Section: Pharmacology

Original Research Article

HORMONE RECEPTOR STATUS AND DRUG-PRESCRIBING PATTERN IN BREAST CANCER PATIENTS AT A TERTIARY GOVERNMENT HOSPITAL IN SOUTH INDIA: A RETROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Hormone receptor and HER2 status determine the biological behaviour and treatment of breast cancer. Data on the distribution of receptor status and the corresponding prescribing pattern from government tertiary hospitals in India are limited. This study evaluated the hormone receptor status and drug-prescribing pattern across molecular subtypes of breast cancer at a government general hospital in South India.

Materials and Methods: This retrospective, single-centre, observational study reviewed the case records of 58 breast cancer patients admitted to the Department of Oncology, Government General Hospital, Vijayawada, between February 2022 and August 2024. Estrogen receptor (ER), progesterone receptor (PR) and HER2 status, molecular subtype, TNM stage and the class and agents of therapy were recorded. Data were summarised descriptively.

Results: The median age was 55 years (range 35–76); 55 patients (94.8%) were women and the remaining 3 patients (5.2%) were men. Hormone receptor (ER and/or PR)-positive disease was present in 23 patients (39.7%), HER2-positive in 13 (22.4%) and triple-negative in 13 (22.4%); receptor status was undetermined in 15 (25.9%). Molecular subtypes were luminal A 18 (31.0%), luminal B 5 (8.6%), HER2-enriched 7 (12.1%), triple-negative 13 (22.4%) and unknown 15 (25.9%). Most patients presented at an advanced stage (stage III 41.4%, stage IV 19.0%). Chemotherapy alone was the commonest regimen (53.4%), followed by endocrine therapy alone (17.2%). Prescribing tracked molecular subtype: all HER2-enriched tumours (7/7, 100%) received trastuzumab-based targeted therapy, 14/23 (60.9%) hormone receptor-positive tumours received endocrine (letrozole)-containing therapy, and 12/13 (92.3%) triple-negative tumours received chemotherapy alone.

Conclusion: Drug prescribing in breast cancer at this government tertiary hospital was largely determined by hormone receptor and HER2 status and was broadly concordant with subtype-directed guidelines. The high proportion of patients with undetermined receptor status and advanced-stage presentation highlights the need for universal receptor testing and earlier detection.

Keywords: Breast cancer; Hormone receptor status; Molecular subtype; Drug-prescribing pattern; Endocrine therapy; Trastuzumab; India.

INTRODUCTION

Breast cancer is the most commonly diagnosed malignancy among women worldwide. According to GLOBOCAN 2022 estimates, approximately 2.3 million women were newly diagnosed with breast cancer and 670,000 died from the disease globally.1 In India, breast cancer accounts for an estimated 13.5% of all cancer cases and 10.6% of all cancer-related deaths, and is the leading malignancy among Indian women.[1]

Within India, breast cancer has overtaken cervical cancer to become the most common cancer among women, and its incidence is rising, particularly in urban populations.[2,3] Data from the Indian Council of Medical Research (ICMR) National Cancer Registry Programme confirm that breast cancer is now the leading site of cancer among women in most Indian population-based registries.[4] Compared with Western populations, Indian women tend to be diagnosed about a decade younger, present more frequently with locally advanced or metastatic disease, and show a higher relative proportion of hormone receptor-negative and triple-negative tumours.[2,5] These epidemiological features carry direct implications for the choice, sequencing and intensity of systemic therapy in Indian patients.

The clinical behaviour and management of breast cancer are strongly determined by its molecular characteristics. Immunohistochemical (IHC) assessment of estrogen receptor (ER), progesterone receptor (PR) and human epidermal growth factor receptor-2 (HER2) is standard practice, as these biomarkers carry major prognostic and predictive value and directly guide the selection of endocrine, targeted and cytotoxic therapy.[6,7] On the basis of these receptors, tumours are grouped into intrinsic molecular subtypes—luminal A, luminal B, HER2-enriched and triple-negative—each with distinct outcomes and recommended treatment strategies.[8,9]

In resource-limited settings such as government tertiary hospitals in India, receptor testing may be incomplete and treatment decisions are made under constraints of cost and availability. Documenting the distribution of hormone receptor status and the corresponding drug-prescribing pattern in such settings is important for assessing the rationality of prescribing and for informing pharmacovigilance and resource planning. The present study was undertaken to evaluate the hormone receptor status and the drug-prescribing pattern across molecular subtypes in breast cancer patients admitted to a government general hospital in Vijayawada, Andhra Pradesh, South India.

MATERIALS AND METHODS

Study design and setting: This was a retrospective, observational, single-centre study conducted in the Department of Oncology, Government General Hospital (GGH), attached to Government Siddhartha Medical College, Vijayawada, Andhra Pradesh, India.

Ethical considerations: The study was approved by the Institutional Ethics Committee, Siddhartha Medical College & Government General Hospital (Reference No. IECSMCGGH/2024/AP/246; dated 25 September 2024). As the study involved retrospective, anonymised review of existing case records, the requirement for individual informed consent was waived by the committee. All data were de-identified before analysis and handled in accordance with the Declaration of Helsinki and the ICMR National Ethical Guidelines for Biomedical and Health Research (2017).

Participants: All patients diagnosed with breast cancer and admitted to the Department of Oncology between February 2022 and August 2024 were eligible for inclusion. Patients who did not receive any chemotherapy, hormonal therapy or targeted therapy were excluded. A total of 58 patients met the criteria and were included in the analysis [Figure 1].

Variables and data sources: Data were extracted from case record forms using a structured proforma. Variables collected included age, sex, laterality, month and year of admission, ER, PR and HER2 status, molecular subtype, tumour–node–metastasis (TNM) stage, and the class and specific agents of oncological therapy received. Receptor status was determined by immunohistochemistry as recorded in the histopathology reports. Molecular subtypes were classified from the recorded ER, PR and HER2 status; where receptor status was not available in the records, the subtype was categorised as "unknown/not assessed."

Statistical analysis: Data were compiled in Microsoft Excel and analysed using IBM SPSS Statistics. Categorical variables are summarised as frequencies and percentages, and the continuous variable (age) as median with interquartile range (IQR) and mean ± standard deviation (SD). In keeping with the descriptive objective of the study, no formal hypothesis testing was performed.

RESULTS

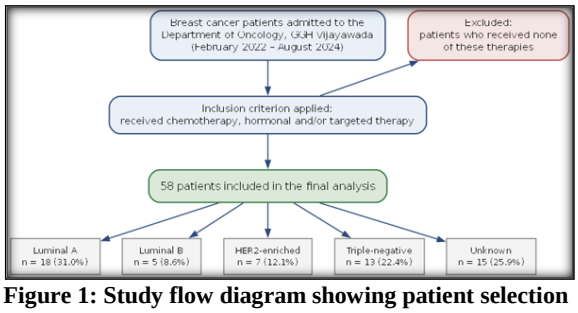

Figure 1: Study flow diagram showing patient selection and the molecular subtype distribution of the 58 included patients.

Demographic and clinical characteristics: Fifty-eight patients were included. The median age was 55 years (IQR 48–62; mean 54.6 ± 9.8; range 35–76).

The majority were women (55; 94.8%); three patients (5.2%) were men, aged 44, 72 and 74 years. The tumour was right-sided in 32 patients (55.2%), left-sided in 23 (39.7%) and bilateral in 3 (5.2%). Admissions were distributed across 2022 (n = 15), 2023 (n = 28) and 2024 (n = 15) [Table 1].

Table 1: Demographic and clinical characteristics of the study population (N = 58).

Characteristic	Category	n (%)
Age, years	Median (IQR)	55 (48–62)
	Mean ± SD	54.6 ± 9.8
	Range	35–76
Age group, years	< 40	3 (5.2)
	40–49	15 (25.9)
	50–59	20 (34.5)
	60–69	16 (27.6)
	≥ 70	4 (6.9)
Sex	Female	55 (94.8)
	Male	3 (5.2)
Laterality	Right	32 (55.2)
	Left	23 (39.7)
	Bilateral	3 (5.2)
Year of admission	2022	15 (25.9)
	2023	28 (48.3)
	2024	15 (25.9)

Note: IQR, interquartile range; SD, standard deviation. Admissions span February 2022 to August 2024.

Hormone receptor status and molecular subtypes: ER was positive in 23 patients (39.7%) and PR in 20 (34.5%); hormone receptor (ER and/or PR) positivity was present in 23 patients (39.7%). HER2 was positive in 13 patients (22.4%). Receptor status could not be ascertained from the records in 15 patients (25.9%). By molecular subtype, 18 tumours (31.0%) were luminal A, 5 (8.6%) luminal B, 7 (12.1%) HER2-enriched and 13 (22.4%) triple-negative; 15 (25.9%) were of unknown subtype [Table 2; Figure 2].

Table 2: Hormone receptor status and molecular subtype distribution (N = 58).

Parameter	Category	n (%)
Estrogen receptor (ER)	Positive	23 (39.7)
	Negative	20 (34.5)
	Unknown	15 (25.9)
Progesterone receptor (PR)	Positive	20 (34.5)
	Negative	23 (39.7)
	Unknown	15 (25.9)
HER2	Positive	13 (22.4)
	Negative	30 (51.7)
	Unknown	15 (25.9)
Hormone receptor (ER and/or PR)	Positive	23 (39.7)
Molecular subtype	Luminal A	18 (31.0)
	Luminal B	5 (8.6)
	HER2-enriched	7 (12.1)
	Triple-negative	13 (22.4)
	Unknown / not assessed	15 (25.9)

Note: HER2, human epidermal growth factor receptor-2. Ki-67 was recorded in only 1 of 58 patients; the distinction between luminal A and luminal B is therefore based mainly on receptor status and should be interpreted as provisional. One case with entirely undetermined receptor status was classified as "unknown" subtype.

Stage at presentation: No patient presented with stage 0 or stage I disease. Twenty-three patients (39.7%) had stage II, 24 (41.4%) stage III and 11 (19.0%) stage IV (metastatic) disease; thus 60.3% presented with locally advanced or metastatic disease [Table 3; Figure 3].

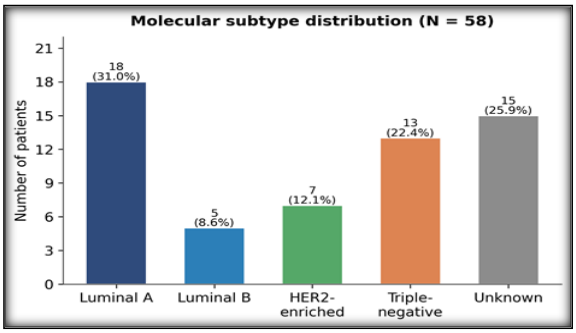

Figure 2: Molecular subtype distribution of the study population (N = 58).

Table 3: TNM stage at presentation (N = 58).

TNM stage	Sub-stage (n)	n (%)
Stage II	IIA (8), IIB (15)	23 (39.7)
Stage III	IIIA (10), IIIB (7), IIIC (7)	24 (41.4)
Stage IV	Metastatic	11 (19.0)

Note: TNM, tumour–node–metastasis. No stage 0 or stage I disease was recorded.

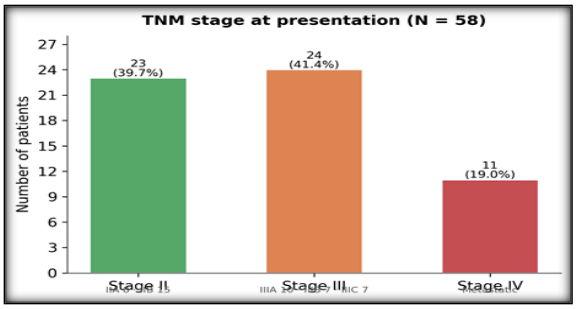

Figure 3: Distribution of TNM stage at presentation (N = 58).

Drug-prescribing pattern: Overall, 40 patients (69.0%) received chemotherapy, 17 (29.3%) endocrine therapy and 14 (24.1%) targeted therapy, alone or in combination. Chemotherapy alone was the commonest regimen (31; 53.4%), followed by endocrine therapy alone (10; 17.2%), chemotherapy plus targeted therapy (6; 10.3%), targeted therapy alone (4; 6.9%), endocrine plus targeted therapy (4; 6.9%) and chemotherapy plus endocrine therapy (3; 5.2%). No patient received the triple combination of chemotherapy, endocrine and targeted therapy [Table 4; Figure 4].

Table 4: Drug-prescribing pattern by therapy class (N = 58).

Therapy class	n (%)
Chemotherapy alone	31 (53.4)
Endocrine (hormone) therapy alone	10 (17.2)
Chemotherapy + targeted therapy	6 (10.3)
Targeted therapy alone	4 (6.9)
Endocrine + targeted therapy	4 (6.9)
Chemotherapy + endocrine therapy	3 (5.2)
Total	58 (100)

Note: Chemotherapy regimens: AC (doxorubicin/Adriamycin + cyclophosphamide), paclitaxel (Taxol), sequential AC followed by paclitaxel, or CMF. Endocrine therapy: letrozole. Targeted therapy: trastuzumab. Grouped exposure: any chemotherapy 40 (69.0%), any endocrine therapy 17 (29.3%), any targeted therapy 14 (24.1%).

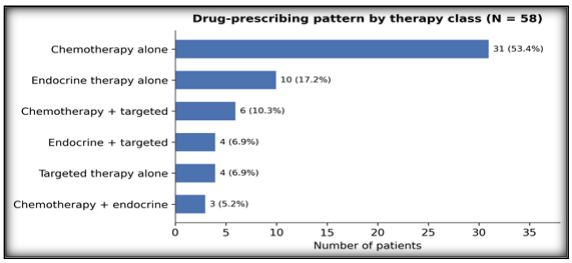

Figure 4: Drug-prescribing pattern by therapy class (N = 58).

Prescribing pattern by molecular subtype

Prescribing pattern varied markedly by molecular subtype [Table 5; Figure 5 and 6]. All 7 HER2-enriched tumours (100%) received trastuzumab-based targeted therapy—combined with chemotherapy in 4 and given without chemotherapy in 3. Among the 23 hormone receptor-positive (luminal A/B) patients, 14 (60.9%) received endocrine (letrozole)-containing regimens. In contrast, 12 of 13 triple-negative tumours (92.3%) were treated with chemotherapy alone. Patients with unknown receptor status were most often managed with chemotherapy (12/15). A small number of prescriptions did not align with the recorded receptor status—for example, trastuzumab recorded in two hormone receptor-positive, HER2-negative (luminal A) cases—most likely reflecting incomplete documentation or clinical circumstances not captured in the records.

Table 5: Drug-prescribing pattern across molecular subtypes, n (row total).

Molecular subtype	CT	CT+ET	CT+TT	ET	TT	ET+TT	Total
Luminal A	6	3	2	5	0	2	18
Luminal B	1	0	0	2	0	2	5
HER2-enriched	0	0	4	0	3	0	7
Triple-negative	12	0	0	1	0	0	13
Unknown	12	0	0	2	1	0	15
Total	31	3	6	10	4	4	58

Note: CT, chemotherapy; ET, endocrine (hormone) therapy; TT, targeted therapy. Percentages in the text are calculated on the row (subtype) total.

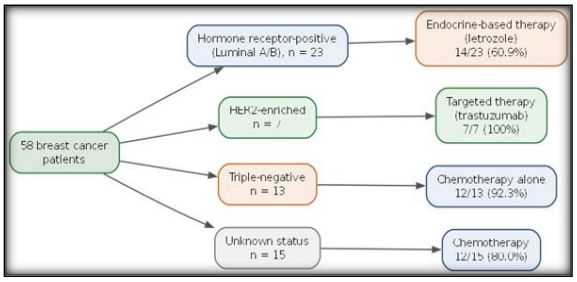

Figure 5: Predominant treatment allocation according to molecular subtype, showing the receptor-directed prescribing pattern.

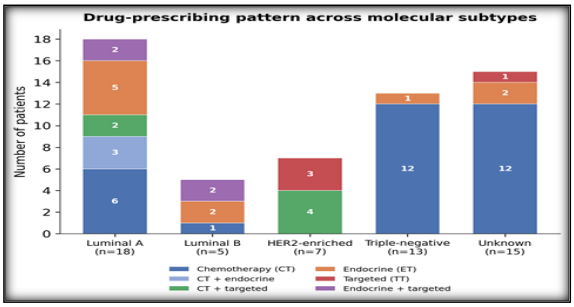

Figure 6: Stacked distribution of therapy classes within each molecular subtype (N = 58).

DISCUSSION

In this retrospective study of 58 breast cancer patients at a government tertiary hospital in South India, hormone receptor-positive disease was the single largest group (39.7%), and the drug-prescribing pattern closely followed the molecular subtype: HER2-enriched tumours were uniformly treated with targeted therapy, hormone receptor-positive tumours predominantly received endocrine-based regimens, and triple-negative tumours were managed almost exclusively with chemotherapy. This concordance indicates that, despite resource constraints, prescribing at this centre was broadly rational and biomarker-driven, consistent with international subtype-directed treatment recommendations.[9,10]

The proportion of hormone receptor-positive tumours in our cohort (39.7%) is lower than the 50–70% typically reported from Western populations and is closer to figures described from Indian cancer centres, where a relatively higher burden of triple-negative and HER2-positive disease has been reported.2,5 The triple-negative proportion in our study (22.4%) is in keeping with the higher frequency of this aggressive subtype reported across Indian series.[2,5]

A notable finding was that receptor status was unavailable in a quarter of patients (25.9%). This gap—reflecting limited access to, or documentation of, IHC testing—has direct therapeutic consequences, since these patients were largely defaulted to chemotherapy and could not be offered the subtype-directed endocrine or targeted therapy for which some might have been eligible. Ensuring universal, good-quality receptor testing is therefore a priority for rational prescribing in this setting.

The advanced stage at presentation—60.3% with stage III–IV disease and no stage I detection—mirrors the well-recognised pattern of late presentation of breast cancer in India and underscores the need for earlier detection and organised screening.[3]

Male breast cancer accounted for 5.2% of cases, higher than the approximately 1% seen in Western data; this is consistent with the higher relative proportions reported from some Indian centres and is a reminder that receptor testing and endocrine therapy are equally relevant in men.[2]

Limitations: This study has several limitations. First, it was a single-centre study with a modest sample size, which limits generalisability and precludes robust subgroup or inferential analysis. Second, the retrospective design meant the analysis depended on the completeness of existing records, and receptor status was missing in 25.9% of patients. Third, Ki-67 was documented in only one patient, so the distinction between luminal A and luminal B is provisional and rests mainly on receptor status. Fourth, treatment completion, dose intensity, adherence, adverse drug reactions and clinical outcomes (response and survival) were not assessed. Finally, a small number of prescriptions were discordant with the recorded receptor status, most likely owing to documentation gaps.

CONCLUSION

In this government tertiary-care cohort, breast cancer presented predominantly at an advanced stage and was most often hormone receptor-positive. Drug prescribing was largely determined by hormone receptor and HER2 status—targeted therapy for HER2-enriched disease, endocrine-based therapy for hormone receptor-positive disease and chemotherapy for triple-negative disease—indicating broadly rational, subtype-directed practice. The high proportion of patients with undetermined receptor status and late-stage presentation highlights the need for universal receptor testing and earlier diagnosis to enable fully individualised, guideline-concordant treatment.

REFERENCES

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, Jemal A. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024;74(3):229–263.
2. Malvia S, Bagadi SA, Dubey US, Saxena S. Epidemiology of breast cancer in Indian women. Asia Pac J Clin Oncol. 2017;13(4):289–295.
3. Mehrotra R, Yadav K. Breast cancer in India: present scenario and the challenges ahead. World J Clin Oncol. 2022;13(3):209–218.
4. ICMR-NCDIR. National Cancer Registry Programme Report 2020. Bengaluru: Indian Council of Medical Research, National Centre for Disease Informatics and Research; 2020.
5. Kumar RV, Panwar D, Amirtham U, Premalata CS, Gopal C, Narayana SM, et al. Estrogen receptor, progesterone receptor, and human epidermal growth factor receptor-2 status in breast cancer: a retrospective study of 5436 women from a regional cancer center in South India. South Asian J Cancer. 2018;7(1):7–10.
6. Allison KH, Hammond MEH, Dowsett M, McKernin SE, Carey LA, Fitzgibbons PL, et al. Estrogen and progesterone receptor testing in breast cancer: ASCO/College of American Pathologists guideline update. J Clin Oncol. 2020;38(12):1346–1366.
7. Wolff AC, Hammond MEH, Allison KH, Harvey BE, Mangu PB, Bartlett JMS, et al. Human epidermal growth factor receptor 2 testing in breast cancer: ASCO/College of American Pathologists clinical practice guideline focused update. J Clin Oncol. 2018;36(20):2105–2122.
8. Perou CM, Sørlie T, Eisen MB, van de Rijn M, Jeffrey SS, Rees CA, et al. Molecular portraits of human breast tumours. Nature. 2000;406(6797):747–752.
9. Goldhirsch A, Wood WC, Coates AS, Gelber RD, Thürlimann B, Senn HJ; Panel members. Strategies for subtypes—dealing with the heterogeneity of breast cancer: highlights of the St Gallen International Expert Consensus on the Primary Therapy of Early Breast Cancer 2011. Ann Oncol. 2011;22(8):1736–1747.
10. 10. Coates AS, Winer EP, Goldhirsch A, Gelber RD, Gnant M, Piccart-Gebhart M, et al. Tailoring therapies—improving the management of early breast cancer: St Gallen International Expert Consensus on the Primary Therapy of Early Breast Cancer 2015. Ann Oncol. 2015;26(8):1533–1546.