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Tumor Discovery

ORIGINAL RESEARCH ARTICLE

Characterizing breast cancer in Myanmar: Insights from receptor status and tumor staging

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Abstract

Breast cancer is a significant global health challenge, with regional variations in its clinical and molecular characteristics. Understanding the interplay between tumor features and molecular subtypes in Myanmar is crucial for improving local breast cancer control strategies. This study investigates the relationship between tumor subtypes and tumor, node, and metastasis staging in a cohort of 184 biopsy-confirmed breast cancer patients diagnosed between January 2022 and December 2023. The mean age at diagnosis was 53 years, with 12% patients under 40. T2 was the most prevalent tumor stage, whereas N0 was the most common nodal status. M1 was identified in 22% of cases. Triple-negative breast cancer (TNBC) subtype showed significant associations with advanced T (p=0.002) and N (p=0.021) stages. In contrast, estrogen receptor-and progesterone receptor-positive tumors were more likely to be diagnosed at earlier stages (p<0.0001 and p=0.006, respectively). No statistically significant relationship was observed between receptor status and M stage or between human epidermal growth factor receptor 2 (HER2) status and component of tumor staging. These findings highlight the aggressive nature of TNBC and the more indolent course of hormone receptor–positive cancers within the studied population. The absence of a correlation between HER2 positivity and staging challenges existing global patterns and suggests population-specific dynamics that warrant further investigation. Overall, the study underscores the urgent need for improved early detection strategies and targeted therapies in Myanmar, particularly for patients with TNBC and those at risk of advanced-stage presentation.

Keywords: Breast cancer; Myanmar; Receptor status; Tumor staging

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1. Introduction

Breast cancer remains a leading global cause of death, though outcomes differ markedly across regions. Developed nations benefit from early detection and advanced treatments, leading to improved survival rates. In contrast, low- and middle-income countries (LMICs) often face late diagnoses and limited access to care, resulting in poorer outcomes. A thorough epidemiological approach—including insights into molecular subtypes and staging—is essential for shaping effective and equitable global breast cancer control strategies.[1]

Breast cancer incidence rates vary worldwide. High-income regions such as North America, Western Europe, and Australia/New Zealand report higher rates, often due to reproductive trends, lifestyle choices, and established screening practices.[2] In contrast,

LMICs generally show lower incidence but significantly higher mortality, largely due to delayed diagnosis, limited treatment availability, and distinct tumor biology. These disparities highlight the need for equitable healthcare access and improved early detection strategies, particularly in LMICs, where later-stage presentations contribute heavily to preventable cancer deaths.[1,3]

1.1. Distribution by receptor status and significance

Breast cancer displays biological diversity, with subtypes defined by the presence or absence of estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2). These receptor statuses significantly influence prognosis, recurrence risk, and therapeutic approaches. Understanding molecular classification is essential for personalized treatment strategies and optimizing breast cancer outcomes across different disease presentations.[4]

1.1.1. Hormone receptor-positive (HR+/HER2+)

The HR+/HER2+ subtype makes up approximately 70% of all breast cancers and is often referred to as Luminal A or Luminal B subtypes.[5] These tumors generally exhibit less aggressive biology, slower proliferation rates, and a more favorable prognosis, especially when diagnosed at earlier stages. They are highly responsive to endocrine therapy, which has significantly improved survival outcomes. Recurrence, while possible, can occur many years after initial diagnosis.[6]

1.1.2. HER2-positive (HER2+)

The HER2+ subtype accounts for about 15–20% of cases and is characterized by overexpression or amplification of the *HER2* gene. Historically, these tumors were associated with a more aggressive clinical course, rapid progression, and poorer prognosis. However, the advent of HER2-targeted therapies (e.g., trastuzumab and pertuzumab) has revolutionized treatment, significantly improving disease-free and overall survival rates. Despite their efficacy, these therapies remain largely inaccessible in LMICs, contributing to global survival disparities.[7]

1.1.3. Triple-negative breast cancer (TNBC)

TNBC constitute 10–15% of all breast cancers and is defined by the absence of ER, PR, and HER2 expression. This subtype is known for its aggressive biology, high histological grade, rapid proliferation, and higher rates of early recurrence and metastasis.[8] It typically affects younger women and often presents with larger tumor sizes and greater lymph node involvement.[8,9] Due to the lack of targeted therapies like endocrine or HER2-directed treatments, chemotherapy remains the primary systemic treatment modality. Prognosis for TNBC is generally less favorable than for HR-positive subtypes, particularly in advanced cancer stages.[4,8]

1.2. TNM staging, survival, and recurrence patterns

Established by the American Joint Committee on Cancer (AJCC), the TNM staging system serves as the cornerstone for assessing breast cancer severity. This globally recognized framework categorizes the disease based on three parameters: Tumor size (T), lymph node involvement (N), and the presence of distant metastasis (M). Each component reflects disease progression and informs both prognosis and treatment planning.[10]

TNM staging is the most powerful prognostic factor in breast cancer, as survival rates drop notably with advancing stage. Lower stages (I and II) generally indicate localized or regional disease with excellent prognosis, while higher stages (III and IV) signify more advanced disease with poorer outcomes.[4,10] For instance, global 5-year relative survival rates exceed 99% for localized disease, are approximately 87% for regional, and drop to 32% for distant metastatic disease.[4] TNM staging also guides treatment decisions, with early stages often managed with surgery and radiation, and advanced stages requiring systemic therapies.[10]

Recurrence patterns in breast cancer are strongly influenced by molecular subtype. TNBC and HER2+ cancers—particularly before the advent of targeted therapies—tend to recur early, typically within the first 5 years of diagnosis. These recurrences frequently involve visceral organs, reflecting the aggressive nature of the disease.[4,8,11] In contrast, HR+ cancers are associated with a more favorable prognosis but may recur late, often beyond 5 years. These recurrences commonly involve the bone and are attributed to the long-term tumor dormancy or the emergence of endocrine resistance.[6,11]

Across all subtypes, tumor size at presentation and lymph node involvement are critical prognostic indicators for recurrence. Larger tumors and nodal spread substantially increase relapse risk. Recognizing these patterns is key for tailoring surveillance strategies, optimizing systemic therapy durations, and improving long-term outcomes—especially in settings with limited access to advanced treatments.[11]

1.3. Breast cancer epidemiology in Southeast Asia and Myanmar

Breast cancer is an escalating public health challenge in Southeast Asia, marked by considerable variation in incidence, mortality, and patient characteristics across the region. Contributing factors include rapid urbanization,

shifts toward Westernized lifestyles, and demographic changes.[12]

Patients in this region are frequently diagnosed at a younger age compared to their Western counterparts and often present with more advanced disease.[13,14] This trend contributes to higher mortality-to-incidence ratios in the region.[3,13] Studies reveal a wide range of stage IV presentations across various ethnic groups and countries, with some populations showing disproportionately high rates of metastatic disease at diagnosis. Several barriers—such as limited awareness, financial constraints, cultural beliefs, and restricted healthcare access—have been identified as contributors to delayed medical consultation and late-stage detection. Addressing these factors through targeted education, improved diagnostic infrastructure, and culturally sensitive outreach is essential for reversing current trends and achieving health equity.[14,15]

While ER+ or PR+ subtypes remain predominant, some studies suggest that Southeast Asian populations—especially younger women—exhibit a relatively higher prevalence of aggressive subtypes, such as TNBC and HER2+ disease, compared to Western counterparts.[16,17] This distribution may partially explain the region's more aggressive clinical presentations and poorer prognoses, underscoring the need for tailored screening, earlier diagnosis, and broader access to targeted therapies across diverse healthcare settings.

Despite regional variations, breast cancer prognostic patterns in Southeast Asia largely mirror global trends. ER/PR+ cancers generally demonstrate more favorable survival outcomes, while TNBC and HER2+ subtypes—especially when untreated with targeted therapies—are linked to poorer prognoses.[15,16] However, survival rates are heavily influenced by disparities in diagnostic and treatment capabilities. Limited availability of advanced imaging, biomarker testing, and comprehensive cancer care in many Southeast Asian countries continues to hinder patient outcomes, reinforcing the need for equitable healthcare infrastructure and improved access to precision therapies.[13,14]

1.3.1. Breast cancer epidemiology in Myanmar

In Myanmar, a Southeast Asia country classified as an LMIC, breast cancer presents a formidable public health challenge. The available literature, while not extensive, consistently points to a concerning epidemiological profile.

Breast cancer is a leading cause of cancer-related mortality among women in Myanmar.[1] The high prevalence of late-stage detection severely limits treatment options and directly contributes to elevated mortality rates.[18,19] Barriers to early diagnosis—including low health literacy, cultural stigmas, financial hardship, and insufficient screening infrastructure—further exacerbate this issue.[19,20] Notably, women in Myanmar are often diagnosed at a younger age than their Western counterparts, reflecting a broader trend observed across many Asian populations.[18] These realities underscore the urgency of strengthening national cancer control efforts through expanded awareness, accessible diagnostic services, and improved pathways to care. Enhancing early detection and timely intervention is critical for reducing breast cancer mortality and improving long-term outcomes nationwide.

Studies from Myanmar reveal that breast cancers frequently present with relatively large tumor sizes, high histological grade, and regional lymph node involvement at diagnosis—markers of advanced disease. Although receptor status distribution generally mirrors global trends, with HR+ subtypes being most prevalent, a substantial proportion of aggressive types such as TNBC and HER2+ tumors has also been reported. These subtypes are associated with poorer prognoses and often display high Ki-67 expression, indicative of increased tumor proliferation.[18]

Breast cancer survival rates in Myanmar remain significantly lower than those in high-income countries. This disparity is largely attributed to a high rate of late-stage diagnosis and limited access to comprehensive care. Many patients present with advanced disease, including distant metastasis, at their initial visit. Even less aggressive subtypes may lose curative potential due to delays in detection and treatment initiation. The systemic obstacles, ranging from limited diagnostic infrastructure to socioeconomic barriers, compound the problem, leading to higher mortality and compromising long-term outcomes.[13,15,17,19]

Although detailed data on recurrence patterns in Myanmar remain scarce, the advanced disease stage at presentation indicates a substantial risk of relapse, especially when early and targeted therapies are unavailable. On a global scale, receptor status and TNM staging are recognized as key determinants in guiding therapy and predicting prognosis. While these benchmarks hold true across regions, Southeast Asia faces distinct challenges such as younger age at diagnosis, higher stage at presentation, and inequitable healthcare access—factors that demand region-specific investigation.

In the Myanmar context, understanding these distinct patterns is essential for informing national cancer control policies. Our study aims to strengthen epidemiological insight and advocate for improved screening, early intervention strategies, and tailored public health initiatives to address the country's breast cancer burden more effectively.

2. Methods

2.1. Study design and setting

This analytic retrospective cross-sectional study was conducted at the Karuna Compassionate Care Center—a private oncology center in Yangon, Myanmar. The study encompassed all eligible patients registered between January 2022 and December 2023. The study protocol was approved by the Institutional Review Board of the respective institution.

2.2. Study population and eligibility

The study included all adult female patients with biopsy-confirmed breast cancer and complete medical records available for review during the study period. A total of 204 patients were initially identified. Patients were excluded if they were younger than 18 years at the time of diagnosis, had recurrent disease, or had inaccessible medical records. Following these exclusions, 184 patients met the inclusion criteria and were included in the final analysis.

2.3. Data collection

Data of the eligible patients were retrospectively extracted from existing medical records maintained at the Karuna Oncology Center. A standardized data collection form was used to ensure consistency. The collected data included: (1) demographic information (age at diagnosis); (2) receptor statuses: ER, PR, HER2, and TNBC status, determined by immunohistochemistry (IHC) and/or fluorescence *in situ* hybridization (FISH) for HER2, based on initial biopsy reports or surgical pathology reports; and (3) tumor characteristics at diagnosis: Classified based on TNM system established by the AJCC. These staging parameters were assessed based on available clinical data, pathology reports, and radiological findings at the time of diagnosis.

2.4. Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences software, version 16.0. Categorical variables were summarized using frequencies and percentages, while continuous variables were described using means and standard deviations. Associations between categorical variables—such as subtype distribution relative to stage at diagnosis or lymph node involvement—were assessed using the Chi-square test. In cases where expected cell counts were fewer than five, Fisher's exact test was employed. Statistical significance was defined as a $p<0.05$.

3. Results

A total of 184 patients were included in the study. The mean age of the cohort was 53 years, with 12% of patients under 40 years of age and 88% aged 40 years or older. Regarding tumor size, the most common presentation was T2 (50%), followed by T3 (20%). The majority of patients presented with no regional lymph node involvement (N0, 29.3%) and without metastasis (M0, 77.2%). Detailed patient characteristics are presented in Table 1. The distributions of T, N, and M stages are shown in Figures 1-3, respectively. The distribution of receptor status (expressed in percentages) is presented in Figure 4. Associations between tumor characteristics (T stage, N stage, M stage) and receptor status (TNBC, ER, PR, and HER2) were analyzed, with the findings summarized in Tables 2-5.

3.1. TNBC cases

TNBC was significantly associated with more advanced T stages (T3-T4, $p=0.002$), indicating that these tumors are more likely to present as larger masses. TNBC was also

Table 1. Background characteristics of breast cancer patients ($n=184$)

Characteristics	Subcategories	Count (%)
Age (mean: 53 years)	≤40 years	22 (12)
	>40 years	162 (88)
ER	Positive	78 (42.4)
	Negative	106 (57.6)
PR	Positive	66 (35.9)
	Negative	118 (64.1)
HER2	Positive	40 (21.7)
	Not positive	143 (77.8)
	Missing data	1 (0.5)
TNBC	Yes	78 (42.4)
	No	105 (57.1)
	Missing data	1 (0.5)
T stage	T1	22 (12)
	T2	98 (53)
	T3 1	38 (21)
	T4	26 (14)
N stage	N0	54 (29.3)
	N1	48 (26.1)
	N2	36 (19.6)
	N3	26 (14.1)
	Nx (unknown)	20 (10.9)
M stage	M0	142 (77.2)
	M1	40 (21.7)
	Mx (unknown)	2 (1.2)

Abbreviations: ER: Estrogen receptor; HER2: Human epidermal growth factor receptor 2; M: Metastasis; N: Node; PR: Progesterone receptor; T: Tumor; TNBC: Triple-negative breast cancer.

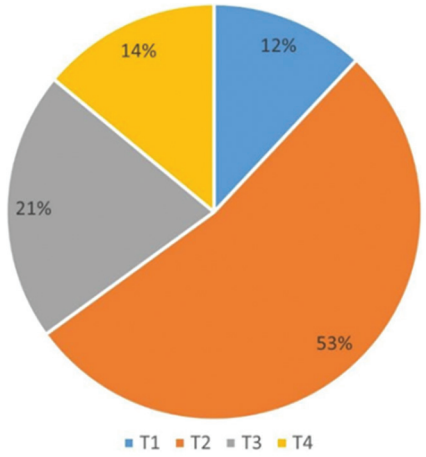


Figure 1. The distribution of T stage among breast cancer patients (*n*=184)

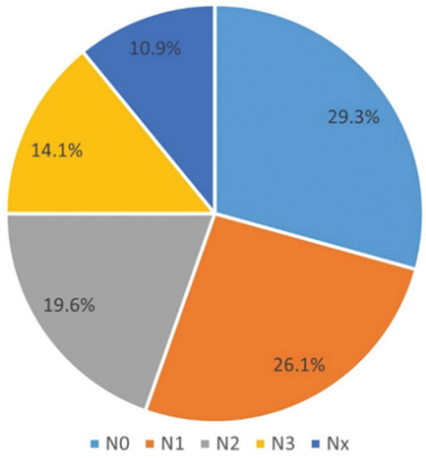


Figure 2. The distribution of N stage among breast cancer patients (*n*=184)

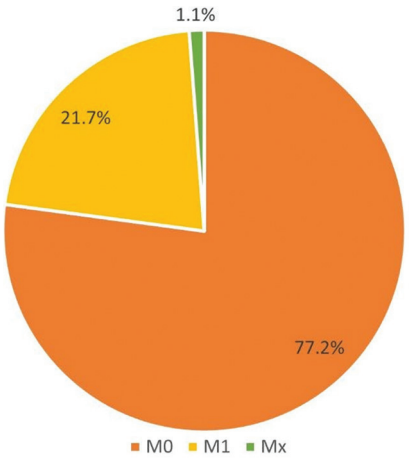


Figure 3. The distribution of M stage among breast cancer patients (*n*=184)

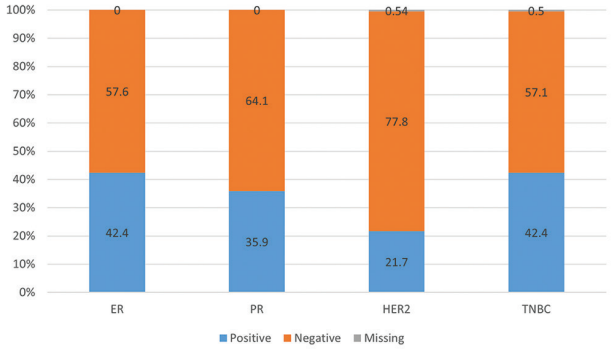


Figure 4. Distribution of receptor status among breast cancer patients (*n*=184)
Abbreviations: ER: Estrogen receptor; HER2: Human epidermal growth factor receptor 2; PR: Progesterone receptor; TNBC: Triple-negative breast cancer.

Table 2. Association between TNBC status and TNM staging at diagnosis

Stage	TNBC	Not TNBC	*p*-value
T1-2	40	79	0.002
T3-4	38	26	
N0	16	38	0.021
N1-3	55	55	
M0	58	84	0.239
M1	20	19	

Abbreviations: M: Metastasis; N: Node; T: Tumor; TNBC: Triple-negative breast cancer.

Table 3. Association between ER status and TNM staging at diagnosis

Stage	ER positive	ER negative	*p*-value
T1-2	64	56	<0.0001
T3-4	16	48	
N0	28	26	0.111
N1-3	50	60	
M0	62	80	0.157
M1	14	26	

Abbreviations: ER: Estrogen receptor; M: Metastasis; N: Node; T: Tumor.

significantly associated with higher lymph node involvement (p=0.021). No significant association was found between TNBC and M stage (p>0.05), suggesting that TNBC does not appear to significantly affect the presence of distant metastases at the time of initial diagnosis in this cohort.

3.2. ER status

ER+ tumors were significantly associated with earlier T stages (T1-T2, p<0.0001), suggesting detection at smaller

Table 4. Association between PR status and TNM staging at diagnosis

Stage	PR positive	PR negative	*p*-value
T1-2	52	68	<0.006
T3-4	16	48	
N0	24	30	0.177
N1-3	42	86	
M0	52	90	0.122
M1	12	28	

Abbreviations: M: Metastasis; N: Node; PR: Progesterone receptor; T: Tumor.

Table 5. Association between HER2 status and TNM staging at diagnosis

Stage	HER2 positive	HER2 negative	*p*-value
T1-2	26	94	0.137
T3-4	14	46	
N0	16	38	0.12
N1-3	22	104	
M0	32	110	0.096
M1	8	30	

Abbreviations: HER2: Human epidermal growth factor receptor 2; M: Metastasis; N: Node; T: Tumor.

tumor sizes. No significant associations were found between ER status and either lymph node involvement or metastatic involvement, indicating similar patterns of spread at diagnosis regardless of ER expression.

3.3. PR status

PR+ tumors were significantly more likely to present at earlier T stages (T1-T2, $p<0.006$). No significant associations were found between PR status and nodal or metastatic involvement.

3.4. HER2 status

No significant associations were found between HER2 status and T, N, or M stages. This suggests that HER2 positivity may not be a determining factor in the initial tumor size, nodal involvement, or presence of metastases in this cohort.

4. Discussion

This study provides valuable insights into the clinicopathological profile of breast cancer patients in Myanmar, with a particular focus on the relationship between receptor status and tumor staging at diagnosis. The age distribution of the cohort closely mirrors patterns reported across Southeast Asia countries, reinforcing the trend of earlier disease onset in Asian populations compared to Western cohorts.[12,17,18,21,22]

Tumor staging in this study also aligns with the regional patterns characterized by delayed presentation. Notably, the proportion of patients presenting with metastatic disease (M1 stage) was slightly higher than in comparable Southeast Asian studies.[12,18,23,24] This elevated M1 rate may reflect referral bias inherent to single-center designs or broader systemic challenges, such as limited access to early detection and screening services. There were some staging limitations in the form of Nx and Mx classifications in the study. These limitations likely stem from inadequate axillary sampling, restricted access to positron emission tomography-computed tomography (PET-CT) or full-body imaging, and broader financial and infrastructure constraints. These challenges are consistent with findings in other studies conducted in Myanmar.[15,19,24]

These findings reveal a unique disease landscape that not only reflects local challenges but also allows meaningful comparison with regional and global epidemiologic data. The observed gaps, particularly in diagnostic completeness, highlight an urgent need to strengthen diagnostic pathways. Enhancing early detection and standardizing evaluation protocols can support more effective public health strategies and promote equitable, targeted approaches to breast cancer care.

Our research also revealed that TNBC was significantly associated with more advanced tumor (T2-T4) and nodal involvement (N stage) at diagnosis. This aligns with existing literature characterizing TNBC as an aggressive subtype associated with larger tumors and greater nodal burden at presentation, including in the Asian population.[25-28] This rapid clinical progression, typical of TNBC, likely contributes to later-stage detection.

Interestingly, we found no significant association between TNBC and distant metastatic status (M stage) at initial diagnosis. While some global cohorts report higher initial metastatic rates for TNBC, others—similar to our findings—did not demonstrate a significant difference.[5,9] This suggests that although TNBC may progress rapidly at the local level, distant metastasis may not be disproportionately higher at the very first diagnosis in this specific cohort, potentially reflecting the timing of diagnosis.

Several factors may explain this finding. Two cases of missing data (HER2 and TNBC status) in our cohort, due to patients' inability to afford testing, may have led to underclassification of TNBC and an underestimation of its true metastatic burden. In addition, limitations in imaging capacity may have resulted in under-detection of distant

metastases—particularly in asymptomatic patients. In settings where PET-CT, bone scans, or other staging tools are not routinely available, subtle metastatic disease may remain undiagnosed.[15]

Moreover, the biological heterogeneity of TNBC could play a role. Emerging evidence suggests that certain TNBC subtypes—such as immunomodulatory or luminal androgen receptor variants—may exhibit less aggressive metastatic behavior compared to basal-like or mesenchymal subtypes. Without molecular subtyping, these distinctions remain obscured in population-level analyses.[29-31] This underscores the urgent need to invest in reliable diagnostic tools, expand access to affordable molecular testing, and standardize staging protocols to enable accurate detection and personalized breast cancer care in Myanmar.

Our finding that ER+ and PR+ tumors were significantly associated with earlier T stages is consistent with global breast cancer literature.[5,6,8] HR+ tumors are widely recognized to follow a more indolent clinical course.[32] The absence of significant associations between ER/PR status and N or M stages further supports their slower progression, reinforcing their generally more favorable initial prognosis compared to more aggressive subtypes.

In contrast, no significant relationship was found between HER2 status and any staging parameters (T, N, or M) at diagnosis. This finding is particularly noteworthy given that HER2+ breast cancer is typically regarded as an aggressive subtype globally and associated with rapid progression and advanced staging at presentation.

Several potential explanations may explain this discrepancy in the Myanmar population. Delayed symptom recognition, limited screening programs, and barriers to healthcare access may contribute to uniformly late-stage presentation across subtypes, masking the expected differences in staging distribution.[15] Furthermore, unique environmental and genetic factors—including dietary patterns, hormonal influences, and local carcinogenic exposures—may modulate tumor behavior in ways that reduce HER2-driven aggressiveness. These population-specific dynamics warrant deeper exploration.[33]

Importantly, diagnostic limitations play a critical role. In Myanmar, HER2 status is primarily assessed through IHC. However, equivocal IHC results (score 2+) require confirmation via FISH, a test that remains largely inaccessible due to cost and infrastructure constraints. This lack of confirmatory testing may lead to misclassification and underestimation of true HER2+ cases.[17,21,33] In addition, a pioneering study conducted at Yangon General Hospital introduced serum HER2/neu enzyme-linked immunosorbent assay (ELISA) testing, reporting only 4.9% positivity among 61 patients. While innovative, this approach is not yet standardized and may not reliably reflect tissue-based HER2 expression.[17]

Our own cohort further underscores these challenges, with two cases of missing data for HER2 and TNBC status—both attributed to unaffordability of testing. Broader systemic data from Yangon General Hospital revealed that only 16.3% of breast cancer patients underwent ER, PR, and HER2 profiling, with 87.7% of untested cases citing financial barriers.[21] This highlights the broader need to strengthen diagnostic access and affordability, ensuring HER2 testing is both accurate and equitable across Myanmar's healthcare system.

5. Limitations and future direction

This study presents several notable limitations. As a retrospective, single-center analysis, its findings may not fully capture the diversity of Myanmar's broader breast cancer population. The relatively small sample size of 184 restricts the statistical power to detect subtle associations, particularly across molecular subtypes. Furthermore, the cross-sectional design inherently lacks long-term follow-up data, precluding an understanding of critical outcomes such as overall survival and disease-free survival, or how disease progresses over time. Selection bias is a further concern, as the study reflects a cohort of patients who were able to access care at one urban oncology clinic—potentially excluding representation from rural and underserved populations.

Another critical limitation is the accessibility and quality of HER2 testing within the studied population. HER2 status was missing in two cases due to unaffordability, reflecting a systemic issue in molecular profiling access. Emerging alternatives, such as serum HER2/neu ELISA, have shown promise in preliminary studies but lack standardization and are not yet part of routine care. These diagnostic challenges may contribute to the unexpected lack of association between HER2 status and disease staging observed in this study.[17,21]

To strengthen future research and address these gaps, several priorities are proposed. First, larger, multicenter studies encompassing diverse geographic and ethnic populations are essential for enhancing the generalizability of findings and gaining a more representative understanding of breast cancer patterns across the country. Such studies will also help identify regional disparities and tailor interventions accordingly.

Second, establishing longitudinal patient cohorts is critical. These cohorts should track individuals over time to examine key outcomes such as overall survival, recurrence

rates, and response to systemic therapies, especially in HER2+ patients. This approach would provide valuable insights into disease progression and treatment efficacy within real-world settings.

Third, strengthening diagnostic infrastructure is a cornerstone of improved care. Given the variability in HER2 testing quality and accessibility, ensuring reliable, confirmatory IHC and FISH testing is imperative. Furthermore, the integration of cost-effective alternatives, such as serum-based HER2 profiling, could expand access in resource-limited regions.

Fourth, there is an urgent need to investigate the biological, genetic, and environmental factors that may influence HER2 expression and its clinical behavior within Myanmar's population. This includes understanding potential ethnic or regional variations that could affect prognosis or response to targeted therapies.

Finally, research must explore the socioeconomic and systemic barriers that influence testing access and treatment availability. This involves examining the role of health literacy, economic constraints, and healthcare distribution in shaping patient outcomes. Insights from such research can inform equitable public health policies, ensuring that lifesaving diagnostics and therapies reach those in greatest need.

Collectively, these initiatives could refine the understanding of HER2+ breast cancer in Myanmar, improve diagnostic accuracy, and guide the development of personalized, accessible treatment protocols.

6. Conclusion

This study sheds light on breast cancer characteristics in Myanmar, confirming the aggressive nature of TNBC, which presents with larger tumors and greater nodal involvement. ER+/PR+ tumors, on the other hand, were typically found at earlier stages, aligning with their generally more favorable prognosis. Our findings on HER2+ cancers were unique, showing no significant association with tumor staging at diagnosis. Moving forward, larger, multicenter studies that track long-term outcomes and explore genetic and socioeconomic influences will be vital to inform more effective strategies for breast cancer care in the region.

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Conflict of interest

The authors declare that they have no competing interests.

Author contributions

Conceptualization: All authors
Formal analysis: All authors
Investigation: Shoon Mya Aye
Methodology: Shoon Mya Aye
Writing–original draft: Shoon Mya Aye
Writing–review & editing: Shoon Mya Aye

Ethics approval and consent to participate

This study was approved by the Institutional Review Board (IRB) of Karuna Compassionate Care Center (2020-0103). Given the retrospective nature of the study and the use of pre-existing, de-identified data, a waiver of informed consent was granted by the IRB.

Consent for publication

IRB granted a waiver of informed consent.

Availability of data

Data is available from the corresponding author upon reasonable request.

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