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Original Research

Profile of Triple Negative Breast Cancer: A Retrospective Review

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Abstract

Background: Triple-Negative Breast Cancer (TNBC) is a particularly aggressive tumor. Major responses to chemotherapy in TNBC do not necessarily correlate with better survival, indicating a need for further research into treatment strategies and underlying molecular mechanisms. This study is aimed at assessing the profile of Triple Negative Breast Cancer.

Methodology: This study retrospectively evaluated the profile of TNBC patients at Lagos State University Teaching Hospital, Ikeja. Sociodemographic data, tumour grade, and type of chemotherapy administered were abstracted from the hospital's cancer register. Statistical analyses were conducted using SPSS version 27.0, with associations between sociodemographic characteristics, tumour grade, and type of therapy established using chi-square tests. Key relationships were considered statistically significant at p-values ≤ 0.05.

Results: A total of three hundred and thirty (330) patients were recruited. The mean age of presentation was 49.96 ± 11.39 years, with the minimum and maximum ages of 22 and 80 years, respectively. The most represented age group was between 41-50 years, constituting about a third of all the patients. About three quarters of the tumours were moderately differentiated. Correlating tumour grade with the age of the patients was statistically significant, p value =0.05

Conclusions: Triple-negative breast Cancers remain a moderately differentiated tumour and are seen predominantly in the middle-aged group.

Keywords: Triple Negative Breast Cancers; Profile; Retrospective Study.

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Quick Response Code:

Introduction

Breast cancer constitutes a significant prevalence among the female population globally. Since 2000, approximately 40.5% of Nigerian women have been diagnosed with breast cancer, making it the most common cancer among females in the country.[1] What makes this statistic more dire is that breast cancer ranks as the highest cause of cancer-related deaths among Nigerian women.[2]

Addressing breast cancer has become a global endeavour, from discovering new treatment options, implementing revised prevention strategies and improving the quality of life for patients.[3] Although there have been considerable advancements in these areas, the mortality rate is still high. This reflects the urgency for new therapeutic options to increase survival rates and improve the quality of life for patient's post-therapy.[4]

Triple-Negative Breast Cancer (TNBC) is particularly aggressive because of its tendency to recur within 1-3 years' post-diagnosis, with a high rate of distant metastasis. [5,6] Despite the sensitivity to anthracycline/taxane-based neoadjuvant chemotherapy in the treatment of TNBC,[7]it remains very aggressive. Patients with TNBC lack the estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2), the very targets that make most breast cancers treatable.[8]Triple-Negative Breast Cancer accounts for 10-20% of breast cancer diagnoses.[9] Its aggressiveness is often linked to BRCA-1 mutations, and tends to cluster in the basal-like category.[8]

The lack of hormone receptors means traditional targeted therapies are off-limits.[8] Clinical oncologists are exploring new strategies targeting EGFR pathways, androgen receptors, PARP inhibition, and immune checkpoints.[6] This study is aimed at assessing the profiles of Triple Negative Breast Cancer (TNBC).

Materials and Methods

Study location

The Lagos State University Teaching Hospital (LASUTH) is a prominent healthcare institution in Nigeria, serving as a referral centre for hospitals in Lagos State and adjacent regions. Established in 1955 as a cottage hospital, it underwent transformations to become a secondary health centre in 1970 and eventually a teaching hospital in 2001, following the establishment of the Lagos State University College of Medicine in 1999.

This clinic is overseen by a consultant oncologist and staffed by radiation and clinical oncologists, resident doctors, nurses, and paramedical personnel; the unit provides specialized care to a diverse patient population. The clinic primarily treats breast cancer cases, while also attending to other malignancies such as colon, prostate, and gynaecologic cancers.

The Oncology clinic provides services such as chemotherapy, hormone therapy, immunotherapy, and combinations thereof.

Study design

This retrospective study aimed to profile triple-negative breast cancer patients.

Data Collection

Patients' records that met eligibility criteria were abstracted, acknowledging the anonymity of their information. Data that were incomplete/missing were noted in the analysis. Data abstracted included sociodemographic information, tumour differentiation, whether neo-adjuvant or adjuvant chemotherapy was used, status immediately after 6-cycles of 3-weekly chemotherapy,6 weeks, and 3 months after chemotherapy. This approach ensured systematic record taking while maintaining ethical standards and preserving participant confidentiality.

Confidentiality
This study utilized hospital registration numbers instead of participant names to ensure confidentiality during data collection. Electronic data were securely password-protected, while hard copy data were maintained in a secure location, safeguarding the privacy and confidentiality of participants' information throughout the research process.

Ethics committee approval
Ethics committee approval was obtained before the commencement of the study from the Health Research and Ethics Committee of Lagos State University Teaching Hospital, Ikeja, with reference LREC/06/10/2632.

Statistical analysis
This study employed the Statistical Package for Social Sciences (SPSS) version 26.0 for comprehensive data analysis. Associations between demographic characteristics and the dependent variables of treatment choice and response rate were thoroughly investigated. To elucidate the relationships among categorical variables, the Chi-square test was conducted, with statistical significance established at the $p \leq 0.05$ threshold.

Results

A total of three hundred and thirty (330) patients were recruited. The mean age of presentation was 49.96 ± 11.39 years with the minimum and maximum ages of 22 and 80 years, respectively. The majority of the participants were Christians (82%) while only 18% were Muslims. A total of 93.4% were married, 6.3% single, and 0.1% were divorced. Almost half (48%) of all the participants had adjuvant therapy after mastectomy, while 40.5% had neo-adjuvant therapy. About half of the patients had inoperable breast cancer.

All the patients had either a platinum-based chemotherapy regimen or anthracycline-based chemotherapy.

All patients had 6-cycles of 3-weekly chemotherapy and were evaluated immediately, 6 weeks, and 3months after the completion of the 6-cycles of 3-weekly chemotherapy. The profiles of the patients after the completion of the chemotherapy are presented in Table 1.

Table 1: Profile of Patients after 6-cycles of 3-weekly Chemotherapy

Status	Immediately post-chemotherapy	6-weeks Post Chemotherapy	3-months Post Chemotherapy
Alive and well	26 (7.8%)	141 (42.3%)	166 (49.8%)
Disease Progression	225 (67.6%)	76 (22.8%)	12 (3.6%)
Disease Recurrence	11 (3.3%)	11 (3.3%)	13 (3.9%)
Dead	1 (7.8%)	4 (1.2%)	4 (1.2%)
Missing Data	70 (20%)	101 (30.3%)	136 (40.8%)
Total	330 (100%)	330 (100%)	330 (100%)

The most represented age group was between 41-50 years, constituting about a third of all patients, while 22-30 years was the least common of all the patients. The age in groups of all the participants is presented in Table 2 and Figure 1.

Table 2: Age Groups of Patients

Age in group (year)	Frequency	Percentage
22-30	8	2.4
31-40	68	20.6
41-50	98	29.7
51-60	94	28.5
61-70	52	15.8
71-80	10	3.0

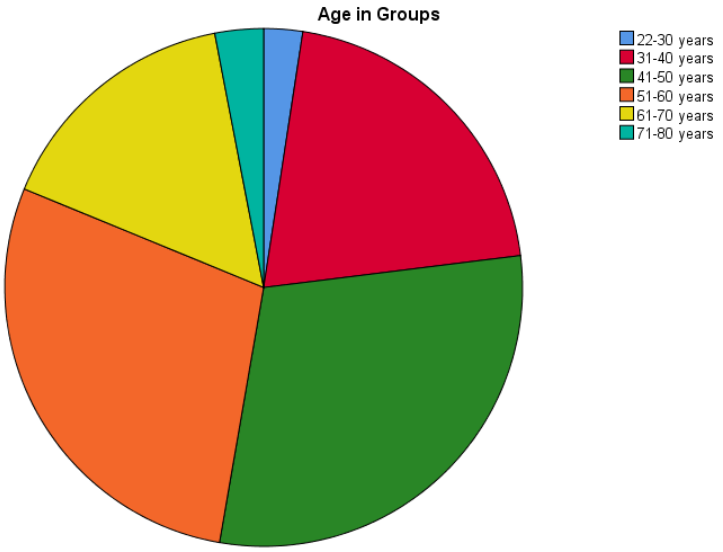

Figure 1: Age groups of all participants

About three-quarters of the tumours were moderately differentiated, followed by poorly differentiated tumours, while well-differentiated tumour was the least common. (Table 3). The pattern of the tumour grade is presented in table 3.

Table 3: Showing pattern of Tumour grade

Tumour grade	Frequency	Percentage
Well	24	7.2
Moderate	244	73.3
Poorly	50	15.0
Missing	15	4.5
Total	330	100

Correlating tumour grade with the age of the patients was statistically significant p value =0.05 (df;266;95% confidence interval). However, the type of therapy used whether adjuvant or neo-adjuvant was statistically significant when compared with the status immediately post chemotherapy p value =0.001 but not statistically significant when compared with status of the patients' six-week and three-month post chemotherapy, p values 0.11 and 0.43 respectively).

Discussions:

Triple-negative breast cancer (TNBC) disproportionately impacts younger female populations and individuals of African descent.[10] In the contemporary landscape of personalized cancer treatment, individuals diagnosed with TNBC continue to experience a significantly elevated risk of recurrence and mortality compared to those with other subtypes of breast cancer, attributable to the inherently aggressive characteristics of TNBC and the absence of novel targeted therapeutic options.[11,12] Approximately one-third of these patients attain a pathologic complete response (pCR), correlating with favourable survival outcomes; however, the remaining cohort experiences relapse and ultimately succumbs to the disease.[13-15]

The identification of TNBC patients who may derive benefit from anthracycline/taxane chemotherapy, alongside the strategic redirection of other patients towards innovative targeted therapies, represents a potentially efficacious approach with imminent clinical relevance in the management of TNBC.

This retrospective study highlights the substantial burden that TNBC imposes on the Nigerian breast cancer demography. With an average age presentation of 49.96 years, and the most represented age group of between 41-50 years, which is similar to 53 years obtained by Dent *et al.*[16]The TNBC is predominantly diagnosed in middle-aged females, and over 40% of cases manifest as inoperable cases, highlighting the need for the implementation of early detection methodologies. Furthermore, despite early detection methodologies and appropriate management, TNBC is recognized for exhibiting an initial surge in recurrence rates within the first to third-year post-diagnosis, alongside more aggressive metastatic behaviour that is predominantly observed in visceral organs, particularly the lungs and brain, while exhibiting a reduced propensity for dissemination to osseous structures.[6]

Alarmingly, a significant proportion of patients (approximately 50%) in this study presented with inoperable disease, suggesting both late presentation and aggressive tumor biology. This is a critical concern in Nigeria, where breast cancer already represents the most prevalent malignancy among women and the leading cause of cancer-related deaths. [1,2]

Despite the use of either anthracycline- or platinum-based chemotherapy in our patients, only 7.8% of patients were categorized as "alive and well" immediately post-treatment, though this number increased

to 49.8% at three months' post-treatment. While this delayed improvement may reflect the time-dependent efficacy of chemotherapy, the initial high rate of disease progression (67.6%) signals the inadequacy of current chemotherapy-only approaches for many TNBC patients. This further supports global findings on TNBC's chemoresistance, especially in tumors with mesenchymal or stem-like features. [17,18]

Given the molecular heterogeneity of TNBC, with subtypes such as basal-like 1 and 2, immunomodulatory, mesenchymal, and luminal androgen receptor (LAR), future treatment protocols should emphasize the incorporation of molecular subtyping and targeted therapies.[19] Promising agents include PARP inhibitors for BRCA-mutant tumors, immune checkpoint inhibitors (e.g., PD-1/PD-L1 inhibitors), and androgen receptor antagonists for LAR subtype.[20,21]

The statistical correlation between tumor grade and patient age ($p = 0.05$) suggests that younger patients may present with more aggressive tumor phenotypes, which is in keeping with earlier study indicating that younger age is often associated with poorer prognosis in TNBC.[22] Notably, the type of chemotherapy regimen (adjuvant vs. neoadjuvant) was significantly associated with immediate post-treatment status ($p = 0.001$), though this significance did not persist at subsequent follow-ups, suggesting that while initial response may vary by treatment strategy, longer-term outcomes are governed by more complex biological factors.

Additionally, the role of circulating tumor DNA (ctDNA) and liquid biopsies in tracking response and relapse risk is becoming increasingly pertinent.[22]

The histopathological analysis in this study reveals that 73.3% of tumors were classified as moderately differentiated, a finding that provides important insights into the biological behavior of TNBC in this population. Tumor differentiation, a key histologic parameter, reflects the extent to which cancer cells resemble their normal counterparts and are generally associated with tumor aggressiveness and prognosis. In breast cancer, well-differentiated tumors tend to grow and spread more slowly than poorly differentiated tumours, while moderately differentiated tumors lie somewhere in between these extremes in terms of behavior and clinical outcomes.

The predominance of moderately differentiated tumors in this study may suggest a predominance of TNBC subtypes with intermediate aggressiveness, potentially correlating with the basal-like subtypes commonly observed in TNBC. Basal-like tumors, while typically high-grade, can exhibit a spectrum of differentiation, and moderate differentiation does not preclude aggressive clinical behavior, especially in the absence of hormone receptor expression and HER2 amplification.[17]

Ultimately, while this study provides meaningful insights into TNBC outcomes in Nigeria, it also underscores the critical gaps. These include limitations in long-term follow-up (evidenced by high missing data rates), restricted access to genomic profiling, and the urgent need for integration of precision oncology in clinical workflows. Addressing these will be vital to improving survival outcomes and aligning TNBC care in Nigeria with international best practices.

Conflict of interest: None declared

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