Adjuvant Capecitabine after Neoadjuvant Chemotherapy in Triple Negative Breast Cancer with Lymph Node Metastasis

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ABSTRACT

Objective: To evaluate the effect of complete pathological response (pCR) on prognosis in patients with axillary lymph node-positive triple-negative breast cancer (TNBC) and the efficiency of adjuvant capecitabine.

Study Design: Analytical study.

Place and Duration of the Study: University of Health Sciences, Dr Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital, between March 2015 and December 2021.

Methodology: The study included 92 patients with TNBC with enlarged axillary lymph nodes and treated with neoadjuvant chemotherapy. The patients were classified as those with and without postoperative pCR and compared in terms of survival. Subsequently, the patients who did not achieve pCR were classified as receiving and not receiving adjuvant capecitabine and were compared for DFS (disease-free survival) and OS (overall survival). Parameters that showed statistical significance were re-evaluated with Cox regression analysis.

Results: The 5-year DFS rate was 84.3% in those who achieved pCR, while it was 55.1% in those who did not (p=0.026). The 5-year OS rate was 82.8% in the pCR arm, while it was 51.0% in the non-pCR arm (p=0.070). The 5-year DFS rate was 66.3% in adjuvant capecitabine-receiving patients, while it was 40.8% in the non-capecitabine arm (HR=0.40, p=0.031). The 5-year OS rate was 68.9% in adjuvant capecitabine-receiving patients, while it was 29.6% in the non-capecitabine arm (HR= 0.40, p=0.062).

Conclusion: Obtaining pCR following NAC in a locally advanced TNBC is an independent prognostic marker for DFS and OS. In the presence of residual disease, improvement in DFS and OS with adjuvant capecitabine was demonstrated by the real-life data.

Key Words: *Triple-negative breast cancer, Neoadjuvant chemotherapy, Capecitabine, Survival.*

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INTRODUCTION

Triple-negative breast cancer (TNBC) differs from other breast cancer subtypes due to its risk factors, molecular and pathological features, natural history, chemotherapy sensitivity, and a lack of targeted treatment options. It has an aggressive course due to poor prognosis, development of visceral metastases, and frequent recurrences in the early period.[1] Patients with TNBC account for approximately 15-20% of invasive breast cancers.[2] Standard treatment methods in a locally advanced breast cancer are adjuvant or neoadjuvant chemotherapy (CT), surgery, and adjuvant radiotherapy (RT).[3]

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CT is an essential component of TNBC therapy and is vital to prevent disease relapse and improve survival. Neoadjuvant chemotherapy (NAC) is the preferred treatment method in patients with high-risk, locally advanced, or inoperable disease and breast-conserving surgery.[4] Neoadjuvant therapy not only reduces the spread of the tumour, but it also enables the evaluation of the effectiveness of a systemic treatment and, thus, the referral to adjuvant therapy.[5] The achievement of complete pathological response (pCR: ypT0/is ypN0) following NAC has been associated with improved overall survival (OS), especially in TNBC and HER2 (+).[6] On the other hand, the patients with the residual disease have a high risk of recurrence (approximately 20-40%).[6] It has become a preferred approach owing to the prolonged DFS and OS upon administration of adjuvant capecitabine in the CREATE-X trial, which included patients with TNBC who underwent surgery after NAC and had the residual disease.[7]

The objective of this study was to evaluate the effect of complete pathological response (pCR) on prognosis in patients with axillary lymph node-positive TNBC and the efficacy of adjuvant capecitabine in patients who could not achieve pCR.

METHODOLOGY

This study was designed retrospectively. Data were recorded from the patient files and the hospital system. Therefore, randomisation and blinding methods were not used in the study.

The study took into account 92 patients diagnosed with TNBC, who underwent neoadjuvant chemotherapy at the Oncology Training and Research Hospital between March 2015 and December 2021.

The inclusion criteria was female patients over 18 years of age, pathologically diagnosed with TNBC and positive axillary lymph nodes. The exclusion criteria was patients in the metastatic stage in diagnosis, bilateral breast cancer patients, patients owning a different secondary malignancy, pregnant or lactating patients, and those who were not operated on after neoadjuvant therapy. After neoadjuvant therapy, axillary or sentinel lymph node dissection was performed along with mastectomy or breast-conserving surgery. The patient files and hospital records were retrospectively examined. The patient's age, menopausal status, clinical stage (cStage) at the time of diagnosis, and ypStage, histological subtype, nuclear grade, Ki-67 proliferation index, the presence/absence of extranodal extension (ENE) in the lymph node were recorded.

Neoadjuvant anthracycline and taxane standard cytotoxic chemotherapy regimens were administered to all the patients. TNM staging in the cancer staging guide (7^{th} and 8^{th} edition) published by the American Joint Committee on Cancer (AJCC) was used for both clinical and pathological staging of patients. With the publication of the CREATE-X trial, an adjuvant capecitabine regimen was recommended for patients who did not achieve pCR. Patients who were recommended adjuvant RT received 1000-1250 mg/m^2 capecitabine every 21 days, twice a day on Day 1 and 14 for six months right after the completion of RT. For those patients who were not recommended adjuvant RT, capecitabine was administered for 4-6 weeks on average after the surgery.

According to the guidelines of the American Society of Clinical Oncology/College of American Pathologists (ASCO/CAP), patients whose estrogen receptor (ER) and progesterone receptor (PR) expression as evaluated by immunohistochemistry (IHC) was <1% and whose HER2 as measured by IHC was 0, 1+ or 2+ and who were negative (not amplified) fluorescence *in situ* hybridisation (FISH) were considered as triple-negative.[8]

The letter "y" is used by AJCC and The Union for International Cancer Control (UICC) to indicate the stage after neoadjuvant therapy in the staging of the tumour, nodal status, and metastasis in breast cancer. The pathological stage following the neoadjuvant therapy in this study was, therefore, denoted by ypT, ypN, ypStage. ypT was measured as the largest single focus of residual invasive tumour, excluding fibrous areas within the tumour bed.

pCR was characterised as no residual invasive disease in the breast and no measurable disease in any sampled axillary lymph node (ypT0/is ypN0). The being of residual carcinoma *in situ* was also considered as pCR.

In the study, the patients were classified as those with and without pCR. These two arms were compared regarding the general features, disease-free survival (DFS) and overall survival (OS). Afterwards, the patients who could not obtain pCR were classified as those who received adjuvant capecitabine and those who did not. These two arms were compared regarding the general characteristics, DFS, and OS.

The residual cancer burden (RCB) score is calculated as a parameter that combines six variables: the two dimensions of the post-treatment breast tumour bed obtained by microscopic evaluation of the resection material, its cellularity, the percentage of carcinoma *in situ*, the number of metastatic lymph nodes, and the diameter of the largest nodal metastatic lesion. The RCB score allows the residual disease to be divided into four categories: RCB 0 (pCR), RCB I (minimal residual disease), RCB II (moderate residual disease), and RCB III (extensive residual disease).[9]

Regarding descriptive statistics, parametric continuous variables were reported as mean ± standard deviation, non-parametric ones as median (range), and the categorical data as frequency (percentage). Normality of the continuous variable was detected *via* Kolmogorov-Smirnov test. Independent samples t-test was used to compare the continuous variables of two independent groups while Chi-square or Fisher's exact test was utilised to compare the categorical data of such groups. The time from the initiation of treatment to recurrence, metastasis, or death was defined as DFS, and the time from the initiation of treatment to death or the last examination date was defined as OS. These times were calculated using the Kaplan-Meier method and log-rank test was used to compare the DFS and OS of the groups. The 5-year DFS and OS rates were calculated for those who did not reach the median DFS (mDFS) and OS (mOS), and 3-year DFS and OS rates for those who did not reach the 5-year DFS and OS. Independent prognostic markers were determined by creating the Cox regression analysis and $p < 0.05$ was considered statistically significant. For statistical analysis, IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp was used.

RESULTS

pCR was achieved in 28 (30.4%) participants out of 92, and the remaining 64 (69.6%) did not achieve pCR. The mean age was 47±12.8 for pCR patients while it was 51±13.6 for non-pCR patients (p=0.270). Of all patients, 55.4% (n=51) was pre/perimenopausal, 44.6% was (n=41) postmenopausal, 37% (n=34) was cStage 1-2, and 63% (n=58) was cStage 3. Regarding the tumour in patients, 83.7% (n=77) had invasive ductal carcinoma histology, 78.3% (n= 72) were nuclear grade 3, and 9.8% (n=9) were grade 2. The median Ki-67 expression was 70%. The expression of Ki-67 was ≤70% in 42 (45.7%), and the Ki-67 expression was >70% in 45 (48.9%). There was no variation between pCR and non-pCR patients in terms of menopausal status, cStage, histology, grade, and Ki-67 index (Table I).

Table I: Comparison of clinicopathology features of patients with or without pCR after neoadjuvant chemotherapy and those who received or did not receive adjuvant capecitabine.

	Total (n=92)	pCR			Adjuvant Capecitabine		
		No (n=64)	Yes (n=28)	p-value	Yes (n=38)	No (n=26)	p-value
*Age (mean ±SD)	49.73±13.37	50.75±13.59	47.39±12.79	*0.270	47.42±12.22	55.62±14.26	*0.017
Menopausal status				0.827			0.257
Pre/perimenopause	51 (55.4%)	35 (54.7%)	16 (57.1%)		23 (60.5%)	12 (46.2%)	
Postmenopause	41 (44.6%)	29 (45.3%)	12 (42.9%)		15 (39.5%)	14 (53.8%)	
cT				0.441			0.771
Tx-T2	57 (62.0%)	38 (59.4%)	19 (67.9%)		22 (57.9%)	16 (61.5%)	
T3-T4	35 (38.0%)	26 (40.6%)	9 (32.1%)		16 (42.1%)	10 (38.5%)	
cN				0.415			0.915
N1	53 (57.6%)	34 (53.1%)	19 (67.9%)		21 (55.3%)	13 (50.0%)	
N2	27 (29.3%)	21 (32.8%)	6 (21.4%)		12 (31.6%)	9 (34.6%)	
N3	12 (13.0%)	9 (14.1%)	3 (10.7%)		5 (13.2%)	4 (15.4%)	
cStage				0.086			0.537
Stage I-II	34 (37.0%)	20 (31.3%)	14 (50.0%)		13 (34.2%)	7 (26.9%)	
Stage III	58 (63.0%)	44 (68.8%)	14 (50.0%)		25 (65.8%)	19 (73.1%)	
Histology				0.116			0.277
IDC	77 (83.7%)	51 (79.7%)	26 (92.9%)		32 (84.2%)	19 (73.1%)	
Other	15 (16.3%)	13 (20.3%)	2 (7.1%)		6 (15.8%)	7 (26.9%)	
Nuclear grade				0.316			0.650
Grade 2	9 (11.1%)	8 (13.1%)	1 (5.0%)		8 (21.1%)	6 (26.1%)	
Grade 3	72 (88.9%)	53 (86.9%)	19 (95.0%)		30 (78.9%)	17 (73.9%)	
Kİ67 index (%)				0.843			0.195
≤70%	42 (48.3%)	30 (47.6%)	12 (50.0%)		18 (47.4%)	16 (64.0%)	
>70%	45 (51.7%)	33 (52.4%)	12 (50.0%)		20 (52.6%)	9 (36.0%)	

*pCR: Complete pathological response, cT: Clinical tumour stage, cN: Clinical lymph node stage, cStage: Clinical stage, SD: Standard deviation. *An independent sample t-test was applied for the Age parameter in the table. The Chi-square test was applied to other parameters in the table.*

Table II: DFS and OS rates of patients receiving neoadjuvant chemotherapy.

		5-year DFS	p-value	5-year OS	p-value
Total		64.3%		61.1%	
Age			0.657		0.891
	≤50	63.8%		68.6%	
	>50	65.2%		50.0%	
Menopausal status			0.487		0.444
	Pre/perimenopause	62.6%		62.5%	
	Postmenopause	66.5%		58.0%	
cStage			0.085		0.017
	Stage I-II	75.5%		84.6%	
	Stage III	57.2%		49.6%	
Histology			0.818		0.548
	IDC	65.2%		60.4%	
	Other	60.0%		66.4%	
pCR			0.026		0.070
	Yes	84.3%		82.8%	
	No	55.1%		51.0%	
ypStage			0.002		0.003
	Stage 0	84.3%		82.8%	
	Stage I-II	65.5%		56.5%	
	Stage III	NA		41.4%	
ENE			0.008		0.057
	Yes	NA		NA	
	No	67.8%		62.9%	
Nuclear grade			0.459		0.853
	Grade 2	72.7%		53.3%	
	Grade 3	56.8%		53.8%	
Kİ67 index (%)			0.262		0.914
	≤70%	54.5%		53.8%	
	>70%	69.8%		56.9%	
RCB			0.071		0.123
	Score 0	84.3%		82.8%	
	Score 1	NA		NA	
	Score 2	64.2%		68.4%	
	Score 3	49.9%		42.6%	

DFS: Disease free survival, OS: Overall survival, cStage: Clinical stage, pCR: Complete pathological response, ypStage: Pathological stage after neoadjuvant chemotherapy, ENE: Extra nodal extension, RCB: Residual cancer burden, NA: Not applicable.

Table III: Cox regression analysis evaluating DFS and OS.

	DFS		OS	
	HR (95%CI)	p-value	HR (95%CI)	p-value
cStage	1.53 (0.63-3.67)	0.341	2.86 (0.96-8.47)	0.057
pCR	0.21 (0.06-0.77)	0.019	0.22 (0.06-0.82)	0.025
ypStage	0.49 (0.18-1.31)	0.157	0.37 (0.13-1.03)	0.057
ENE	1.33 (0.47-3.77)	0.587	1.02 (0.32-3.25)	0.964
RCB	0.84 (0.32-2.21)	0.732	-	-

DFS: Disease free survival, OS: Overall survival, HR: Hazard ratio, CI: Confidence interval, pCR: Complete pathological response, ypStage: Pathological stage after neoadjuvant chemotherapy, ENE: Extra nodal extension, RCB: Residuel cancer burden.

The median follow-up time was 39 months (95% CI 34.3-43.5). mDFS was not reached in the whole sample, and the 5-year DFS rate was 64.3%. Those with pCR were found to have higher DFS than those without pCR (5-year DFS rates 84.3% *vs.* 55.1%, respectively) (p=0.026). When the patients were grouped based on their pathological stages as ypStage 0, ypStage 1-2, and ypStage 3, it was seen that those in the earlier stages had much higher DFS rates (5-year DFS rates = ypStage 0: 84.3%, ypStage 1-2: 65.5%; ypStage 3: Not reached (NR), p=0.002). DFS of patients with or without extranodal extension in patients with lymph node positivity in the postoperative pathology preparation were evaluated using the Kaplan-Meier method. While 5-year DFS was 67.8% in patients in whom ENE was not detected in the pathological lymph node, in the presence of ENE was NR (p=0.008); 5-year DFS rates according to residual cancer burden (RCB) score were 84.3% at score 0, 64.2% at score 2, and 49.9% at score 3 while score 1 could not be reached (p=0.071) (Table II). Cox regression analysis was performed to assess the presence of cStage, pCR, ypStage, RCB scoring, and ENE, and pCR was determined to be an independent prognostic marker for DFS (HR: 0.21; 95% CI: 0.06-0.77, p=0.019) as shown in Table III. There was no variance in DFS when the patients were grouped based on age, menopausal status, cStage, histology, nuclear grade, and Ki-67 expression (Table II).

Median overall survival (mOS) was not reached in the whole sample, and the 5-year OS rate was 61.1%. While the 5-year OS rate of those with pCR was 82.8%, the OS of those without pCR was 51.0% (p=0.070). When the patients were grouped based on their pathological stages, it was observed that OS was 82.8% in ypStage 0, 56.5% in ypStage 1-2, and 41.4% in ypStage 3 (p=0.003), 5-year OS rates according to RCB score were 82.8% at score 0, 68.4% at score 2, and 42.6% at score 3, and score 1 could not be reached (p=0.123) (Table II). Cox regression analysis was performed to evaluate the cStage, pCR, ypStage, and ENE parameters, and pCR was an independent prognostic marker for OS (HR= 0.22; 95% CI: 0.06-0.82, p=0.025) (Table III). There was no variance in OS when the patients were grouped according to age, pre or postmenopause, cStage, histology, ENE, nuclear grade, and Ki-67 expression (Table II).

Of 64 non-pCR patients, 38 (59.4%) received adjuvant capecitabine treatment while 26 (40.6%) did not. The mean age of capecitabine users was 47±12.2 years, and 56±14.2 years of non-users (p=0.017). When those who received adjuvant capecitabine and those who did not were compared, there was no difference in terms of cT, cN, cStage, ypT, ypN, ypStage, residual cancer burden (RCB) score, histological type, presence of ENE in the lymph node, nuclear grade, Ki-67 proliferation index, and menopausal status (Table I).

The patients who received adjuvant capecitabine had higher 5-year DFS rates than those who did not receive capecitabine (66.3% *vs.* 40.8%, respectively, p=0.031, HR=0.42; 95% CI: 0.19-0.95, Figure 1a). Similarly, the 5-year OS rates were higher in the group that received adjuvant capecitabine than in those who did not (68.9% *vs.* 29.6%, respectively, p=0.062, HR=0.44; 95% CI: 0.18-1.07, Figure 1b).

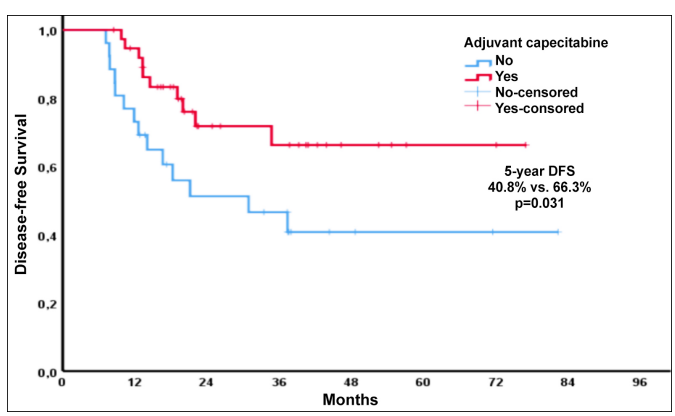

Figure 1a: Kaplan-Meier curve of disease-free survival adjuvant capecitabine users.

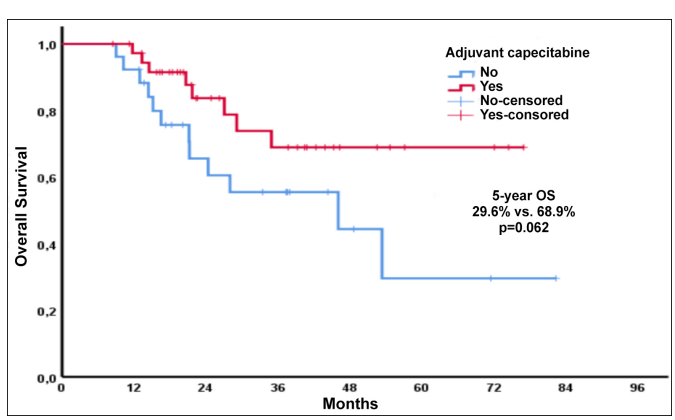

Figure 1b: Kaplan-Meier curve of overall survival adjuvant capecitabine users.

DISCUSSION

This study evaluated the factors affecting survival in breast cancer with triple-negative axillary lymph node metastases who underwent surgery after NAC. The pCR achieved after NAC was found to be a good prognostic marker. Moreover, adjuvant capecitabine in patients with residual disease was demonstrated to benefit in terms of DFS and OS.

Many studies have shown increased response rates with taxane given concomitantly or sequentially to an anthracycline-containing regimen in neoadjuvant therapy.[4,10] The fact that pCR is achieved in approximately 40% of TNBC patients following the administration of NAC despite its aggressive biology indicates that these tumours are susceptible to chemotherapy.[11] In the CTNEoBC pooled analysis that included 9440 patients and evaluated pCR as well as its long-term clinical benefit, in breast cancer, 1157 (12.3%) of the patients had TNBC, and the pCR rate was 33.6% in these patients.[6] In an MD Anderson Cancer Center study, pCR incidence was better in stage I-III TNBC patients who received NAC than in the other breast cancer subtypes (22% *vs.* 11%; p=0.034).[12] On the other hand, the GeparSixto study showed that pCR was 53% in stage 2-3 TNBC patients who received carboplatin and 37% who did not (p=0.005).[13] Similarly, the Brightness study demonstrated that the pCR rate rose from 31% to 58% following the addition of carboplatin to NAC in 634 stage 2-3 TNBC patients.[14] Furthermore, in the recently published KEYNOTE-522 study, pCR jumped from 51.2% to 64.8% (p<0.001) upon adding pembrolizumab to a neoadjuvant platinum-based regimen in stage 2-3 TNBC patients.[15] In this study, pCR was achieved in 28 (30.4%) of 92 TNBC patients who were operated on after anthracycline and taxane-based NAC. According to the literature, it was assumed that the relatively low pCR rate in the study was associated with the fact that none of the patients received neoadjuvant carboplatin and immunotherapy.

In the meta-analysis, patients who achieved pCR, particularly those with triple-negative, had significantly better event-free survival (EFS, HR= 0.18). Similarly, pCR was found to improve OS in TNBC patients (HR= 0.22).[16] The 5-year EFS rates of patients with and without pCR were 90% and 57%, respectively. The 5-year OS rates of those with and without pCR were 84% and 47%, respectively. The findings of this study showed that pCR could be a marker for evaluating the effectiveness of neoadjuvant therapy in TNBC patients.[16] In the study by Carey *et al*., the rate of TNBC patients was 11%, and the pCR rate after NAC was 29%, while the 4-year distant DFS rate was 71%.[17] CTNeoBc analysis evaluated pCR, EFS, and OS in NAC-treated breast cancer. A powerful association between pCR and long-time results was observed, particularly in TNBC patients (EFS: HR=0.24). In addition, there was a direct correlation between obtaining pCR and survival in this patient population (OS: HR= 016).[6]

In this study, the 5-year DFS and OS rates were 64.3% and 61.1%, respectively, in patients with TNBC who were given NAC. The 5-year DFS rates of patients with and without pCR were 84.3% and 55.1%, respectively (p=0.026). Cox regression analysis was performed with pCR, patients' ypStage, cStage, presence of ENE in the lymph node, and RCB score for DFS. Cox regression analysis pointed to the pCR rate as the independent prognostic marker for DFS. Similarly, only pCR was an independent prognostic marker for OS because of the Cox regression analysis.

RCB provides a standard approach to assess the extent of residual invasive disease in axillary nodes and tumour bed after NAC.[11,18] In RCB, score 0 is expressed as complete pathologic response, score 1 as minimum residual disease, score 2 as middle residual disease, and score 3 as large residual disease, and the scoring can be used to classify the risk of recurrence based on the extent of residual disease. Many studies have shown that RCB predicts 10-year recurrence-free survival and is an independent prognostic marker.[11,19] A study that analysed the distribution and prognosis of RCB using patient data from the I-SPY2 study confirmed that RCB was prognostic for EFS in TNBC patients. Three-year EFS rates by RCB score in TNBC were as follows: RCB-0 (pCR): 93%, RCB-1: 83%, RCB-2: 72%, RCB-3: 41%. In this study, the prognostic value of RCB was established to be independent of neoadjuvant therapy.[20] In this study, 5-year DFS rates by RCB score were as follows: RCB-score 0 (pCR): 84.3%, RCB-score 1: not available, RCB-score 2: 64.2%, RCB-score 3: 49.9% (p=0.071). However, no effect on 5-year OS rates was observed (p=0.123). In the Cox regression analysis, the RCB score was not an independent prognostic marker for DFS (p=0.732). The small group of patients and the lack of a homogeneous distribution between the groups (e.g., there were only 3 patients with an RCB- score 1) may be listed as the reason for this.

Residual disease after NAC is associated with the poor survival, so there are studies evaluating options for adjuvant therapies in patients. The CREATE-X trial is one of the most crucial study that showed improvement in survival with adjuvant capecitabine.[21] Of the TNBC patients included in this study, 139 were randomised to the capecitabine arm and 147 to the control arm. The DFS rate was 69.8% in the capecitabine arm and 56.1% in the control arm (HR=0.58). On the other hand, the OS rate was 78.8% and 70.3% in the capecitabine and the control groups, respectively (HR=0.52).[21] The ECOG-ACRIN study, EA1131, compared the adjuvant capecitabine with platinum-based CT in patients with residual tumours with TNBC. While the 3-year invasive DFS was 42.8% with platinum-based treatment, it was 53.5% with capecitabine (HR=1.16). On the other hand, the 3-year OS was 59.2% with platinum-based therapy and 69.4% with capecitabine (HR=1.32).[22] This study demonstrated that platinum agents were associated with more severe toxicities and were not more effective than capecitabine.[23] Bianco *et al.*, assessed adjuvant therapy in the presence of pathological residual tumour after NAC in TNBC patients. The participants were randomised to a standard dose infusion regimen, oral metronomic chemotherapy, and control groups. The 5-year

DFS rates of the adjuvant oral metronomic CT group and no treatment group were 64.5% and 52.5%, respectively, while the 5-year OS rates were 71.2% and 55.6%.[24] In the SYSUC-C-001 study, 434 TNBC patients were treated with a lower-than-standard dose of capecitabine for up to one year after adjuvant or neoadjuvant chemotherapy. The 5-year DFS was 82.8% in the maintenance capecitabine arm and 73.0% in the control arm (HR= 0.64; p = 0.03). Although this study found a difference between the arms in terms of DFS, no difference was found in terms of OS. Moreover, the aforementioned study does not provide sufficient information about adjuvant capecitabine in residual disease because the rate of patients who received NAC was approximately 5%.[25]

In this study, 5-year DFS was 66.3% in those who received capecitabine and 40.8% (p=0.031) in those who did not. The 5-year OS was 68.9% in those who received capecitabine and 29.6% in those who did not (p=0.062). This study is consistent with the current literature, showing the difference in DFS and OS with adjuvant capecitabine in the presence of residual disease after NAC. Despite the recommendation by the guidelines (NCCN, ESMO) of the use of adjuvant capecitabine after the CREATE-X trial, the real-life data is not available yet. The present study emphasizes the prognostic importance of pCR and presents a real-life data on the utilisation of adjuvant capecitabine, and reveals the effectiveness of capecitabine in non-Asian ethnicities (CREATE-X trial had people of Asian origin only).

The limitations of the study are as follows: median follow-up was 3.2 years, mDFS and mOS were not reached due to the short follow-up time, hence the use of 5-year DFS and OS rates. Although the follow-up period was brief, significant DFS and OS rates were achieved in the capecitabine arm. Since the information on adjuvant capecitabine-related side effects and dose reduction was not kept in the records regularly and comprehensively, the data could not be included in this study. Due to the insufficient data, tumour infiltrating lymphocyte level and BRCA status, which are prognostic indicators in neoadjuvant therapy, could not be evaluated. The fact that carboplatin was not added to the patients' standard anthracycline and taxane-based regimens may have affected the results. The number of patients was limited since it was a single-centre study.

CONCLUSION

Pathological complete response after NAC has been shown to prolong survival in a locally advanced breast cancer. The study also demonstrated improvement in DFS and OS with the achievement of pCR in TNBC patients. In addition, this study demonstrated that adjuvant capecitabine prolongs DFS in residual disease.

ETHICAL APPROVAL:
Ethical approval was taken from the University of Health Sciences, Dr. Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital Ethics Committee (2022-06/138).

PATIENTS' CONSENT:
Not applicable as this study was conducted retrospectively.

COMPETING INTEREST:
The authors declared no competing interest.

AUTHORS' CONTRIBUTION:
IO: Data collection, writing the article, translation from the native language to English, statistical analysis.
CK: Design of the study, statistical analysis, writing and revision of the manuscript.
AT, ES, PKT: Data collection, source scanning, and review of the study.
OBCO: Design of the study and revision of the manuscript.
All authors have approved the final version of the manuscript to be published.

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