

The association between neutrophil to lymphocyte ratio and echocardiographic parameters in hospitalised adults with COVID-19 - a retrospective analysis

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Background: The neutrophil to lymphocyte ratio (NLR) is an inflammatory biomarker with prognostic value in several cardiovascular conditions. Hyperinflammation contributes to severe coronavirus disease 2019 (COVID-19), which is characterized by a multi-organ dysfunction. Cardiovascular complications of COVID-19 include arrhythmias, myocardial damage, acute heart failure, and acute coronary syndrome. Transthoracic echocardiography (TTE) can be used to assess cardiovascular structure and function non-invasively.

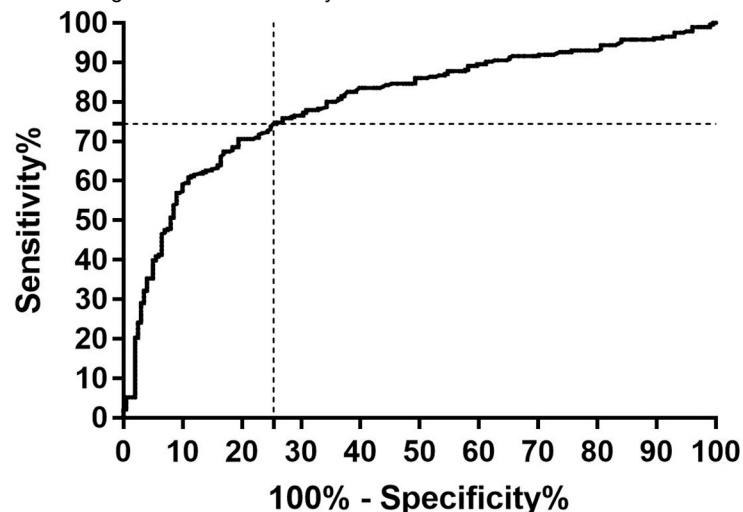
Purpose: To investigate the association between NLR at admission and TTE abnormalities in hospitalised adults with COVID-19.

Methods: This single-centre retrospective study was conducted at a COVID-19 referral hospital in Indonesia. All consecutive hospitalised adults with confirmed COVID-19 who underwent TTE assessments between 3 April 2020 to 6 April 2021 were included. Comprehensive data including NLR at admission, demographics, co-morbidities, peak severity of COVID-19, and TTE parameters were extracted from electronic medical records. A receiver operating characteristic (ROC) curve analysis was conducted to determine the optimal NLR cut-off for prediction of severe-critical COVID-19. Patients with high and low NLR were compared using the chi-square test and odds ratios (OR), with a confidence level of 95%.

Results: A total of 487 patients were included in this study. From ROC curve analysis, the area under curve was 0.80 (95% CI: 0.76 – 0.84). The optimal NLR cut-off was determined as 4.42, which predicted severe-critical COVID-19 with a sensitivity of 74.5% and a specificity of 74.6%. Based on this, the low NLR and high NLR groups had 223 and 264 patients, respectively. Male sex, diabetes, and chronic kidney disease occurred more frequently in the high NLR group ($P < 0.05$). On TTE assessment, the high NLR group had higher odds of left ventricular (LV) systolic dysfunction (OR: 2.49; 95% CI: 1.14 – 5.45), LV wall motion abnormalities (OR: 2.62; 95% CI: 1.41 – 4.87), valve abnormalities (OR: 2.04; 95% CI: 1.35 – 3.07), and right ventricular (RV) dysfunction (OR: 10.55; 95% CI: 2.46 – 45.25).

Conclusions: COVID-19 patients with a high NLR at admission had higher odds of abnormal TTE findings, including LV systolic dysfunction, LV wall motion abnormalities, valve abnormalities, and RV dysfunction. This indicates a possible link between inflammation and cardiovascular dysfunction in COVID-19, which must be confirmed in larger prospective studies.

Abstract Figure. ROC Curve Analysis



Abstract Figure. Odds Ratios for TTE Abnormalities

