative	94	43.1
	Missing	387	

Table 5: Distribution of intrinsic subtype by some clinicopathologic factors

Variable	Luminal A (%)	Luminal B (%)	HER2-enriched (%)	Triple negative (%)	P Value
Combined group staging (N)					0.239*
Early (Stage I & II) (22)	31.8%	9.1%	18.2%	40.9%	
Locally-advanced (130)	13.8%	14.6%	30.0%	41.5%	
Metastatic (66)	6.1%	16.7%	30.3%	47.0%	
Grade (N)					0.736*
Well differentiated (35)	5.7%	14.3%	37.1%	42.9%	
Moderately differentiated (127)	15.7%	14.2%	26.8%	43.3%	
Poorly differentiated (56)	12.5%	16.1%	28.6%	42.9%	

* = Likelihood ratio quoted

DISCUSSION

This study provided a comprehensive 10-year review of the sociodemographic, reproductive, clinicopathologic, and treatment characteristics of breast cancer patients managed at the Radiation Oncology Clinic, University College Hospital, Ibadan. This offers valuable insights into the pattern of presentation and care in a resource-limited setting.

As expected, majority were women (98.7%), with a concentration of patients within the 40–60-year age range. This underscores the established epidemiological profile of breast cancer as a disease that predominantly affects middle-aged women. The mean age of 48.2 years and the predominance of patients between the ages of 40 and 60 years are consistent with previous Nigerian studies, which report a younger age of onset compared to Western populations, where breast cancer typically peaks in the sixth and seventh decades of life. This younger age of

presentation raises important implications for screening policies, as many affected women may be below the age cut-off for routine mammographic surveillance.

There was a high proportion of patients with at least secondary level of education, and nearly half were engaged in semi-skilled occupations, reflecting the demographic makeup of the area. These findings may suggest a modest level of health literacy and access to employment, yet do not appear to translate into earlier detection or better outcomes. This disconnect underscores the complexity of health-seeking behaviour, where education alone may not overcome systemic barriers, such as the cost of care, availability of screening, cultural beliefs, and trust in the healthcare system.

Late-stage presentation remains a major issue, as nearly 92% of the patients presented with stage III or IV disease. This trend is consistent with previous studies from Nigeria and across sub-Saharan Africa.

The male-to-female ratio of 1:74.6 in this study aligns with earlier Nigerian studies, where male breast cancer ranged from 1.7% in Ibadan to 9% in Zaria.[30–38] Globally, male breast cancer is rare, accounting for about 1% of all breast cancers, with an estimated 2,500 cases annually in the U.S.[39] Risk factors in men include BRCA mutations, family history, Klinefelter's syndrome, liver disease, testicular abnormalities, and obesity.[31,33] This low proportion of males (1.3%) aligns with global patterns but reaffirms the need to recognise that breast cancer, though rare in men, does occur and requires clinical awareness and tailored messaging.

Studies have shown that a positive family history of breast cancer in an increasing number of female first-degree relatives is associated with an increased risk of breast cancer compared to women without a family history of breast cancer. A pooled analysis of over 50,000 women with breast cancer and over 100,000 controls noted that the risk of breast cancer in women with one first-degree relative with breast cancer increased almost twofold. The risk increased almost threefold in women with two first-degree relatives with breast cancer.[40] In this study, 13.4% of the study population had a positive family history of breast cancer.

In rare circumstances (5-6% of all breast cancers), an inherited breast cancer susceptibility gene is identified as the direct cause of breast cancer. These genes include BRCA1, BRCA2, p53, ATM, and PTEN. However, this study was not powered to investigate this.

Alcohol and tobacco use, both established risk factors, were reported in 13.1% and 7.1% of patients, respectively.[15–17,41] These figures are relatively modest compared to Western populations, where substance use is more prevalent, but they remain significant in the Nigerian context, where such behaviours are less culturally widespread. Alcohol consumption has been linked to increased estrogen levels and oxidative stress, which contribute to carcinogenesis. Tobacco use, though less common among women in sub-Saharan Africa, is known to induce DNA damage and may interact with other risk factors to accelerate tumour development. The relatively low prevalence of alcohol and tobacco use in this cohort may reflect sociocultural norms that discourage such

behaviours, especially among women. However, underreporting due to social desirability bias cannot be ruled out. It is also important to consider that even low to moderate exposure to these agents may have a compounded effect in populations with other prevalent risk modifiers, such as late presentation, genetic susceptibility, or limited access to preventive care. These findings reinforce the importance of incorporating substance use education and behavioural counselling into breast cancer prevention programs, especially as lifestyle transitions occur with urbanisation.

Clinically, most tumours were left-sided, moderately differentiated invasive ductal carcinomas, aligning with other Nigerian studies.[42–47] However, unlike patterns in Western populations, there was a higher proportion of triple-negative (43.1%) and HER2-enriched (28.9%) subtypes compared to Luminal A (13.3%) and Luminal B (14.7%). This trend, observed in Africans and African Americans, may reflect underlying biological differences.[29,48,49]

The reproductive profile of the patient cohort offers important insights into potential hormonal and reproductive risk modifiers of breast cancer in this setting. A significant proportion of patients (61.3%) reported early menarche (≤13 years), a factor associated with prolonged lifetime estrogen exposure and increased breast cancer risk. Additionally, the majority had high parity, with 81.8% having 3–5 children, and a remarkable 91.5% had their first childbirth before the age of 30. These findings reflect reproductive patterns typical of sub-Saharan Africa, where early and frequent childbearing is common. While high parity and early childbirth have traditionally been regarded as protective, their interplay with other factors—such as genetic predisposition, lifestyle, and limited access to health services—may attenuate these benefits. Notably, 90.3% of women had breastfed for at least one year, and two-thirds (67%) were premenopausal at the time of diagnosis. These gynaecological features, in the context of a population with a high burden of biologically aggressive tumours and limited screening infrastructure, suggest that reproductive factors alone do not fully account for the observed patterns of disease. Further studies are warranted to explore how these variables interact with molecular and environmental determinants to shape breast cancer risk in Nigerian women.

The presence of comorbid conditions such as hypertension (11.7%), diabetes mellitus (2.8%), and HIV infection (2.5%) among the breast cancer patients reflects the emerging dual burden of communicable and non-communicable diseases in sub-Saharan Africa. Hypertension and diabetes are increasingly prevalent in the Nigerian population, partly due to urbanisation, dietary transitions, and sedentary lifestyles. Their coexistence with breast cancer poses challenges in treatment planning, as they may influence the choice and tolerability of chemotherapy, radiotherapy, and surgical interventions. For example, cardiovascular comorbidities may increase the risk of treatment-related complications and necessitate dose adjustments. Additionally, the observed HIV prevalence (1.8%) among the cohort is slightly higher than national adult prevalence estimates of 1.4%,[50] highlighting the need for integrated oncology-HIV care models. HIV-positive breast cancer patients often face compounded risks of

immunosuppression, stigma, and treatment delay. These findings reinforce the importance of comprehensive patient assessment at diagnosis, including screening for comorbidities and optimising co-management with other specialities to improve overall outcomes.

HER2 positivity in this cohort (43.6%) far exceeds recent Western estimates of 15–20%.[51,52] Older Western studies cited higher proportions (20–30%),[53,54] possibly due to being hospital-based before the establishment of population-based screening programs. In Nigeria, HER2 positivity rates vary widely. Adebamowo et al. reported a 5.2% rate in Ibadan,[44] while Emmanuel et al. reported 33.3% in Jos.[55] As a tertiary referral centre with a functional radiotherapy unit and available immunohistochemistry services, our centre may see more aggressive disease phenotypes.

LIMITATIONS

This study was retrospective, and some variables had missing data. Selection bias affected the immunohistochemistry subgroup due to limited testing availability. Financial barriers hindered the use of imaging modalities like CT and MRI for recurrence surveillance, which instead relied on clinical symptoms and physical examination, potentially underestimating recurrence rates.

CONCLUSION

This 10-year review showed that breast cancer patients at a South-West Nigerian Radiation Oncology Department were mostly middle-aged women with tertiary education and semi-skilled jobs. Many reported early menarche, high parity and prolonged breastfeeding, risk patterns that differ from much of the global literature. More than 90% presented with stage III–IV, left-sided invasive ductal carcinoma, and, among those tested, triple-negative and HER2-enriched tumours predominated. Earlier detection, routine immunohistochemistry and affordable targeted treatments are essential to improve outcomes.

RECOMMENDATIONS

Given that breast cancer affects women in their productive years, Nigeria should urgently establish a national screening program for early detection. To support this, the government and private sector must invest in equipping tertiary and cancer centres with comprehensive diagnostic and treatment facilities, including CT, MRI, and PET/CT scanners. Histopathology services should be standardised, ensuring every malignant breast cancer case includes immunohistochemistry at an affordable cost. This holistic approach, from early detection to complete treatment, is essential to improving outcomes and reducing mortality.

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