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Original Article

Sociodemographic Factors and Late-stage Diagnosis of Breast Cancer in India: A Hospital-based Study

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Abstract

Context: Breast cancer (BC) is one of the major causes of cancer mortality in India. Late-stage diagnosis of BC is associated with poor survival. Identification of factors affecting late presentation of the disease could be an effective step to reduce BC mortality. **Aims:** To study the association of sociodemographic factors with BC stage at diagnosis. **Settings and Design:** The study is a retrospective analysis from the case records from a single institution. **Subjects and Methods:** Data for the year 2008 was collected from the hospital records. A total of 1210 cases were included for the analysis. Sociodemographic factors included were age, place of residence, religion, marital status, level of education, and occupation. Other study variables were family history, presence of comorbidity, and stage at diagnosis. **Statistical Analysis:** Association between sociodemographic factors by stage at diagnosis was tested using Chi-square statistics, with odds ratios (ORs) estimated through logistic regression modeling. **Results:** In the study cohort, 46% patients had reported at early stages and 54% at advanced stages. All factors were evaluated for being predictors of disease stage at presentation using univariate and multivariate logistic regression model. Women from urban background were less likely to present with advanced stage disease (OR = 0.64; 95% confidence interval [CI]: 0.49–0.84) as compared to rural women. Similarly, illiterate women were also more likely to present with advanced-stage disease (OR = 1.55; 95% CI: 1.16–2.09). **Conclusions:** This data clearly indicate that the patients of rural background and of low education status are more likely than their respective counterparts to have an advanced stage of BC diagnosis. Our results may be considered the keys to determining how stage variation may be related to patients and community characteristics and where limited resources need to be invested to ensure early diagnosis of BC.

Keywords: *Breast cancer, sociodemographic factors, stage*

Introduction

Breast cancer (BC) is the most frequently diagnosed cancer and the leading cause of cancer-related death among women worldwide. The annual age-standardized incidence rate of BC worldwide in 2012 was 43.1/100,000 women and 25.8/100,000 in India.[1] However, despite a lower incidence the BC mortality in India (12.7/100,000) is similar to worldwide mortality (12.9/100,000).[2] Within India also, there are substantial differences in BC incidence rates between rural and urban areas. rates observed in urban registries range from 29/100,000 to 35/100,000 women, whereas those observed in rural registries vary from 10/100,000 to 12/100,000 women.[3] BC is said to be most common cancer in females of urban India. The rise of BC in India is a cause for concern and calls for increased awareness of factors associated with the disease.[4] A low level of awareness and knowledge about BC has been found to be associated with delayed presentation.[5] Epidemiologic evidence exists that late-stage diagnosis for BC is related to a number of sociodemographic factors such as age, level of education, marital status, unemployment, and family history of BC.[6-9] Long-term prognosis of BC patients strongly depends on stage of disease at diagnosis.[10] The 5-year survival rates of patients treated for carcinoma of the breast are dependent on the stage of diagnosis with a survival of 100% in patients with Stage 0 and Stage I disease.[11] Detecting new BCs in its earliest stages increases the probability of long-term survival, which is why early disease detection is of the utmost importance.[12]

There are few studies in India that have examined the influence of sociodemographic factors on late presentation among BC

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patients. It is, therefore, desirable to assess the effect of these factors on late reporting. Findings of which may assist in developing appropriate strategies aimed at reducing delay. Therefore, this study was aimed to examine the association and impact of sociodemographic factors on the stage at diagnosis of BC patients in India.

Subjects and Methods

Study design

This study design is based on retrospective BC data collected from the Hospital-Based Cancer Registry, Tata Memorial Hospital (TMH), Mumbai, India.

Study population

BC patients were included in the present study if they had reported in the year 2008 and taken the treatment in TMH (n = 1210). Patients were excluded if they had undergone any cancer-directed treatment elsewhere before reporting at the TMH.

Data collection

Data were retrospectively abstracted and analyzed from the hospital electronic medical records system. Sociodemographic factors and other background variables recorded are age (below 49 years vs. 49 and above), place of residence (rural/urban), religion (Hindu, Muslim, or others), marital status (married, widow/divorced, unmarried), level of education (illiterate, literate/primary, secondary, and college and above), and occupation (working and nonworking). Other study variables were family history of cancer (yes/no), presence of comorbidity, and stage at diagnosis (Stages I and II were identified as "early" and III and IV as "advanced").

Statistical analysis

Association between sociodemographic factors by stage at diagnosis was tested using Chi-square statistics. The odds ratios (ORs) for late-stage reporting and their 95% confidence intervals (CIs) according to sociodemographic factors were estimated through logistic regression model. All the analyses were done using the statistical package SPSS software v20.0 (SPSS, IBM, Chicago, IL).

Results

A total of 2112 BC patients registered at the TMH during the year 2008. Nine-hundred and two patients who had undergone partial treatment before reporting to the TMH were excluded from the present analysis. The total number of patients analyzed was 1210. Age of patients ranged from 21 to 89 years with a mean age of 49 years. Twenty-seven percent of patients were found to be resident of rural area and 73% of population from urban area. Patients belonging to the Hindu faith constituted 83.7%, Muslims 9.7%, and others 6.6%. Eighty-one percent of patients were married, 15.2% widowed or divorced, and 3.5% were unmarried. Eighteen percent of patients were illiterate, and 28.1% had higher education of college and above. Only fourteen percent of patients reported to be employed or working [Table 1].

Table 2 describes the various sociodemographic factors and their relationship to the stage at diagnosis. Forty-six percent were diagnosed at an "early" stage of BC and 54% were diagnosed at a "late" stage. Age at the time of diagnosis, place of residence, religion, marital status, level of education, and occupation were evaluated for being predictors of disease stage at presentation using univariate and multivariate logistic regression model. Women from urban background were less likely to present with advanced-stage disease (OR = 0.64; 95% CI: 0.49–0.84) as compared to rural women. Similarly, illiterate women were also more likely to present with advanced stage disease (OR = 1.55; 95% CI: 1.16–2.09). All the other factors were not found to be significantly associated with stage at presentation.

Discussion

India is a vast country with varying social, cultural, and religious practices. Cultural dynamics and sociodemographic

Table 1: Patient's characteristics

Parameter	Number of patients (%)
Age (years)	
Median	49
Range	21-89
Place of residence	
Rural	328 (27.1)
Urban	882 (72.9)
Level of education	
Illiterate	216 (17.9)
Literate and primary	252 (20.8)
Secondary	402 (33.2)
College and above	340 (28.1)
Occupation	
Working	172 (14.2)
Nonworking	1038 (85.8)
Marital status	
Married	984 (81.3)
Widow/divorced	184 (15.2)
Unmarried	42 (3.5)
Religion	
Hindu	1013 (83.7)
Muslim	117 (9.7)
Others	80 (6.6)
Staging	
Early stage (I and II)	556 (46)
Late stage (III and IV)	654 (54)
Family history of cancer	
Yes	73 (6)
No	1137 (94)
Comorbidity	
Present	254 (21)
Absent	956 (79)

Table 2: Univariate and multivariate analysis of sociodemographic factors by late stage of breast cancer patients

Parameter	Univariate		Multivariate	
	OR (95% CI)	*P*	OR (95% CI)	*P*
Age (years)				
<49	Ref			
≥49	0.80 (0.64-1.01)	0.061		
Place of residence				
Rural	Ref			
Urban	0.55 (0.42-0.71)	<0.001*	0.64 (0.49-0.84)	<0.001*
Religion				
Hindu	Ref			
Muslim	1.27 (0.86-1.88)	0.223		
Others	0.77 (0.49-1.22)	0.270		
Level of education				
Illiterate	Ref			
Literate and primary	2.96 (2.06-4.24)	<0.001*	2.60 (1.79-3.75)	<0.001*
Secondary	1.75 (1.26-2.44)	0.001*	1.64 (1.18-2.29)	0.003*
College and above	1.64 (1.23-2.20)	0.001*	1.55 (1.16-2.09)	0.003*
Marital status				
Married	Ref			
Widow/ divorced	1.34 (0.97-1.84)	0.071		
Unmarried	1.62 (0.85-3.09)	0.139		
Occupation				
Working	Ref			
Nonworking	1.09 (0.78-1.49)	0.624		
Family history of cancer				
Yes	Ref			
No	0.64 (0.40-1.04)	0.073		
Comorbidity				
Present	Ref			
Absent	1.01 (0.76-1.33)	0.919		

*Statistically significant (P<0.05). OR – Odds ratio; CI – Confidence interval; Ref – Reference category

differences across population subgroups modulate how biologic disease is expressed among different ethnic groups.[13] These interactions contribute to the observed variations in breast carcinoma incidence, mortality, and survival. Stage, a measure of disease status, is used to assess prognosis, plan treatment, and evaluate outcome. Long-term prognosis of BC patients strongly depends on stage of disease at diagnosis.[14] Factors associated with advanced stage at diagnosis in multicultural populations range from changes in the basic biological characteristics at the molecular and cellular level to societal issues – such as access to care and socioeconomic conditions – all of which impact on the health measure called "stage at diagnosis."[13] BC in developing countries is characterized by late presentation, advanced stage of disease at diagnosis, worse biologic behavior, and occurrence in younger women than reported in the developed countries.[15]

The present study analyzed the impact of sociodemographic factors according to the stage at diagnosis among BC patients reporting to a major cancer hospital in India. Our study findings found that 54% of the patients presented with an advanced stages of cancer. Such high proportion of late-stage presentation is a reflection of the cultural norms which downplay women's health problems.[16]

BC is more probable to be diagnosed at earlier stages in urban women than in rural women and consequently more treatable.[17] In this study, the relationship between late stage at diagnosis and living in rural background was significant (P < 0.001). According to the results of MacKinnon JA *et al.*, living place has an important role in defining risk of advanced BC.[18] Former studies have also reported that late stage at diagnosis and lower survival have been linked to poor access to healthcare facilities and lower awareness, especially in the urban poor and rural populations as well as demographic factors such as lower education and literacy.[9,19] Harirchi *et al*. in their study found that living in small cities and lack of access to health-care systems and health facilities contribute to delay in referring patients with advanced level of BC.[20] There are multiple factors that delay diagnosis in Indian women, ranging from limited availability and access to cancer health services, lower health literacy, and social stigma.[21]

In our study, we found that education played a significant role in the diagnosis of the BC. In other words, those with lower educational level were referred at more advanced level of disease. Education is a key factor of the socioeconomic status, which influences lifestyles, behavioral patterns, reproductive factors, such as parity and even stage at presentation.[22] Socioeconomic status has massive influence on a woman's health. Women with low socioeconomic status are more likely to be diagnosed with advanced BC compared to more economically privileged women.[23] A low level of education and a low socioeconomic status lead to poor uptake of screening by women. Previous studies have demonstrated that lower education and income are the most important causes of delay in diagnosis of BC in women in the developing countries.[9,20-24] Harirchi *et al*. have also reported that lower education is one of the most important causes of delay in referring to practitioners with advanced level of cancer.[20] Similarly, Richardson *et al*. also reported low socioeconomic status is one of the risk factors of late-stage diagnosis of BC and patients' referring.[25]

In the present study, 52% of younger women (<49 years) and 48% of older women (>49 years) presented with late disease. Although there are many studies in literature which have found that older women are more likely to present with late-stage BC, our study failed to find this association. Similarly, Satariano and Ragland in their study of 936 BC

patients failed to find any statistical association between age and stage of disease.[26] This may be due to similar average age in both early- and late-stage group of patients. The present study also did not find any association between presence of comorbidity and stage of diagnosis, which is similar to results reported earlier by other studies.[27,28] A systematic review conducted by Ramirez *et al*.[29] in 1999 found strong evidence that marital status was unrelated to delays by patients in reporting the disease, which is similar to our study. In the present study, family history of BC was not associated with stage at diagnosis as did by Burgess *et al*.[30] and Meechan *et al*.[31] Yip *et al*. reported no difference in size, stage, and duration of symptoms of BC between Malaysian women with a positive family history and those without.[32] Thus, the finding of the current study further emphasizes that specific factors are of particular importance in certain groups of patients and vice versa. Investigation and better understanding the nature of the BC-related health beliefs and attitudes of the general female population hold the key to reduce late-stage presentation of BC. Hence, an explicit, comprehensive model of human emotions, cognitions, and behaviors is required as the basis for assessment of the psychosocial risk factors.

This study has examined a range of individual factors that might influence BC stage at the time of diagnosis. To our knowledge, this work is unique in looking at sociodemographic factors in a hospital-based sample of BC patients. However, our study is not devoid limitations and hence must be considered while interpreting the results. One of the main limitations is that we could not consider the major sociodemographic factor such as income in our study as it was not documented at the time of registration in the hospital.

Conclusions

BC being the leading cause of death due to malignant neoplasm in the female population worldwide is currently a public health problem which merits priority attention. This study may represent a contribution to the investigation of the factors associated with later stage BC diagnoses in India. Our results may be considered the keys to determining how stage variation may be related to patients and community characteristics and where to invest limited resources for ensuring an early diagnosis and treatment of BC.

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Conflicts of interest

There are no conflicts of interest.

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