

INTISARI

Latar Belakang: Penyakit kardiovaskuler merupakan salah satu masalah kesehatan utama di dunia dengan angka kejadian 32% dari total penyebab kematian dunia. Berdasarkan data statistik terdapat 400.000 pasien yang menjalani prosedur bedah jantung dalam 1 tahun dan lebih dari 80% dilakukan dengan prosedur *cardiopulmonary bypass* (CPB). Insidensi terjadinya pemanjangan ventilasi mekanis pada pasien yang menjalani bedah jantung yang dilaporkan berkisar 2% – 43%. Inflamasi yang berhubungan dengan penggunaan CPB dapat mengakibatkan terjadinya cedera paru dan disfungsi paru pasca operasi yang merupakan salah satu indikasi pemasangan ventilasi mekanis. Salah satu parameter untuk menilai status inflamasi dan imunitas adalah *Systemic Immune-Inflammation Index* (SII). Penelitian untuk mengetahui prediktor pemanjangan ventilasi mekanis pasca CPB masih terbatas dan jarang dilakukan, sehingga diperlukan lebih banyak data untuk menentukan prediktor pemanjangan ventilasi mekanis pasca CPB.

Tujuan: Penelitian ini bertujuan untuk mengevaluasi nilai $SII \geq 529 \times 10^3/\mu L$ dapat digunakan untuk memprediksi pemanjangan ventilasi mekanis pasca CPB di RSUP Dr. Sardjito Yogyakarta.

Metode: Desain penelitian ini adalah observasional analitik dengan pendekatan *cohort prospective*. Subjek penelitian adalah pasien operasi bedah jantung dengan CPB di RSUP Dr. Sardjito Yogyakarta pada bulan Juli-November 2023. Nilai SII didapatkan dari perhitungan netrofil absolut dibagi dengan limfosit absolut dan dikalikan dengan jumlah trombosit. Nilai SII diperiksa pasca CPB. Subjek diklasifikasikan menjadi dua kelompok berdasarkan nilai SII dengan *cut off* $\geq 529 \times 10^3/\mu L$, dan diamati luaran klinis pemanjangan ventilasi mekanis. Prediksi pemanjangan ventilasi mekanis dinyatakan dalam *Relative Risk* (RR) dengan analisis bivariat dan multivariat. Nilai $p < 0,05$ dianggap bermakna secara statistik.

Hasil: Penelitian melibatkan 50 subjek, 22 (44%) subjek dengan $SII \geq 529 \times 10^3/\mu L$ dan 28 (56%) subjek $SII < 529 \times 10^3/\mu L$. Kelompok $SII \geq 529 \times 10^3/\mu L$ memiliki median durasi ventilasi mekanis lebih lama dibandingkan kelompok $SII < 529 \times 10^3/\mu L$, (99 jam vs. 20 jam, $p=0,018$). Hasil analisis bivariat dan multivariat faktor prediktor pemanjangan ventilasi mekanis, menunjukkan hasil signifikan pada SII pasca CPB (RR: 1,32; 95% CI 1,02-1,73 dan RR: 1,58; 95% CI 1,20-1,96).

Simpulan: SII pasca CPB $\geq 529 \times 10^3/\mu L$ terbukti sebagai faktor prediktor pemanjangan ventilasi mekanis.

Kata Kunci: *systemic immune-inflammation index*, *cardiopulmonary bypass*, ventilasi mekanis

ABSTRACT

Background: Cardiovascular disease is one of the major health problems in the world with incidence of 32% of the total causes of death in the world. Based on statistical data, there are 400.000 patient who undergo cardiac surgery procedures in 1 year, and more than 80% are performed with cardiopulmonary bypass (CPB) procedures. The incidence of prolonged mechanical ventilation in patients undergoing cardiac surgery ranges from 2% - 43%. Inflammation associated with the use of CPB contributes to lung injury and post operative pulmonary dysfunction which is one of the indications for mechanical ventilation. One of the parameters to assess the status of immunity and inflammation is SII. Research to determine predictors of prolonged mechanical ventilation after CPB is still limited and rarely conducted, so more data is needed to determine predictor of prolonged mechanical ventilation after CPB.

Objective: This study aims to evaluate whether SII (Systemic Immune-Inflammation Index) $\geq 529 \times 10^3/\mu\text{L}$ can be used to predict prolonged mechanical ventilation after cardiopulmonary bypass at RSUP Dr. Sardjito Yogyakarta.

Methods: The design of this study was observational analytic with a prospective cohort approach. The research subjects were cardiac surgery patients with CPB at RSUP Dr. Sardjito Yogyakarta in July-November 2023. The SII value is obtained from the calculation of absolute neutrophil count divided by absolute lymphocyte count and multiplied by platelet count. SII was checked post-CPB. Subjects were classified into two groups based on intraoperative SII with a cut-off of $\geq 529 \times 10^3/\mu\text{L}$, and clinical outcomes prolonged mechanical ventilation were observed. Prediction of prolonged mechanical ventilation is expressed in Relative Risk (RR) with bivariate and multivariate analysis. p value < 0.05 was considered statistically significant.

Results: The study involved 50 subjects, with 22 (44%) subjects with SII $\geq 529 \times 10^3/\mu\text{L}$ and 28 (56%) subjects with SII $< 529 \times 10^3/\mu\text{L}$. The group with SII $\geq 529 \times 10^3/\mu\text{L}$ had a longer median of duration mechanical ventilation than the group with SII $\leq 529 \times 10^3/\mu\text{L}$, (99 hours vs. 20 hours, $p=0.01$). The bivariate and multivariate analysis of predictors for prolonged mechanical ventilation showed significant results in intraoperative SII (RR: 1,32; 95% CI 1,02-1,73 and RR: 1,58; 95% CI 1,20-1,96).

Conclusion: SII after CPB $\geq 529 \times 10^3/\mu\text{L}$ has been shown to be a predictive factor for prolonged mechanical ventilation

Keywords: *systemic immune-inflammation index* (SII), cardiopulmonary bypass, mechanical ventilation