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## ■ Original Article

# External validation of the new prognostic western score in predicting survival after curative resection of gastric cancer

## *Mide kanserinin küratif rezeksiyonundan sonra sağkalımı ön görmede new prognostic western score' un eksternal validasyonu*

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### Abstract

**Aim:** Gastric cancers may progress differently depending on the factors affecting the prognosis. In our study, we evaluated the external validation of the new prognostic western score used to predict the surveillance of gastric cancer patients undergoing curative resection.

**Material and methods:** The study included 139 patients over 18 years of age who underwent curative resection for gastric adenocarcinoma in our hospital between 2004 and 2015. The demographic characteristics of the patients and their albumin level, neutrophil lymphocyte ratio and pathological tumor-nodes-metastasis stage were evaluated.

**Results:** Fifty-nine (42.4%) of the patients were female and 80 (57.6%) were male. The mean albumin value was 39±7 mg/L, and the median value of the neutrophil/lymphocyte ratio was 2.5 (1.76-4). According to the pathological tumor-nodes-metastasis staging, 13 cases (9.4%) were stage 1, 21 (15.1%) stage 2, 99 (71.2%) stage 3, and 6 (4.3%) stage 4. The five-year median survival of the patients was 32.5 months. Age was significantly higher in the mortality group (P=.021). In the log-rank analysis, a low albumin level, a high neutrophil lymphocyte ratio, and a high tumor-nodes-metastasis stage were statistically significant in the mortality group (P=.001, .000 and .030 respectively). In the Cox regression analysis, the only significant variable was determined as pathological stage (P=.005).

**Conclusion:** The new prognostic western score was not significant in predicting the prognosis of gastric cancers.

**Key words:** albumin; neutrophil/lymphocyte ratio; survival; gastric cancer

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## Öz

**Amaç:** Gastrik kanserlerde prognoz etki eden faktörlere bağlı olarak farklı seyredabilmektedir. Biz çalışmamızda küratif rezeksiyon yapılan gastrik kanserlerin sağkalımını ön görmede kullanılan new prognostic western score' un eksternal validasyonunu değerlendirdik.

**Gereç ve Yöntemler:** Hastanemizde 2004- 2015 yılları arasında gastrik adeno kanser nedeniyle küratif rezeksiyon yapılan 18 yaş üzeri 139 hasta çalışmaya dahil edildi. Hastaların demografik özellikleri albümin, nötrofil lenfosit oranı ve patolojik tümör-lenf nodu-metastaz evresi değerlendirildi.

**Bulgular:** Hastaların 59 (%42,4)' u kadın, 80 (%57,6)' i erkekti. Albümin ortalama değeri  $39 \pm 7$  mg/L, nötrofil lenfosit oranı medyan değeri 2,5 (1,76-4) idi. Hastaların patolojik tümör-lenf nodu-metastaz evrelemesine göre 13 (%9,4)' ü evre 1, 21 (%15,1)' i evre 2, 99 (%71,2)' u evre 3, ve 6 (%4,3)' sı evre 4 teydi. Hastaların 5 yıllık medyan sağkalımı 32,5 ay idi. Yaş mortalite grubunda anlamlı yüksek bulundu ( $P=0,021$ ). Log rank analizinde mortalite grubunda albümin düşüklüğü, nötrofil lenfosit oranı yüksekliği ve tümör-lenf nodu-metastaz evresi yüksekliği istatistiksel anlamlıydı ( $P=0,001, 0,000$  ve  $0,030$  sırasıyla). Cox regresyon analizinde anlamlı değişken sadece patolojik evre olarak belirlendi ( $P=0,005$ ).

**Sonuç:** Mide kanserlerinde new prognostic western score prognozu göstermede anlamlı bulunmadı.

**Anahtar kelimeler:** albümin; nötrofil lenfosit oranı; sağkalım; mide kanseri

## Introduction

Gastric cancer ranks third in cancer-related deaths worldwide [1]. Despite advances in gastric cancer treatment, the prognosis remains poor in advanced (locally advanced or metastatic) cases [2]. Although the tumor-nodes-metastasis (TNM) staging system is used in prognosis classification, the prognosis may differ among patients at the same stage and receiving the same treatment [3, 4]. Some inflammatory cells in the blood also negatively affect the prognosis with the proteins they secrete [5]. In this study, we aimed to validate the new prognostic western score in the prediction of survival in patients undergoing curative resection for gastric cancer.

## Material and methods

### Patients data

The study included 139 patients who underwent curative resection due to gastric adenocarcinoma between 2004 and 2015. The patients were retrospectively evaluated. The study was carried out in accordance with the Helsinki Declaration of Principles. The demographic characteristics of the patients and their albumin level, neutrophil/lymphocyte ratio (NLR) and pTNM results used in the new prognostic western score were examined. Patients younger than 18 years old, those with cancer other than gastric adenocarcinoma, and those receiving palliative treatment were excluded from the study. Based on the cut-off values in scoring, 1 point was given for albumin <

35 g/L,  $NLR > 2.62$ , and pTNM stage 3-4. The prognostic risk classification was made as Class 1 if the total number of points was 0, Class 2 if 1 point, Class 3 if 2 points, and Class 4 if 3 points in total. This study was approved by institutional ethical committee. Informed consent was obtained from all patients and the principles of the Helsinki Declaration were followed.

### Statistical analysis

The basic patient demographic data were summarized as n (%) for categorical variables and mean with standard deviation (SD) or 95% confidence interval (CI) for continuous variables. Continuous variables were compared using Student's t-test or the Mann-Whitney U test as appropriate depending on the normality of their distribution. The differences between the categorical variables were assessed by Fisher's exact test or the  $\chi^2$  test with Yeat's correction for continuity, when necessary. Receiver operating characteristic (ROC) curves and the area under the curve (c-statistic) for the outcome of overall mortality was calculated to determine the accuracy of the score.

Overall survival (OS) in the prognostic categories was calculated according to the Kaplan-Meier method. Log-rank tests were used to determine the significant differences between the survival curves. A multivariate Cox proportional hazard model with backward selection was performed to determine which factors were independently predictive of survival.

A P value of  $<0.05$  was considered significant. Statistical analyses were conducted using SPSS v. 24.0.0.0 (SPSS IBM, New York, NY).

## Results

Of the 139 patients included in the study, 59 (42.4%) were female and 80 (57.6%) were male, and the mean age value was  $59 \pm 13$  (26-88) years. The mean albumin value was  $39 \pm 7$  mg/L, and the median NLR value was 2.5 (1.76-4). According to the pTNM staging of the cases, 13 (9.4%) were stage 1, 21 (15.1%) were stage 2, 99 (71.2%) were stage 3, and 6 (4.3%) were stage 4. Among the prognostic factors for scoring, 11 patients had 0 risk factor while 67 patients had 1, 48 patients 2, and 13 patients 3 risk factors.

The five-year median survival of the patients was 32.5 months. When the mean age value was taken as cut-off, it was found to be significantly higher in the age mortality group in the log-rank analysis ( $P = .021$ ). In the log-rank analysis, the decrease in albumin in the mortality group was statistically significant ( $P = .001$ ), but when the cut-off value of albumin was taken as 3.5 mg/dl, it was not statistically significant ( $P = .650$ ). The log-rank analysis also revealed that an elevated NLR was statistically significant in the mortality group ( $P = .000$ ), but no statistical significance was observed at the NLR cut-off value of 2.62 ( $P = .612$ ). In addition, in the same analysis, a significant difference was found in the mortality group as the stage increased both according to TNM and based on the cut-off value ( $P = .030$  and  $.003$ , respectively) (Figure). There was no statistically significant difference in the log-rank analysis of the new prognostic western risk scoring ( $P = .065$ ). In the Cox regression analysis, the only significant variable was found to be the pathological stage ( $P = .005$ ). The data of the patients are given in the table.

**Table:** Demographic characteristics of the patients and statistical analysis results

Variables	n = 139	p value
Gender F/M (%)	59/80(42.4/57.6)	=.157
Age (years) (m±sd)	59±13	=.021
Albumin g/L (m±sd)	39±7	=.001
Albumin at cut-off <3.5g/L		=.650
Median NLR	2.5 (1.76-4)	=.000
NLR at cut-off >2.62		=.612
TNM stage (%)		
1	13 (9.4)	=.030
2	21 (15.1)	
3	99 (71.2)	
4	6 (4.3)	
Stage at cut-off ≥3		=.003
Western score risk classification (n)		
Risk class 1	11	=.065
2	67	
3	48	
4	13	

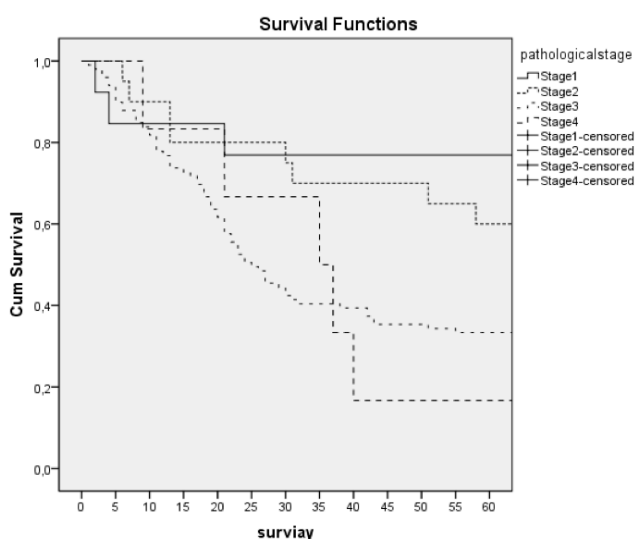
TNM; Tumor-nodes-metastasis, NLR; neutrophil/lymphocyte ratio, F; Female, M; Male, m; mean, sd; standard deviation,

## Discussion

In addition to the late diagnosis and detection of gastric cancers in advanced stages, various markers have an important place in predicting prognosis [6]. This study is important in terms of being the first to attempt to validate the new prognostic western score in predicting the prognosis in gastric cancers.

Sun et al. [7] reported that the NLR-platelet/lymphocyte ratio combination was significant in showing prognosis in stage 1-2 gastric cancers, and in a similar study, Graziosi et al. [8] stated that an elevated NLR negatively affected OS. In the literature, it has been suggested that low albumin levels are effective in predicting OS [9, 10]. In the scoring system we validated, low albumin and high NLR values were found to be poor prognostic markers.

In studies conducted to date, Lu et al. [11] determined that lymphovascular invasion was a prognostic marker, and Graziosi et al. [6] also similarly found that an increase in the TNM stage, elevated NLR, and decreased albumin had a negative effect on OS. In the same study, the authors also suggested that the prognosis could be better predicted in gastric cancers with the new prognostic western score they developed using these prognostic markers [6]. In our study, it was seen that the TNM stage alone was significant in predicting the prognosis, but the new prognostic western score was not sufficient for this purpose.



**Figure:** Statistical analysis of pathological stage in gastric cancer



The limitation of the study can be considered as the small number of patients and its retrospective nature.

### Conclusion

External validation studies are one of the most reliable indicators for evaluating the accuracy of a system. In our study, the new prognostic western scoring system was not found significant in predicting prognosis in gastric cancer patients.

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### Declaration of Conflicting Interest

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