Research Article

Correlation of Platelet-to-Lymphocyte Ratio (PLR), Neutrophil-to-Lymphocyte Ratio (NLR) to Gleason Score in Prostate Cancer Patients at Haji Adam Malik Medan General Hospital

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Abstract:
Introduction : PLR and NLR have been shown to be scientifically significant as prognostic factor in patients suffering from Prostate Cancer. In other side, Gleason Score is the main parameter in determining the prognosis of patients with prostate cancer. In this study, we will analyse the correlation of PLR and NLR to Gleason Score in prostate cancer patients.
Method : This study was conducted by using the cross-sectional method at the Department of Urology of H. Adam Malik General Hospital Medan in 2012 until 2017. We analyzed 38 samples that met inclusion and exclusion criterias using spearman correlation test and Kaplan-Meier Curve test for Survival Rate analysis on Statistics SPSS ver 21.
Results : From 38 samples analyzed, we found the relationship between PLR and NLR with Gleason Score (p <0.001, with R 0.675 and 0.607 respectively)
Conclusion : Increased PLR and NLR scores had a significant association with Gleason Score in Prostate Cancer patients.

Introduction

Prostate cancer is one of the medical problems in the male population, and is the second most common cancer. Prostate cancer is in number 5 as cancer-related deaths in men worldwide. According to statistics, the prevalence of prostate cancer in Europe is 214 / 100,000 and the number of cases diagnosed each year is 2.6 million.

From the data of the Indonesian Society of Urologic Oncology (ISUO) in 2011 during the period 2006-2010 there were 971 patients diagnosed with prostate cancer. The mean age was 68.3 years, the highest among age group was 70-79 years for 37.6%. Primarily diagnostic modalities were used is biopsy in 563 cases (57.9%). Thus the number of cases of prostate cancer in Indonesia, a check that can be used widely in major health centers with good sensitivity and specificity so that it can be used as a parameter in assessing prognosis of prostate cancer.

Neutrophil-to-lymphocyte ratio (NLR) is the most commonly used method because it is easily accessible. Recent evidence indicates that NLR is associated with poor life expectancy in patients with prostate cancer (PCa). Similarly with Platelet-to-lymphocyte, PLR is a way that can be used to predict the prognosis of patients with prostate cancer, but is still rarely used worldwide. (Cao J, Zhu X, 2016) more evidence suggests that inflammation may have a major role in tumorogenesis and

PCa development. A low number of serum neutrophils predicts a positive prostate biopsy. Neutrophil lymphocyte ratios (NLR) appear to represent independent prognostic markers in patients with PCa.

Similarly platelet lymphocyte ratio (PLR) is also a parameter based on systemic inflammation. Numerous studies have revealed high platelet lymphocyte ratio (PLR) pretreatment independently predicting poor prognosis in patients with tumors including stomach cancer, pancreatic cancer, ovarian cancer, colorectal cancer, lung cancer, hepatocellular carcinoma, kidney cancer, esophageal cancer. Yuksel OH et al and Kaynar M et al. Reported that PLR is commonly used to distinguish benign prostatic hyperplasia and prostate cancer, to support its diagnostic value. However, whether PLR and NLR play an important role in PCa prognosis has not been reported. Platelet and lymphocyte counts are routinely performed in most clinical laboratories around the world, therefore we evaluate whether PLR and NLR pre-treatment can predict prognosis for prostate cancer patients.

Method

This research was conducted by using analytical method of Cross-sectional conducted in Department of Surgery of Urology Division of RSUP H. Adam Malik Medan with data

taken from medical record of outpatient of urology department of RSUP H. Adam Malik Medan in 2012 until 2017. Population target is prostate cancer patients. Affordable populations are outpatients who have been diagnosed with prostate cancer in RSUP H. Adam Malik in 2012. The sample used is patients with a diagnosis of prostate cancer that has been done histopathologic examination through simple random sampling technique that has met the criteria of inclusion and exclusion.

Inclusion criteria: All patients with prostate cancer who have been diagnosed histopathologically in RSUP H. Adam Malik Medan, Complete medical record data, and Approve informed consent.

Exclusion criteria: Incomplete medical record results (patient data in the form of address and telephone number, laboratory results of routine blood), metabolic disorders such as Type 2 diabetes mellitus and haematological disorders and infections.

We analyzed 38 samples that met inclusion and exclusion criterias using spearman correlation test and Kaplan-Meier Curve test for Survival Rate analysis on Statistics SPSS ver 21.

Result

In this study, normality tests were performed using Kolmogorov-Smirnov (KS) test for numerical data. The results of the KS test are listed in Table 1. It was found that prostate-specific antigen (PSA), hemoglobin, leukocyte, absolute platelet count, absolute lymphocyte count, absolute neutrophil count, platelet-to-lymphocyte ratio (PLR), and neutrophil-to-lymphocyte ratio (NLR), all of which have a value of $P < 0.05$, so all the numerical variables in this study are non parametric data.

Table 1. Kolmogorov-Smirnov (KS) for numeric data result

Variable	P value
PSA	< 0.001
Hemoglobin	0.049
Leukocyte	0.001
Absolute Thrombocyte Count	0.2
Absolute Lymphocyte Count	<0.001
Absolute Neutrophile Count	0.011
PLR	0.01
NLR	0.051
Gleason Score	< 0.001

Test PSA = *prostate-specific antigen*, PLR = *platelet-to-lymphocyte ratio*, NLR = *neutrophil-to-lymphocyte ratio*
In this study, 38 subjects were diagnosed with prostate adenocarcinoma and being analyzed. The characteristics of the subject are included in Table 2.

Table 2. Subject Characteristics

	N	%
PSA	15 (0.8-436.7)[a]	
Haemoglobin	13.3 (8.8-15.9)[a]	
Leukocyte	7.8 (1.1-21.3)[a]	
Absolute Thrombocyt Count	382.022,57 ± 97728,13	
AbsoluteLymphocyte Count	900 (400-3800)[a]	
Absolute Neutrophil Count	7500 (2770-19050)[a]	
PLR	391,64 (74,67-688,57)[a]	
NLR	8,01 ± 4,4	
Mortality	16	42%
Gleason Score	6 (4-8)	

The abnormal distributed numerical data is shown in the median (minimum-maximum) form PSA = prostate-specific antigen, PLR = platelet-to-lymphocyte ratio, NLR = neutrophil-to-lymphocyte ratio
Characteristics of patients during the 5-year follow-up period is illustrated by the table below.

Tabel 3. Total mortality during 5 years of follow up

	Dead	live	Total
Gleason ≥ 6	14	10	24
Gleason < 6	2	12	14

During 5 years of follow-up, 16 patients were found dead, with the highest number being found in the group of patients with gleason score ≥ 6 of 14 patients, and group of patients with Gleason score <6, as many as 2 patients.

To analysed the correlation between PLR and Gleason score and NLR with Gleason score, Spearman correlation test was performed. Spearman correlation test results are shown in Table 4.

Table 4. *Spearman* correlation result test

	Corelation Coefficient (R)	P value*
PLR with Gleason	0.675	<0.001
NLR with Gleason Score	0.607	<0.001

*Spearman test for non-parametrik data

Spearman test was performed to find the relationship between PLR and Gleason Ratio obtained p value <0.001, the same

thing was done on the test variable between the ratio of NLR and Gleason where the value of P <0.001 is obtained.

Discussion

In this study, we found a significant relationship between increasement in PLR compared to increasement of Gleason score (p<0.001 and R=0.675). This indicates that PLR can be used as a predictor of malignancy degree of prostate cancer. There are several studies that assess the relationship between PLR with prostate cancer outcome. Sun et al (Sun, 2017) found that prostate cancer patients with elevated PLR or NLR had higher Gleason scores. Li (Li, 2015) found that when compared with lower PLR groups, those with higher Gleason scores had higher Gleason scores.

In this study, it was also found that the higher the levels of NLR, the higher the degree of Gleason score and malignancy of prostate cancer patients (p<0.001 and R=0.607). This is similar to previous studies. Sun et al (Sun, 2017) and Li et al (Li, 2015) also found that the increase in NLR was associated with higher Gleason score. Research conducted by Sun and colleagues (Sun, 2017) found that patients with higher NLR values had worse overall survival (OS) and disease-free survival (DFS) than patients with lower NLRs. Multivariate analysis showed that NLR was an independent prognostic factor for DFS. Meta-analysis of 22 studies involving 18,092 cases found that the increase in NLR was a mild risk factor for biochemical recurrence (BCR) in patients with prostate carcinoma after radical prostatectomy.

Conclusion

1. The higher the number of PLR, the higher the degree of malignancy of prostate cancer patients with Gleason Score parameters.
2. The higher the number of NLR, the higher the degree of prostate cancer patients with Gleason Score parameters.

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