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ORIGINAL ARTICLE

Novel Inflammatory Prognostic Markers in Lung Cancer Patients Treated with Definitive Chemoradiotherapy

Definitif Kemoradyoterapi İle Tedavi Edilen Akciğer Kanseri Hastalarinda Yeni İnflamatuar Prognostik Belirteçler

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ABSTRACT

Primary lung cancer is the most common cancer worldwide and is an increasingly common problem. The primary endpoint of this study was; to investigate the effect of radiotherapy dose and neutrophil-lymphocyte ratio (NLR) on overall survival (OS) and progression-free survival (PFS). We retrospectively examined 99 patients who were stage III A and stage III B at the time of diagnosis, who did not receive surgical treatment, and who received definitive chemoradiotherapy. Data of patients such as sex, age, ECOG status, tumor location, pathological subtype, radiotherapy dose, type of chemotherapy, neutrophil/lymphocyte ratio (NLR), and some biochemical parameters and PFS and OS were included in the study by scanning the patient's files. The radiotherapy cut-off value was accepted as 60 Gray. OS was statistically better in patients who received radiotherapy at doses of 60 Gray and above. When the patients with radiotherapy dose less than 60 Gy and patients with more than 60 Gray were evaluated in two groups, the overall survival was 8,569 ± 1,404 / month and 14,326 ± 1,209 / month, respectively. (p <0.05). When we evaluate the patients based on NLR; It was observed that the overall survival of patients below NLR 4 at the time of diagnosis was statistically significantly better. The overall survival of patients with NLR <4.0 and NLR> 4 were 14.32 ± 1.30 / month and 10.54 ± 1.16 / month, respectively. (p <0.05)

Keywords: Lung Cancer, Definitive Chemoradiotherapy, Prognostic Markers.

ÖZ

Primer akciğer kanseri dünya çapında en sık görülen kanserdir ve giderek yaygınlaşan bir sorundur. Bu çalışmanın birincil sonlanım noktası; radyoterapi dozu ve nötrofil-lenfosit oranının (NLR) genel sağ kalım (OS) ve progresyonsuz sağ kalım (PFS) üzerindeki etkisini araştırmaktır. Tanı anında evre III A ve evre III B olan, cerrahi tedavi olmayan ve definitif kemoradyoterapi alan 99 hastayı retrospektif olarak inceledik. Hastalara ait cinsiyet, yaş, ECOG durumu, tümör yerleşimi, patolojik alt tip, radyoterapi dozu, kemoterapi tipi, nötrofil/lenfosit oranı (NLR), bazı biyokimyasal parametreler ve PFS ve OS gibi veriler hastaların detaylı dosya taraması yapılarak çalışmaya dahil edildi. Radyoterapi cut-off değeri 60 Gray olarak kabul edildi. OS, 60 Gray ve üzeri dozlarda radyoterapi alan hastalarda istatistiksel anlamlı olacak şekilde daha iyiydi. Radyoterapi dozu 60 Gy'nin altında olan hastalar ve 60 Gray'in üzerinde olan hastalar iki grupta değerlendirildiğinde genel sağ kalım sırasıyla 8.569 ± 1.404 / ay ve 14.326 ± 1.209 / ay idi. (p <0.05). Hastaları NLR'ye göre değerlendirdiğimizde; tanı anında NLR 4'ün altındaki hastaların genel sağ kalımının istatistiksel olarak anlamlı derecede daha iyi olduğu gözlendi. NLO <4.0 ve NLO> 4 olan hastaların genel sağ kalımları sırasıyla 14.32 ± 1.30/ay ve 10.54 ± 1.16/ay idi. (p <0.05)

Anahtar Kelimeler: Akciğer Kanseri, Definitif Kemoradyoterapi, Prognostik Belirteçler

Introduction

Lung cancer is the most common cancer worldwide. It is estimated that there are 14.1 million new cancer cases in the world every year, and 8.2 million people die of cancer. It is estimated that 1.89 million (12.9%) of these cases are lung cancer and that 1.59 million (19.4%) people lose their lives each year due to lung cancer (1). The most common cause of lung cancer is the use of cigarettes and other tobacco products. Although mortality rates gradually decrease within 1 year of smoking cessation, lung cancer mortality rates are higher than lifetime non-smokers. Despite the decrease in smoking rates in the USA, 40% of the new cases are still smokers; 40% are those who have quit; and 20% are those who have never smoked cigarettes (2). In the world, lung cancer is the leading cause of both cancer and cancer-related death in men by gender, followed by prostate and colorectal cancers. In women, lung cancer is the third most malignant disease after breast cancer and colorectal cancer. Lung cancer ranks second after breast cancer in terms of mortality in women. When both sexes are evaluated together, lung cancer is the most common cancer

and is the first cause of death due to malignancies. Lung malignancy constitutes 18.4% of cancer-related causes of death (3). Mortality rate is high because only 15% of patients are diagnosed at an early stage (4). Case-control epidemiological studies in the 1950s showed that there was a strong link between lung cancer and smoking cigarettes. Lung cancer has become one of the most important preventable causes of death in the last 50 years (5). Many causes of lung cancer have been identified. Active smoking, passive smoking, smoking pipes and use of other tobacco products; exposure to occupational agents (radon gas, asbestos, nickel, chromium and arsenic); radiation; and exposure to indoor and outdoor air pollution are the main reasons identified. Although there are so many well-known risk factors, the main cause of the global lung cancer epidemic is smoking cigarettes and other tobacco products (6). In a study conducted in the United States among non-smokers who had lung cancer; it was observed that 19% of women and 9% of men developed lung cancer. It is observed that sex may also include various risk factors for susceptibility to cancer (7). The vast majority of lung cancers are examined in 2 main groups: NSCLC (85%) and SCLC (15%). Around 1% of other sub-types such as sarcomas are observed (8). NSCLC is pathologically examined under 3 subheadings: adenocarcinoma, squamous cell carcinoma, and large cell carcinoma. This distinction is important in terms of treatment decisions and prognosis (9). In many previous studies with lung cancer, the effects of various parameters such as age, sex, number of metastases, inflammatory markers, patient performance evaluations, weight loss, and lactate dehydrogenase (LDH) on prognosis were investigated. In our study, we aimed to investigate the effects of various parameters and demographic characteristics on disease-free survival and overall survival in patients diagnosed with locally advanced non-small cell lung carcinoma with no history of operation.

Materials And Methods

Case Selection and Data Collection

The files of 99 patients diagnosed with non-small cell lung carcinoma and admitted to the Medical Oncology Department Clinic between January 2011 and December 2019 for diagnosis and treatment, were examined with approval from the Malatya Clinical Research Ethics Board (Approval number: 2018/21-11) in accordance with patient rights regulations and ethical rules. Relevant data was retrospectively collected from the hospital's electronic database and patient polyclinic files. A form was created to record patient data. Patients' characteristics such as sex, age, lymph node stage, the histopathologic subtype of lung carcinoma, tumour diameter, tumour localisation, ECOG performance score, total radiotherapy dose received, type of chemotherapy received, complete blood parameters before chemotherapy (WBH, HGB, LENF, NEU, PLT), creatinine, total protein, albumin, AST, ALT, ALP, LDH, calcium, CEA, neutrophil-lymphocyte ratio and albumin total protein ratio, date of recurrence or progression, whether patients survived, date of death if deceased, and values such as disease-free survival and overall survival (total survival) were collected.

Inclusion criteria in the study were as follows:

1- Patients were older than 18 years of age
2- Patients had a histopathological diagnosis of lung cancer after 2011
3- Patients' follow-up was done in our centre
4- Patients had a locally advanced NSCLC (stage 3A and stage 3B) at the time of diagnosis and did not receive surgical treatment

The patients' exclusion criteria from the study were as follows: the presence of another solid organ malignancy, severe heart failure that would affect the patient's mortality at the time of diagnosis, the presence of a pathologically benign lung tumour or the diagnosis of small cell carcinoma. The staging of the patients was done according to the imagining methods at the time of diagnosis. It was conducted according to the International Association for the Study of Lung Cancer (IASLC) 2009 TNM 7th edition, which is the current staging system for lung cancer.

Statistical Method

The information was presented in the form of an average (standard deviation) and a number (percentage). Conformity to normal distribution was made with the Kolmogorov-Smirnov test. For statistical analysis, Spearman and Pearson correlation coefficients were used where appropriate. Survival time analysis was done by the Kaplan-Meier method. IBM SPSS Statistics 22.0 program was used for analysis. A p-value of $p<0.05$ was considered statistically significant.

Findings

A total of 99 patients, 90 (%90.9) of whom were male, 9 (%9.1) of whom were female, were included in the study. It was observed that there was no statistically significant relationship between sex and disease-free survival or overall survival ($p>0.05$). The cases followed were between the ages of 35 and 92. The average age was 61.43 and the median value was 61.0. The average age of male patients was 61.7, while the age average of female patients was 58. When the patients were divided into 2 groups, under the age of 65 and over 65, age was found statistically significant data for disease-free survival ($p<0.05$). There was no statistically significant relationship between age and overall survival ($p>0.05$). Tumour location was examined in 6 different groups: upper right, right middle, lower right, upper left, lower left lobe, and mediastinal. Tumor localization was observed to have no statistically significant effect on disease-free and overall survival in survival analysis ($p>0.05$) The mean tumor size of the patients included in the study was 6.27 cm, and the median value

was 6.0 cm. The minimum tumour diameter was 1.9 cm and the maximum tumour diameter was 14.0 cm. The mean tumor diameter of men was 6.36, and the mean tumor diameter of women was 5.42. When the tumour size was grouped as below 6 cm and above 6 cm, no statistically significant relationship was found in the survey analysis (disease-free survival and overall survival) (p>0,05). This data is shown in Table 1.

Table 1: Patient demographics and clinical characteristics

Parameters	Number of Patients (n= 99)	(%)
Sex		
Male	90	90.9
Female	9	9.1
Age		
Median (min-max)	61 (35-92)	
Mean	61.43 ± 8.2	
ECOG		
0	47	30.2
1	32	49.1
2	27	20.7
Cancer Location		
Right upper lobe	30	30
Right middle lobe	12	12
Right lower lobe	10	10
Left upper lobe	22	22
Left lower lobe	12	12
Mediastinal	14	14
Tumor Diameter		
Median (mean-max) cm	6 (1.9 – 14)	

When patients were evaluated according to the lymph node stating, it was found as N1: 13 (13.1%), N2: 62 (62.6%), and N3: 24 (24.2%). Pathological adenocarcinoma was 56 (56.6%), squamous cell carcinoma was 31 (31.3%), large cell carcinoma was 1 (1%), and the non-typeable group was 11 (11.1 %). There was no statistically significant finding in the survival analysis of both lymph node stage and tumour subtype (p>0.05). The chemotherapy regimens of the patients were examined and their rates are shown in Table 2.

Table 2: Overall survival of chemotherapy regimens

Parameters	Number of Patients (n= 99)	p score
Chemotherapy regimen		
Paclitaxel + carboplatin	72	
Gemcitabine + cisplatin	12	
Docetaxel + cisplatin	4	>0,05
Vinorelbin + cisplatin	3	
Pemetrexed + cisplatin	1	
Unable to complete treatment	7	
No difference in overall survival between chemotherapy regimen.		

Table 3: Parameters Affecting Overall Survival and Disease-Free Survival

Parameters	Average survival (months)	P score	Disease free survival	p score
Radiotherapy Dose				
>60 Gy	14.326±1.209	**0.0048**	7.938±1.084	0.114
<60Gy	8.569±1.404		10.155±0.799	
WBC<11x10³/µL	15.101±1.364		10.366±0.901	
WBC≥11 x10³/µL	9.784±1.075	**0.004**	8.374±0.735	0.073
NEU<6.5 x10³/µL	16.187±1.614		10.733±0.976	
NEU≥6.5 x10³/µL	10.734±1.120	**0.010**	8.731±0.882	0.169
PLT<400 x 10³/µL	14.476±1.217		9.904±0.713	
PLT≥400 x 10³/µL	9.626±1.452	**0.020**	9.146±1.673	0.935
LYM<2x10³/µL	12.562±1.421		8.455±0.658	
LYM≥2 x10³/µL	13.905±1.448	0.557	10.863±1.082	**0.022**
Neutrophil lymphocyte ratio (NLR)				
NLR <4.0	14..32±1.30	**0.046**	7.20±0.86	0.08
NLR > 4.0	10.54±1.16		5.4±0.71	
Albumin / Total Protein Ratio				
<0.4	11.56±1.72	0.37	6.92±1.58	0.88
>0.4	13.86±1.22		6.68±0.73	
ECOG				
0	19.233±2.100	**0.00017**	10.257±0.839	0.070
1	13.695±1.297		10.750±1.259	
2	8.076±1.274		7.126±1.288	

WBC: White Blood Count, NEU: Absolute Neutrophil Count; PLT: Total Platelet Count; LYM: Absolute Lymphocyte Count; ECOG: Eastern Cooperative Oncology Group

The patients were found according to their performance status as ECOG 0: 47 (47.5 %), ECOG 1: 32 (32.3%), and ECOG 2: 20 (20.2 %). It was observed that ECOG performance status did not constitute a significant statistic for disease-free survival in the survey analysis but it was a statistically significant parameter for overall survival (p<005). When the total radiotherapy dose was evaluated, radiotherapy was given at an average dose of 58.33 grays (Gy). When those who received less than 60 Gy were evaluated as the first group and those who received 60 Gy and above as the second group, it was statistically observed that total survival was longer in group 2 (p=0.0048). When the complete blood parameters of the patients were examined, the mean WBC was 9.9 x 10³/µL, the standard deviation was 2.4, the minimum value was 5.3 x 10³/µL and the maximum value was 16.2 x 10³/µL. The hemoglobin average was 13.4 gr/dl, the standard deviation was 1.76, the minimum value was 8 gr/dl and the maximum value was 18 gr/dl. The mean lymphocyte was 2.09 x 10³/µL, the standard deviation was 0.6, the minimum value was 0.70 x 10³/µL and the maximum value was found 3.81 x 10³/µL. The mean neutrophil count was 6.69 x 10³/µL, the standard deviation was 2.16, the minimum value was 3.0 x 10³/µL and the maximum val-

ue was 12.6 x 10³/µL. Platelets averaged 333 x 10³/µL, the standard deviation was 104, minimum was 149 x 10³/µL and maximum was 644 x 10³/µL.

The WBC value was taken as a cut-off of 11 x 10³/µL. When those below 11 x 10³/µL were examined in the first group and those with 11 x 10³/µL and above were examined in the second group, it was statistically observed that total survival was better in the first group ($p<0.05$). When the lymphocyte count was examined in two groups as below 2 x 10³/µL and above, it was observed that the disease-free survival was statistically longer in the group above 2 x 10³/µL ($p<0.05$). When grouped as those with a neutrophil count below and above 6.5 x 10³/µL, it was observed that total survival was statistically longer in the group below 6.5 x 10³/µL ($p<0.05$). When the biochemistry parameters were examined, the mean value of creatinine was 0.81 mg/dl, the standard deviation was 0.2, the minimum value was 0.57 mg/dl and the maximum value was 1.85 mg/dl. The total protein mean was 7.23 gr/dl, the standard deviation was 0.6, the minimum value was 5.9 gr/dl, and the maximum value was 9.4 gr/dl. The average albumin was 3.24 gr/dl, the standard deviation was 0.47, the minimum value was 2.2 gr/dl, and the maximum value was 4.3. The mean value of ALP was 99.5 U/L, the standard deviation was 50.9, the minimum value was 35 U/L, the maximum value was 411 U/L. The AST average was 20.7 U/L, the standard deviation was 15.8, the minimum value was 8 U/L, the maximum value was 154 U/L. The average ALT was 20.7 U/L, the standard deviation was 20.1, the minimum value was 6 U/L and the maximum value was 179 U/L. The average LDH was 235 U/L, the standard deviation was 73.6, the minimum value was 143 U/L and the maximum value was 513 U/L. The average calcium value was determined as 9.23 mg/dl, the standard deviation was determined as 0.5, the minimum was determined as 8,1 and the maximum was determined as 11.2 mg/dl. The average CEA value was 60.8 ng/ml, the standard deviation was 209.6, the minimum was 0.1 ng/ml and the maximum was 897. It was observed that the LDH, calcium (Ca), creatinine, albumin, total protein, ALP, AST, ALT, LDH and CEA parameters included in the study did not have a statistically significant effect on survival ($p>0.05$). The mean neutrophil-lymphocyte ratio (NLR) was 3.58 ±1.98. When we took the cut-off value as 4.0 and examined those with values up to 4 in the first group and examined those with values of 4 and above in the second group, total survival was statistically longer in the group with NLR<4.0 (n=45) ($p=0.046$). However, a statistically significant effect on disease-free survival could not be demonstrated ($p>0.05$). Albumin total protein ratio (ATO) was 0.44 ±0.05, minimum was 0.31 and the maximum was 0.60. This data was not statistically significant in the survival analysis ($p>0.05$). This data is shown in Table 3.

Discussion

In the study we conducted, we examined factors that may affect survival in patients with stage IIIA and stage IIIB NSCLC and could not undergo surgery. We examined the relationships of factors such as age, sex, tumour location, tumour diameter, smoking history, lymph node stage, differentiation of tumour, histopathological subtype, ECOG performance evaluation, CRT regimen, WBC, HGB, LYM, NEU, PLT, creatinine, total protein, albumin, AST, ALT, ALP, LDH, Ca, and CEA levels, total radiotherapy dose, and NLR with survival.

In our study, patients were divided into 3 groups with ECOG-PS as 0, 1 and 2. There were 47 patients (47.5%) in ECOG 0 group, 32 (32.3%) in ECOG 1 group and 20 patients (20.2%) in ECOG 2 group. In our study, it was observed that ECOG-PS had a statistically significant effect on survival ($p=0.00017$) and had no significant effect on disease-free survival ($p>0.05$). This result obtained in our study is an expected situation. Because we think that patients with ECOG-PS 0-1 tolerate cytotoxic treatment better, have a good general condition and do not have serious comorbidities. Therefore, it is reasonable to determine the survival outcomes of these patients better.

In this study, we did not find a relationship between AST, ALT, GGT and LDH values and survival. There are many studies in the literature showing the relationship between lung cancer and laboratory parameters and survival. Statistical significance was also demonstrated in some of these studies. However, in the study we completed, although there was a numerical difference, a statistically significant difference was not detected. This may be due to the insufficient number of patients and the fact that the study was a single-center study. In most cancers, tumor markers can be effective for both follow-up and treatment response. In previously published studies, there are outcomes associated with CEA and survival. In one of these studies, Arrieta et al. showed that high CEA levels were related to poor prognosis in patients with advanced NSCLC (12). Similarly, in a study they conducted, Tomita et al. found that preoperative CEA levels were related to patient prognosis (13). In our study, no statistically significant data were found in the analysis of CEA level and survival. CEA was not requested in most of our patients because it is a parameter that is not routinely used in diagnosis and follow-up in lung cancer patients. Therefore, we think that this result in our study is statistically insignificant.

In a study by Urvay et al. conducted on inoperable stage III NSCLC patients, the cases of squamous cell carcinoma were 68% (n:100), adenocarcinoma was 18% (n:27), and the non-typeable group was 14% (n:21). They investigated the effect of tumor subtype on 3-year survival rates and mean survival times and observed that there was no statistically significant contribution ($p=0.17$) (14). In a study Unal et al. conducted, 70.2% of the patients were patients with adenocarcinoma, 16% were patients with squamous cell carcinoma, and 13.8% were in the non-typeable group. Similar to the studies conducted by Kacan et al., no relation between tumour subtype and survival

was found in the studies of Kwas et al., (15–17). In our study, when patients were evaluated according to the subtype, adenocarcinoma constituted the majority with 56 (56.6%). Of the remaining patients, 31 (31.3%) of them were patients with squamous cell carcinoma, 1 (1%) was a patient with large cell carcinoma, and 11 (11.1%) of them were in the non-typeable group. These rates were similar to some studies, and it was observed that there was no statistical relationship between tumour subtype and disease-free and overall survival (p>0.05).

In a retrospective single-centre study conducted by Kefeli et al. on 1031 patients in 2015, patients were grouped as under 60 and older according to their age. It was observed that the overall survival was lower in patients over 60 years old (p<0.001). While the mean total survival in the group under 60 years old was 13.6 months, it was 10.0 months in the group above the age of 60 (18). Other studies related to age, including the studies of Kwas et al. and Unal et al., have shown that age has no statistical relationship with survival parameters (15, 16). In our study, we examined patients in 2 groups: under the age of 65 and over the age of 65. It was statistically observed that disease-free survival was lower in the group over 65 (p<0.05). Total survival was statistically insignificant. While the total survival in the group under 65 years of age in our study was 10.35 ± 0.84 it was 7,93 ±0.76 in the group over 65. The statistical insignificance of age for total survival made us think that it may be due to the difference in patient distribution.

Clinical records of 148 patients with stage III NSCLC treated between 2007 and 2015 were evaluated retrospectively by Urvay et al. According to the dose they received for radiotherapy, they were evaluated in two groups: below 60 Gy and above 60 Gy. While the mean survival of the first group was 7 months, the mean survival of the second group was 21 months. It was observed that the overall survival was better in the group with higher radiotherapy dose and this was statistically significant (p<0.05) (14). Similarly, in other studies, it was observed that high doses of radiotherapy given up to certain Gy doses increased the survival of patients (19.20). Similarly, in our study, we examined patients with radiotherapy doses below 60 Gy in group 1 and above 60 in group 2. It was observed that the mean total survival was 8.56±1.4 months in group 1 and 14.32±1.2 months in group 2 and the total survival analysis was statistically significant (p=0.0048). However, it was observed that the radiotherapy dose was not statistically significant for disease-free survival (p>0.05). Increasing the dose of radiotherapy above a certain level in patients who can tolerate it may result in better results in terms of local disease control and survival.

In most tumor types, a significant relationship was found between inflammation and tumor biology. Inflammation is an effective mechanism in both tumor development and aggression. In previous studies, inflammation markers have been associated with poor survival. The most well-known of these inflammation markers is NLR. In one of the previous studies, Scilla et al. conducted a study on 276 patients between 2000 and 2010, including patients with stage-IIIA and stage-IIIB NSCLC. The limit value for NLR was based on 5. Accordingly, total survival was observed as 26 months in the group with NLO < 5 and 11 months in the group with NLR ≥ 5 (p<0.00001). In this study, the hypothesis that the low NLR value measured at the time of diagnosis was associated with longer overall survival in patients was confirmed (23). In the analysis performed by Meriggi et al., which included five centres between January 2011 and December 2015, with 63 patients with EGFR-mutated NSCLC, the relationship between NLR rate and survival was investigated. The NLR was obtained from absolute neutrophil and absolute lymphocyte counts of the complete blood count, and the cut-off was determined according to the mean NLR value (3.5). It was observed that 40 patients were under 3.5, and 23 patients with 3.5 and above. While the mean total survival was 21 months in the group with under 3.5 NLR, it was 8.3 months in the other group and was statistically significant (p=0.013). While the mean duration of disease-free survival was 12 months in the group with less than 3.5, it was 6.5 months in the other group and was statistically significant (p=0.025)(24). The clinical data of NSCLC patients were reviewed retrospectively and followed-up until July 2017 in a study conducted by Zhang et al. with 127 patients with EGFR mutant in a single center between January 2013 and December 2015. The effect of NLR and lymphocyte monocyte ratio on overall survival and disease-free survival of stage III B and stage IV patients treated with EGFR-TKI was investigated. A statistically significant relationship was found between disease-free survival and overall survival and NLR (p<0,001). Taken the NLR cut-off value as 2.9, the overall survival was 32.5 months in ≤ 2.90 patients, while this period was found to be 20.9 months in > 2,9 patients. Disease-free survival was 17.7 months in patients with an NLR value of less than 2.9, while it was found 10.6 months in those with an NLR value of above 2.9. The lymphocyte-monocyte ratio was not found associated with disease-free survival and overall survival (25).

The cut-off value for the NLR ratio was taken as 4 in the study we conducted in our centre. Current neutrophil and lymphocyte counts were recorded and proportioned just before treatment. Patients were examined in 2 groups as NLR<4 and NLR ≥ 4. When examined for total survival, there were 45 patients in group 1 and 18 patients in group 2. Total survival was 14.32±1.3 in group 1 and 10.54±1.16 in group 2. When these two groups were compared, it was seen that NLR had a statistically significant effect on total survival (p<0.05). The mean of the first group was 10.22±0.86 months, while the mean of the second group was 8.411±0.71. There was no statistically significant difference between groups 1 and 2 for disease-free survival (p>0.05). It was seen both in our and other studies that when the neutrophil-lymphocyte balance was impaired in favour of neutrophils, it was a poor

prognostic factor for survival. Leukocytes, which is thought to play a key role in the concepts of tumour growth, invasion and metastasis, and the mediators they secrete, lymphocytes, which are known to be responsible for apoptosis mechanisms and anti-tumoral activity, and the cytokines they secrete, suggest that there may be new treatment models in the future. Also, it was observed that NLR was an important predictive factor in terms of survival and prognosis.

As a result, Lung cancer is a serious public health problem as it is the most common cause of cancer-related death worldwide. In our study, it was determined that there was a statistically significant difference between the inflammation markers of the patients and their survival. It has been observed that when the specified cut-off values are used, it can be useful in predicting the survival and prognosis of the patients. These and similar inflammatory prognostic markers can be useful both in confirming prognosis and in determining which patients need more intensive treatment. By detecting patients whose NLR exceeds certain cut-off values, we can aim to increase the survival of these patients with a more intensive treatment.

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