Socioeconomic Factors, Health Behavior, and Late-Stage Diagnosis of Breast Cancer: Considering the Impact of Delay in Diagnosis

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Abstract

We explored the association between a number of factors and stage of breast cancer in a study on 497 newly diagnosed women. Several factors are associated with late stage of breast cancer even if patients were diagnosed with no delay. The results suggest worse prognosis among patients with these factors. Women with the factors introduced in this study should take extra precautions when diagnosed with breast cancer.

Background: Stage of cancer at diagnosis is one of the most important factors in patient prognosis. By controlling for diagnostic delay, this study aimed to identify factors associated with late-stage breast cancer (BC). **Patients and Methods:** From November 2014 to January 2017, required information on 497 patients who were newly diagnosed with BC was obtained from patients' medical records. Logistic regression was used to measure the association between cancer stage and study variables. **Results:** Only 18.3% of patients were diagnosed at stage I. The rest were diagnosed at stage II (45.5%) or higher (36.2%). Among those with $\leq$ 3 months' diagnostic delay, age (odds ratio [OR] = 0.96; 95% confidence interval [CI], 0.93-0.99), place of residence (OR urban/rural = 1.72; 95% CI, 1.42-1.93), income (OR high/low = 0.27; 95% CI, 0.10-0.72), performing breast self-examination (OR yes/no = 0.51; 95% CI, 0.0.26 -0.98), smoking (OR yes/no = 2.23; 95% CI, 1.37-3.62), history of chest X-ray (OR yes/no = 1.40; 95% CI, 1.16-1.98), presence of chronic diseases (OR yes/no = 1.73; 95% CI, 1.36-5.48), and, for those with a delay of $>$ 3 months, marriage age (OR = 0.83; 95% CI, 0.73-0.94), income (OR high/low = 0.07; 95% CI, 0.008-0.63), family history of BC (OR = 3.82; 95% CI, 1.05-5.05), daily exercise (OR $<$ 10/10-20 = 0.10; 95% CI, 0.01-0.67), and presence of chronic diseases (OR yes/no = 1.77; 95% CI, 1.73-5.07), were associated with late-stage of cancer. **Conclusion:** Shortening the diagnostic delay can help patients receive medical treatment at an earlier disease stage, resulting in better prognosis. Smokers, younger women, and those with chronic conditions or a family history of BC should take extra caution, as they may have worse prognosis if diagnosed with cancer.

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Introduction

Breast cancer (BC) is the most common type of cancer and is the primary cause of death from cancer among women.[1-3] Several studies have suggested that tumor stage at diagnosis (TSD) is a strong predictor of patient prognosis and survival.[4] Accordingly, diagnosis of BC at an earlier disease stage results in better response to treatment and better prognosis.[2,5] For example, it is suggested that the 5-year survival rate among patients diagnosed with BC at early stage (85%) is much higher than those diagnosed at late stage (25%).[1] As a result, identifying predicting factors of TSD can improve patient survival. Several researchers have investigated the association between socioeconomic and demographic factors, and the survival of the patients with BC.[6,7] However, it is likely that the associated factors exert their effect via the delay time between starting the first disease-related symptoms and diagnosis of the disease, known as diagnosis delay (DD).[8,9] It is important to note that after controlling for DD, TSD seems to

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represent the rate of tumor progression.[2] Despite the importance of this issue, current evidence about TSD and its predictive factors are still being debated.[10] The associations of the studied factors with tumor stage differs among countries.[11,12] As a result of the tight association of DD and tumor stage,[2,4,13] the effects of other potential associations are inadequately understood.[10] That is, we do not know if factors related to disease stage exert their effect independently or by the length of delay in diagnosis.

We performed a delay-stratified analysis to study the associations of a wide range of variables, including sociodemographic and clinical factors, with tumor stage of BC. By so doing, it was possible to distinguish between DD-mediated and direct associations of the study variables.

Materials and Methods

Settings

In this hospital-based cross-sectional study, the associations of tumor stage with demographic, socioeconomic, and clinical characteristics of the patients were measured. In total, 497 patients who were newly diagnosed at Namazi hospital were selected from November 2014 to January 2017. The hospital is located in Shiraz (the capital of Fars province) and provides medical services to patients the from southern part of Iran. Patients' medical records were obtained from the Namazi hospital cancer registry database, the biggest and the most referred medical center, for other provinces in the southern part of Iran, including Fars, Khuzestan, Bushehr, Hormozgan, and Kohgiluyeh and Boyer Ahmad for all types of diseases, including cancer.[14]

Data Collection

Face-to-face interviews conducted by a trained nurse and patient medical files were used to obtain the required information. A subsample (50 patients) of the participants was selected to evaluate the reliability of an interview-administered questionnaire (using the test–retest method) and interview procedures. Accordingly, the questioner's reliability was estimated to be adequate (Cronbach's $\alpha = 0.86$).

On the basis of the results of the pilot study, the timing, method, and place of the interview was finalized. Demographic information including age, education, income, marital status, number of children, and place of residence was obtained via interview, which was conducted by a trained female nurse in a quiet and private place. Data on smoking, family history of BC, and patient health status, including history of any chronic disease or previous breast problems as well as her knowledge about breast self-examination (BSE), were also obtained during the interview. In addition, after a brief explanation, the first related symptom and the approximate date at which it was noticed was reported by the patients. Clinical data were collected by reviewing patients' medical records, which was conducted by an experienced medical coder. The clinical data included tumor; presence of estrogen receptor, progesterone receptor, human epidermal growth factor receptor 2, preneural invasion, and lymphovascular invasion; and disease stage.

An experienced pathologist defined the cancer stage on the basis of the tumor, node, metastasis classification system. Type of tumor was defined as ductal, lobular–medullary, or unknown. In this study, stages I or II were defined as early-stage disease, and stages III or IV were considered late- or advanced-stage disease.[15] DD was defined as the time interval (in days) between the self-reported date of onset of the first related symptom to the date at which the pathology report was issued.[2]

Inclusion and Exclusion Criteria

Only new patients who had pathology reports were selected. As a result, participants with relapsed disease were excluded from the analysis. A total of 497 cases met the inclusion criteria and were included in the study.

Statistical Analysis

The stage of BC was dichotomized into early (stages I or II) or late (stages III or IV) stage. Power analysis suggested that with such a sample size and at a significance level at 5% and 80% power, a 50% difference in the risk of late-stage diagnosis was detectable for those having a family history of the disease. For bivariate analysis, the unadjusted associations of all independent variables with the stage of cancer were measured by the chi-square test. Multiple logistic regression was used to measure the adjusted associations between the study variables and cancer stage. Stepwise selection strategy was applied to define the final logistic model.[16] The modeling procedure was started after collinearity between the independent variables was tested using variance inflation factor index. The cut point for the variance inflation factor index was set at 10. After variables in the model were defined, any significant interaction was also tested. The Akaike information criterion was used to compare models.

To distinguish between direct or intermediated (via DD) causal effects of independent variables (ie, age, education), 2 major approaches were applied. First, the results of both simple (unadjusted for DD or other covariates) and multiple (adjusted for DD and all other covariates that remained in the model) regression analysis were used to define whether an association fully or partially affected disease stage via DD, or whether the variable was directly associated with disease stage. A variable that was significantly associated with disease stage in both simple and multiple analysis was considered to have an at least partially direct effect on the outcome.[17,18] Second, DD-stratified analysis was conducted to measure DD-controlled associations of the explanatory variables and TSD. All statistical approaches were applied assuming a 2-sided test based on a 5% level of type I error. Stata 12 (StataCorp, College Station, TX) was used to conduct the analysis.

Patients who were literate read and signed an informed consent form, and verbal consent was obtained from illiterate patients. Only a small number of patients (n = 13) did not agree to participate in the study, and because there was an interview-administered questionnaire, only a small number of questions were left unanswered. In addition, because having a pathology report was mandatory in order for patients to be included on the study, nearly all patients had the basic required information in their medical file, with the highest missing rate for lymphovascular invasion, at 5.1%. Ethical approval was obtained from the Shiraz University of Medical Sciences ethical committee (no. 94-01-04-11052).

Results

Selected Characteristics of Study Subjects

In total, 497 women with BC were selected for analysis. The distributions of study variables by the stage of BC among participants are presented in Table 1. The mean age of patients at diagnosis was 47.7

Table 1 Characteristics of 497 Study Participants

Characteristic	Early Stage n (%)	Late Stage n (%)	Total (%)	P[a]
Age (y)				.661
<40	81 (25.6)	55 (30.5)	136 (27.4)	
40-50	107 (33.8)	59 (32.8)	166 (33.4)	
50-60	87 (27.4)	45 (25.0)	132 (26.5)	
>60	42 (13.2)	21 (11.7)	63 (12.7)	
Place of Residence				.064
Rural	60 (18.9)	47 (26.1)	107 (21.5)	
Urban	257 (81.1)	133 (73.9)	390 (78.5)	
Education				.018
Primary or illiterate	114 (36.0)	71 (39.4)	185 (37.2)	
Middle school	50 (15.7)	42 (23.3)	92 (18.5)	
High school	95 (30.0)	51 (28.4)	146 (29.4)	
College	58 (18.3)	16 (8.9)	74 (14.9)	
Family Income				<.001
Low	56 (17.7)	51 (28.3)	107 (21.5)	
Moderate	103 (32.5)	69 (38.3)	172 (34.6)	
High	158 (49.8)	60 (33.4)	218 (43.9)	
Occupation				.293
Housewife	235 (74.1)	141 (78.3)	376 (75.7)	
Employed	82 (25.9)	39 (21.7)	121 (24.3)	
Marital Status				.937
Ever married	293 (92.4)	166 (92.2)	459 (92.4)	
Never married	24 (7.6)	14 (7.8)	38 (7.6)	
Age at Marriage (y)				.960
<20	172 (54.3)	100 (55.5)	272 (54.7)	
20-25	68 (21.4)	40 (22.2)	108 (21.7)	
25-30	35 (11.0)	16 (8.9)	51 (10.3)	
>30	18 (5.7)	10 (5.6)	28 (5.6)	
Single	24 (7.6)	14 (7.8)	38 (7.7)	
Age at First Childbirth (y)				.922
<20	136 (42.9)	77 (42.8)	213 (42.9)	
20-30	111 (35.0)	59 (32.8)	170 (34.2)	
>30	26 (8.2)	17 (9.4)	43 (8.6)	
Single or no child	44 (13.9)	27 (15.0)	71 (14.3)	
Family History of Breast Cancer				.043
No	248 (78.2)	126 (70.0)	374 (75.3)	
Yes	69 (21.8)	54 (30.0)	123 (24.7)	
History of Breast Problem				.839
No	263 (83.0)	148 (82.2)	411 (82.7)	
Yes	54 (17.0)	32 (17.8)	86 (17.3)	
Aware of Breast Exam				.002
No	147 (46.4)	109 (60.6)	256 (51.5)	
Yes	170 (53.6)	71 (39.4)	241 (48.5)	
Daily Exercise (min)				.316
<10	193 (60.9)	117 (65.0)	310 (62.4)	
10-20	22 (6.9)	16 (8.9)	38 (7.6)	
>20	102 (32.2)	47 (26.1)	149 (30.0)	

Table 1 Continued

Characteristic	Early Stage n (%)	Late Stage n (%)	Total (%)	P[a]
Smoking				.001
No	279 (88.0)	138 (76.7)	417 (83.9)	
Yes	38 (12.0)	42 (23.3)	80 (16.1)	
X-ray History				.962
No	233 (73.5)	132 (73.3)	365 (73.4)	
Yes	84 (26.5)	48 (26.7)	132 (26.6)	
Other Chronic Disease				.004
No	207 (65.3)	94 (52.2)	301 (60.6)	
Yes	110 (34.7)	86 (47.8)	196 (39.4)	
Delay in Diagnosis (d)				<.001
<15	117 (36.9)	9 (5.0)	126 (25.4)	
15-30	84 (26.5)	29 (16.1)	113 (22.7)	
31-90	59 (18.6)	41 (22.8)	100 (20.1)	
>90	57 (18.0)	101 (56.1)	158 (31.8)	
Type of Tumor				.794
Ductal	289 (91.2)	167 (92.8)	456 (91.8)	
Lobular and medullary	16 (5.0)	8 (4.4)	24 (4.8)	
Unknown[b]	12 (3.8)	5 (2.8)	17 (3.4)	
PN Invasion				.032
No	192 (60.6)	91 (50.5)	283 (56.9)	
Yes	110 (34.7)	79 (43.9)	189 (38.1)	
Unknown[b]	15 (4.7)	10 (5.6)	25 (5.0)	
LVI				<.001
No	168 (53.0)	41 (22.8)	209 (42.0)	
Yes	134 (42.3)	129 (71.7)	263 (52.9)	
Unknown[b]	15 (4.7)	10 (5.5)	25 (5.1)	
ER				.181
Negative	82 (25.9)	37 (20.6)	119 (23.9)	
Positive	205 (64.7)	125 (69.4)	330 (66.4)	
Unknown[b]	30 (9.4)	18 (10.0)	48 (9.7)	
PR				.623
Negative	86 (27.1)	45 (25.0)	131 (26.3)	
Positive	201 (63.4)	117 (65.0)	318 (64.0)	
Unknown[b]	30 (9.5)	18 (10.0)	48 (9.7)	
HER-2				.558
Negative	175 (55.2)	105 (58.3)	280 (56.3)	
Positive	111 (35.0)	59 (32.8)	170 (34.2)	
Unknown[b]	31 (9.8)	16 (8.9)	47 (9.5)	

Abbreviations: ER = estrogen receptor; HER-2 = human epidermal growth factor receptor 2; LVI = lymphovascular invasion; PN = preneural invasion; PR = progesterone receptor.
[a]Chi-square test.
[b]Not included in analysis.

(standard deviation 10.57) years, with a range of 25 to 76 years. Only 18.3% of the patients were diagnosed with stage I disease. The rest were diagnosed with stages II (45.5%), III, or IV (36.2%).

Univariable Analysis

Table 1 presents the unadjusted associations between the stage of BC at diagnosis and study variables. Accordingly, among patients who were diagnosed at late stage, 54 (30.0%) had at least a family member who had been diagnosed with BC, whereas only 69 (21.8%) of patients with early-stage disease reported a history of BC among their family ($P = .04$). Among patients at early-stage disease, 170 (53.6%) were able to perform breast BSE, whereas only 71 (39.4%) of patients with late-stage disease were aware of BSE ($P = .002$). Of the patients diagnosed at late stage, 101 (56.1%) had a delay of > 3 months in diagnosis compared to 57 (18.0%) among those diagnosed at early stage ($P < .001$). Among patients at late stage and early stage of tumor, respectively, 129 (71.7%) and 134 (42.3%) were reported to have lymphovascular invasion

($P < .001$). Also, preneural invasion was reported in 110 (34.7%) of the patients who were diagnosed at early stage compared to 79 (43.9%) of patients at late stage ($P = .03$). Moreover, education ($P = .01$), family income ($P < .001$), smoking ($P = .001$), and presence of other chronic diseases ($P < .004$) were associated with cancer stage. However, age at diagnosis, place of residence, occupation, marital status, age at marriage, age at first delivery, history of breast problems, physical exercise, X-ray history, type of tumor, estrogen receptor, progesterone receptor, and human epidermal growth factor receptor 2 among those who experienced late-stage cancer did not differ significantly from that of those with early-stage disease ($P > .05$ for all).

Multivariable Analysis

After controlling for the effects of delay time and other potential confounders, results from multiple logistic regression analysis suggested that older age at diagnosis (odds ratio [OR] = 0.97; 95% confidence interval [CI], 0.94-0.99; $P = .02$) and higher family income (OR high/low = 0.19; 95% CI, 0.06-0.58, $P < .001$) were significant preventive factors of being diagnosed with late-stage BC. As expected, longer delay in diagnosis was strongly associated with late disease stage (OR = 1.05; 95% CI, 1.03-1.08, $P < .001$). The risk of being diagnosed at late stage was also significantly increased with having other chronic diseases (OR yes/no = 1.77; 95% CI, 1.73-5.07; $P = .03$) or reporting a history of BC among relatives (OR yes/no = 2.48; 95% CI, 1.04-3.62; $P = .04$). Significant interactions between DD with income ($P = .006$) and presence of other disease (0.04) were found.

Table 2 shows the results of delay-stratified analysis using the same strategy used for the main model variable selection. Accordingly, among those with ≤ 3 months' diagnostic delay, age (OR = 0.96; 95% CI, 0.93-0.99; $P = .03$), place of residence (OR urban/rural = 1.72; 95% CI, 1.42-1.93; $P = .04$), income (OR high/low = 0.27; 95% CI, 0.10-0.72; $P = .009$), ability to perform BSE (OR yes/no = 0.51; 95% CI, 0.0.26-0.98; $P = .04$), smoking (OR yes/no = 2.23; 95% CI, 1.37-3.62; $P = .001$), history of chest X-ray (OR yes/no = 1.40; 95% CI, 1.16-1.98; $P = .04$), and presence of other chronic diseases (OR yes/no = 1.73; 95% CI, 1.36-5.48; $P = .004$) were directly associated with BC stage.

Among those with a delay of > 3 months, age at marriage (OR = 0.83; 95% CI, 0.73-0.94; $P = .005$), income (OR high/low = 0.07; 95% CI, 0.008-0.63; $P = .01$), family history of BC (OR = 3.82; 95% CI, 1.05-5.05; $P = .04$), daily exercise (OR < 10/10-20 = 0.10; 95% CI, 0.01-0.67; $P = .01$), and presence of other chronic diseases (OR yes/no = 1.77; 95% CI, 1.73-5.07; $P = .03$) were associated with cancer stage.

Discussion

In the present study, more than a third of patients were diagnosed with late-stage disease. The mean age at diagnosis of the patients was about 45 years, which is in line with the latest report from the Iranian health minister in 2007; it is also in accordance with other Iranian studies that reported the mean age of patients at diagnosis of BC.[19,20] Other important factors that were directly associated with TSD were DD and presence of other chronic diseases. Family income was the only factor that was inversely associated with TSD. A longer delay in diagnosis is strongly associated with late disease stage. The results of several studies on the same subject are consistent with our findings.[21] The later stage of BC among women with significant DD could possibly be associated with the fact that longer DD is associated with a longer time for disease to progress. However, later BC stage among women with no DD may suggest more invasive or faster-growing disease. In the present study, a significant number of the patients were aware of the method of BSE, and some reported that they regularly checked their breasts for palpable masses. Among those with no diagnostic delay, being aware of BSE was inversely associated with cancer stage at time of diagnosis. However, this association no longer existed when the diagnostic delay was > 3 months. This finding is in accordance with the findings of Hackshaw and Paul.[22]

The pooled and DD-stratified analysis revealed an inverse association between age of those with no significant DD and the BC stage. This may indicate that those having BC at a younger age experience faster disease progression, and thus worse prognosis. This finding is in accordance with the findings of Nixon et al[23] but is in contrast with those of Arndt et al.[24] However, in these studies, the possible effect of DD on the association between age and TSD was not considered. In addition, only among those with no DD, smoking and X-ray were significantly associated with TSD. These results may suggest a contribution of later factors on more invasive and faster progress of BC. Ecologic studies have suggested that women from low- and middle-income countries have a higher chance of being diagnosed at late disease stage.[25] This association was reported by Clegg et al,[26] who found an inverse association between income and BC stage among women. Harper et al[27] suggested that a difference in socioeconomic status in various geographic areas was the main determinant of the spatial differences in BC stage. These findings were interpreted as a possible DD intermediary effect on the association, as women with a higher socioeconomic status (more education, younger, and better access to medical services) have faster response and shorter DD. However, the findings from our study suggest that among those with no DD, people with better socioeconomic status were diagnosed at lower TSD. This raises the question as what drives the association between socioeconomic status of women and TSD irrespective of DD.

On the basis of our results, there was no significant association between TSD and marital status, a result that is supported by Mohaghegh et al[28] but that is in contrast to Shieh et al,[21] who reported a significant association between TSD and the patient's marital status. Finding an inverse association between age at marriage and stage of cancer among those with significant DD has not previously been reported, and it requires a closer look, as women married at a younger age are predominantly from communities with a lower socioeconomic status and less education. Among similar groups, family history was associated with TSD.

In line with the results of a previously published study,[29] analysis of data from those with no significant DD suggested that smoking is directly associated with TSD. However, this association disappears when studying participants with a significant TSD. Several studies have reported smoking to be an important risk factor for BC, and a few have suggested that patients who smoke had a worse prognosis.[30,31] These findings may suggest that smoking is a risk factor for not only BC but also for more invasive types of the disease.

Table 2 Delay-Stratified Associations of Study Variables With Stage of Breast Cancer

	≤3 mo		>3 mo		Overall	
Variable	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***
Age (y)	0.96 (0.93-0.99)	.032	—	NI	0.97 (0.94-0.99)	.025
Age at marriage (y)	—	NI	0.83 (0.73-0.94)	.005		
Place of Residence		.041	—	NI	—	NI
Urban	1 (—)					
Rural	1.72 (1.42-1.93)					
Education	—	NI			—	NI
Primary and lower			1 (—)	—		
Middle school			3.06 (0.67-13.82)	.142		
High school			3.22 (0.61-19.61)	.168		
College			0.05 (0.001-5.21)	.214		
Family Income						
Low	1 (—)	—	1 (—)	—	1 (—)	—
Moderate	0.40 (0.15-1.04)	.065	0.12 (0.01-0.89)	.032	0.55 (0.28-1.07)	.081
High	0.27 (0.10-0.72)	.009	0.07 (0.008-0.63)	.017	0.19 (0.06-0.58)	<.001
Family History of Breast Cancer	—	NI				
No			1 (—)		1 (—)	
Yes			3.82 (1.05-5.05)	.045	2.48 (1.04-3.62)	.041
Aware of Breast Exam		.043	—	NI	—	NI
No	1 (—)					
Yes	0.51 (0.26-0.98)					
Daily Exercise (min)	—	NI			—	NI
<10			1 (—)	—		
10-20			0.10 (0.01-0.67)	.019		
>20			0.35 (0.10-1.24)	.105		
Smoking		.001	—			
No	1 (—)			NI	1 (—)	.080
Yes	2.23 (1.37-3.62)				1.64 (0.92-2.93)	
X-ray History		.045	—	NI	—	NI
No	1 (—)					
Yes	1.40 (1.16-1.98)					
Chronic Disease[a]		.004		.036		.036
No	1 (—)		1 (—)		1 (—)	
Yes	1.73 (1.36-5.48)		1.77 (1.73-5.07)		1.77 (1.73-5.07)	
Delay in diagnosis (d)	—	NA	—	NA	1.05 (1.03-1.08)	<.001

Abbreviations: CI = confidence interval; NA = not applicable; NI = not included in final model after stepwise variable selection; OR = odds ratio.
[a]Diabetes, hypertension, and cardiovascular disease.

The association between presence of other chronic diseases and cancer stage is another important finding of the present study. Regardless of diagnostic delay, women with a chronic condition were diagnosed at later stage. Yancik et al[32] suggested that several chronic diseases such as diabetes increase the risk of mortality among patients with advanced BC stage. In addition, Iyengar et al[33] have shown that obesity and insulin resistance are associated with worse prognosis in early-stage BC. Although it has been suggested that women with other chronic diseases may relate their symptoms to their chronic condition and only seek medical help later,[11] the results of the present study suggested that the association is possibly independent of DD. With the same analogy for the association of smoking and TSD, chronic diseases may also make women unable to resist tumor progression or may cause more invasive types of the disease.

Our results also suggested that among those with no significant DD, women who live in rural areas had a higher chance of being diagnosed at late stage of BC.[34] However, the association was nonsignificant when considering those with DD. A significant association was also found between a self-reported history of chest X-ray and disease stage among those with no DD. Again, this finding may suggest that exposure to X-rays may contribute to more invasive types of BC or faster progression of BC. Finally, no association was found between marital status or number of children and TSD.

Strengths and Limitations

We used a wide range of variables that might influence the rate of progression of BC. Recruiting participants who visited the biggest referral center in the southern part of Iran makes the results generalizable to the city's population. However, in interpreting the results, the possibility of error in self-reported information, such as the date at which the first symptom was noted, ought to be taken into account. Participant ethnicity was not included in the analysis because of the inadequacy of the sample size for different ethnic groups.

Conclusion

Although this study was not able to measure a causal association between the outcome and other study variables, the results revealed several potential causal links that warrant further research.

Several important known risk factors of BC are possibly also important in the rate of disease progression. Delay in diagnosis has been found to be an important predictive factor of BC disease stage. As a result, shortening the DD can help patients to receive medical treatment at an earlier stage and thus have a better prognosis. Although more studies are needed to confirm our results and to explain the mechanism of action of the associated factors, it seems that smokers or younger women and those with chronic conditions or a family history of cancer ought to take extra caution, as they may have a worse prognosis if diagnosed with BC.

Clinical Practice Points

- The importance of diagnosis delay in treatment of cancer is appreciated before.
- Taking care of diagnosis delay in our study, we introduced several other factors, which are apparently affecting the rate of progression of BC among women.
- In that regard, women who are smokers, are younger and those who are suffering from chronic diseases are at higher risk of advanced clinical stage of BC.
- These findings may able us to provide faster detection and better care for patients with BC.

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Disclosure

The authors have stated that they have no conflict of interest.

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