Association between age at presentation and pathological features of breast cancer and its effect on survival; a comparative study done in Sri Lanka

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ABSTRACT

Objective: The young age at presentation of breast cancer (BC) is an independent prognostic factor of poor survival. Therefore the aim of this study was to determine the association between age at presentation and the clinicopathological features of BC and to assess the impact of this association on the breast cancer specific survival (BCSS) of different age groups.
Methods: This retrospective study included all BC patients who had sought the services of our unit from May 2006 to December 2012. Data were collected through follow up visits, clinic and laboratory records. BCSS was calculated from the date of BC diagnosis to the last follow up date or the event: death due to BC. Analysis was done using Pearson chi-square, Kaplan-Meier and Cox-regression models.
Results: A total of 944 subjects were grouped according to the age at presentation; ≤ 35 years (7%), 36-60 years (70%) and >60 years (23%). The prevalence of duct carcinoma *in situ*, tumour size, lymph node stage (LNS), lympho-vascular invasion and Nottingham prognostic index decreased as the age at presentation increased ($p<0.05$). Multivariate analysis revealed that LNS is the single factor affecting the BCSS of all groups. BCSS of each group was influenced by one or two additional factors (tumour size for ≤35 years; progesterone receptor and Her2 status for 36-60 years group and estrogen receptor status for >60 years).
Conclusions: Poor prognostic features are prevalent among the ≤35 years group. LNS is the single most important independent predictor of BCSS irrespective of the age at presentation.

KEY WORDS: Age at presentation
Breast cancer specific survival
Clinicopathological features
Prognostic factors of breast cancer
Hormone receptors

Introduction

Breast cancer developing at a young age has been reported to have a more aggressive biological behavior compared to the disease in older patients. Breast cancers in younger women are found to have less well differentiated (higher grade) tumors with higher proliferating fraction and higher chance of vascular invasion than those occurring in older patients [1]. The age at presentation is recognized by some studies as an independent prognostic factor and as a significant predictor of long term survival of breast cancer patients [2]. However, there are studies which have given contradictory results [3, 4]. Yoshida M et al have shown that the age at presentation is not an independent prognostic factor for Japanese women with breast cancer [3]. Apart from the age at diagnosis, tumour size, lymph node status, histological grade and pathological stage are other important prognostic factors for survival of breast cancer patients [5].

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In making therapeutic decisions, age is considered as one factor together with other prognostic information of the patients. In general, chemotherapy is recommended for

patients who are less than 35 years at the time of diagnosis of the disease [6]. The age, less than 35 years is considered a high risk factor in planning adjuvant treatment [6,7].

Older women with breast cancer are claimed to have a more indolent course. The specific tumour types and patterns of metastasis associated with a more favorable prognosis are found more frequently among elderly [8].The aim of our study was to document the breast cancer specific survival (BCSS) rate for a Sri Lankan cohort of patients as there is no published research data on the survival of breast cancer population in Sri Lanka and to determine the association between the age at presentation and the clinicopathological features of females with breast cancer. The study assessed the impact of this association on the BCSS of different age groups.

Materials and methods

Study population

This was a retrospective study. This study included female patients who had histopathologically confirmed to have breast cancer. The patients who had sought the services of our unit from May 2006 to December 2012 were included in the study. There were 1068 breast cancer patients. Only 944 patients gave consent to participate in the study. The study was approved by the Ethical Review Committee of our institution.

Data collection

The histopathological findings of the breast tumors were retrieved from the laboratory records available in the laboratory. They were recorded according to the modified version of the minimum data set of National Health Service Breast Screening Programme (NHSBSP) guidelines [9]. Nottingham grading for all breast cancers were done by a single investigator (principal investigator) using the hematoxylin and eosin (H&E) stained slides to eliminate inter-observer variation. Nottingham Prognostic Index (NPI) was calculated for all breast cancers using the formula; NPI = 0.2 × tumour size (cm) + lymph node stage (1, 2 or 3) + histological grade (1, 2 or 3) [9].

Laboratory methods

Slides with sections that had been immunohistochemically stained for estrogen receptor (ER), progesterone receptor (PR) and human epidermal growth factor receptor 2 (Her2) expressions were retrieved from the archives of the department for evaluation. Primary monoclonal mouse antihuman estrogen receptor α clone 1D5 (Dako-M7047), monoclonal mouse antihuman progesterone receptor (Dako- M3569) and polyclonal rabbit antihuman c-erbB-2 oncoprotein (Dako-A0485) have been used with the secondary antibody (Dako Real EnVision^{TM}) for immunohistochemical (IHC) staining of all breast cancers to assess the ER, PR and Her2 expression. Scoring of ER and PR expressions were done using Allred Score and Her 2 expression was assessed using UK recommendations for all breast cancers [10, 11]. IHC assessment too was done by a single investigator eliminating inter-observer variation. The complete absence of the staining for ER, PR and a score of 0 or +1 for Her 2 were considered the criterion for categorizing as triple negative breast cancer (TNBC) for this analysis.

Follow up and outcomes

After enrolling, the study subjects were followed up for recurrence or death at six months intervals. The study ended on 31st December 2013. The actual minimum follow up period was 12 months. More than 50% of patients were followed up beyond four years from the date of diagnosis (88% for 24 months, 67.7% for 36 months, 51% for 48 months and 38.9% for five or more years). Breast cancer specific survival time was defined as the time elapsed from the date of diagnosis of breast cancer to the last follow up date or the date of death. Patients who died of breast cancer or who died with breast cancer (progression/metastasis) were included [12]. Deaths from other causes or from unknown causes were censored to the date of death. The cause of death of the patient was obtained from the death certificate issued by the Department of Registrar General. Those who were lost to follow up or alive at the last follow up date were censored.

Statistical Analysis

The subjects were divided into three age groups; ≤ 35 years, 36-60 years and >60 years. The age at the date of diagnosis of breast cancer was taken as the age at presentation of the disease. The Pearson chi-square test and the

chi-square test for trends were used to determine the association between age groups and the histopathological factors. Kaplan-Meier model was used to estimate the BCSS; in this case the log-rank test was used to compare the different groups. In multivariate analysis, Cox-regression model was used to estimate the predictors of survival using the backward factor retention method. $p < 0.05$ was considered significant in all analysis.

Results

There were 64 (7%) females aged 35 years and younger, 661 (70%) aged 36-60 years and 219 (23%) were older-than 60 years. The mean age of the younger age group was 32.47 (SD±3.62), while it was 49.67 (SD ±6.49) and 67.59 (SD±6.16) in the 36 to 60 years and <60 years groups respectively.

In situ carcinoma

The prevalence of associated ductal carcinoma *in situ* (DCIS) in the breast tumour was compared among the age groups. Out of the total 944, this information was not available for 18 patients. The prevalence of DCIS was 47% in the ≤35years age group while 38% and 23% in the36-60 years and >60 years groups respectively. The youngest age group had the highest prevalence of associated DCIS and there was a statistically significant trend of decreasing prevalence of DCIS with increasing age ($p<0.001$; χ^2trend<0.001). However there was no statistically significant difference with regard to the grade or growth pattern of the associated DCIS. There was no statistically significant difference between the age groups with regard to the presence of lobular carcinoma *in situ* (LCIS) or the presence of Paget's disease.

Within the entire group of subjects, invasive duct carcinoma of no special type (93.7%) was the most common. Invasive tubular, lobular, mucinous, papillary and medullary like comprised of 0.1%, 3.4%, 1.4%, 1.0% and 0.3% respectively.

Tumour characteristics

Tumour size

In all age groups, T2 (20-50mm) tumour was the most common. However T3 (>50mm) tumour was more prevalent in the youngest age group (13%) while T1 (≤20mm) tumour was more prevalent in the oldest group (40%). There was a statistically significant trend of decreasing prevalence of T3 tumours with increasing age ($p=0.040$, χ^2 trend=0.010) (Table 1).

Nottingham Grade

Nottingham grading of invasive breast cancers was done only for 790 subjects out of the total 944 breast cancers due to the unavailability of well-preserved archival tissue blocks to prepare H&E slides to replace the faded ones. There was a statistically significant difference between the age groups where the young patients had more high grade tumors compared to the other age groups while only 3% of the young patients had Grade 1 tumors ($p=0.043$). However there was no significant trend of increase or decrease in the grade with increasing age at presentation (χ^2 trend=0.102) (Table 1).

Tumour stage

The prevalence of patients with stage I and II breast cancer in the entire study population was 58% while the prevalence of III and IV disease was 42%. There were no stage IV patients in the youngest age group. The majority of the young patients were stage II or III (44%). The prevalence of stage IV tumors was highest in the elderly group (3%). However there was no statistically significant difference between the age groups ($p=0.109$) with regard to the stage at presentation (Table 1).

Lymph-node metastasis (LNM)

The axillary clearance had been done only for 912 subjects and 27 had not had axillary clearance. Out of the 912 patients, the number of involved lymph nodes was available only for 897 subjects. There was a progressive reduction in the prevalence of LNM with increasing age ($p=0.012$, χ^2trend=0.004). The prevalence of LNM was least among the females who were >60 years old (Table 1).

Presence of lympho-vascular invasion (LVI)

For the present study, no attempt was made to differentiate between blood vessel and lymphatic invasion. The highest prevalence of LVI was seen in the youngest age group (44%). The lowest prevalence; 21% was seen in the oldest age group. There was a statistically significant trend of decrease in the prevalence of LVI with increasing age at presentation ($p=0.002$, χ^2trend=0.001) (Table 1).

Nottingham Prognostic Index (NPI)

Patients with NPI of ≤3.4 and >5.4 are considered to have good and poor prognosis respectively according to the NHSBSP guidelines [9]. The age group ≤35 years had the highest prevalence (52%) of NPI >5.4, which indicated poor prognosis. There was a statistically significant trend of decreasing NPI with increasing age at presentation (p=0.011, χ^2trend=0.001) (Table 1).

Table 1. Comparison of tumour characteristics among the age groups.

Tumour characteristics	**Age (years)**			**p**	**χ^2 trend**
	≤35 ***(n=64)***	**36-60** ***(n=661)***	**>60** ***(n=219)***		
Tumour size					
T1 (≤20mm)	20 (33%)	194 (31%)	79 (40%)	0.040	0.010
T2 (21-50mm)	33 (54%)	377 (61%)	113 (56%)		
T3 (>50mm)	8 (13%)	51 (8%)	8 (4%)		
Missing	3	39	19		
Nottingham grade					
Grade 1	2 (3%)	73 (13%)	21 (11.5%)	0.043	0.102
Grade 2	21 (36%)	248 (45%)	86 (47%)		
Grade 3	35(60%)	228 (42%)	76 (41.5%)		
Missing	6	112	36		
Tumour stage					
I	7 (12%)	97 (15%)	44 (22%)	0.109	0.158
II	27 (44%)	265 (42%)	78 (39%)		
III	27(44%)	263 (42%)	74 (37%)		
IV	0 (0%)	8 (1%)	6 (3%)		
Missing	3	28	17		
Lymph-node metastasis					
Presence	39 (64%)	363(57%)	93 (46%)	0.012	0.003
Absence	22 (36%)	273 (43%)	107 (54%)		
Missing	3	25	19		
Lymph node stage					
0 (No positive LNs)	22 (36%)	273 (43%)	107 (54%)	0.147	0.007
1(1-3 positive LNs)	16 (26%)	163 (26%)	44 (22%)		
2 (4-9 positive LNs)	15 (25%)	128 (20%)	30 (15%)		
3(>9 positive LNs)	8 (13%)	72 (11%)	19 (9%)		
Missing	3	25	19		
Lympho-vascular invasion					
Presence	28 (44%)	187 (29%)	45 (21%)	0.002	0.001
Absence	36 (56%)	465 (71%)	166 (79%)		
Missing	0	9	8		
Nottingham Prognostic Index					
≤3.40	5 (9%)	73 (14%)	30 (18%)	0.011	0.001
3.41-5.40	22 (39%)	279 (53%)	92 (55%)		
>5.40	29 (52%)	174 (33%)	44 (27%)		
Missing	8	135	53		

n, number; p, significance

Hormone receptors and Her2 expression

Out of the total 944 breast cancers, IHC assessment was done only on 805 subjects with ER, 795 subjects with PR and 804 subjects with Her2 due to the unavailability of the well preserved archival tissue blocks for the replacement of the faded slides. There was a statistically significant trend of decrease in the prevalence of ER negative tumors, with increasing age at presentation (p=0.002, χ^2 trend=0.001) (Table 2). The prevalence of PR negative tumors was highest in the young age group compared to the others (p=0.005). However PR expression did not have a decreasing / increasing trend across the three age groups.

Table 2. Comparison of ER, PR and Her 2 expression among the age groups.

		Age (years)			p	χ^2 trend
		≤35 *(n=64)*	36-60 *(n=661)*	>60 *(n=219)*		
ER						
	Positive	12 (21%)	222 (39%)	86 (47%)	0.002	0.001
	Negative	46 (79%)	341 (61%)	98 (53%)		
	Missing	6	98	35		
PR						
	Positive	13 (22%)	248 (44%)	73 (41%)	0.005	0.186
	Negative	45 (78%)	312 (56%)	105 (59%)		
	Missing	6	101	41		
Her2						
	Positive	16 (28%)	142 (25%)	49 (27%)	0.848	0.869
	Negative	42 (78%)	422 (75%)	133 (73%)		
	Missing	6	97	37		
Triple negative						
	Yes	27 (47%)	182 (32%)	60 (33%)	0.093	0.236
	No	31 (53%)	380 (68%)	121 (67%)		
	Missing	6	99	38		

n, number; p, significance; ER, estrogen receptor; PR, progesterone receptor; Her2, human epidermal growth factor receptor 2

Her2 expression did not show a statistically significant difference between the age groups (p= 0.848). The majority of patients in the youngest age group was ER negative (79%), PR negative (78%) and Her2 negative (78%). Therefore the youngest age group had the highest prevalence of TNBC (47%) (Table 2). The study group was divided into two age groups as ≤35 years and >35 years, to compare the receptor status. A statistically significant difference was observed between those two age groups with regard to their ER status (p=0.002, χ^2 trend=0.002), PR status (p=0.002, χ^2 trend=0.002) and triple negative status (p=0.030, χ^2 trend=0.030). However, Her2 expression did not show a statistically significant difference (p=0.739).

Clinical management

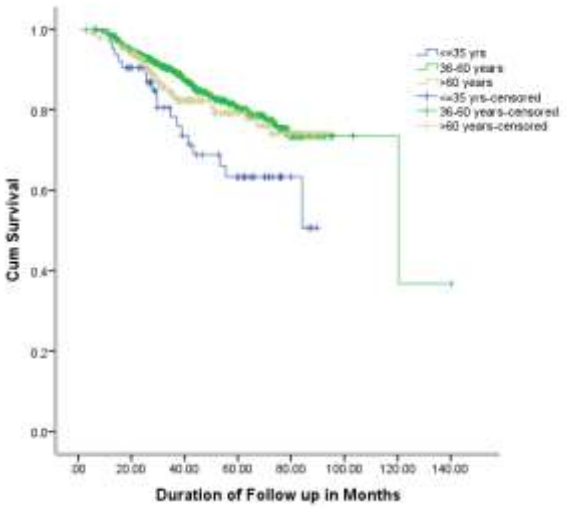
Mastectomy with axillary clearance was the main type of surgical management for all the three age groups. The 97% of ≤35 years age group, 95% of 36-60 years age group and 83% of >60 years age group patients had received adjuvant chemotherapy. Radiotherapy had been given to 80% of ≤35 years, 75% of 36-60 years and 66% of >60 years age patients. Hormone therapy had been given to 48% of ≤35 years, 65% of 36-60 years and 68% of >60 years age patients.

Survival analysis

Breast cancer specific survival

There were 164 deaths due to breast cancer and 20 deaths due to causes other than breast cancer, and the rest (760) were censored to the last follow up date. Those who had died due to other reasons were censored to the date of death. Out of the censored population 35.5% (270/760) were followed up for more than five years from the date of diagnosis of the disease (≤35 years-47%, 36-60 years-36% and >60 years-32%). The median survival time was 120.367 months (SE 25.651; 95% CI 70.090-170.644). The Kaplan-Meier model was used to estimate the five-year BCSS. The five-year BCSS rate of the whole cohort was 78.8%. The five year BCSS varied according to the age group; 63%, 80% and 79% respectively for the ≤35 years, 36-60 years and >60 years age groups (Figure 1).

Figure 1. Breast Cancer Specific Survival patterns of the three age groups. Kaplan-Meier survival analysis of patients with breast cancer stratified into three age groups (35 or below, 36-60 and above 60): patients age 35 or below had a poor survival compared to the age groups 36-60years and above 60years (p=0.02).



The BCSS curves were compared using the log-rank test which indicated that there was a survival benefit of being more than 35 years of age at presentation (p=0.02).

Histopathological and IHC factors which were found to have a significant association with the age groups were considered for the univariate analysis using the Kaplan-Meier estimator and the log-rank test for the estimation and comparison of survival curves. According to the findings of the univariate analysis, tumour size, LNS, NPI, pathological stage and Her2 status were significantly associated with the survival of the youngest age group (≤35 years) (Table 3). The tumour size, Nottingham grade, LNS, LVI, NPI, pathological stage, PR and Her2 status were significantly associated with the survival of the age group 36-60 years (Table 3).

The LNS, pathological stage, TNBC, ER and PR status of the tumour were significantly associated with survival of the age group >60 years (Table 3).

Table 3. Results of univariate analysis of pathological features.

Factor	Log-rank test p value		
	Age group ≤35 years	Age group 36-60 years	Age group >60 years
Presence of associated DCIS	0.428	0.329	0.690
Tumour size	0.026	0.005	0.290
Nottingham grade	0.507	0.005	0.220
Presence of LVI	0.437	<0.001	0.217
Lymph node metastasis	0.062	<0.001	0.001
Lymph node stage	<0.001	<0.001	0.001
Pathological stage	0.001	<0.001	<0.001
NPI	0.012	<0.001	0.077
ER	0.397	0.104	<0.001
PR	0.210	0.002	0.005
Her2	0.007	<0.001	0.301
TNBC	0.862	0.859	0.001

DCIS, ductal carcinoma *in situ*; LVI, lympho-vascular invasion; NPI, Nottingham Prognostic Index; ER, estrogen receptor; PR, progesterone receptor; Her2, human epidermal growth factor receptor 2; TNBC, triple negative breast cancer.

Multivariate analysis was performed for all the age groups separately to find out the factors which independently affect the survival of each age group. It was the lymph node stage which independently affected the survival of all three age groups. All three age groups had an additional prognostic factor which independently affected the survival of each group (Table 4).

Table 4. Multivariate analysis of factors predicting BCSS of the age groups.

Factor	HR	95%CI	p
Age group ≤35			
Lymph node stage			<0.001
0 (No positive LNs)	1 (ref)		
1(1-3 positive LNs)	1.05	0.09-12.10	
2 (4-9 positive LNs)	4.80	0.87-26.38	
3(>9 positive LNs)	34.87	5.41-224.93	
Tumour size			
T1 (≤20mm)	1 (ref)		0.008
T2 (21-50mm)	2.13	0.24-19.07	
T3 (>50mm)	21.32	2.07-219.04	
Her2	a	-	0.515
Age group 36-60			
Lymph node stage			<0.001
0 (No positive LNs)	1 (ref)		
1(1-3 positive LNs)	2.60	1.31-5.17	
2 (4-9 positive LNs)	4.71	2.44-9.11	
3(>9 positive LNs)	8.94	4.53-17.64	
PR			0.001
Presence	1 (ref)		
Absence	2.25	1.36-3.72	
Her2			0.051
Absence	1 (ref)		
Presence	1.62	1.00-2.63	
Tumour size	a	-	0.382
Nottingham grade	a	-	0.295
Presence of LVI	a	-	0.388
Age group >60			
Lymph node stage			0.002
0 (No positive LNs)	1 (ref)		
1(1-3 positive LNs)	2.64	0.92-7.55	
2 (4-9 positive LNs)	4.04	1.46-11.17	
3(>9 positive LNs)	7.04	2.46-20.15	
ER			0.003
Presence	1 (ref)		
Absence	4.41	1.66-11.66	
PR	a	-	0.551
TNBC	a	-	0.855

HR, hazard ratio; CI, confidence interval; p, significance; LNs, lymph nodes; ref – reference group; Her2, human epidermal growth factor receptor 2; a- removed from the final model; PR, progesterone receptor; LVI, lympho-vascular invasion; ER, estrogen receptor; TNBC, triple negative breast cancer.

Table 5. Characteristic features of breast cancer in young patients (≤35 years).

large tumours (2-5cm />5cm)
high Nottingham grade (Grade 2 / Grade 3)
lymph node metastasis
lympho-vascular invasion
high NPI value

Discussion

One of the aims of our study was to document the BCSS rate as there are no published data on BCSS for Sri Lankan breast cancer patient population. Cancer Institute data has been published in the past on overall survival but not on the BCSS. In the present cohort of breast cancer patients, the five year BCSS was 78.8% and the overall survival was 76%. A study on global surveillance of cancer survival (1995-2009) based on 279 population based registries from 67 countries revealed that for women diagnosed during 2005-2009, age standardized five year net survival from breast cancer was 80% or higher in 34 countries around the world including Canada, Germany, US, UK and Japan. However, breast cancer survival is less than 70% in Malaysia (68%) and India (60%) [13]. According to the same study overall survival was less than 60% in Mongolia (57%) and South Africa (53%) [13]. The BCSS of our cohort is very much close to 80% and much better than the neighboring Asian countries. The relatively better BCSS in the present Sri Lankan study cohort may be multifactorial. Since there is no national breast cancer screening programme established in Sri Lanka, a significant proportion of patients present with stage III or IV disease according to the present study (Stage I and II-58%, Stage III and IV-42%). However patients have the access to best care at government hospitals free of charge and in private sectors which may have improved the survival. There are many reports on the association between age at presentation and the prognosis of breast cancer patients [1, 3, 4, 8]. Although the definition of 'young patient with breast cancer' varies from publication to publication, many agree that younger patients have a poor prognosis [1, 2, 4, 14, 15]. For the present study we defined the young age group as females who are ≤35 years [4, 15, 16]. Age as an independent prognostic factor has been disputed in some studies while others have found results favoring it [8, 17]. In the clinical setting, we have often seen young females have breast cancers with poor prognostic features and not surviving long. Therefore we designed the present study to determine the survival of different age groups of breast cancer patients and assess whether the well-established pathological prognostic parameters vary according to the age. The prevalence of associated DCIS was found to decrease with increasing age in the present study. Therefore the youngest age group of this can be expected to have a higher chance of developing local recurrences [18]. With increasing age, the prevalence of T3 tumors (>5cm), LNS and LVI became less. The NPI also became less with the increase in age at presentation. Therefore the pathological factors which predict poor prognosis became less prevalent with increasing age predicting a better prognosis as the age increased.

Although the pathological stage depends on the tumour size and lymph node stage, it did not show a significant difference between the age groups. Similarly Nottingham grade did not have an increasing or decreasing trend with the age at presentation. Except for ER expression, other IHC markers did not show a trend with increasing age. ER expressing tumors became more prevalent with increasing age. But PR did not have the same effect. Therefore, whether patients became more responsive to hormone therapy with increasing age is uncertain as expression of PR is needed for the ER to have its effect [19]. There was no association found between the Her2 expression and the age at presentation (Table 3). A few pathological factors were identified to have an association with the different age groups without any significant trend with increase or decrease in age. TNBCs, PR negative tumors and high Nottingham grade tumors were more common in the age group of ≤35 years than the rest. All three are considered poor prognostic features. A study done in India stated that tumors with high grade, high lymph node involvement and negative hormone receptor expression occur more commonly in young breast cancer patients [14]. Our results on the biological nature of breast cancer in young patients are very much similar to the mentioned Asian countries. Clinicopathological profile of breast cancer in the age group ≤35 years according to the present study supports the poor prognostic behavior of breast cancer patients who are ≤35 years (Table 5). The cumulative effect of these statistically significant trends and associations were re-

flected in the survival curves/patterns and the five year BCSS rates of the three age groups. The age group ≤35 year, had the worst survival. Although the said pathological factors indicate a better survival in the oldest age group, the survival curves of the middle and oldest age groups were similar and overlapped each other. This is reiterated in the BCSS rates of 36 to 60 years and >60years groups which were 80% and 79% respectively. Although the elderly patients have better prognostic features compared to the other two groups, they too have more of high grade (Grade 2and 3 in 88.5%) and larger tumors (T2 and T3 in 60%) within the group. These features are indications for adjuvant chemotherapy. The majority (83%) of the elderly patients had received chemotherapy. Therefore their survival may have deviated from the better survival predicted in the analysis of pathological features and superimposed on the survival curve of the 36-60 years age group. A study done in USA, reported that older patients (>65 years) with breast cancer usually are undertreated because of co-morbid conditions (40.9%), or for refusal of treatment (31.8%), or favorable tumour pathology (13.8%) or unexplainable causes (13.6%) [20]. In the present study too, some of those factors may have had an effect. The poor tolerance of chemotherapy in elderly and the biological behavior of high grade larger tumors would have contributed to the deviation in the survival. The univariate analysis revealed that the pathological stage and the LNS affected the survival of all three age groups and presence of DCIS affected none. The survival of patients of 36-60 years age was affected by tumour size, Nottingham grade, LVI, PR and Her2 status but not by the expression of ER. All these factors were used for the multivariate analysis to identify the factors with an independent effect on the survival. The LNS was the single most important pathological factor affecting the survival of all age groups in the present study. The LNS has been recognized as the most significant prognostic indicator for patients with early-stage breast cancer in the past [8, 21]. It is being reiterated in our study too. In our study, the presence of T3 tumors affected the survival of ≤35 years age group in addition to the LNS. The expression of PR and Her2 (36-60 years) and ER (>60 years) also had an independent effect on the survival. This retrospective study enrolled breast cancer patients who have been treated or are on treatment. The majority have undergone simple mastectomy with level I or II axillary clearance and one or more forms of adjuvant therapy. Even though these patients had been treated or on treatment, the patients who were ≤35 years had a poor survival compared to the others most probably due to the high degree of aggressiveness of the tumors in the youngest age group, which is substantiated by the association of poor prognostic pathological features. This retrospective study is the first study on the BCSS in Sri Lanka according to the accessible literature. Therefore we do not have published data in Sri Lanka to compare. Since this is a retrospective study, follow up period of individual patients varied depending on the date of diagnosis. Therefore patients who developed breast cancer in 2006, 2007 and 2008 could be followed up beyond five years (38.9%) while the others could be followed up for less than five years. However those who could be followed up beyond five years were almost equally distributed within the three groups. Therefore the effect is similar on all three groups and the power of statistical analysis is less affected. Since the length of follow up period is not too long, the present cohort of patients is homogeneous in terms of treatment modalities. These patients have been diagnosed and managed at a single unit (the tertiary care hospital). Immunohistochemical assessment also was done in a single laboratory. Therefore there is a consistency among the study subjects of the cohort in terms of diagnosis, management and prognostication.

On the basis of observed outcomes, this study has revealed that being ≥35 years of age at presentation gives a survival benefit as breast cancers with poor prognostic features are seen mostly among the ≤35 years age group compared to the others. Lymph node stage is the single independent predictor of survival irrespective of the age at presentation. However having T3 tumors in ≤35 years age group, expression of PR and Her2 in 36-60 years age group and expression of ER in >60 years age group independently affect the survival of breast cancer patients.

Conflict of Interest

We declare that we have no conflict of interest.

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