

## Original Research Article

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# Factors associated with the employment status of breast cancer survivors: a single center cross-sectional study

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## ABSTRACT

**Background:** Breast cancer survivors constitute a big proportion among all female cancer survivors and the employment status of breast cancer survivors is an important public health issue. The aim of the study is to evaluate the effects of some demographic properties and the treatment modalities used for breast cancer on patients' employment status.

**Methods:** This is a single-center cross-sectional study. We assessed 2550 patients with breast cancer for eligibility. Face to face interview was performed with 688 breast cancer survivors. A total of 249 patients who had an income-generating job before diagnosis and completed at least 1 year after surgery and/or adjuvant radiotherapy, chemotherapy for breast cancer were included in the study. The job loss rate of the patients was evaluated according to their demographics, clinical features and treatment methods applied for breast cancer. Univariate and multivariate analyses were used in order to show these associations.

**Results:** The job loss rate of the whole study group was 49.4% (n=123). Adjuvant radiotherapy was associated with continued employment, however, neither adjuvant chemotherapy nor hormone therapy had no association. Higher level of education, higher household income, being a public officer, and having a breast-conserving surgery was associated with continued employment in breast cancer survivors.

**Conclusions:** The prior employment as a private sector employee should not be a determinant for losing job. Therefore, improvements or modifications should be made for this factor in order to keep breast cancer survivors in working life.

**Keywords:** Job loss, Breast cancer, Chemotherapy, Radiotherapy

## INTRODUCTION

Breast cancer is one of the most frequent malignancies and an important cause of death among women.<sup>1</sup> The improvement in therapies has reduced mortality from breast cancer.<sup>2</sup> For female breast cancer patients, the five-year survival rate is approximately 90 percent, in the US.<sup>3</sup> Breast cancer survivors constitute the biggest proportion among all female cancer survivors 41%, and this number represents 3.6 percent of the United States population.<sup>4,5</sup>

With the improved prognosis, the breast cancer survivors experience long life and therefore, they have psycho-social concerns like employment, child-bearing, marriage in addition to the outcomes associated with cancer such as cancer recurrence, development of new cancer and short or long-term problems associated with treatment.<sup>6</sup> The breast cancer survivors are mostly in the working age.<sup>7</sup> Approximately 20% of the breast cancer survivors do not return to work.<sup>8</sup> Studies show that the quality of life of breast cancer survivors worsens with unemployment.<sup>9</sup>

Therefore, the employment status of breast cancer survivors becomes an important public health issue.

Many studies investigated the employment status and the factors related to that in female breast cancer survivors.<sup>8</sup> Socioeconomic status, employer support, treatment modality, and other factors are investigated in the literature. However, there is a wide variety of the results among different papers.<sup>6</sup> Therefore, the aim of the present study is to evaluate the effects of demographics, treatment modalities, prior employment status of patients on working status of the breast cancer survivors with a perspective of multivariate evaluation.

## METHODS

### **Study design and setting**

This study is a single-center cross-sectional study to which was conducted in accordance with the declaration of Helsinki and in line with the strengthening the reporting of observational studies in epidemiology (STROBE) statement.<sup>10</sup> We performed the study between January 2020 and April 2020 at the Health Sciences University, Ankara Oncology Hospital, Medical Oncology Department after the ethical approval was obtained from Health Sciences University, Dr. Abdurrahman Yurtaslan Ankara Oncology Hospital Ethics Committee.

Our hospital is an oncology research and training hospital which provides a comprehensive health care for cancer patients. The department of oncology treats three thousand newly diagnosed cancer patients, annually. Approximately half of them are breast cancer patients. Approximately, four hundred cancer patients are seen, daily, in our clinic.

### **Sample size and patients**

We did not calculate a priori sample size. We intended to enroll all eligible patients who met the study criteria in the study.

All patients diagnosed with breast cancer in our oncology clinic between January 2020 and April 2020 was evaluated for eligibility. Patients between 18 and 70 years old and who completed at least 1 year after surgery and/or adjuvant radiotherapy, chemotherapy for breast cancer were included in the study. Patients with continuing hormone therapy are also included. The patients with missing data, stage IV breast cancer patients and patients who are currently taking adjuvant chemotherapy or radiotherapy were excluded from the study. The flow diagram of the study is given in (Figure 1).

Those who met the study criteria were informed by the secretary about the study. An informed consent form was given to those wishing to participate in the study with sufficient time to read. Informed consent form was signed

by those who agreed to participate in the study. Then, a face to face interview was carried out by a medical oncologist by using a questionnaire form prepared by the researchers in a separate room. The patients' baseline and follow-up data were gathered from the electronic health records.

### **Variables and outcomes**

Age and sex of the patients, marital status, education, monthly household income, the time of diagnosis and the stage of cancer, cancer treatments, employment status before and after the diagnosis and treatment were recorded.

Treatment methods were categorized as surgical approach, chemotherapy, radiotherapy and hormone therapy. Two types of surgery are performed; total mastectomy and breast-conserving surgery (lumpectomy). As adjuvant chemotherapy, anthracycline, cyclophosphamide and taxane treatments are applied in our center. Whole-breast radiotherapy (WBRT) is applied to patients undergoing breast-conserving surgery. Postmastectomy radiotherapy (PMRT) is applied to the chest wall and to the regional nodes to those who underwent total mastectomy with positive axillary lymph node and those with a tumor diameter greater than 5 cm.

The primary outcome of this study was the job loss rate of the patients after treatment. We defined the job loss as being fired, or being retired related to breast cancer.

### **Statistical analysis**

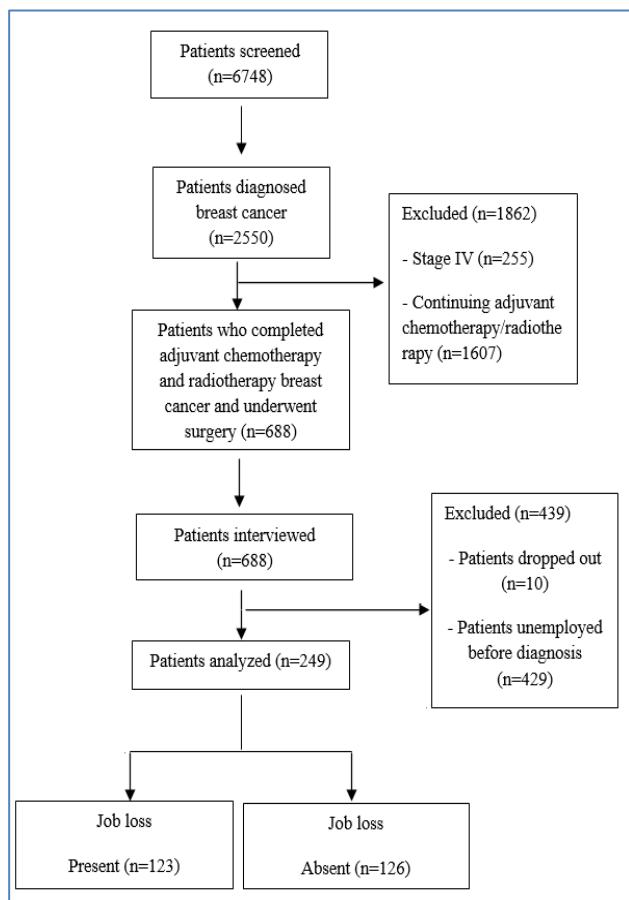
Statistical analyses were performed using SPSS version 23 (IBM Corp. in Armonk, NY). There was no missing data of the variables in the study. Shapiro-Wilk test was used to evaluate the distribution of the data. Descriptive data are presented as the median with the interquartile range (IQR) for non-normally distributed numerical variables, and the frequency (n) and the percentage (%) for categorical variables. The job loss risk was determined by univariate and multivariate binary logistic regression analyses. Patients' characteristics that were significantly associated with job loss rate in univariate analysis, were included multivariate logistic regression model. The Hosmer-Lemeshov goodness of fit test was used to determine the goodness of fit of the logistic regression model, and Nagelkerke R<sup>2</sup> was used to estimate the variance explained by the variables in the logistic regression model. The odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for comparing job loss risk. P<0.05 was considered as statistically significant level.

### **Ethical approval**

The study was approved by the University of Health Sciences, Dr. A.Y. Ankara Oncology Training and Research Hospital Ethics Committee.

## RESULTS

During the study period, 2550 patients with breast cancer were assessed for eligibility for the study. Face to face interview was performed with 688 patients. 429 patients who were unemployed before breast cancer diagnosis were excluded and 10 patients were dropped out after being informed about the study. A total of 249 patients were included in the study (Figure 1).



**Figure 1: Flow diagram of the study.**

The median age of patients was 46.0 (41.0-50.0) years old. The education level and the monthly household income of the participants were evenly distributed. Of the patients, 73.5% were married, and 88% lived in the city center. The patient demographics are shown in (Table 1).

The median follow-up time of the patients was 36.3 months (IQR: 21.5-56.0 months). Of these 249 patients 141 (56.6%) had TNM stage 2 cancer. 102 (41%) of them had breast-conserving surgery and the rest had total mastectomy. The patients received chemotherapy (213, 85.5%), radiotherapy (195, 78.3%), and hormone therapy (222, 89.2%). Approximately one-thirds of them had a comorbid disease. Approximately half of the participants were working in private sector (120, 48.2%). During the follow-up half of the patients left their jobs (123, 49.4%) (Table 2).

**Table 1: Demographics of the patients.**

Variables	n=249
<b>Age (years) and median (IQR)</b>	46.0 (41.0-50.0)
<b>Education level, N (%)</b>	
Primary education	84 (33.7)
Secondary education	72 (28.9)
Higher education	93 (37.4)
<b>Place of residence, N (%)</b>	
City center	219 (88.0)
District	30 (12.0)
<b>Marital status, N (%)</b>	
Single	66 (26.5)
Married	183 (73.5)
<b>Monthly income, N (%)</b>	
<400\$	72 (28.9)
401-800 \$	93 (37.4)
>800 \$	84 (33.7)

Note: IQR - interquartile range.

**Table 2: Clinical features and occupational characteristics of the patients.**

Variables	n=249
<b>TNM stage, N (%)</b>	
Stage 1	42 (16.9)
Stage 2	141 (56.6)
Stage 3	60 (24.1)
Stage 4	6 (2.4)
<b>Surgical method, N (%)</b>	
Total mastectomy	147 (59.0)
Breast-conserving surgery	102 (41.0)
<b>Adjuvant therapy, N (%)</b>	
Chemotherapy	213 (85.5)
Radiotherapy	195 (78.3)
Hormone therapy	222 (89.2)
Follow-up time (month) and median (IQR)	36.3 (21.5-56.0)
Comorbid disease, N (%)	81 (32.5)
<b>Working status before diagnosis, N (%)</b>	
Public employee	78 (31.3)
Private sector employee	120 (48.2)
Part-time employee	39 (15.7)
Self-employed	12 (4.8)
Job loss, N (%)	123 (49.4)

Note: IQR - interquartile range.

The univariate analysis showed that age, place of residence, tumor stage, and presence of a comorbid disease were not associated with job loss. Lower level of education, being single, low household income increased the risk of losing job significantly ( $p<0.001$ ,  $p=0.08$ ,  $p<0.001$ , respectively). Undergoing total mastectomy increased the job loss risk 3.3 times than the breast conserving surgery (OR: 0.30 (0.18-0.51) 95% CI,  $p<0.001$ ).

Adjuvant radiotherapy was associated with continued employment (OR: 0.40 (0.22-0.76) 95% CI,  $p<0.001$ ), however, neither adjuvant chemotherapy nor hormone therapy had no association. The working status before diagnosis significantly affected the risk of job loss. When compared to public employees, private sector employees and part time employees had higher risk of losing their jobs (Table 3).

**Table 3: Univariate analysis of the patients' characteristics for job loss risk.**

Characteristics	OR (95% CI)	P value
<b>Age (years)</b>	0.97 (0.94-1.01)	0.118
<b>Education level</b>		
Primary education	Ref	
Secondary education	0.66 (0.35-1.25)	0.200
Higher education	0.27 (0.14-0.49)	<0.001
<b>Place of residence</b>		
City center	Ref	0.275
District	0.65 (0.30-1.41)	
<b>Marital status</b>		
Single	Ref	0.008
Married	0.45 (0.26-0.81)	
<b>Monthly income</b>		
<400 \$	Ref	
401-800 \$	0.21 (0.10-0.45)	<0.001
>800 \$	0.04 (0.02-0.10)	<0.001
<b>TNM stage</b>		
Stage 1	Ref	
Stage 2	1.17 (0.59-2.35)	0.652
Stage 3	2.00 (0.90-4.45)	0.090
Stage 4	1.33 (0.24-7.39)	0.742
<b>Surgical method</b>		
Total mastectomy	Ref	
Breast-conserving surgery	0.30 (0.18-0.51)	<0.001
Adjuvant chemotherapy	0.97 (0.48-1.97)	0.938
Adjuvant radiotherapy	0.40 (0.22-0.76)	0.005
Adjuvant hormone therapy	0.45 (0.19-1.04)	0.062
Presence of comorbid disease	1.34 (0.79-2.29)	0.278
<b>Working status before diagnosis</b>		
Public employee	Ref	
Private sector employee	10.21 (4.97-20.99)	<0.001
Part-time employee	30.25 (10.42-87.78)	<0.001
Self-employed	NC	

OR: odds ratio, CI: confidence interval, Ref: reference category, and NC: not calculable.

Table 4 presents the multivariate analysis of the patients' characteristics for job loss risk. The analysis showed that the lower household income, surgical method, adjuvant radiotherapy, and being a private sector employee or part-

time employee are independent risk factors for job loss. Breast conserving surgery decreased the risk of losing job 2.5 times when compared with total mastectomy (OR: 0.40 (0.19-0.87) 95% CI,  $p<0.001$ ). Similarly, adjuvant radiotherapy was associated with 2.5 times decrease in leaving job (OR: 0.41 (0.17-0.99) 95% CI,  $p=0.049$ ). The high risk of losing job in private sector employees and part-time employees continued in multivariate analysis (OR: 7.82 (3.09-19.80) 95% CI,  $p<0.001$  and OR: 23.51 (6.43-86.02) 95% CI,  $p<0.001$ , respectively) (Table 4).

**Table 4: Multivariate regression analysis of the patients' characteristics for job loss risk.**

Characteristics	OR (95% CI)	P value
<b>Education level</b>		
Primary education	Ref	
Secondary education	0.88 (0.35-2.25)	0.793
Higher education	0.47 (0.18-1.22)	0.119
<b>Marital status</b>		
Single	Ref	
Married	0.56 (0.23-1.33)	0.185
<b>Monthly income</b>		
<400 \$	Ref	
401-800 \$	0.29 (0.11-0.79)	0.015
>800 \$	0.13 (0.04-0.40)	<0.001
<b>Surgical method</b>		
Total mastectomy	Ref	
Breast-conserving surgery	0.40 (0.19-0.87)	<0.001
Adjuvant radiotherapy	0.41 (0.17-0.99)	0.049
<b>Working status before diagnosis</b>		
Public employee	Ref	
Private sector employee	7.82 (3.09-19.80)	<0.001
Part-time employee	23.51 (6.43-86.02)	<0.001
Self-employed	NC	

OR: odds ratio, CI: confidence interval, Ref: reference category, NC: not calculable, \*Hosmer-Lemeshow test  $p=0.231$  and Nagelkerke's  $R^2=0.570$ .

## DISCUSSION

In this study, our aim was to assess the factors that increased the risk of leaving job in breast cancer survivors. We found that demographics, treatment approaches, and employment characteristics were risk factors for leaving jobs.

Different studies show approximately 20% of their study groups were unemployed after cancer diagnosis.<sup>9</sup> According to a systematic review, rates of the return to work varied between 43-93%.<sup>6</sup> In our study, approximately half of the patients lost their jobs. This may be related to higher percentage of stage 2 and above patients and the need for adjuvant chemotherapy in 85% of the patients. In our center, the shortest adjuvant therapy is at least 3 months and continuing side effects related to

chemotherapy may be a cause for not returning to work. High unemployment rates in our country may also be the root factor for this result.

Several studies show being single is associated with returning to work in breast cancer patients.<sup>11,12</sup> The reason behind being single as a facilitator for returning to work may be related with the financial needs of the patient.<sup>11,12</sup> A 2018 metanalysis found no association between marital status and employment status.<sup>13</sup> Lower level of education is described as a risk factor for unemployment in many studies.<sup>9,12-15</sup> This is consistent with the knowledge that these workers are mostly “peripheral workers” and predisposed to unemployment.<sup>16</sup> In our univariate analysis, being single increased and higher education decreased the risk of job loss, however, these associations are lost in multivariate analysis.

Our multivariate analysis showed that lower household income was an independent factor associated with unemployment. Similarly, many studies show that lower household income is one of the most important factors that is associated with unemployment in breast cancer survivors.<sup>11,13,17-19</sup>

In a case-control study which investigated the “work ability” in breast cancer survivors -which is a strong predictor of return to work after treatment- they found that the only socioeconomic factor associated with decreased work ability was low household income.<sup>17,20</sup> However, this association must be interpreted with caution in cross-sectional studies as low-household income may both be a cause or result of unemployment.

In our study, both univariate and multivariate analyses showed that breast-conserving surgery was associated with low job loss risk. This finding is consistent with other studies and coherent with the idea of preserved self-confidence.<sup>7,11,13,21</sup>

Breast-conserving surgery is also related to improved arm functionality because axillary lymph node dissection is made less than in patients undergone total mastectomy which results with fewer arm lymphedema. Improved arm functionality will help breast cancer survivors for returning to work. Lymphedema, which develops more in patients undergoing modified radical mastectomy, presents difficulties for patients even in daily life, while it seems quite difficult for them to continue their work life in this way.

The association between receiving chemotherapy or radiotherapy and unemployment was substantially investigated in different studies.<sup>12,18,19,22,23</sup> A recent meta-analysis showed no association between receiving radiotherapy or endocrine therapy with unemployment; however, unemployment was associated with receiving chemotherapy.<sup>13</sup> We did not find an association between chemotherapy and employment status. However, both univariate and multivariate analyses showed an

association between receiving radiotherapy and not losing job.

In our study, one of the most important factors associated with unemployment is found to be the prior employment status of the breast cancer patients, in our study. The part-time workers and private sector employees lose their jobs more than full-time workers and public employees. This association is shown as the support of the employer is emphasized in many qualitative and quantitative studies.<sup>21,24,25</sup> Studies also show increased unemployment rates in part-time workers.<sup>15</sup>

However, to the best of our knowledge, a direct comparison between public and private employees has not been done. Our results clearly show that breast cancer survivors can be accommodated in working life when they are public employees. Therefore, improvements for continuous employment should be instituted for private sector employees with breast cancer.

### **Limitations**

There are several limitations in the present study. Firstly, our study gives the results of our single-center population and should not be generalized to all breast cancer survivors. Secondly, our study was cross-sectional, therefore, the associations do not show a causal relationship. Another limitation of our study is not getting detailed and specific information about the job-seeking time and process. This information may confound the other associations. We also did not investigate the specific job tasks which would affect the work ability of the patient.

### **CONCLUSION**

The employment status of a person is determined by several intricate factors. In a breast cancer patient these factors are interwoven like a spider web. However, our study showed that higher level of education, higher household income, being a public officer, and having a breast-conserving surgery is associated with continued employment in breast cancer survivors. If the employment status as a civil servant is protective for breast cancer survivors for staying in working life, private sector employees should make adaptations to keep their workers employed. Awareness campaigns and supportive measures should be provided for employers for their breast cancer survivor employees.

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