RESEARCH COMMUNICATION

Effects of Socio-economic and Demographic Factors in Delayed Reporting and Late-stage Presentation among Patients with Breast Cancer in a Major Cancer Hospital in South India

Rabia Ali[1], Aleyamma Mathew[2]*, B Rajan[2]

Abstract

Objective: We analyzed the distribution of socio-economic and demographic (SEDs) factors among breast cancer patients and assessed their impact on the stage at diagnosis of the disease and symptom duration. Methods: Data for the year 2006 was collected from the Hospital Based Cancer Registry, Regional Cancer Centre (RCC), Trivandrum, Kerala, India. Patients (n=522) were included if they were from native Kerala state or adjoining Tamil Nadu. SEDS factors included age, residing district, religion, marital status, income, education and occupation. Other study variables were menopausal status, parity, listed symptoms with duration and stage at diagnosis. Association between SEDs factors by stage at diagnosis and duration of symptoms was tested using chi-square statistics, with odds ratios (OR) estimated through logistic regression modeling. Results: Forty-five percent were reported at early stages and 53% at late stages. Elevated risks for late stage reporting among breast cancer patients were observed for women who were unmarried (OR=3.31; 95%CI: 1.10-9.96), widowed/ divorced (OR=1.46; 95%CI: 0.89-2.37), with lower education (OR=2.72; 95%CI: 1.06-7.03 for illiterate women and OR=2.32; 95%CI: 1.05-5.13 for women with primary school education and OR=2.07; 95%CI: 1.02-4.21 for women with middle school education) and post-menopausal women (OR=1.45; 95%CI: 0.97-2.19). Conclusions: This analysis helped to identify the target population group for receiving health education for early detection of breast cancer.

Key Words: Breast cancer, socio-economic factors, stage at diagnosis, symptoms

Asian Pacific J Cancer Prev, **9**, 703-707

Introduction

Breast cancer is the most common malignancy among women worldwide (Parkin et al., 2002). Globally, breast cancer incidence is on the rise, causing much concern in the realm of women's health specifically in developing countries like India. The most recently calculated age-adjusted incidence rates (AAR) of breast cancer among women in India range from 25 to 31 cases per 100,000 (Curado et al., 2007). Among females in urban Trivandrum, Kerala, a southern state in India, breast cancer accounted for 36.0% of all female cancers with an AAR of 29.4 per 100,000 women and was the leading site of cancer among these women (Cancer registry report, 2007). Across India, major cancer registries in Bangalore, Delhi, Chennai, Bhopal, Mumbai and Ahmedebad also reported that breast cancer is the leading site of cancer among females (NCRP, 2006).

Although these figures are comparatively lower than those of more developed nations such as the United States—where, according to SEER data, the AAR is 90.0 per 100,000 females (about three times that of national Indian average) (Curado et al., 2007)- the fact that breast cancer is on the rise in India is a cause for concern and calls for increased awareness of factors associated with the disease. This is especially relevant in India, where there are no organized and regular screening programs for breast cancer prevention and early detection. Detecting new breast cancers in its earliest stages increases the probability of long-term survival, which is why early disease detection is of the utmost importance (Hanrahan et al., 2007).

Studies have reported that the likelihood of breast cancer survival can be impacted by socio-economic and demographic factors (SEDs) such as income status (Boyd et al., 1999; Thomson et al., 2001; Bouchardy et al., 2006), race (Gordon et al., 1992; Grau et al., 2005; Lantz et al., 2006) and economic deprivation (Macleod et al., 2000). Deprived women with breast cancer have poorer outcomes than affluent women (Thomson et al., 2001). Black and Hispanic women in the U.S. were less likely to be diagnosed with early-stage breast cancer than White women (Lantz et al., 2006). Also, it has been reported that income indeed influenced breast cancer survival differences between Blacks and Whites in the U.S.

*[1]Stony Brook University, School of Medicine, NY, USA, [2]Regional Cancer Centre, Trivandrum, Kerala, India *For correspondence: amathew@rcctvm.org, aleyammam@yahoo.com*

population (Ansell et.al., 1993; Maloney et al., 2006). Socio-economic factors were independent prognostic factors for the stage at diagnosis as well as the probability of survival among breast cancer cases (Gentil-Brevet et al., 2008). Further it has been reported that the probability of survival among breast cancer patients decreased as their distance from cancer centers grew (Haynes et al., 2008).

Studies have shown that diagnosis at a later stage is correlated with lower survival rates among breast cancer patients (Sant et al., 2004; Grau et al., 2005). It has also been reported that increased duration of symptoms among breast cancer patients negatively affects survival (Arndt et al., 2003). These two factors can therefore be useful predictors for the severity of illness and likelihood of survival among breast cancer patients.

Few studies have investigated impact of SEDs factors on the stage of diagnosis among female patients in India. The present paper attempts to analyze the distribution of SEDS factors among breast cancer patients and compare them to the symptom duration and stage at diagnosis.

Materials and Methods

Data were collected from the Hospital Based Cancer Registry of the Regional Cancer Centre (RCC) in Trivandrum, Kerala, India. The RCC is an exclusive cancer specialty hospital established in 1981 and today caters to 11,000 new cancer patients, which is one third of the new cancer patent load in one calendar year in the State of Kerala (population in Kerala: approximately 31 million as on 2001 census of India). The RCC also caters to patients from the neighboring state of TamilNadu and neighboring countries such as the Maldives (approximately 1,500 new cancer patients). The Government of India has identified the RCC as the nodal agency for implementing the National Cancer Control Programme in the Trivandrum district ('district' is an administrative division of a state in India).

Breast cancer patients were included in the present study if they were from the native State of Kerala or the adjoining state of Tamil Nadu and reported to the RCC in the year 2006. Patients were excluded if they lived outside of India, or if they had undergone any cancer directed treatment elsewhere prior to reporting at the RCC.

Data were retrospectively abstracted and analyzed during the months of June and July 2008 from the RCC patient information records. Socio-economic and demographic (SEDs) factors and other background variables as listed below were recorded. SEDs factors included the residing district, education level (based on grade completed), income level (low, medium and high: income was assessed by social workers based on a variety of factors such as patient's occupation, husband's occupation and whether they own or rent their land etc.), occupation (housewife, white collar, or blue collar), religion (Hindu, Muslim or Christian), marital status (married, single, divorced or widowed) and age (below 50 years vs. 50 and above). Other background variables included the menopausal status (pre, peri and post menopausal), parity (number of live births), "listed symptoms" with duration in months, stage at diagnosis (TNM) and group staging (stages I & II identified as 'early' and III & IV as 'late').

Cross tabulation was performed by stage at diagnosis and duration of symptoms (months) vs. all SEDs factors. Statistical association between the above variables was tested using chi-square statistic. Fisher's exact test was used if the expected value in a cell in the cross tabulation was less than five (Armitage and Berry, 1994). The odds ratios (OR) for late-stage reporting and their 95% confidence intervals (CI) according to SEDS factors were estimated through logistic regression model (Breslow and Day, 1980). The ORs were modeled using a linear relationship between the SEDS factors and the log odds of disease. All the analyses were done using the statistical package SPSS.

Results

A total of 1,386 breast cancer patients registered at the RCC during the calendar year 2006. Seven-hundred and ninety-nine patients who had undergone partial treatment before reporting to the RCC, 10 patients from the Maldives and 55 patients whose case records were missing were excluded from the present analysis. The total number of patients analyzed was 522 (453 from Kerala and 69 from Tamil Nadu). Patient age ranged from 19 to 95 years with a mean age of 51 years (SD=12 years). Fifty-three percent of patients were 50 years of age or older. Thirty two percent of patients resided in Trivandrum, 17.4% in the nearby Kollam district. Patients belonging to the Hindu faith constituted 64.8%, Muslims 13.8% and Christians 21.5%. Seventy percent of patients were married, 24% widowed or divorced. Patients in the lowest income category comprised 36.4%, medium 25.1% and high 38.5%. Nine percent of patients were illiterate, 14.4% literate or up to primary school level, 24.1% middle school, 32.0% secondary school and 21% had higher education. Seventy six percent of patients identified their occupation as "housewife', 12.1% had 'white collar' jobs such as teachers, government employer, etc., and 11.9% had 'blue collar' jobs labeled as laborers and factory workers (Table 1).

Table 1 describes the various SEDs factors and their relationship to the stage at diagnosis. Forty-five percent were diagnosed at an "early" stage of breast cancer and 52.7% were diagnosed at a "late" stage (2.3% unknown). In the univariate logistic regression analysis, it was observed that patients were more likely diagnosed in later stages if they were aged 50 years or older (p=0.07) or post-menopausal women (p=0.005), in a lower income bracket (p=0.02), widowed/divorced or unmarried (p=0.001) or with lower education (p=0.001). However, in the multivariate analysis, elevated risks for late stage reporting were observed for women who were unmarried (OR=3.31; 95% CI: 1.10-9.96), widowed/divorced (OR=1.46; 95% CI: 0.89-2.37) and women with lower education (OR=2.72; 95% CI: 1.06-7.03 for illiterate women, OR=2.32; 95%CI: 1.05-5.13 for women with primary school education and OR=2.07; 95%CI: 1.02-4.21 for women with middle school education).

Thirty-seven percent were pre-menopausal, 53.4%

Table 1. Distribution and Association of Socio-economic and Demographic Factors by Stage at Diagnosis: Multivariate Analysis

Factor	Category	Stage			Total	OR	95% CI	P- value
		Early	Late	UK				
Age	< 50 years	50.2	43.3	58.3	244	1.00	ref	0.939
	> 50 years	49.8	56.7	41.7	278	1.02	0.66-1.57	
District	Trivandrum	35.3	30.5	16.7	169	1.00	ref	0.384
	Kollam	15.7	18.2	33.3	91	1.38	0.79-2.42	
	Others	48.9	51.3	50.0	262	1.32	0.86-2.03	
Religion	Hindu	65.5	64.0	66.7	338	1.00	ref	0.528
	Muslim	14.0	13.5	16.7	72	1.08	0.62-1.89	
	Christian	20.4	22.5	16.7	112	1.31	0.82-2.11	
Marital status	Married	77.9	63.3	50.0	363	1.00	ref	0.045*
	Widowed /divorced	18.7	28.0	41.7	126	1.46	0.89-2.37	
	Unmarried	2.1	4.7	8.3	19	3.31	1.10-9.96	
	Unknown	1.3	4.0	--	14			
Income	Lowest	29.8	41.5	50.0	190	1.00	ref	0.21
	Medium	26.8	24.0	16.7	131	0.67	0.41-1.12	
	Highest	43.4	34.5	33.3	201	1.00	0.59-1.72	
Education	Illiterate	24.7	14.5	8.3	46	2.72	1.06-7.03	0.045*
	Literate & Primary	36.2	28.4	33.3	75	2.32	1.05-5.13	
	Middle	20.4	26.5	41.7	126	2.07	1.02-4.21	
	Secondary	36.2	28.4	33.3	167	1.16	0.63-2.16	
	> College	24.7	14.5	8.3	99	1.00	ref	
	Unknown	1.7	1.8	--	9			
Occupation	Housewife	75.7	76.0	83.3	397	1.00	ref	0.66
	Blue collar	8.9	14.9	8.3	63	1.24	0.66-2.35	
	White collar	15.3	9.1	8.3	62	0.82	0.41-1.63	

*Statistically significant at the 10% level

Table 2. Distribution of Socio-economic and Demographic Factors by Duration of Symptoms

Factor	Symptom Duration (months)					Total	
Category	1	2-3	4-6	≥7	Unknown		P value
Age							0.44
< 50	49.2	50.6	45.5	39.3	47.8	244	
> 50	50.8	49.4	54.5	60.7	52.2	278	
District							0.57
Trivandrum	31.5	32.7	28.6	38.3	21.7	168	
Kollam	14.5	17.3	19.6	16.8	30.4	92	
Others	54.0	50.0	51.8	44.9	47.8		
Religion							0.18
Hindu	58.1	67.3	67.0	67.3	60.9	338	
Muslim	12.9	17.9	10.7	11.2	17.4	72	
Christian	29.0	14.7	22.3	21.5	21.7		
Marital Status							0.018*
Married	76.6	75.0	67.9	57.0	60.9	363	
Widowed/ Divorced	19.4	18.6	28.6	29.9	39.1	126	
Unmarried	2.4	3.2	1.8	8.4	--	19	
Unknown	1.6	3.2	1.8	4.7	--	14	
Income Category							0.001*
Lowest	22.6	34.6	42.0	48.6	39.1	190	
Medium	26.6	34.0	16.1	19.6	26.1	131	
Highest	50.8	31.4	42.0	31.8	34.8	201	
Education							0.007*
Illiterate	6.5	3.2	16.1	13.1	4.3	46	
Primary	12.1	14.7	16.1	14.0	17.4	75	
Middle	17.7	28.2	18.8	29.0	34.8	126	
Secondary	32.3	37.8	30.4	27.1	21.7	167	
College	29.8	14.1	16.1	15.9	21.7	99	
Unknown	1.6	1.9	2.7	0.9	--	9	
Occupation							0.053*
Housewife	72.6	82.1	69.6	77.6	78.3	397	
Blue collar	8.9	10.9	14.3	15.0	13.0	63	
White collar	18.5	7.1	16.1	7.5	8.7	62	

*Statistically significant at the 10% level

were post-menopausal and 6.3% were peri-menopausal (3.3% were unknown). Seven percent were nulliparous, 13.6% had one child, 44.1% had two children and 35.3% had three or more children. Elevated risks for late stage reporting were observed for post-menopausal women after adjusted for district of residence, religion, marital status, education, occupation and income (OR=1.45; 95%CI: 0.97-2.19).

"Listed symptoms" included breast and axillary lump (74.1%), breast and axillary lump with pain (16.7%), breast lump with nipple ulceration (2.5%), breast lump with nipple retraction (2.1%), breast lump with nipple discharge (1.0%), breast lump with skin ulceration (5.9%), breast lump with size increase (9.2%), backache (1.9%), nausea/ vomiting/ loss of appetite (0.4%), headache (0.2%), abdominal pain (0.8%), weakness (0.4%) and itching (0.2%).

Twenty-four percent had duration of symptoms last one month before seeking medical attention, 16.5% had symptoms lasting two months, 13.4% had symptoms lasting three months, 5% had symptoms lasting four months, 23.2% had symptoms lasting between five to ten months, and 13.8% had symptoms lasting eleven or more months (4.4% unknown) (Table 2).

As duration of symptoms increased from 1 month to 12+ months, married women showed a decreasing trend in the amount of time they waited prior to seeking medical attention compared to unmarried/ widowed/ divorced women (p=0.029). Women with higher education were decreasingly likely to wait longer periods of time to seek out medical attention after the onset of symptoms (p=0.017). A higher proportion of women in the lower income category reported with increased duration of symptoms compared to higher income category

(p=0.0001). Women who reported to the RCC for treatment and were diagnosed with a late stage of breast cancer were shown to have waited much longer after the onset of symptoms prior to seeking medical treatment (p=0.0001) (Table 2).

Discussion

The present study analyzed the impact of SEDS factors according to the stage at diagnosis and symptom duration among breast cancer patients reported to a major cancer hospital in South India. Patients were more likely diagnosed as having a later stage of cancer if they were widowed/ divorced/ unmarried or had a lower level of education. This trend may exist due to a lack of support from the family of the patient which would discourage them from seeking treatment. Those with little to no education may not understand or be knowledgable about the implications involved with the symptoms of cancer. Women may also be less inclined to seek treatment due to pre-existing notions about body image and modesty inherent in the culture.

In the present analysis, elevated risks for late stage reporting among breast cancer patients were observed for women who were widowed/divorced or unmarried. They were also shown to have a longer duration of symptoms than married women. Perhaps this is due to the ability of married women to rely on their husbands for household support: a fellow adult in their home that will allow them to take time from their daily schedules and household duties (raising children, working, etc.) and to go to a hospital soon after the onset of symptoms. Husbands also serve as a source of economic support, therefore allowing these women more of an option to seek medical treatment than widowed or divorced women supporting a household on their own income or labor. Since treatment of breast cancer in the earlier stages produces better results (Hanrahan et al., 2007), it is important that disparities in reporting according to SEDS factors be narrowed.

In the present study, women of higher education levels were diagnosed at earlier stages of cancer than were women of lower education levels. These women were also less likely to have a long duration of symptoms prior to seeking medical treatment. Perhaps an increased level of education among women in South India allows them to be more aware of the risks associated with symptoms of cancer, thus making them more likely to go to a hospital upon the onset of symptoms as opposed to waiting until they are physically compromised. Also, women who have obtained higher levels of education tend to come from families with higher incomes; they are more able to afford a hospital or doctor visit and are therefore less likely to let their symptoms exist for long periods of time without seeking medical attention. Detecting new breast cancers at the earliest stages (Hanrahan et al., 2007) and decreasing the symptom duration (Arndt et al., 2003) increases the chances of long-term survival.

Indian families of lower incomes are less likely to educate their daughters than are families with higher expendable incomes. According to Desai (1994) "parents reluctance to educate daughters has its roots in the situation of women. Parents have several incentives for not educating their daughters. Foremost is the view that education of girls brings no returns to parents and that their future roles, being mainly reproductive and perhaps including agricultural labor, require no formal education". Low level of female literacy is often associated with poor access to health facilities, poor awareness of proper childcare and other hygienic practices, which adversely affect the welfare of the whole family (Kurian, 1997). In the present study, low-income women were more likely to wait a longer period of time following the onset of breast cancer symptoms before seeking medical treatment. Perhaps this was due to their lack of ability to pay for a doctor's visit or treatment, and thus these women were forced to wait until their health had deteriorated to a point where medical attention was of absolute necessity.

Women in India are reporting with breast cancer at younger age groups than they are in the U.S. This translates to a loss of productive life years at a higher rate among Indian breast cancer cases versus those in the U.S. This stresses the fact that India should focus more on early detection of breast cancer. According to SEER data, 65% were diagnosed above the age of 54 years (Ries et al., 2008) whereas in the present study only 35% were diagnosed above the age of 54 years. The present study data showed that post-menopausal women were more likely to report in the late stages than pre-menopausal women. This was probably due to the ages of these women; who being post-menopausal were naturally older. In the present study, women reporting to the RCC for cancer treatment, who were diagnosed with later stages of cancer, were more likely to be in the older age category (>50 years of age), while women in the younger age category (<50 years of age) were more likely to be staged with an early stage of cancer.

In the present study income did not emerge as a significant factor for late stage reporting in the multivariate analysis. Even though income was assessed based on a variety of factors such as patient occupation, husband's occupation and whether they own or rent their land, it may have been consistently underestimated since patients are reluctant to report higher income amounts so as to avoid making payments for treatment and other services in the hospital. This might be the reason for insignificance.

The present study data very clearly displayed the importance of early medical attention to the symptoms of breast cancer. Women with longer duration of symptoms of breast cancer were more likely to be diagnosed with later stages of cancer. Many of these patients eventually opted for palliative care, as no other treatment was feasible. This study has several limitations being a retrospective analysis. First, the duration of symptoms were described by the patient during their first hospital visit as a part of the patient history record. Patients may have recalled duration of symptoms incorrectly. The present study relied heavily on the medical records hand written by the medical professionals who would not have envisaged great vigil at recording. Medical records might have contained incorrect information as they are all subject to human error. Prospective studies are required to assess the pattern of symptoms along with duration. Despite these limitations

inherent in studies using medical records and self reported patient information, the advantages of the present study included a large patient population of 522 patient files, and highly descriptive and detailed medical records kept by the RCC.

In conclusion, this analysis has helped to identify the target population group to receive health education for early stage reporting of breast cancer. Specific educational approaches should be tailored to the target group in order to achieve the greatest effect. This type of analysis aids in acknowledging a target population where there is a lack of organized screening programs and therefore strong need of health education pertaining to early reporting of breast cancer.

References

Arndt V, Stürmer T, Stegmaier C, et al (2003). Provider delay among patients with breast cancer in Germany: a population-based study. *J Clin Oncol*, **21**, 1440-6.

Ansell D, Whitman S, Lipton R, Cooper R (1993). Race, income and survival from breast cancer at two public hospitals, Wiley-Liss, New York.

Armitage P, Berry G (1994). Statistical Methods in Medical Research, Blackwell Scientific Publication, Oxford.

Bouchardy C, Verkooijen HM, Fioretta G (2006). Social class is an important and independent prognostic factor of breast cancer mortality. *Int J Cancer*, **119**, 1145-51.

Boyd C, Zhang-Salomons JY, Groome PA, Mackillop WJ (1999). Associations between community income and cancer survival in Ontario, Canada, and the United States. *J Clin Oncol*, **17**, 2244.

Breslow NE and Day NE (1980). Statistical methods in cancer research. Vol II. The design and analysis of case-control studies. IARC Scientific Publications no.31, International Agency for Research on Cancer, Lyon, France.

Chatterjee M (1990). Indian Women: Their Health and Economic Productivity. World Bank Discussion Papers 109, Washington D.C.

Curado MP, Edwards B, Shin HR, et al (eds.) (2007). Cancer Incidence in Five Continents, Vol. IX, IARC Scientific Publications No. 160, IARC Lyon, France.

Desai S (1994). Gender Inequalities and Demographic Behavior. India, New York.

Gentil-Brevet J, Colonna M, Danzon A, et al (2008). The influence of socio-economic and surveillance characteristics on breast cancer survival: a French population-based study. *Br J Cancer*, **98**, 217-24.

Gordon NH, Crowe JP, Brumberg DJ, Berger NA (1992). Socioeconomic factors and race in breast cancer recurrence and survival. *Am J Epidemiol*, **135**, 609-18.

Grau AM, Ata A, Foster L, et al (2005). Effect of race on long-term survival of breast cancer patients: transinstitutional analysis from an inner city hospital and university medical center. *Am Surg*, **71**, 164-70.

Haynes R, Pearce J, Barnett R (2008). Cancer survival in New Zealand: ethnic, social and geographical inequalities. *Soc Sci Med*, **67**, 928-37.

Hanrahan EO, Gonzalez-Angulo AM, Giordano SH, et al (2007). Overall survival and cause-specific mortality of patients with stage T1a,bN0M0 breast carcinoma. *J Clin Oncol*, **25**, 4952-60.

Lantz PM, Mujahid M, Schwartz K, et al (2006). The influence of race, ethnicity, and individual socioeconomic factors on breast cancer stage at diagnosis. *Am J Public Health*, **96**, 2173-8.

Macleod U, Ross S, Gillis C, et al (2000). Socio-economic deprivation and stage of disease at presentation in women with breast cancer. *Ann Oncol*, **11**, 105-7.

Maloney N, Koch M, Erb D, et al (2006). Impact of race on breast cancer in lower socioeconomic status women. *Breast J*, **12**, 58-62.

Mudur G (1996). India's women get poor deal on healthcare, says World Bank. *BMJ*, **312**, 1627-8.

Parkin DM, Whelan SL, Ferlay J, Teppo L, Thomas DB (2002). Cancer Incidence in Five Continents Vol VIII. Lyon: IARC Scientific Publications No. 155.

NCRP (2006). National Cancer Registry Programme of India. Consolidated Report of Population Based Cancer Registries 2001-2004. Indian Council of Medical Research. NewDelhi.

Ries LAG, Melbert D, Krapcho M et al (eds) (2008). SEER cancer statistics review, 1975-2005. National Cancer Institute, Bethesda, MD.

Sant M, Allemani C, Berrino F, et al, for the European Concerted Action on Survival and Care of Cancer Patients (EUROCARE) Working Group (2004). Breast carcinoma survival in Europe and the United States. *Cancer*, **100**, 715-22.

Thomson CS, Hole DJ, Twelves CJ, Brewster DH, Black RJ; Scottish Cancer Therapy Network (2001). Prognostic factors in women with breast cancer: distribution by socioeconomic status and effect on differences in survival. *J Epidemiol Community Health*, **55**, 308-15.