



# Factors associated with delayed diagnosis of breast cancer; a study in North-West of Iran

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## Abstract

**Introduction:** Delayed diagnosis and treatment of breast cancer leads to the presentation of the disease in advanced stages necessitating more invasive surgical interventions, increasing health care costs and mortality rate, and finally reduced patients' survival.

**Objectives:** This study aimed to investigate the factors associated with delayed diagnosis of breast cancer in the north-west of Iran.

**Patients and Methods:** This retrospective cross-sectional study was conducted on 70 breast cancer patients referred to the cancer registry of Ardabil city, north-west of Iran. The time from the presentation of clinical symptoms to the initiation of treatment was determined by interviews to identify the system and patients' delays. The data was analyzed in SPSS 19 with the level of significance as  $P < 0.05$ .

**Results:** The mean age of the patients was  $43.3 \pm 13.2$  years. The means of total, patient, and system related delays were  $9.4 \pm 1.6$  weeks,  $6.3 \pm 9.9$  weeks, and  $3.1 \pm 2.8$  weeks respectively. Regression analysis showed that age, marital status, educational level, monthly income, fear of cancer, and residency were significantly associated with patients' delay.

**Conclusion:** Our results highlighted the important role of patients' related factors in delayed diagnosis of breast cancer. Therefore, it is essential to educate individuals for timely referrals to physicians.

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## Introduction

Breast cancer is the second leading cause of cancer related deaths among 20-59 years old women after lung cancer and the second most common cancer among women after non-melanoma skin cancer (1).

The global incidence of breast cancer has increased during the past two decades to about 12.5% (i.e. one out of eight women) delivering a growing social problem in all communities. According to the World Health Organization (WHO), more than 1.2 million patients are diagnosed with breast cancer, since more than 500 000 people have died from breast cancer related complications annually (2).

Breast cancer is the most common cancer among Iranian women with an incidence rate of 22.6 per 100 000 of population. Because of the high incidence rate of breast cancer in Iran and considering at least one-decade early presentation of this neoplasm in Iran compared with developed countries, it is crucial to devote special attention to this

## Key point

In a retrospective cross-sectional study conducted on 70 breast cancer patients referred to the cancer registry of Ardabil city, north-west of Iran, we found older patients had longer delays in seeking primary medical care. Higher educational level and monthly income were associated with shorter patients' delay. Furthermore, fear of breast cancer and negligence deterred patients from visiting doctors.

disease (3).

Since breast cancer is an important cause of death in women, diagnostic procedures are of particular importance to timely diagnose this neoplasm. Nevertheless, due to the lack of knowledge about the importance of screening test, most patients present in advanced stages of the disease (1).

Delayed diagnosis and treatment of breast cancer are major challenges leading to the presentation of the disease in advanced stages requiring more invasive therapeutic interventions, imposing higher health care

costs and cancer related mortality, and finally reduced patients' survival (4).

Overall, around 70 % of Iranian women with breast cancer present in advanced stages of the disease. This can be partly attributed to the delays in either referral, diagnosis or treatment of this condition. The delayed diagnosis of breast cancer weeks; on the other hand, increases the risk of disease recurrence and progression resulting in higher rate of mortality (5).

The word "delay" refers to the interval from the clinical presentation to the primary medical intervention and treatment. Delayed diagnosis of breast cancer can be due to either system or patient related factors. Patient delay refers to the interval between the presentation of clinical symptoms or signs and receiving the first medical advice, and also system delay refers to the interval from the first medical advice to the initiation of breast cancer treatment (6). Overall, the delay may also be addressed as the interval from visiting a doctor to refer to the hospital, visiting hospital to diagnosis, or the diagnosis to treatment of breast cancer (7).

According to recent studies, factors related to patient delay include patients' distrust, fear of cancer, educational level, supports from family members and friends, and access to medical facilities. Factors associated with system delay include those related to therapeutic services (i.e. surgery, radiotherapy and chemotherapy), and factors associated with physician's experience (i.e. medical negligence) (8).

## Objectives

Considering the high incidence of breast cancer in Ardabil province, and the importance of evaluating factors associated with delayed diagnosis of breast cancer, we aimed to evaluate the factors influencing the timely diagnosis of breast cancer in this province.

## Patients and Methods

### Study design and participants

In this retrospective cross-sectional study, 70 breast cancer patients referred to the cancer registry of Ardabil city and treated with either surgery, chemotherapy, radiotherapy or combinations of them were randomly selected. The required data was collected by making phone calls, interviews, and referring to patients' archived records. The data included patients' age, gender, body mass index (BMI), education, income, family history of breast cancer, ages of menstrual cycle onset, marriage, birth of first child, as well as breastfeeding duration and parity. Other information included the name of referring hospital, the start dates and the types of therapeutic (i.e. surgery and chemotherapy) and diagnostic (i.e. ultrasound or mammography) interventions, and the elapsed times from the diagnosis to treatment start, from symptoms appearance to first doctor appointment, and finally from

the first appointment to initial advice or therapeutic and diagnostic procedures.

### Ethical issues

This research was performed according to the Declaration of Helsinki. Informed written consent was obtained from the patients, and the study was approved by the Ethics Committee of Ardabil University of Medical Sciences (ethical code: IR.ARUMS.REC.1394.136).

### Statistical analysis

The data was analyzed by descriptive and analytical statistical methods in SPSS version 19. Pearson's correlation was used to assess the relationships between factors influencing the diagnosis of breast cancer. Linear regression analysis was performed to determine predictors of delayed diagnosis.

## Results

Most patients (60%) had an age of 40-60 years with the mean age of  $43.3 \pm 13.2$  years (range; 14-71 years old). Five patients (1.7%) had academic educations, and 69 (98.6%) were housewives. Total and partial mastectomy was conducted for 51 (73%) and 19 (27%) of patients respectively. History of breast cancer in close and distant relatives was noted in 10 (14%) and 7 (10%) of cases respectively. The patient delay (i.e. from the onset of symptoms to visiting a doctor) and system delay (i.e. from the diagnosis until surgical intervention) less than 4-week were noticed in 43 (61.4%) and 67 (96%) of patients respectively (Figure 1).

There were significant relationships between patient delay and patients' age ( $P=0.001$ ), educational level ( $P=0.001$ ), and income ( $P=0.001$ ) with the most delays of more than 4 weeks were related to the age group of 40-60 years, low educated women, and those with monthly income of less than 150\$. However, no significant relationships were detected between the delay and family history of breast cancer or the type of surgery.

The most important patient delay factors were residency (40, 57%), monthly income (45, 64%) and fear of cancer (40, 57%). Furthermore, the most important system delay contributor was the type of diagnostic procedures (49, 70%).

The means of intervals from visiting a doctor to performing diagnostic procedures were 1.95, 5.4, and 7.4 days for breast ultrasonography, mammography, and biopsy examination respectively. The delays between visiting the doctor and undergoing surgery were 14-28 days and >42 days in 26 (37%) and 5 (7%) of patients respectively.

Feeling lumps in the breast was the presenting symptom in 98.6% of the patients. Although there was no significant relationship between the size of lumps and delayed diagnosis, the longest delay was related to the patients

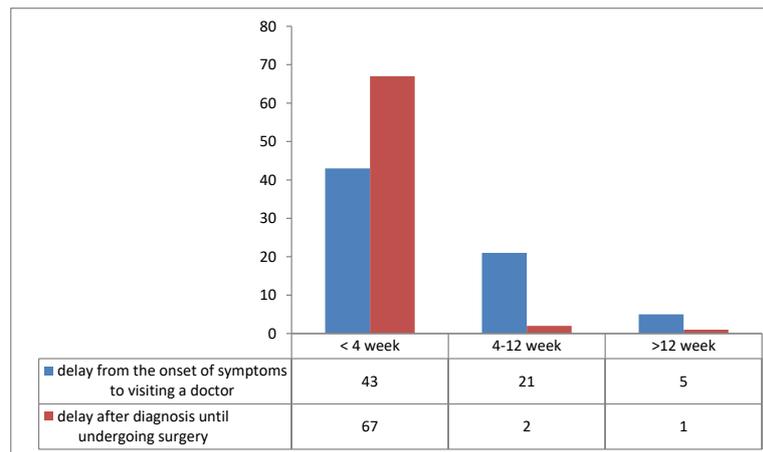


Figure 1. The patient and system delays in Iranian women with breast cancer.

who had 2-4 cm breast lumps. Furthermore, 42 (60%) of the women with breast lumps reported patient delay of <4 weeks.

The mean overall delay was 9.4 weeks. The mean of patient delay was 4.6 weeks (the minimum and maximum of one week and 72 weeks respectively), and the mean of system delay was  $3.1 \pm 2.8$  weeks (the minimum and maximum of one week and 24 weeks respectively). Significant relationships were detected between patient delay and patients' age, marital status, income, and fear of breast cancer. Moreover, patients with higher number of pregnancies had longer delays. The residency (i.e. access to health care facilities) was the most important factor affecting patient delay.

In linear regression analysis, patients' age, marital status, education, income, fear of breast cancer, residency, behavior of spouse, and carelessness significantly predicted patient delay (Table 1). On the other hand, the diagnostic procedure had the most significant impact on system delay (Table 2).

## Discussion

The results of this study showed that women with the age

Table 1. Linear regression analysis of factors affecting patient delay in diagnosis of breast cancer among Iranian women

Variables	T	Beta	P value
Age (y)	3.12	0.354	0.003
Marital status	2.7	0.31	0.009
Literacy	-2.8	-0.32	0.007
Income per month	-2.8	-0.33	0.006
Family history of breast cancer	-1.3	-0.15	0.21
Parity	1.7	0.21	0.11
Fear of cancer	-2.03	-0.24	0.046
Occupation	-0.6	-0.07	0.54
Residency	2.3	-0.2	0.001
Spouse	1.2	-0.3	0.006
Carelessness	1.3	-0.003	0.007

of 40-60 years old had longer delays compared with other age groups. This finding was consistent with the results of Bariati et al (8) and Jassem et al (4). In our study, the youngest and oldest patients aged 14 and 71 years old, since 60% of the patients belonged to the age group of 40-60 years. In the study of Bariati et al, 50% of patients aged > 59 years old (8). The mean age of our patients was 43.7 years old. Similar to other Mediterranean countries, the mean age of patients with breast cancer in Iran is 10 years lower than the global mean age of breast cancer occurrence in other areas of the world. The patients older than 43 years old had longer delays in our study, and the longest delay (i.e. 13 weeks) was seen in the age group of 40-60 years. This was concordant with the study of Montazeri et al, in which the longest delay (i.e. 3 months) was seen in women aged 40-50 years old (9).

Furthermore, 78.6% of our patients and 78% of patients in the study of Bariati et al were married (8). In accordance with our study, Montazeri et al and Bairati et al also mentioned that married women had longer patient delay compared with single patients in seeking health cares (8,9). In this study, the patients with elementary and non-academic educations had also longer delays compared with others. This finding was consistent with the reports of Montazeri et al (9), Jassem et al (4) and Bairati et al

Table 2. Linear regression analysis of factors affecting system delay in diagnosis of breast cancer among Iranian women

Variables	T	Beta	P value
Monthly income	-0.17	-0.02	0.87
Fear of cancer	-1.4	-0.18	0.17
Occupation	-0.33	-0.04	0.7
Residency	0.9	0.13	0.32
Spouse	-1.05	-0.14	0.3
Specialist	0.65	0.08	0.52
Diagnostic procedures*	0.89	-0.02	0.008

\* Ultrasonography, mammography, biopsy examination.

(10) in which most of the women with low educations (i.e. illiterate or elementary) had delays more than three months. We observed delays more than three months mainly in patients with no family history of breast cancer. This result confirmed the findings of Montazeri et al too. The delayed referral of women with no family history of breast cancer can be attributed to their lack of awareness of the disease (9).

Overall, delays > 4 weeks and < 4 weeks were mostly seen in patients undergoing total and partial mastectomy respectively. This finding indicated that patients with shorter delays had less invasive surgeries which were in line with other studies, demonstrating longer delays in patients undergoing more invasive surgeries (10,11).

In this study, 61% of patients with delays of more than 4 weeks had earned less than \$150 per month. The level of monthly income inversely and significantly correlated with delayed diagnosis. We further found that women with breast lumps had lower delays compared with women with other clinical presentations (8,9, 12,13). Most of our patients (98.6%) had noticed lumps in their breasts as the first sign of the disease. In comparison, 65% of patients had found a lump in their breast as the first symptom in the study by Jassem et al (4).

In the present study, 51.4% of patients who had 2-4 cm lumps in their breasts demonstrated the longest delays; nevertheless, there was no significant relationship between the lump size and delayed diagnosis.

In this study, 34% and 66% of our patients had at least one deterrent and propelling event respectively which was similar to the report of Bariati et al (8). The most influential factor affecting patient delay was monthly income. Bairati et al reported the patients' perceived fear of cancer and the lack of access to a family physician as the deterrent factors and family members, friends and behavior of spouse as propelling factors (8).

Most 26 (37.1%) of our patients mentioned an interval of 14-28 days from first visiting a doctor to undergoing surgery. On the other hand, this time interval was > 42 days in 5 (7.1%) of the patients. In a study by Bariati et al, 17% of patients had postponed ultrasound scanning (8). In the present study, 83% of our patients had performed mammography from whom 67% had delays of < 4 days. In the reports of Bariati et al and Jassem et al, on the other hand, 6% and 35% of patients had delay in mammography, respectively (4,8). In 96% of our patients undergoing biopsy examination, 37% showed delays from 8 to 12 days which was higher than the rate reported by Bariati et al (8). In the study of Jassem et al, the mean duration of patient delay was 7.4 weeks which was slightly higher than the rate obtained in the present study (i.e. 6.3 weeks). The longer delay observed in the present study may be due to the lack of screening tests in Iranian women including those living in Ardabil province. Moreover, the mean duration of system delay was 3.1 weeks in our study which was significantly lower than the delay reported by Jassem et al

(i.e. 11.9 weeks). Finally, the overall delay was 9.4 weeks in our study that was five weeks shorter than the time described by Jassem et al (i.e., 15.5 weeks) (4).

## Conclusion

Overall, patient delays were the most significant reasons for delayed diagnosis of breast cancer in our study. Our results showed that older patients had longer delays in seeking primary medical care. Higher educational level and monthly income were associated with shorter patients' delay. Furthermore, fear of breast cancer and negligence deterred patients from visiting doctors. Our results can be used to implement strategies to shorten both patients' delay and system delay in diagnosis of breast cancer to prevent disease progression and decrease mortality rate in patients.

## Limitations of the study

Our sample size was relatively low as we excluded some patients because of missing hospital records. Therefore, the power of our study was low and somehow limited to detect significant associations between the variables.

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## Authors' contribution

NF supervised the study, helped to design the study, confirmed the results and wrote the initial draft of the manuscript. FA contributed in data analysis and helped in preparing the initial draft. SE collected the data, conducted interviews and performed data analysis. MoB and MaB revised the manuscript and helped with the study design. All authors read and approved the final version of the manuscript.

## Conflicts of interest

The authors declare that they have no conflict of interest.

## Ethical considerations

Ethical issues (including plagiarism, misconduct, data fabrication, falsification, double publication or submission, redundancy) have been completely observed by the authors.

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