Epidemiology, Pathological Characteristics and Estrogen and Progesterone Receptor Status of Operated Cases of Female Breast Cancer: A Retrospective Review of 266 Cases from Kerala

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Abstract Breast cancer is presently the most common cancer among women in Kerala, in Southern India. The objectives of this study were to analyze the epidemiology and pathological characteristics of female breast carcinoma in Kerala. 266 patients who were diagnosed with operable breast cancer between April 2009 and June 2010 were studied. Various pathological characteristics including stage, grade, axillary lymph nodal status, tumor size, and estrogen and progesterone receptor status were studied. Estrogen and progesterone receptor status were evaluated by immunohistochemistry. Chi-square test and frequency tables were used for statistical analysis. The mean age at presentation was 50 years. 48.9 % of the patients were premenopausal. 53.76 % had grade II tumors. Positive axillary lymph nodes were found in 70.3 % patients, and 68 % presented with stage II disease. 54.13 % were ER positive and 62 % were PR positive. The relatively young age at diagnosis, late presentation of the disease, and lower estrogen and progesterone receptor expression compared to patients from the West point toward the need for better breast cancer awareness and screening programmes in Kerala.

Keywords Breast cancer · Age · Menopause · Lymph node · Stage · Grade · Estrogen receptor · Progesterone receptor · Kerala

Abbreviations

ER Estrogen receptor
PR Progesterone receptor
AJCC American joint committee on cancer

Introduction

Breast cancer is the most common cancer among women in Kerala and its incidence is on the increase [1]. However most of our current knowledge on breast cancer has been derived from studies on Western populations. The College of American Pathologists and the American Society of Clinical Oncology have recommended ER and PR testing for all newly diagnosed cases of invasive carcinoma breast [2]. The aims of this study were to analyze the epidemiology and pathological characteristics of female breast carcinoma treated in a tertiary level teaching hospital in Central Kerala.

Methods

The study population consisted of 266 female patients with operable breast cancer who sought treatment at the Department of General Surgery, Govt. Medical College, Thrissur, Kerala between April 2009 and June 2010. In keeping with

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institutional protocols during the period, all patients were treated by modified radical mastectomy. All types of histologically proven breast carcinoma have been included in the study. Data were collected retrospectively from patients' medical records. The variables studied were age at presentation, menopausal status, and pathological characteristics including tumor size, tumor grade (Modified Bloom Richardson grade), stage of the disease (AJCC), axillary lymph node status, and estrogen and progesterone receptor status. "Postmenopausal" was defined as "more than 12 months having elapsed since the last menstrual period".

ER status was assessed in post-mastectomy specimen using BioGenex monoclonal mouse Ig G (Clone 1D5) and PR status was assessed using monoclonal IgG1 (Clone 1A6). Antigen retrieval was done using BioGenex EZ retriever system. Receptor expression was considered positive when at least 10 % of tumor nuclei stained positive for ER or PR.

Chi-square test and frequency tables were used for statistical analysis and significance was set at the 5 % level (p -value

<0.05). Statistical analysis was performed using SPSS version 16.

Results

The mean age at presentation was found to be 50 years (SD-10). Out of the 266 patients, 130 (48.9 %) were premenopausal women. A majority presented with grade II disease (53.76 %). Most of the patients presented with a tumor size between 2 and 5 cm (62.78 %). 70.3 % had positive axillary lymph nodes. 68 % presented with stage II disease.

Of the 266 cases, 144 (54.13 %) were ER positive and 165 (62 %) were PR positive. 137 (51.5 %) were ER+PR+, 107 (40.2) were ER-PR-, 15 (5.6 %) were ER-PR+ and 7 (2.6 %) were ER+PR-.

The association of different pathological variables with estrogen and progesterone receptors and menopausal status are shown in Tables 1 and 2 respectively.

Table 1 Tumor characteristics of the study population based on estrogen and progesterone receptors

Variable	N	ER+PR+ (%)	ER-PR-(%)	ER+PR-(%)	ER-PR+ (%)	p -value
	266	137(51.50)	107(40.23)	7(2.63)	15(5.64)	
Age at diagnosis						
<40	43	23(53.5)	17(39.5)	1(2.3)	02(4.7)	0.463
40–50	85	45(52.9)	37(43.5)	0	03(3.5)	
>40	138	69(50.0)	53(38.4)	6(4.3)	10(7.2)	
Menopausal status						
Premenopausal	130	68(52.3)	56(43.1)	1(0.8)	05(3.8)	0.148
Post-menopausal	136	69(50.7)	51(37.5)	6(4.4)	10(7.4)	
Grade						
I	19	13(68.4)	04(21.1)	2(10.5)	0	0.048
II	143	76(53.1)	53(37.1)	4(2.8)	10(07)	
III	104	48(46.2)	50(48.1)	1(01)	5(4.8)	
Tumor size						
<2 cm	19	10(52.60)	08(42.1)	0	1(5.30)	0.618
2–5 cm	167	86(51.50)	67(40.1)	5(3.0)	9(5.40)	
>5 cm	80	41(51.25)	32(40.0)	2(2.5)	5(6.25)	
Axillary nodal status						
LN negative	79	50(63.3)	29(36.7)	0	0	0.002
1–3 positive LN	81	36(44.4)	32(39.5)	6(7.4)	7(8.6)	
>3 positive LN	106	51(48.1)	46(43.4)	1(0.9)	8(7.5)	
Stage of the disease						
IA	16	08(50.0)	08(50.0)	0	0	0.002
II A	58	43(74.1)	15(25.9)	0	0	
II B	123	54(43.9)	49(39.8)	6(4.9)	14(11.4)	
III A	34	19(55.9)	14(41.2)	0	1(2.90)	
III B	24	09(37.5)	14(58.3)	1(4.2)	0	
III C	11	04(36.4)	07(63.6)	0	0	

Table 2 Tumor characteristics of the study population based on menopausal status

Variables	N	Premenopausal (%)	Postmenopausal (%)	<i>p</i> -value
	266	130	136	
Grade				
I	19	09(47.4)	10(52.6)	0.037
II	143	80(55.9)	63(44.1)	
III	104	41(39.4)	63(60.6)	
Tumor size				
<2 cm	19	12(63.2)	07(36.80)	0.618
2–5 cm	167	79(47.3)	88(52.70)	
>5 cm	80	39(48.75)	41(51.25)	
Axillary nodal status				
LN negative	79	36(45.6)	43(54.4)	0.029
1–3 positive LN	81	32(39.5)	49(60.5)	
>3 positive LN	106	62(58.5)	44(41.5)	
ER status				
ER+	144	69(47.9)	75(52.1)	0.735
ER–	122	61(50.0)	61(50.0)	
PR status				
PR+	165	76(46.1)	89(53.9)	0.241
PR–	101	54(53.5)	47(46.5)	

Discussion

As in the rest of the world, India too has been witnessing a surge in the incidence of female breast cancer, and it is now the most common cancer of women in many parts of India [1]. Kerala is no exception.

The mean age at presentation of female breast carcinoma in the present study is 50 years which is a decade earlier compared to patients from West. The average age at diagnosis of breast carcinoma in the US is 61 years [3, 4]. It is to be noted that other studies from India too have reported similar mean ages at presentation. [4] Young age at diagnosis has been found to be independently predictive of worse survival [5, 6]. The youngest patient is 27 years old, and nearly half of the study population is in the premenopausal age group. The exact reason for the younger age of onset of breast cancer in Indian population remains unknown, though it has variously been attributed to race, genetic composition and the environment.

Most patients presented in stage II or III of the disease; together, they account for about 80 % of the study population. Patients with stage I disease were only 6 %. In contrast, 60 % of patients in the US were diagnosed when they had stage I disease [7]. Though Kerala is known for a higher literacy rate and better standards of healthcare compared to other states of India, the rate of early detection of breast cancer is not significantly different from that of other regions of the country. The reason for late presentation may possibly be due to low socioeconomic status and lack of awareness regarding the disease.

In India, larger proportions of patients have high grade tumors and positive axillary lymph nodes. In the present study 39 % tumors were of grade III, and 60 % of the patients had positive axillary lymph nodes at diagnosis. In developed countries, the majority of the patients have negative lymph nodes [8, 9]. Other Indian studies too have documented a higher proportion of lymph node positive disease compared to the West [10, 11]. The difference could be attributed to the well-established screening programmes in developed countries.

At 62 %, ER positivity is low when compared to the West, but similar to the other studies from India [3, 12–14]. That the proportion ER-PR- was found to be higher, supports the hypothesis that breast cancer tends to be more aggressive in young individuals [15].

Among the different tumor characteristics, grade of disease, axillary nodal status and stage at presentation showed statistically significant association with estrogen and progesterone receptor expression. Menopausal status, age at presentation and tumor size did not show any statistically significant association with hormone receptor expression.

Conclusion

Breast cancer is now a prominent oncological problem in Kerala. Late presentation of the disease is of great concern, when coupled with the much younger age at diagnosis. These, along with the fact that patients were found to have lower estrogen

and progesterone receptor expression, point toward the need for improved breast cancer awareness and screening programmes in Kerala; such endeavours aiming at early diagnosis and apt treatment are imperative to tackle the challenges arising out of the soaring incidence of breast cancer in Kerala.

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Conflict of interest None

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