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IMMUNORECEPTOR AND KI-67 CHARACTERIZATION OF BREAST CANCER IN A TERTIARY HEALTHCARE FACILITY IN SOUTH EAST NIGERIA

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ABSTRACT

Background: Breast cancer is highly complex and heterogeneous with disparities in ethnic and racial histological subtypes and tumour behaviour; is the second most common cancer in the world, and the most common cancer in women. Nigeria maintains the 9th position in breast cancer mortality worldwide.

Aim: The present study assessed the immune receptor and tumour proliferation marker characterization of breast cancers.

Methods: A retrospective cross-sectional study was carried out from 2010 to 2015. Two hundred (200) archived breast cancer tissue samples were retrieved from the histopathology Laboratory of Nnamdi Azikiwe University Teaching Hospital Nnewi. Patients' data were retrieved from the histopathology reports. Tissue blocks were re-embedded in fresh paraffin wax and 4µ thick serial sections were cut and stained accordingly.

Results: Breast tissue samples were the most prevalent sample types (48.9%) while grade 3 tumours were the most pervasive cancer grades; patients' ages at presentation range from 23 to 86 years, with a mean age of 55. Positive immunoreactivity for estrogen receptor (ER), progesterone receptor (PR), human epidermal growth factor receptor 2 (HER2) and proliferation marker (Ki67) were 89.2%, 69.7%, 24.1% and 98.5% respectively, for invasive ductal carcinoma. Her-2 was the least expressed whereas Ki67 was expressed in almost all the cancer types. ER-positive tumours were the most prevalent with ER/PR co-positivity being the second.

Conclusion: The characterization and hormonal expression pattern of breast cancer maintained the same trend. ER-positive tumours were the most prevalent with ER/PR co-positivity being the second. Her-2 was the least expressed whereas Ki67 was expressed in almost all the cancer types.

Keywords: *Breast cancer, immune receptors, invasive ductal carcinoma, Ki67*

INTRODUCTION

Breast cancer was reported as the second most common cancer in the world, and the most common cancer in women, with about 2.3 million new cases reported in 2022[1]. This is higher than the 1.67 million new cases reported in 2012, despite improved awareness, diagnosis and management regimen. In a corroborative report, WHO[2] reported that out of the 2.4 million cases, 670 deaths were recorded. Whereas breast cancer occurs in every country of the world in women at any age after puberty, it is more prevalent in China and USA with 357,161 and 274, 375 new cases respectively recorded in 2022[1]. Also in their breast cancer statistics report of 2024, while India, China, USA led in the mortality burden, Nigeria is in the 9th position of breast cancer mortality worldwide with 16,322 deaths

recorded in 2022. WHO Breast Cancer Factsheet 2024 revealed a diminishing pattern of breast cancer burden by human development. The report estimated that 1in 12 women will be diagnosed with breast cancer with 1 in 71 deaths with High Human Development Index (HDI) whereas with low HDI only 1 in 27 women will be diagnosed while 1 in 48 will die of the cancer.

Being a female is the main risk factor for breast cancer, accounting for about 99% of all cases with 0.5-1% occurring in males[2]. Risk factors like race and ethnicity, overweight and obesity, physical inactivity, alcohol use, and smoking have been reported[3]. Breast cancer risk can also significantly increase for women with first-degree relatives with breast cancer and women with increased breast density. Reproductive risk factors include early age at menarche, nulliparity, late age at first birth, lack of breastfeeding, oral contraceptive use, menopausal status, and menopausal hormone therapy. About half of breast cancer cases develop in women with no identifiable risk factors other than gender and age[2]. The association of mutant genes such as BRAC 1, BRAC 2 and PALB-2 with breast cancer aetiology has been well documented[3,4]. Women who inherit any of these high penetrance gene mutations have high-fold risks of developing breast cancers in their lifetime. According to independent reports, women with inherited BRCA1, BRAC2 and PALB-2 genes have 72%, 69% and 58% risks of developing breast cancer by the age of 80 years respectively[5,6]. Those who are diagnosed early with these genes may consider removing the two breasts and pursuing aggressive preventive chemotherapy.

According to Qi, *et al*[7], breast cancer is a highly complex and heterogeneous disease with disparities in ethnic and racial histological subtypes and tumour behaviour, which must be taken into cognizance for effective and efficient patient management. The treatment algorithms for breast cancer in Nigeria have been based on the luminal classification of cancer, which is based on the expression pattern of Estrogen Receptor (ER), Progesterone Receptor (PR) and human epidermal growth factor receptor-2 (HER-2/neu). These include, in a more practical clinical application; triple positive (ER, PR and Her 2 positive cancer), bi positive (ER/PR positive, ER or PR/Her2 positive), mono positive (either ER, PR or Her 2 is positive) and triple negative (neither ER, PR or Her 2 is positive) breast cancers[8]. This classification has enabled a more personalized and targeted therapeutic management of the breast cancer burden in Nigeria[8]. A much earlier study in 2016 by Ghoncheh *et al*, [9] reported and validated that the adverse effect of the treatment is reduced by using the classification as the basis of treatment. This by implication made the classification either a true prognostic factors, which evaluate disease outcomes such as disease-free or overall survival in the absence of adjuvant therapy, or a predictive factor, which estimates the likelihood of response or lack of response to a specific treatment.

Studies have been done where known and established molecular markers such as ER, PR, p53, and Her-2 were examined along

with clinical stage and pathological grades in breast cancer and the outcome suggested a biologically aggressive form of breast cancer in Nigerian women with the possibility of poor response to both hormonal therapy and chemotherapy[10]. Bi-positive breast cancers (ER/PR positive) have been reported as the most prevalent cancers in our clime, followed closely by triple negative cancers[8]. The levels of estrogen receptor expression in a breast tumour are useful indicators in predicting breast cancer response to endocrine therapy. Approximately 80% of all breast cancers are ER-positive while about 15-20% account for triple-negative cancers[11]. Typically, since the expression of progesterone is highly dependent on estrogen receptor levels, to begin with, it is very uncommon to find a PR-positive tumour which is ER-negative with only 1% of all breast cancers being PR+ER-. Breast cancer tumours with high levels of ER but low levels of PR are more common, and it is generally believed that the response to endocrine therapy in metastatic breast cancers is better where both are in evidence. HER2 is an oncogene which has been identified as a valid indicator of breast cancer prognosis. Over-expression of HER2 tends to lead to a higher rate of breast cancer relapse and shorter overall survival. HER2 amplification and overexpression are found in about 15% of all breast cancers. If identified, women with HER2 breast tumours benefit significantly from anti-HER2 treatments[12].

Molecular characterization of breast cancer using immunohistochemistry has made individual personalized medicine possible, especially for people living in the poor and low-resource world. Most works in Nigeria were done on the predictive therapeutic nature of breast cancer by evaluating Estrogen Receptor, Progesterone Receptor and Human Epidermal Growth Factor Receptor[13,14]. Besides the luminal classification, the Ki67 immunoreactivity pattern of breast cancers is used to assess the degree of invasiveness and to some extent is a measure of disease progression and survival rate during treatment. The treatment of breast cancers is based on the disease subtype, while ER/PR positive breast cancers usually respond well to hormonal therapies like tamoxifen or aromatase inhibitors[2], the more aggressive triple-negative cancers are the most difficult to manage using. Despite the progress in diagnosis and the multidisciplinary approach to the treatment of breast cancer, the incidence continues to increase globally[11]. This calls for continued study on the pattern of presentation and characterization with a view to improved and more targeted therapeutic methods, and predictive and prognostic indicators. This current study, therefore, aimed to characterize breast cancers in a tertiary healthcare facility, correlating the hormonal immunoreactivity pattern with ki67 expression. The overall prevalence and burden of breast cancer will be elucidated.

MATERIALS AND METHOD

Study area/ Study design

A retrospective cross-sectional study was undertaken using archived breast tissue samples collected from a tertiary healthcare institution in South East Nigeria from 2010 to 2015. Ethical approval to conduct this study was granted by the Ethics Committee of Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi (NAUTH/CS/66/VOL9/VER.3/48/2016/69).

Sample collection

Two hundred (200) archived formalin, paraffin wax processed breast cancer tissue samples were retrieved, sorted and selected from the histopathology Laboratory of

Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi. Patients' socio-demographic and clinical data were retrieved from the daily surgical register, patients' folders and histopathology reports of the patients.

Sample preparation

Retrieved tissue blocks were re-embedded in fresh paraffin wax and 4µ thick serial sections were cut with a rotary microtome (HM340E Thermo Scientific. Massachusetts, United States of America). Six (6) cut sections were floated out on a lukewarm Leica water bath, mounted on charged slides, drained, labelled and placed on a hot plate to dry and affix the tissue onto the slides, before staining.

Staining

Cut Sections were stained by the Haematoxylin and Eosin (H&E) method to determine cancer morphological subtype and grade and immunohistochemistry, using monoclonal anti ER, PR, HER2 and ki67 to determine ER, PR, HER2 and ki67status of each sample.

Immunohistochemical Staining (IHC)

IHC staining of test and control slides was carried out using the method described by Dabbs and Thompson[15]. Sample slides were treated in two changes of xylene to remove wax, passed through ascending grades of ethyl alcohol (70%, 90% and absolute) for 60 seconds in each bath and hydrated by immersion in water. Antigen retrieval was performed using the heat method, using a pressure cooker. Tissue sections, on slides, were encircled with solution from a hydrophobic pen and the slides were arranged in a humidity chamber for staining, to prevent drying.

Peroxidase and protein blocking were performed by covering sections with drops of commercially supplied peroxidase and protein block reagents for 10 minutes each and washed in two changes of PBS buffer after each treatment. Subsequently, monoclonal antibodies to ER, PR, HER2 and ki67(1:100 serial dilution) were applied onto sections and were incubated for 1 hour at room temperature. A secondary antibody was afterwards applied and allowed also to incubate for 1 hour. Exposed Mouse and Rabbit Specific horseradish peroxidase/diaminobenzidine (HRP/DAB) detection IHC kit was added and incubated for 15 minutes at room temperature before 4 times in buffer. Detection of immunoreactivity was enabled by the application of DAB/Substrate to the tissue which was incubated for 7 minutes and rinsed 4 times in PBS buffer. IHC-stained slides were counter-stained with haematoxylin. hydrated, cleared and mounted in DPX.

Tumour grading

Tumour grading was done using the Nottingham combined histological grading system (Elston–Ellis modification of the Scarff–Bloom–Richardson grading system)[16]. The tumour grades were determined by assessing three morphological features. These were the amount of tubule formation, the extent of nuclear pleomorphism, and the mitotic activity (count). Each feature was given a score of 1, 2, or 3, and the scores were added to get a combined score. For instance, a combined score of 3–5 points was reported as grade 1, a combined score of 6–7 points was reported as grade 2, whereas a combined score of 8–9 points was recorded as grade 3.

Immunoreactivity Scoring

Modified Allred semi-quantitative scoring method[17] was used to score immunoreactivity of ER, PR and Her2

expression, while ki67 immunoreactivity was scored according to St. Gallen's 2013 recommendation as reported by Abubakar *et al*[18]. The modified Allred score was based on the percentage of cells (area) that stained positively and the intensity of the staining (strong, moderate, weak and negative). A score of 4 was assigned to 67 to 100% of either or both epithelial or stromal cells that stained positive with strong intensity, 3 was assigned to 34 to 66% of epithelial cells and/ stromal cells with strong intensity, 2 was assigned to 11 to 33% of either or both epithelial or stromal cells with strong intensity, 1 was assigned to 5 to 10% of cells that stained positive with strong intensity and 0 was assigned to 0 to 5% of cells that stained positive. Similarly, St. Gallen scoring was carried out by counting at least 100 cells (excluding mitotic cells) and the percentage of stained cells in the nucleus was determined. Hence, Score 4 was assigned to $\geq$ 26% positive staining, 3 was assigned to 19 to 25%, 2, to 10-18 while 0 to 9% immunopositivity was assigned score 1.

Data Analysis

Data obtained were summarized and presented in frequencies and percentages.

RESULTS

A cross-tabulation of the nature of the specimen revealed that breast tissue samples were the highest accounting for 48.9% (85) of the total sample while Fungating tissue breast (1) was the least sample with 0.6% occurrence. Age at presentation ranges from 23 to 86 years, with 55 years as the modal age, while grade 3 tumours made the highest occurrence (Table 1 and 2).

ER, immunoreactivity for invasive ductal carcinoma showed 10.8% negative reaction and 89.2% positive reactivity, PR was 30.3% negative and 69.7% positive while Her-2 and ki67 expressed 75.9% and 1.5% negative reactions and 24.1% and 98.5% positive reactivity respectively. Her-2 negative expression were more prevalent amongst all cancer types whereas Ki-67 was expressed in almost all the cancers. ER-positive tumours were more prevalent with ER/PR positivity trailing behind (Table 3).

Plate 1 is a photomicrograph of H&E-stained breast cancer types: Slides A and B are lobular carcinoma X400 and X100, a special subtype of invasive breast carcinoma characterized by discohesive tumour cells arranged in single files as individual single cells. Slide C shows invasive ductal carcinoma X10, invasion through the basement membrane of a breast duct. D is intraductal carcinoma showing a prominent arborescent, fibrovascular core lined by a double layer of epithelial cells which is at least focally present in all papillomas, with a prominent collagenous or spindle myoepithelial component.

Plate 2 is a photomicrograph of ER-positive stained breast cancer sections: Slide A depicts strong staining for estrogen receptors (ER) in breast cancer tissue in nuclei and cytoplasm ((X400), score 4 as the control); B is score 2 weakly positive staining for ER, C is Score 3 represents moderately positive for estrogen receptors while D is score 4 representing strongly positive immunostaining for estrogen.

Plate 3 is a photomicrograph of PR-positive stained breast cancer sections: Slide A depicts strongly reactive progesterone receptors (PR) breast cancer tissue in nuclei and cytoplasm X40, with score 4 as the control. B=score3 depicts moderately positive for PR, C= Score 2 represents weak staining for Progesterone receptors and D= score 1 represents Negative staining for progesterone receptors respectively.

The plate is a photomicrograph of a breast cancer section with HER-2 positive staining in which, Slide A, B, C, and D are good representative examples of Human epidermal growth factor 2 (HER-2) immunohistochemistry (IHC) in breast cancer, A, and B uniform intense membrane staining of >30% invasive tumour cells represents HER2 IHC positive(3+ve). While C and D show complete membrane staining that is either non-uniform or weak in intensity but with obvious circumferential distribution at least 10% of cells represent HER2 IHC equivocal (2+ve). Less than 10%, weak incomplete membrane staining in any portion of tumour cells, weak, complete membrane staining in less than 10% of tumour cells or no staining observed, where incomplete membrane staining is faint or barely perceptible and within less or equal to 10% of the invasive tumour cells represents HER2 IHC (0-1 -VE) negative respectively.

Plate Shows the breast cancer section with Ki67 positive staining in which Slide A= score 4 depicts three giant oval-shaped (arrow) signifies very active mitotic cells, as control (Lymph node), Slide B shows a breast cancer stained with Ki67 in which less than 18% of the tumour cells were stained (Score 2), Slide C shows a breast cancer stained with Ki67 in which less than 25% of the tumour cells were stained brown (Score 3) and slide D = Score 4 depicts a breast cancer stained with Ki67 in which more than 25% of the tumour cells were stained brown and intense respectively.

Table 1 Cross-tabulation between the nature of the specimen, patient age and morphology grading

Nature of specimen	Tumour Grade	Age (Years)					Total (%)
		20-30 years	31-40 years	41-50 years	51-60 years	61 years & above	(100%)
Breast tissue (85)	Grade 1 tumour (score 3-5)	2 (11.8)	3 (17.6)	6(35.3)	4(23.5)	2 (11.8)	17(20)
	Grade 2 tumour (score 6-7)	5 (16.7)	6 (20.0)	8(26.7)	4(13.3)	7 (23.3)	30(35.3)
	Grade 3 tumour (score 8-9)	4 (10.5)	19(50.0)	8(21.1)	3 (7.9)	4 (10.5)	38 (44.7)
Mastectomy (48)	Grade 1 tumour (score 3-5)	0	0	1(33.3)	2(66.7)	0	3 (6.3)
	Grade 2 tumour (score 6-7)	1 (5.9)	2 (11.8)	4(23.5)	9(52.9)	1 (5.9)	17 (35.4)
	Grade 3 tumour (score 8-9)	0	3 (10.7)	8(28.6)	11(39.3)	6 (21.4)	28 (58.3)
Breast lump (10)	Grade 1 tumour (score 3-5)	0	0	0 (100)	1 (66.7)	0	1 (10.0)
	Grade 2 tumour (score 6-7)	0	1 (33.3)	2(66.7)	0	0	3 (30.0)
	Grade 3 tumour (score 8-9)	1 (16.7)	2 (33.3)	1(16.7)	1 (16.7)	1 (16.7)	6 (60.0)
Lumpectomy (3)	Grade 1 tumour (score 3-5)	0	0	1(50.0)	0	1 (50.0)	2 (66.7)
	Grade 3 tumour (score 8-9)	0	0	1 (100)	0	0	1 (33.3)
Fungating tissue breast (1)	Grade 3 tumour (score 8-9)	0	0	0	1 (100)	0	1 (100)
Breast biopsy (5)	Grade 1 tumour (score 3-5)	0	0	1 (100)	0	0	1 (20)
	Grade 2 tumour (score 6-7)	0	1 (100)	0	0	0	1 (20)
	Grade 3 tumour (score 8-9)	1 (33.3)	0	1(33.3)		1 (33.3)	3 (60)
Bilateral breast tissue (5)	Grade 1 tumour (score 3-5)	0	0	0	0	1 (100)	1 (20)
	Grade 2 tumour (score 6-7)	1 (100)	0	0	0	0	1 (20)
	Grade 3 tumour (score 8-9)	0	2 (66.7)	0	0	1 (33.3)	3 (60)
Breast lymph node (10)	Grade 2 tumour (score 6-7)	0	1 (20.0)	2(40.0)	1 (20.0)	1 (20.0)	5 (50)
	Grade 3 tumour (score 8-9)	0	2 (40.0)	1(20.0)	1 (20.0)	1 (20.0)	5 (50)
Breast-Trucut tissue (7)	Grade 1 tumour (score 3-5)	1 (100)	0	0	0	0	1 (14.3)
	Grade 2 tumour (score 6-7)	2 (50.0)	0	0	1 (25.0)	1 (25.0)	4 (57.1)
	Grade 3 tumour (score 8-9)	0	2 (66.7)	0	2(100.0)		2 (28.6)

Table 2: Distribution of tumour type and grades

Tumour types	Tumour Grades (Frequency (%))

	1	2	3
Invasive ductal carcinoma	18 (69.2)	47 (77.0)	64 (73.6)
Adenoid cystic carcinoma	0	0	1 (1.1)
Intraductal carcinoma	0	0	2 (0.1)
Infiltrating ductal carcinoma	8 (30.8)	12 (19.7)	17 (19.5)
Advanced metaplastic carcinoma	0	1 (1.6)	0
Ductal carcinoma	0	0	2 (2.3)
High-grade invasive ductal	0	1 (1.6)	1 (1.1)
Total	**26 (14.9%)**	**61 (35.1%)**	**87 (50.0%)**

Table 3: Distribution pattern of ER, PR, Her-2 and Ki-67Immunoreactivity amongst cancer types

Marker	Immunoreactivity Score	Breast cancer type						
		IDC	ACC	IC	INC	AMC	DC	HID
ER	Negative (score 1)	14(10.8%)	0	1(50%)	5(13.5%)	1(100%)	1(50%)	0
	Weakly Positive (score 2)	44(34.2%)	0	0	8(21.6%)	0	1(50%)	1(50%)
	Moderately positive score 3)	56(43.4%)	1(100%)	1(50%)	22(59.5%)	0	0	1(50%)
	Strongly positive(score 4)	15(11.6%)	0	0	2(5.4%)	0	0	0
PR	Negative (score 1)	39(30.3%)	0	1(50%)	8(21.6%)	1(100%)	1(50%)	0
	Weakly Positive (score 2)	67(51.9%)	0	1(50%)	20(54.1%)	0	0	2(100%)
	Moderately positive score 3)	19(14.7%)	1(100%)	0	9(24.3%)	0	1(50%)	0
	Strongly positive (score 4)	4(3.1%)	0	0	0	0	0	0
Her-2	Negative (score 1)	98(75.9%)	0	2(100%)	32(86.5%)	1(100%)	2(100%)	2(100%)
	Weakly Positive (score 2)	20(15.5%)	0	0	4(10.8%)	0	0	0
	Moderately positive (score 3)	5(3.9%)	1(100%)	0	1(2.7%)	0	0	0
	Strongly positive (score 4)	6(4.7%)	0	0	0	0	0	0
Ki67	Negative (score 1)	2(1.5%)	0	0	0	0	0	0
	Weakly Positive (score 2)	30(23.3%)	0	0	10(27%)	0	0	0
	Moderately positive (score 3)	50(38.8%)	1(10%)	0	20(54%)	0	1(50%)	1(50%)
	Strongly positive (score 4)	47(36.4%)	0	2(100%)	7(195)	1(100%)	1(50%)	1(50%)

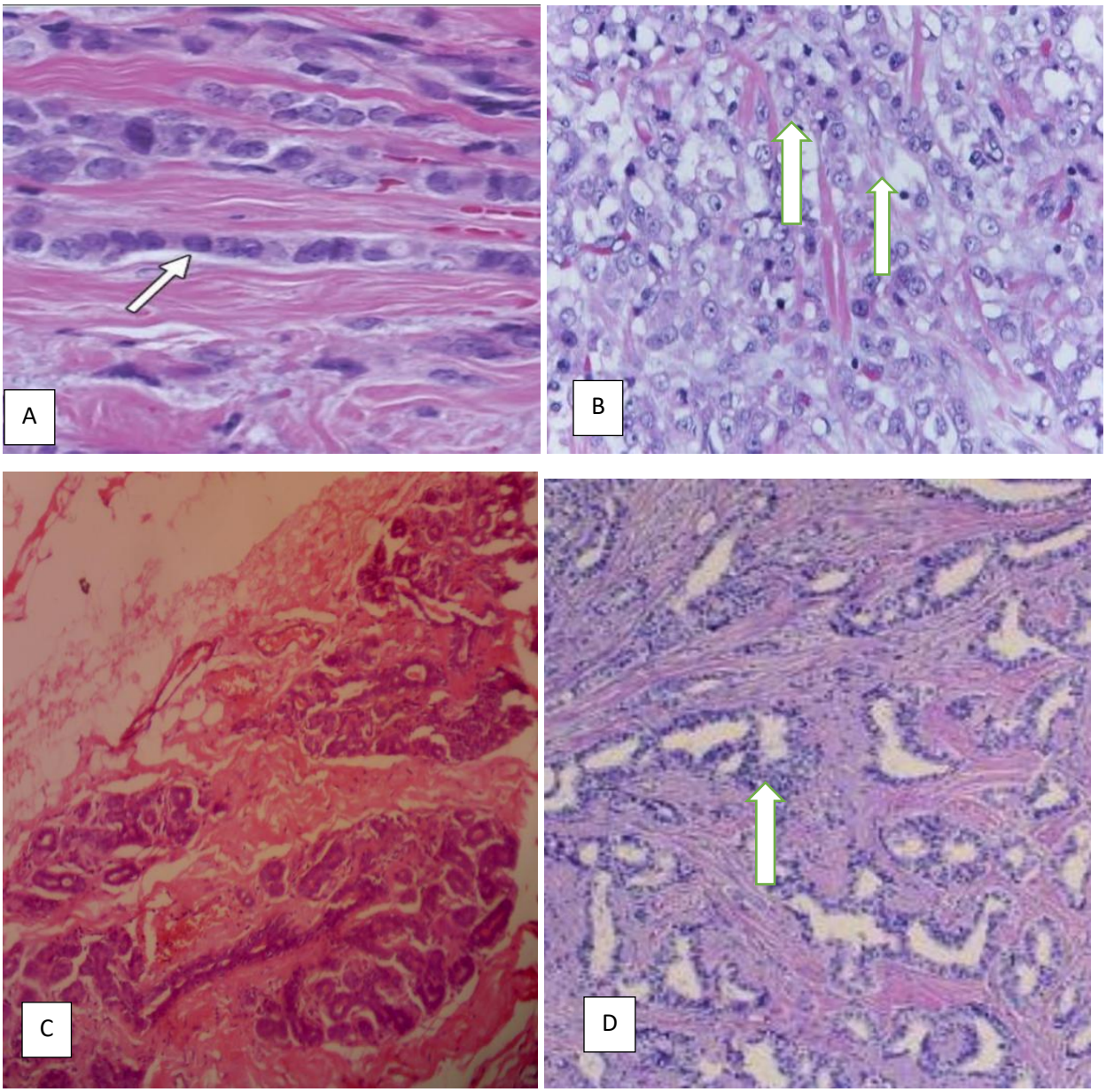

Plate 1: H&E Staining showing different breast cancer; Slide A and B lobular carcinoma X40(arrow) and X10, while Plates C invasive ductal carcinoma X10, Plate D intraductal carcinoma x10(arrow)

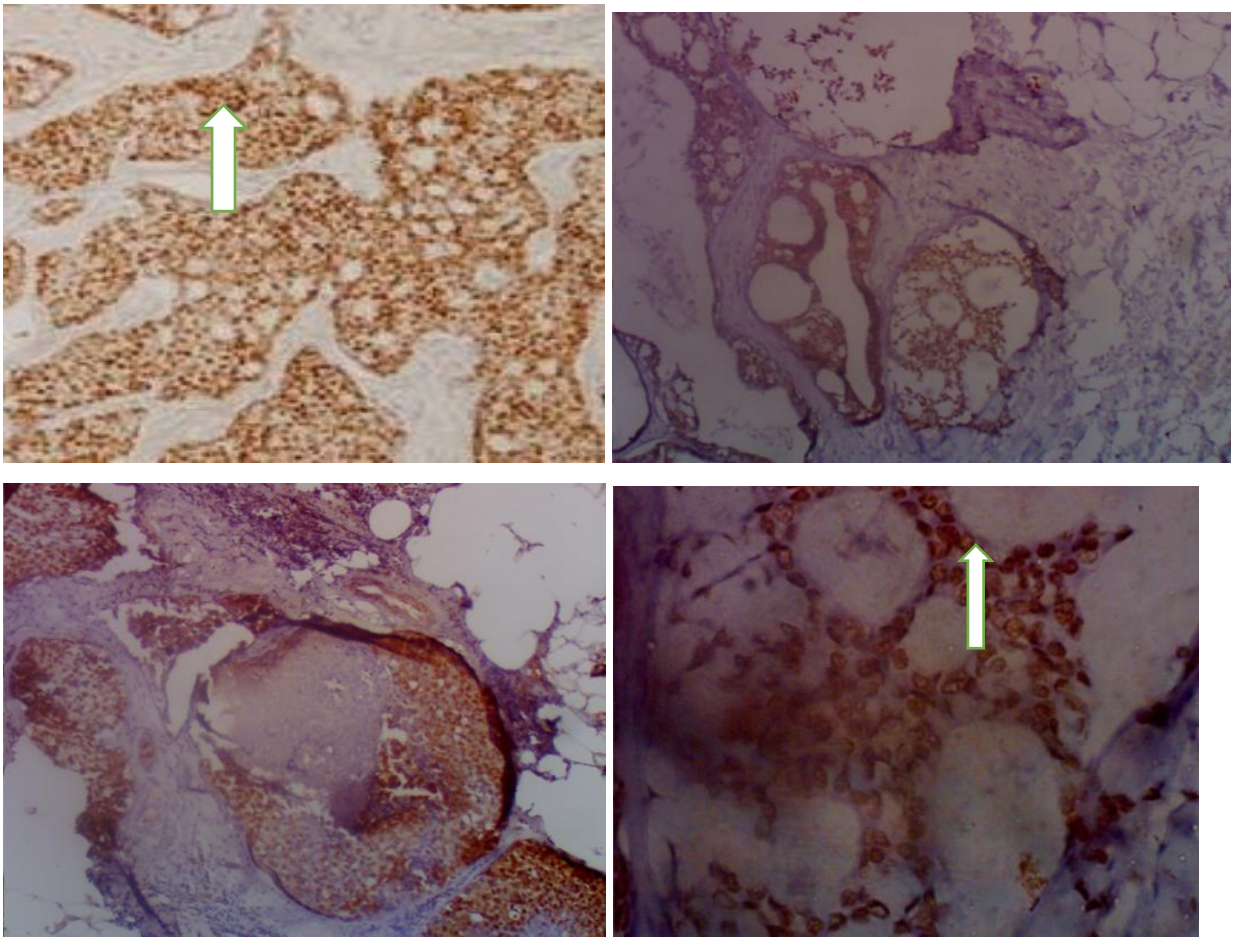

Plate2: .ER +VE staining of breast cancer for score 4 as the control, A, B = Score 1, C= score 2 and D= score 3 respectively.

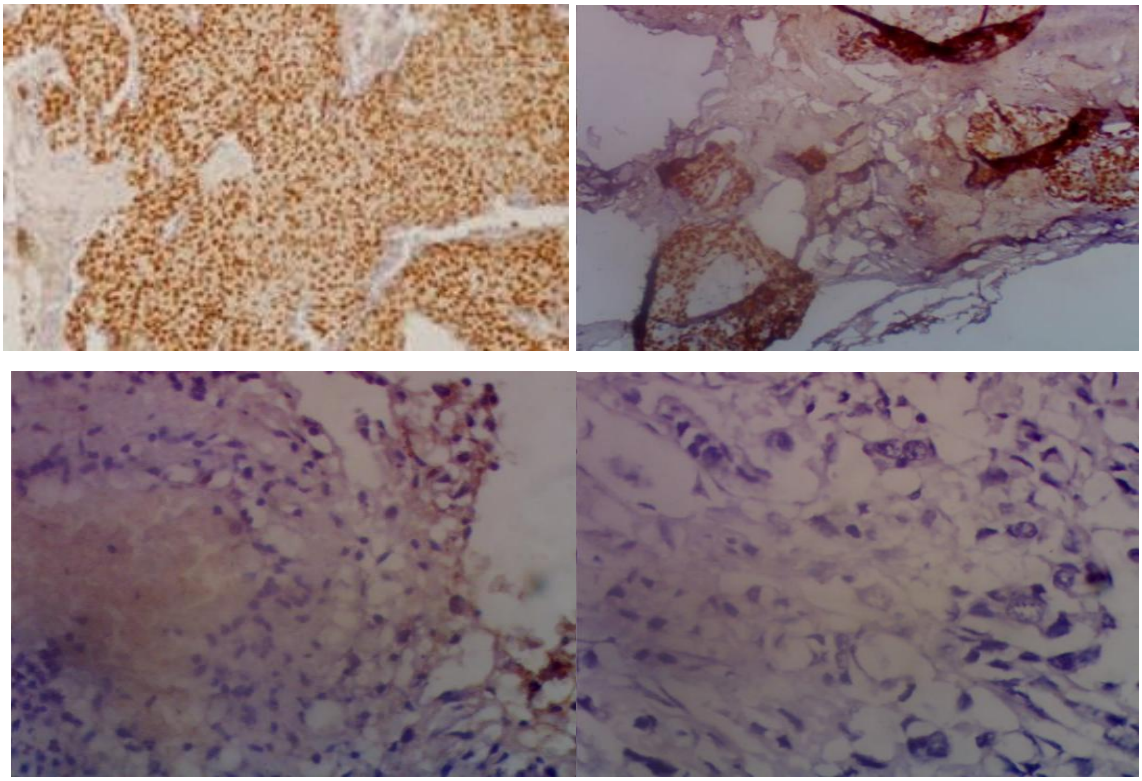

Plate 3: .PR +VE staining of breast cancer for score 4 as control, 2, 1 and 0 respectively.

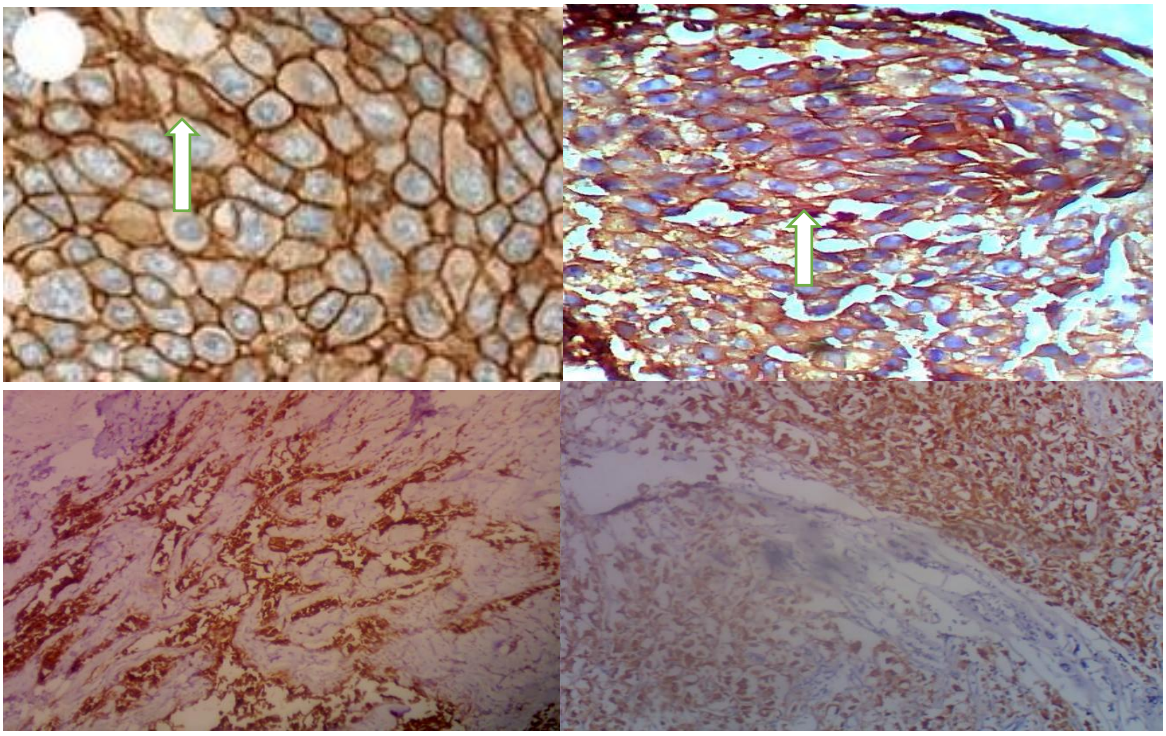

Plate 4: HER-2 +VE staining of breast cancer for score 4 as control, 4, 3 and 2 respectively.

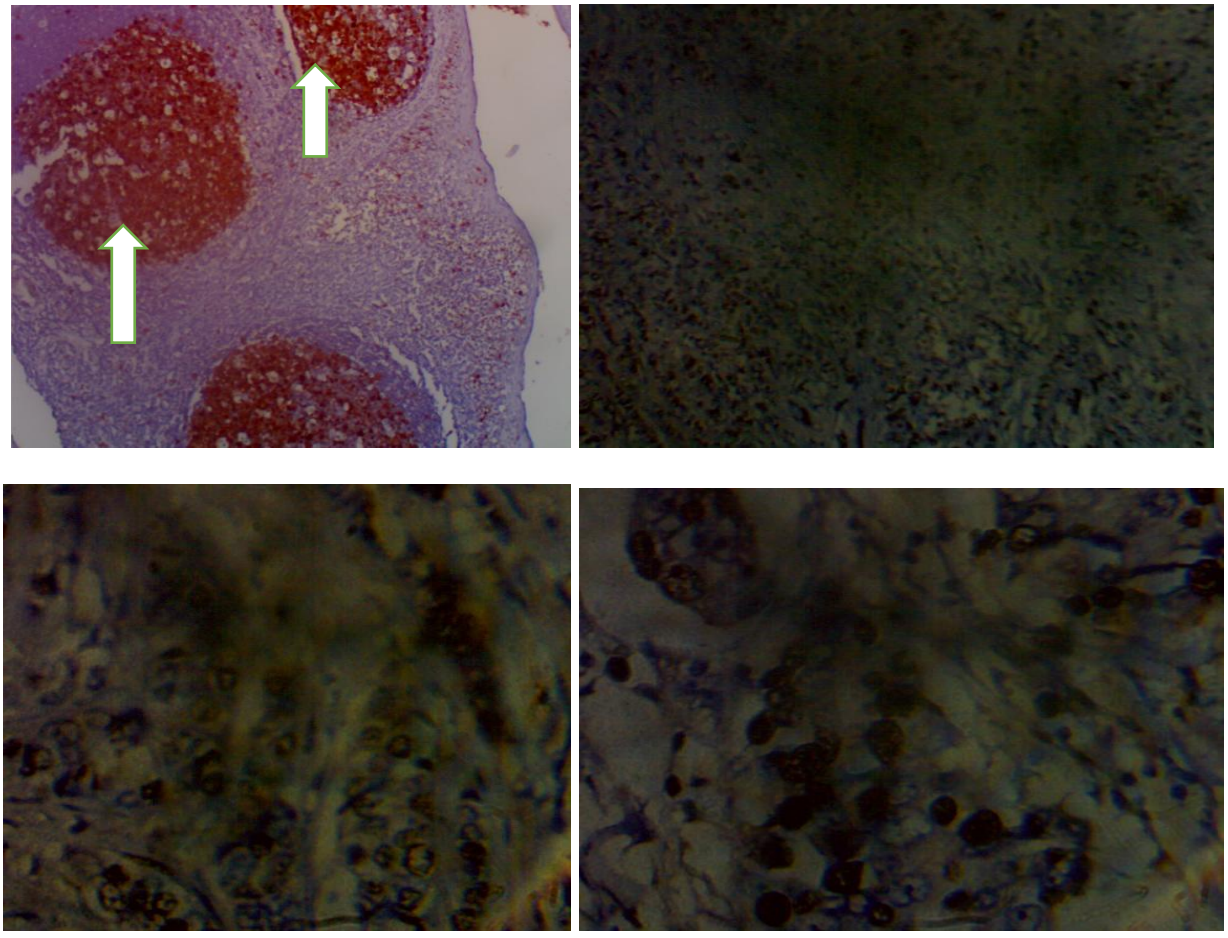

Plate 5: Ki67 +VE staining of breast cancer, Slide A score 4, as control (Lymph node), Slide B = Score 2, Slide C = Score 3 and Slide D = Score 4 respectively.

DISCUSSION

Out of 200 samples examined as histomorphological, 174 were malignant cases while 26 specimens were non-proliferative benign breast lesions. The current study reported that whereas breast tissue samples were the most frequent samples received, fungating breast tissue specimens had the least occurrence., with grade 3 tumours being the most prevalent. Whereas many recent studies seemed not to focus in those directions, it should be noted that much earlier studies by Forae *et al*[19] and Nwafor *et al*[20] corroborated partly with the current report. Most breast cancer patients within this clime visit the hospital only when the lump has been well developed. The presentation time for patients varies from 1week to 3 years. This study agreed

with the much earlier findings of Olajide *et al* [21] (2014) that the high level of breast cancer awareness and breast screening did not translate to early presentation of breast cancer at the clinic in Lagos; all patients on breast screening showed fear of breast loss and death from cancer. In addition, the belief of the patients that the disease is spiritual and amenable to miracle healing resulted in a fate outlook with many patients seeking alternative treatments presenting late at the clinic. This is similar to the belief of patients reported from Cameroun by Suh *et al*[22] with 50% of respondents believing that breast cancer can be cured by spiritual and alternative care.

The nature of the sample at presentation and the high prevalence of high-grade lesions may be predicated on late presentation by most patients when the tumour may have progressed to high grade. This invariable is tantamount to poor prognosis and reduced survival rate. This, therefore, underscores the importance of improved awareness and breast cancer campaigns and the need for renewed preventive strategies. Similarly, invasive ductal carcinoma was reported as the cancer type with the highest occurrence at 74.1%, while adenoid cystic carcinoma and advanced metaplastic carcinoma were the least, each having 0.6% occurrence. This agrees with an earlier reported 66.1-73% in other parts of Nigeria[20].

This study reported 89.2%, 69.3%, 24.1% and 98.5% immunoreactivity for ER, PR, Her-2 and ki-67 respectively in invasive ductal carcinoma. This not only agrees with earlier studies, [8,11] but is in tandem with much earlier reports[23,24]. Other cancer types, which were in the minority, in terms of occurrence, showed varied expression patterns. This has many implications. Whereas the reason for the expression pattern cannot be adduced by this study, this report further revealed that the trend in cancer heterogeneity regarding hormonal involvement has not changed. What seemed to have changed is the incidence and variability in terms of cancer types. Therefore, with improvement in presentation time, and a more strategic targeted therapy, effective management may be achieved. The long and continued practice of using the ki-67 expression pattern to estimate tumour invasiveness, cancer progression and response to treatment is not out of place. However, quantitation and involvement in tumour grading will not only make it more empirical but also a definite prognostic biomarker for breast cancers.

The study reported that the age range for cancer patients ranged from 20 to 86 years. Whereas this agrees with much earlier reports of Titiloye *et al*[13] and Omoniyi *et* al[14] who in their independent studies reported 22-82 years and 23-92 years respectively, it partly deviated from earlier studies, which reported that breast cancer is more prevalent within the third and eighth decades of life. The reported 55 years' mean age of patients is in line with many earlier studies, both in Nigeria and other countries around the globe. Daniyal *et al*[25] reported a mean age of 63 years among Germany; 50.73 years in china; 58.7 years in Finland while Tiltiloye *et al*[13] and Godwin *et al*[22] reported 50.7 years in Ife, south west Nigeria and 45.06 years in Calabar.

CONCLUSION

The distribution and hormonal expression pattern of breast cancer maintained the same trend despite all treatment strategies. Invasive ductal carcinoma and grade 3 lesions are the most prevalent while most cancers express ER, PR and ki-67. The mean age at presentation was 55 years, while the least age was 23 years old. Whereas the prognosis and treatment of breast cancer based on the age of the patient,

histological grade, tumour size, estrogen receptor value [ER], progesterone Receptor value[PR] and human epidermal growth factor receptor 2 [HER2] status should be sustained, campaign for breast cancer screening and prevention should also be intensified. Efforts in the area of personalized and a more targeted therapeutic approach may help in reducing the morbidity and mortality burden of breast cancer in Nigeria.

Competing Interest: The authors wish to declare no competing or conflicting interests.

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