

## Original Article

# Assessment of the Relationship of Treated Basal-Type Breast Cancer with Recurrence, Metastasis, and Chemotherapy Regimen at A Tertiary Hospital Over Five Years

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## Abstract

**Background:** Some studies suggest that basal-type breast cancer is a subtype of triple-negative breast cancer, and some others mention that it is a unique type of breast cancer. There are limited studies on the results of treatment and outcomes of patients with basal-type breast cancers. Therefore, we aimed to assess the relationship of treated basal-type breast cancer with recurrence, metastasis, and chemotherapy regimen.

**Materials and Methods:** This retrospective cohort study analyzed patients with treated basal-type breast cancer at Omid Hospital in Mashhad, Iran, from 2016 to 2020. Data were obtained from the Breast Cancer Registry System, including age at diagnosis, affected side (right or left breast), cancer stage, metastasis, relapse, and chemotherapy regimens. Patients were then contacted to assess their two-year survival outcomes. A significance level of less than 0.05 was considered.

**Results:** Ninety-three patients with a mean age of  $47.41 \pm 17.16$  years were evaluated. Of these, 19 patients (20.4%) presented with metastasis, and 14 patients (15.1%) faced relapse. The two-year survival rate was 74.2%. Age was associated with relapse and metastasis (P-value < 0.01 and 0.03, respectively). Higher tumor stage was associated with increased metastasis (P-value < 0.05). Among patients without relapse, 81.0% survived after two years; among those without metastasis, the survival rate was 86.5%. Chemotherapy type did not show significant associations with metastasis, relapse, age, stage, or survival outcomes (all P-values > 0.05).

**Conclusion:** The administration of chemotherapy, irrespective of its specific type, has demonstrated beneficial effects on basal-type breast cancer.

**Keywords:** Breast neoplasms, Chemotherapy, Iran, Triple negative breast cancer

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## Introduction

Triple-negative breast cancers (TNBC) are a diverse group of tumors defined by the absence of estrogen

receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (Her2/neu) overexpression. TNBC serves as a surrogate for the aggressive basal breast cancer subtype, although they

are not biologically synonymous. The basal subtype is characterized by a distinct gene expression profile, including elevated levels of basal markers such as cytokeratins 5, 6, and 17. Both basal-type and TNBC are associated with poor clinical outcomes<sup>1-3</sup>.

Despite advancements in early detection and treatment, breast cancer remains a major cause of cancer-related mortality, primarily due to recurrence and metastasis. Treatment strategies have significantly evolved, particularly with the adoption of neoadjuvant chemotherapy for patients with locally advanced and high-risk disease. Neoadjuvant chemotherapy reduces tumor burden, facilitating breast-conserving surgery and providing critical insights into tumor biology and chemosensitivity, which inform further treatment decisions<sup>4,5</sup>.

Breast cancer poses a significant economic burden worldwide, with particularly noteworthy implications in Iran, where the financial impact is anticipated to rise due to increasing incidence rates<sup>6,7</sup>. The growing prevalence of breast cancer, especially among young women, is related to various factors, including lifestyle changes associated with Western culture, environmental influences, and genetic predispositions. Thus, assessment of incidence and mortality rates is crucial for informing public health strategies in the country<sup>8-12</sup>. There are limited studies about treated basal-type breast cancer regarding the prevalence and cancer-related data. So, in this study, the relationship of treated basal-type breast cancer with recurrence, metastasis, and chemotherapy regimen was assessed at a tertiary hospital over five years.

## Methods

This retrospective cohort study was conducted to evaluate the relationship between treated basal-type breast cancer and its recurrence, metastasis, and chemotherapy regimen at the Omid Hospital (Mashhad, Iran) from the start of 2016 to the end of 2020.

Information on all patients with breast cancer from 2016 to 2020 was obtained from the Breast Cancer Registry System.

The inclusion criteria were confirmed diagnosed basal-type breast cancer and receiving chemotherapy. The exclusion criteria were a lack of data in the hospital's registry system, not being a confirmed

**Table 1.** Stage of the cancer and chemotherapy regimen of the patients.

		Frequency	Percent
Stage	1	13	14.0
	2	45	48.4
	3	28	30.1
	4	7	7.5
Regimen	Taxol	20	21.5
	CP*	30	32.3
	Carboplatin	23	24.7
	AC*	20	21.5

\*CP: Cyclophosphamide, AC: Adriamycin + Cyclophosphamide

dancer, and not receiving chemotherapy.

The breast cancer registry system of the hospital was reviewed, and patients who were involved with a confirmed diagnosis of basal-type breast cancer were assessed. Data on age at the time of diagnosis, involved side (right or left breast), stage, metastasis, relapse, and type of chemotherapy regimen were recorded. All patients were contacted to assess two-year survival; if a patient or a relevant person did not answer, the patient was excluded.

**Statistical analysis:** In this study, the collected data were analyzed using SPSS version 26 software. The mean and standard deviation for continuous variables and the frequency (number and percentage) for categorical variables were used to describe the data. An independent t-test was used to examine differences between groups for continuous variables. For categorical variables, Fisher's exact test was used to assess group differences. The statistical significance level in this study was set at 0.05.

**Ethical issue:** This study was approved by the ethical committee of Mashhad University of Medical Sciences (IR.MUI.MED.REC.1403.330).

## Results

After implementing inclusion and exclusion criteria, 93 patients were assessed. The mean age of patients at diagnosis was  $47.41 \pm 17.16$  years. Nineteen patients (20.4%) had metastasis, and relapse was found in 14 patients (15.1%). The two-year survival rate was 74.2% (69 patients). Stage and type of chemotherapy regimen are presented in Table 1.

We analyzed the relationship between age and relapse and found that patients without relapse had a mean age of  $44.84 \pm 16.26$  years, whereas patients with relapse had a mean age of  $62.00 \pm 15.13$  years ( $P < 0.001$ ). We also determined the relationship between metastasis and age and observed that the mean age of patients without metastasis was  $49.36 \pm 16.70$  years, whereas

**Table 2.** Comparison of mean age based on the presence or absence of disease recurrence and metastasis.

		Age	
		Mean	Standard Deviation
Relapse	No	44.84	16.26
	Yes	62.00	15.13
P-value		<0.001	
Metastasis	No	49.36	16.70
	Yes	39.84	17.26
P-value		0.03	

that of patients with metastasis was  $39.84 \pm 17.26$  years ( $P = 0.03$ ). The data are presented in Table 2.

Based on Table 3, there was no relationship between tumor side (left or right) and relapse or metastasis ( $P = 0.396$  and  $0.44$ , respectively). However, the tumor stage showed a statistically significant association with metastasis ( $P < 0.001$ ), but not with relapse ( $P = 0.087$ ).

We assessed the relationship between two-year survival and relapse, and this relationship was significant ( $P = 0.001$ ). The relationship between metastasis and two-year survival was also statistically significant ( $P < 0.001$ ). The details of the mentioned results are presented in Table 4.

In Table 5, the relationship between chemotherapy

regimen and relapse and metastasis was examined. There were no statistically significant differences in the incidence of relapse and metastasis between chemotherapy regimens ( $P$ -values:  $0.697$  and  $0.543$ , respectively).

Table 6 compares the clinical characteristics of patients treated with four chemotherapy regimens: Taxol, Cyclophosphamide, Carboplatin, and AC (Adriamycin + Cyclophosphamide). The results showed that none of the disease-related variables differed significantly between the treatment groups (all  $P$ -values  $> 0.05$ ).

## Discussion

In the current study, 93 patients with a mean age of  $47.41 \pm 17.16$  years were assessed. Nineteen patients (20.4%) had metastasis, and relapse was found in 14 patients (15.1%). The two-year survival rate was 74.2% (69 patients). We found that patients with higher age had a higher rate of relapse after the treatment, but metastasis had a significantly higher rate in patients with lower age. A higher stage was associated with metastasis. In patients without relapse, 81.0% ( $n = 64$ ) were alive after 2 years; in patients without metastasis, 86.5% ( $n = 64$ ) were alive after 2 years, indicating a significant association between metastasis and relapse and with 2-year survival. The types of chemotherapy had no significant relationships with metastasis, relapse, age, stage, or two-year survival. Triple-negative breast cancers (TNBCs) are defined by low or absent expression of estrogen receptors, progesterone receptors, and human epidermal growth factor receptor 2, accounting for approximately 20% of breast cancer cases.

**Table 3.** Frequency distribution of tumor side and disease stage based on relapse and metastasis status.

		Relapse				P-value	Metastasis				P-value
		No		Yes			No		Yes		
		Count	N %	Count	N %		Count	N %	Count	N %	
Side	Left	39	49.4	5	35.7	0.396	37	50.0	7	36.8	0.44
	Right	40	50.6	9	64.3		37	50.0	12	63.2	
Stage	1	13	16.5	0	0.0	0.087	13	17.6	0	0.0	<0.001
	2	38	48.1	7	50.0		44	59.5	1	5.3	
	3	24	30.4	4	28.6		16	21.6	12	63.2	
	4	4	5.1	3	21.4		1	1.4	6	31.6	

**Table 4.** Relationship between two-year survival and disease recurrence and metastasis.

		Relapse				P-value	Metastasis				P-value
		No		Yes			No		Yes		
		Count	N %	Count	N %		Count	N %	Count	N %	
<b>2-Year Survival</b>	No	15	19.0	9	64.3	0.001	10	13.5	14	73.7	<0.001
	Yes	64	81.0	5	35.7		64	86.5	5	26.3	

\*p-value based on Chi-square and Fisher’s test

**Table 5.** Assessment of the relationship between drug regimens and the incidence of disease recurrence and metastasis.

		Relapse				P-value	Metastasis				P-value
		No		Yes			No		Yes		
		Count	N %	Count	N %		Count	N %	Count	N %	
<b>2-Year Survival</b>	No	15	19.0	9	64.3	0.001	10	13.5	14	73.7	<0.001
	Yes	64	81.0	5	35.7		64	86.5	5	26.3	

\*p-value based on Chi-square and Fisher’s test

**Table 6.** Clinical characteristics of patients according to the type of drug regimen.

		Regimen								P-value
		Taxol		Cyclophosphamide		Carboplatin		AC		
		Count	N %	Count	N %	Count	N %	Count	N %	
<b>Side</b>	Left	9	45.0	14	46.7	13	56.5	8	40.0	0.739
	Right	11	55.0	16	53.3	10	43.5	12	60.0	
<b>Stage</b>	1	2	10.0	5	16.7	3	13.0	3	15.0	0.681
	2	13	65.0	16	53.3	8	34.8	8	40.0	
	3	4	20.0	7	23.3	9	39.1	8	40.0	
	4	1	5.0	2	6.7	3	13.0	1	5.0	
<b>Metastasis</b>	No	17	85.0	24	80.0	16	69.6	17	85.0	0.543
	Yes	3	5.0	6	20.0	7	30.4	3	15.0	
<b>Survival 2 Years</b>	No	4	20.0	6	20.0	7	30.4	7	35.0	0.568
	Yes	16	80.0	24	0.0	16	69.6	13	65.0	
<b>Relapse</b>	No	16	80.0	27	90.0	20	87.0	16	80.0	0.697
	Yes	4	20.0	3	10.0	3	13.0	4	20.0	

\*p-value based on Chi-square and Fisher’s test

Studies revealed that TNBCs should not be equated with basal-type tumors. In a specific study, 71% of 172 TNBCs were classified as the basal subtype, while 77% of 160 basal-type tumors were triple-negative by immunohistochemistry. TNBCs are associated with poor clinical outcomes, similar to those of non-triple-negative basal-type tumors. Despite this, some studies believed that basal-type breast cancer is a subgroup of TNBC<sup>13-18</sup>. Because of the limited number of studies on basal-type breast cancer, especially in Iran, we compared our results with studies on TNBCs.

Zhou et al. assessed the survival of women with basal-type breast cancer. They assessed 32 patients with basal-type breast cancer, and they found that basal-type breast cancer had a higher risk of relapse compared to TNBC<sup>19</sup>. In the current study, we did not compare TNBC with basal-type breast cancer, but we observed that 15.1% of our patients had a relapse. This issue demonstrated that basal-type cancers had a considerable risk of relapse, and physicians should be aware of that. Cassol et al. evaluated the prevalence and prognosis of early basal-type breast cancer, and they showed that of

112 patients, 13 had basal-type breast cancer, and the rest had TNBCs. During a median follow-up of 81 months, there were 26 (23%) relapses and 12 (10.7%) mortality<sup>20</sup>. In this respect, the mortality and relapse rate in the current study were 25.8% and 15.1%, respectively. The difference between the results of the current study and those of Cassol et al. may stem from differences in sample size and study duration. We assessed 2-year survival in 93 patients, whereas Cassol et al. assessed 112 cases over 81 months.

Aghili et al. evaluated TNBC survival in Iranian patients. They reported that the 2-year survival rate was 69.8% and the relapse rate was 33.6%<sup>21</sup>. In the current study, we observed a relapse rate of 15.1% and a 2-year survival of 74.2%. Although the relapse rate differed between the two studies, 2-year survival was similar. The difference in relapse rates between the two studies may be attributable to their timing. Our study was conducted in 2024, whereas Aghili et al.'s was in 2013, and breast cancer treatments had improved by then.

Kashi et al. assessed the clinical characteristics and five-year survival in Iranian women. They found that the median age at diagnosis was 48 years. Relapse rate was 17.22%. The five-year disease-free survival rate was 71%. Unfavorable prognostic factors for five-year overall survival were age of 40 years, stage III at diagnosis compared to stage I, and relapse<sup>22</sup>. In the current study, we found that the mean age of patients was  $47.41 \pm 17.16$  years, the relapse rate was 20.4%, and two-year survival was 74.2%. We found that higher age was associated with a higher rate of relapse after chemotherapy. A significant association between metastasis and relapse and two-year survival was found in the current study; relapse was also significantly associated with survival. The current study confirmed Kashi et al.'s findings, except for the relationship between disease stage and survival rate. In the current study, we observed an increasing trend in cancer stage, but these changes were not statistically significant. This issue may be due to the small sample size in the current study, and it is recommended that further studies be conducted with a larger sample.

We found that patients with higher age had a higher relapse rate and patients with lower age had a higher metastasis rate, significantly. Tzikas et al. in a study

found that higher age in patients with TNBC was associated with higher rates of metastasis and relapse<sup>23</sup>. Although the results of these studies were similar regarding relapse, they differed regarding metastasis. In a study by Brantley et al., metastatic breast cancers were assessed. They found that younger women with metastatic breast cancer at the time of diagnosis had worse overall survival. It was more common in hormone receptor-positive/HER2-positive tumors and HER2-negative/luminal B-like<sup>24</sup>. There is limited data about such findings in patients with basal-type breast cancer, specifically. Further studies should investigate our findings regarding the relationships between age and metastasis and relapse in this type of breast cancer.

Dabbagh et al. compared overall and disease-free survival in patients with TNBC between adjuvant and neoadjuvant chemotherapy over 10 years. They found that the type of treatment did not differ across chemotherapy regimens<sup>25</sup>. In the current study, the findings of Dabbagh et al. were confirmed. We observed that the type of chemotherapy was not associated with mortality. This issue may demonstrate that although chemotherapy administration had a positive effect on patient-related factors such as mortality and survival, the type of chemotherapy had no effect. However, further studies are still needed in this respect.

Omidvari et al. investigated long-term outcomes of all types of breast cancer in southern Iran. They assessed 1024 patients and found that cancer type, tumor stage, nodal stage, hormone receptor status, and chemotherapy type were prognostic factors for survival<sup>26</sup>. Regarding the effect of chemotherapy type on patient survival, our study yielded a different result from that of Omidvari et al. The cause of this difference may be explained by the study by Omidvari et al., which reported that hormone receptor status and cancer type are important factors in disease prognosis. We only focused on basal-type breast cancer, and we found that the type of chemotherapy regimen was not associated with survival, metastasis, or relapse in this type of cancer.

## Conclusion

Treated basal-type breast cancer had 74.2% two-year survival. The metastasis rate and relapse rate in our cohort were 20.4% and 15.1%, respectively. The chemotherapy regimen was not associated with

metastasis, relapse, or 2-year survival. These results demonstrated that performing chemotherapy regardless of the type of it had improving effects on basal-type breast cancer.

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## Conflict of Interest

The authors declare no conflicts of interest related to this study.

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