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Epidemiology and Molecular Classification Status in Cancer Breast in Central India: An Institutional Study

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Abstract

Aim: Breast cancer is the most common cancer among women worldwide and also in India. Patients with same diagnosis have different clinical outcomes and prognosis. This study aimed to evaluate molecular classification in Indian population along with various parameters like tumor grade, tumor histology, age, site, menopausal status and metastasis at the time of presentation. *Methods:* In this retrospective, single institutional study, we included 429 patients, who underwent immunohistochemistry (IHC) markers for ER, PR, HER2 and further subclassified as per molecular classification into subtypes and their relation with other parameters was studied. *Results:* This study revealed 39.62% Luminal A, 16.31% Luminal B, 27.03% Basal and 17.01% Her 2 Enriched subtypes with less hormone positivity in Indian population. *Conclusion:* Our results of molecular classification are consistent with other Indian studies but quite different from western studies. Triple negative breast cancer is slightly more in Indian population going towards poor prognosis and increased probability of metastasis.

Keywords: Breast; Epidemiology; Receptor; IHC; Central India.

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Introduction

Breast cancer is the most common cancer and a major public health problem across the world as reported, especially in western countries and is one of the leading cause of death among women all over the world. In India, it is reported as most common cancer representing 27% of all cancers in women followed by cancer cervix as 2nd most common cancer which represents 22.86% of all cancers in women.[1-2]

Breast cancer development is related to female reproductive hormones especially estrogen. Molecular classification of breast cancer based on gene expression (immunohistochemical markers) as (a) Luminal A type – Estrogen Receptor (ER) positive, Progesterone Receptor (PR) positive and Human Epidermal Growth Factor Receptor 2 (Her2) negative, (b) Luminal B type–ER positive, PR positive and Her2 positive, (c) Her2 Enriched subgroup–ER negative, PR negative and Her2 positive, (d) Basal like–ER, PR and Her2 negative, cytokeratin (CK) 5/6 positive and/or Epidermal Growth Factor Receptor (EGFR) positive, and (e) Unclassified/Penta negative (PN)–ER, PR, Her2, CK 5/6 and EGFR all negative.[3-5] ER, PR, Her2 status is important for deciding hormonal therapy and prognosis in breast cancer patients.

This study has been carried out to evaluate molecular classification in Indian population along with various parameters like tumor grade,

tumor histology, age, site, menopausal status andmetastasis at the time of presentation in Indian scenario.

Materials & Methods

This is a retrospective, single institutional study carried out from January 1, 2013 to July 31, 2018 in central India. During this time period total number of registered cancer patients in our institute were 9263, out of which 4930 were male and 4333 were female. Among the registered females, 1160 (26.7%)were breast cancer patients and 626 were cervixcancer patients, based on our institutional records. For this study, we have selected 429 patients of breast cancer, who underwent immunohistochemistry (IHC) markers.

Exclusion criteria

Breast cancer patients who did not underwent IHC markers were excluded of all the included patients. Ki-67, EGFR and Cytokeratin (CK) was not done for this study.

Results

The mean age at the time of presentation was 49.79%. 6.9% (30/429) presented in <35 years of age, 41.02% (176/429) in 35–49 years of age and 51.98% (223/429) in >50 years of age which signifies increasing trends of breast cancer in older age groups.36.59% (157/429) breast cancer patients were pre-menopausal and 63.40% (272/429) were post- menopausal. Where as, 51.28% (220/429) cases of left side and 48.25% (207/429) cases of right side were found which does not constitute any significant difference.

Two cases of bilateral breast involvement were also found at the time of presentation. Histologically, 89.04% (382/429) patients had infiltrating ductal carcinoma (IDC), 5.12% (22/429) patients hadlobular carcinoma and 5.82% (25/429) categorized as others which included other histology like 8 cases of mucinous (colloid), 6 medullary, 5 mixed (both IDC and lobular), 3 papillary and 3 metaplastic. 47.08% (202/429) were of intermediate grade (Grade II) followed by 32.86% (141/429) of high grade (Grade III), and then 9.09% (39/429) low grade (Grade I). Unspecified grading includes 10.95% (47/429). This study revealed 55.47% (238/429) ER positive (+), 44.05% (189/429) ER negative (-), 45.22% (194/429) PR+, 54.77% (235/429) PR-, 44.75% (192/429) both ER+PR+, 44.05% (189/429) both ER-PR-.33.33% (143/429) Her-2/neu positive and 66.66% (286/429) Her-2/neu negative cases were found in this study (Table 1).

At the time of presentation 9.3% (40/429) patients presented with metastasis. Most commonly to bone, brain, lung, liver and omentum.

Table 1: Clinical and Pathological data

Category	No. of patients with %
Age	
• <35 years	30 (6.9%)
• 35–49 years	176 (41.02%)
• >50 years	223 (51.98%)
Menstrual status	
• Pre-menopausal	157 (36.59%)
• Post-menopausal	272 (63.40%)
Laterality	
• Left	220 (51.28%)
• Right	207 (48.25%)
• Bilateral	2 (0.46%)
Histology	
• IDC	382 (89.04%)
• Lobular	22 (5.12%)
• Others	25 (5.82%)
Grading	
• Grade I	39 (9.09%)
• Grade II	202 (47.08%)
• Grade III	141 (32.86%)
• Unspecified	47 (10.95%)
ER and PR status	
• ER positive	238 (55.47%)
• ER negative	189 (44.05%)
• PR positive	194 (45.22%)
• PR negative	235 (54.77%)
• Both ER PR positive	192 (44.75%)
• Both ER PR negative	189 (44.05%)
Her-2/Neu status	
• Her-2/neu positive	143 (33.33%)
• Her-2/neu negative	286 (66.66%)

Molecular classification

In this study, 39.62% (170/429) Luminal A-hormone responsive and Her2- in which ER + PR + was 32.4% (139/429), ER+PR- was 6.99% (30/429) and 0.23% one case of ER-PR+.

16.31% (70/429) Luminal B- hormone responsive and Her2 +, in which ER + PR + 12.35% (53/429), ER + PR- 3.72% (16/429) and 0.3% one case of ER-PR +.

27.03% (116/429) Basal- triple negative (ER-PR-Her2-),

17.01% (73/429) Her 2 Enriched- hormone irresponsive group (Fig. 1).

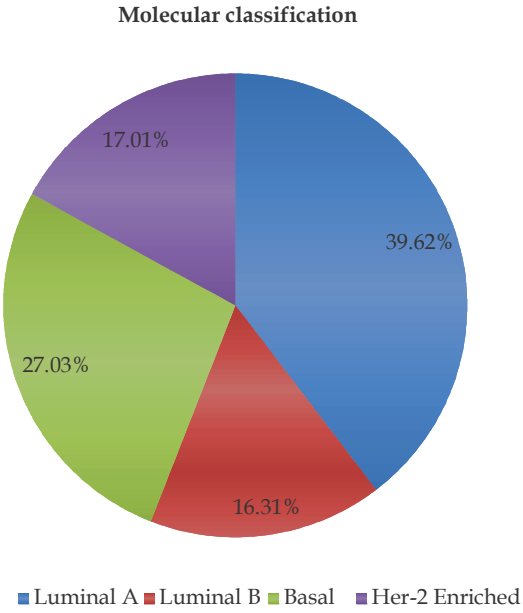

Fig. 1: Molecular classification

Discussion

Breast cancer is one of the major public health problem and is on rising trends in India.[1-2] Receptor study (ER, PR, Her2) is one of the important milestone in treatment of breast cancer as well as in determining its prognosis. So many risk factors have been identified in the development of breast cancer. In this study, we classified breast cancer as per molecular classification, based on IHC study into following subtypes and found Luminal A 39.62%, Luminal B 16.31%, Basal 27.03% and Her2/neu enriched 17.01%. Fernandes *et al.* in their study, reported Luminal A 35%, Luminal B 19.4%, Basal like 29.1%, Her2/neu enriched 16.4% cases which is similar to our study.[6] In an Indian study by Nikhilesh kumar, he reported Luminal A 34%, Luminal B 18%, Her2/neu enriched 18%, Basal 25% and Unclassified 5% respectively similar to our study.[7] In another study by Munjal *et al.*, luminal A 37.4%, luminal B 11.1%, Her2 (+) 29% and basal-like 7.5%.[8]

In this study, we noted 55.47% (238/429) ER+ and 45.22% (194/429) PR + while in an Indian study by Moses Ambroise *et al.*,[9] ER and PR positivity was seen in 59.19% and 51.1% respectively Western studies[9–11] have reported 70–80% ER and 60–70% PR positivity which signifies ER, PR positivity is slightly lower in Indian trends.

We noticed a wide range of Her-2/neu positivity ranging from 17 to 43% in different studies. In our study, Her-2/neu positivity is 33.33% (143/429) while Moses Ambroise *et al.*reported 27.10%,[9] Munjal *et al.*,[8] reported 29%,Vaidyanathan *et al.*[12] reported 43.2% Her-2/neu positivity respectively.

In this study, maximum number of patients were in postmenopausal group 63.4% (272/429) while in premenopausal group there were 36.59% (157/429) patients, outof which <35 years of age were 6.9% while in another study by Patnayak R *et al.*[13] reported 6.7% patients <35 years age group. Mean age at presentation in our study is 49.79%. In comparison to western studies mean age at presentation of breast cancer is lower in India.[9]

In our study, infiltrating ductal carcinoma (IDC) were found in 89.04% (382/429) while in other Indian studies, Munjal *et al.*[8] reported 93.3% andAmbroise *et al.*[9] reported 96.3%respectively.

Tumor Grade II 47.08% (202/429) had highest prevalence in our study followed by Grade III 32.86% (141/429) comparable to 60.9% Grade II and 30.2% Grade III in a study done by Nikhilesh kumar.[7]

Conclusion

Our results of molecular classification are consistent with Indian studies but quite different from western studies and percentage of breast and cervix cancer 26.7% and 14.4% respectively in female patients are also similar with Indian Cancer Statistics but again different from western studies.

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Ethical Issues: NIL

Conflicting Interest: NIL

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