

# Correlation between neutrophil-to-lymphocyte ratio with Gleason score in patients with prostate cancer at Adam Malik Hospital Medan 2013 – 2015

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## Abstract

**Context:** A grading system was created by Donald F. Gleason for prostate cancer as prognostic indicators. The neutrophil-to-lymphocyte ratio (NLR) was found that it could be a prognostic factor in solid tumors.

**Aims:** This study aims to assess whether there is a correlation between NLR with the results of the Gleason score of patients with prostate adenocarcinoma biopsy at Haji Adam Malik Hospital Medan.

**Settings and Design:** A total of 121 patients underwent a prostate biopsy from early January 2013 to December 2015 at Adam Malik Hospital.

**Subjects and Methods:** Of the 121 patients, thirty were not included in the study because of incomplete baseline data and a history of hematological abnormalities. Data from 91 patients were then taken, including age, hematologic data prebiopsy, prostate-specific antigen (PSA) on initial examination, prostate weight estimation, and Gleason scores from biopsy results.

**Statistical Analysis Used:** The data are processed with SPSS version 22.

**Results:** A significant moderate strength correlation was found between NLR and Gleason Score ( $r = 0.572$ ;  $P = 0.001$ ). However, no statistically significant correlation found between NLR and prostate weight estimation ( $r = 0.077$ ;  $P = 0.469$ ) and NLR with PSA ( $r = 0.072$ ;  $P = 0.496$ ).

**Conclusions:** A significant correlation between the neutrophil-to-lymphocyte ratio and the Gleason score was noted. Further studies are needed to confirm these findings.

**Keywords:** Gleason score, neutrophil-to-lymphocyte ratio, prostate cancer

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## INTRODUCTION

Prostate cancer (PCa) is the most common malignancy in urology.<sup>[1-3]</sup> The increasing incidence rate was noted since the use of prostate-specific antigen (PSA), as diagnostic and therapeutic monitoring.<sup>[4-6]</sup> A grading system was created by Donald F. Gleason for PCa as prognostic indicators.<sup>[7]</sup>

Virchow proposed that inflammation plays an essential role in the development and progression of cancer, as proved by many studies.<sup>[4,5,8,9]</sup> The neutrophil-to-lymphocyte ratio (NLR) was found that it could be a prognostic factor in solid tumors.<sup>[1]</sup> This study aims to assess the correlation

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between NLR and the Gleason score in patients with prostate adenocarcinoma biopsy at Haji Adam Malik Hospital Medan.

## SUBJECTS AND METHODS

A total of 121 patients underwent a prostate biopsy from early January 2013 to December 2015 at Adam Malik Hospital. Of the 121 patients, thirty were not included in the study because of incomplete baseline data and a history of hematological abnormalities. Data from 91 patients were then taken, including age, hematologic data prebiopsy, PSA on initial examination, prostate weight estimation, and Gleason score from biopsy results. The data are processed with SPSS version 22 (IBM Corp, Armonk, NY, USA).

## RESULTS

Based on data from 91 patients, the data obtained demography characteristics are as follows.

In the data [Table 1], we found patients with a mean age of 68.34 years with age ranging from 52 to 85 years. Initial PSA level with an average of 51.95 ng/mL. Measurement of Gleason score with an average of 5.9 and Gleason range of lowest score two and highest ten. In this study found NLR with an average of 7.9.

In the analysis with the Spearman test [Table 2], there was a significant correlation with moderate strength in which the increment of NLR score also got an improvement of Gleason Score with  $r = 0.572$  and  $P = 0.001$ . In the analysis with the Spearman test, there is no statistically significant correlation between NLR and prostate weight estimation with  $r = 0.077$  and  $P = 0.469$ , and also, there is no statistically significant correlation between NLR and PSA with  $r = 0.072$  and  $P = 0.496$ .

## DISCUSSION

PCa is a frequent malignancy, with high levels of morbidity. This study finds that patients with an average PCa age of 68 years. The same result is found in Lee *et al.*, Minardi *et al.*, and Langsenlehner *et al.* study.<sup>[10-12]</sup> The average value of NLR in this study is 7.9. Furthermore, the present study found that the average NLR score is 7.9, but based on a study by Langsenlehner *et al.*, the majority of patients were in the low NLR (cut off point <5). The study by Langsenlehner *et al.* was performed for external validation of NLR that is used as a prognostic factor in patients with PCa, where the NLR cutoff point <5 correlated with better survival rates.<sup>[12]</sup>

PSA is a marker that plays a role in early screening of PCa because PSA comes from the prostate organ. Increased PSA may occur in conditions such as prostate hypertrophy, prostatitis, or prostate manipulation (massage, instrumentation, or biopsy). However, high PSA levels are known to indicate a higher incidence of PCa.<sup>[4]</sup> In this study, all patients with PCa were found to have increased PSA. With the development of the knowledge about the mechanism of inflammatory incidence in tumors, research on the correlation between inflammatory factors, and cancer is increasingly common. Many studies have shown that the invasion ability of cancer cells is not only influenced by the biological factors of tumor cells but also influenced by the proinflammatory environment of tumors, especially interactions by various proinflammatory factors. Proinflammatory factors can primarily play a role by stimulating or suppressing tumor cells.<sup>[13]</sup> NLR, as a proinflammatory factor, has been widely studied with varying results. The modalities of therapy in PCa are based on various factors such as clinical stage, age, preoperative PSA, general patient condition, and life expectancy, but the use of the Gleason score can help to guide the therapeutic modalities to choose. Gleason score from biopsy results correlates with various pathological parameters. Tumors with higher Gleason scores had worse clinical properties and were associated with a poorer prognosis.<sup>[14,15]</sup>

In this study, it is found that NLR was positively correlated with the Gleason score. Our finding is consistent with the results of Gokce *et al.*'s study, in which NLR is associated with higher Gleason scores.<sup>[16]</sup> The study found that in the high NLR found a higher Gleason score, with higher progression rates. This supports the theory that the immune response plays an important role in patients with higher Gleason scores; where high Gleason scores are associated with greater systemic dissemination risk. Furthermore, high NLR shows an increase in neutrophils and/or decreases in lymphocytes. Neutrophils are known to respond to the release of interleukin 8 (IL-8) by tumor cells by removing enzymes that can affect the extracellular matrix. Unfortunately, this leads to angiogenesis, which is known to aid tumor development and tumor dissemination to the vascular. IL-8 is reported to be associated with aggressive properties found in PCa.<sup>[10]</sup> Besides, there was no correlation between NLR with prostate weight and serum PSA levels, as was found in other studies.<sup>[4,5]</sup> This research has some limitations, that is, research done retrospectively, so there is risk factor confounding factor in the sample. Furthermore, despite a reassessment of some factor factors that may affect the neutrophil-lymphocyte ratio, it is difficult to prove that the numbers obtained are only influenced by inflammation due to PCa. Furthermore, data

**Table 1: Sample characteristic**

Variable	Mean±SD	P*
Age	68.34±6.76	0.200
PSA	51.95±39.16	0.000
Prostate weight estimation	54.4±22.3	0.005
Gleason score	5.9±1.52	0.000
NLR	7.9±4.27	0.000

\*P: Kolmogorov-Smirnov test. PSA: Prostate-specific antigen, NLR: Neutrophil-to-lymphocyte ratio, SD: Standard deviation

**Table 2: Correlation test results between neutrophil-to-lymphocyte ratio and Gleason score, prostate weight, prostate-specific antigen**

Variable	r	P*
Gleason score	0.549	0.000
Prostate weight estimation	0.077	0.469
PSA	0.072	0.496

\*Spearman test for nonparametric data. PSA: Prostate-specific antigen

from this study are only obtained from one institution, so the possibility of bias on pathology examination may occur.

## CONCLUSIONS

Here is a significant correlation between the ratio of neutrophils/lymphocytes with the results of the Gleason score examination in PCa patients at Haji Adam Malik Hospital. Further studies are needed, whether the ratio of neutrophils/lymphocytes can be used to predict the Gleason score in patients with suspected PCa.

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## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Yin X, Xiao Y, Li F, Qi S, Yin Z, Gao J. Prognostic role of neutrophil-to-lymphocyte ratio in prostate cancer. *Medicine (Baltimore)* 2016;95:e2544.

2. Tang L, Li X, Wang B, Luo G, Gu L, Chen L, *et al.* Prognostic value of neutrophil-to-lymphocyte ratio in localized and advanced prostate cancer: A systematic review and meta-analysis. *PLoS One* 2016;11:e0153981.
3. GLOBOCAN. Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012. GLOBOCAN; 2012.
4. Cao J, Zhu X, Zhao X, Li X-F, Xu R. Neutrophil-to-lymphocyte ratio predicts PSA response and prognosis in prostate cancer: A systematic review and meta-analysis. *PLoS One* 2016;11:e0158770.
5. Gu X, Gao X, Li X, Qi X, Ma M, Qin S, *et al.* Prognostic significance of neutrophil-to-lymphocyte ratio in prostate cancer: Evidence from 16,266 patients. *Sci Rep* 2016;6:22089.
6. Hayashi T, Fujita K, Tanigawa G, Kawashima A, Nagahara A, Ujike T, *et al.* Serum monocyte fraction of white blood cells is increased in patients with high Gleason score prostate cancer. *Oncotarget* 2016;8:35255-61.
7. Baydar DE, Epstein JI. Gleason Grading System: Modifications and additions to the original scheme. *Turkish J Pathol* 2009;25:59-7.
8. Jang WS, Cho KS, Kim MS, Yoon CY, Kang DH, Kang YJ, *et al.* The prognostic significance of postoperative neutrophil-to-lymphocyte ratio after radical prostatectomy for localized prostate cancer. *Oncotarget* 2016;8:11778-87.
9. Kwon YS, Han CS, Yu JW, Kim S, Modi P, Davis R, *et al.* Neutrophil and lymphocyte counts as clinical markers for stratifying low-risk prostate cancer. *Clin Genitourin Cancer* 2016;14:e1-8.
10. Lee H, Jeong SJ, Hong SK, Byun SS, Lee SE, Oh JJ. High preoperative neutrophil – Lymphocyte ratio predicts biochemical recurrence in patients with localized prostate cancer after radical prostatectomy. *World J Urol* 2016;34:821-7.
11. Minardi D, Scartozzi M, Montesi L, Santoni M, Burattini L, Bianconi M, *et al.* Neutrophil-to-lymphocyte ratio may be associated with the outcome in patients with prostate cancer. *Springerplus* 2015;4:255.
12. Langsenlehner T, Thurner EM, Krenn-Pilko S, Langsenlehner U, Stojakovic T, Gerger A, *et al.* Validation of the neutrophil-to-lymphocyte ratio as a prognostic factor in a cohort of European prostate cancer patients. *World J Urol* 2015;33:1661-7.
13. Sun Z, Ju Y, Han F, Sun X, Wang F. Clinical implications of pretreatment inflammatory biomarkers as independent prognostic indicators in prostate cancer. *J Clin Lab Anal* 2018;32:e22277.
14. Montironi R, Mazzucchelli R, Beltran AL, Scarpelli M, Cheng L. The Gleason grading system: where are we now? *Diagn Histopathol* 2011;17:419-27.
15. Gevaert T, Van Poppel H, Joniau S, De Ridder D, Lerut E. Current perspectives on the use of the Gleason grading system for prostate cancer. *Belgian J Med Oncol* 2012;6:45-51.
16. Gokce MI, Tangel S, Hamidi N, Suer E, Ibis MA, Beduk Y. Role of neutrophil-to-lymphocyte ratio in prediction of Gleason score upgrading and disease upstaging in low-risk prostate cancer patients eligible for active surveillance. *Can Urol Assoc J* 2016;10:E383-7.