

# Correlation of Procalcitonin and C-Reactive Protein with SOFA Score in Patients with Severe Burns at Haji Adam Malik General Hospital, Medan, Indonesia

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## Abstract

**Background:** Severe burns predispose patients to sepsis and multiple organ dysfunction. PCT and CRP are commonly measured inflammatory biomarkers, but their association with organ dysfunction severity (SOFA score) in burn sepsis needs local validation.

**Objective:** To assess correlations of PCT and CRP with SOFA score in severe burn patients with sepsis.

**Methods:** Retrospective review of severe burn cases treated at the Burn Unit of Haji Adam Malik General Hospital, Medan (2019–2023). Patients with sepsis and available PCT/CRP on day 1 and day 5 were included. Spearman correlation evaluated biomarker–SOFA associations; paired analyses compared day 1 vs day 5.

**Results:** From 21 severe burn patients, 14 (66.7%) developed sepsis. Mean±SD PCT decreased from 11.31±1.27 to 9.36±1.38 ng/mL ( $p=0.003$ ) and CRP from 140.25±20.31 to 118.73±17.89 mg/L ( $p=0.001$ ). PCT correlated with SOFA on day 1 ( $r=0.62$ ;  $p=0.015$ ) and day 5 ( $r=0.57$ ;  $p=0.021$ ); CRP correlated with SOFA on day 1 ( $r=0.53$ ;  $p=0.034$ ) and day 5 ( $r=0.60$ ;  $p=0.018$ ).

**Conclusion:** PCT and CRP show significant positive correlations with SOFA score and may support monitoring of burn sepsis severity. <sup>2-5</sup>

## Keywords

severe burns; sepsis; procalcitonin; C-reactive protein; SOFA

## INTRODUCTION

Sepsis is a leading cause of late morbidity and mortality after severe burn injury. Diagnosing sepsis in burn patients is challenging because burn-induced systemic inflammation can mimic infection. Sepsis-3 emphasizes organ dysfunction, commonly quantified using the SOFA score. PCT and CRP are widely used to support diagnosis and monitoring, but their relationship with SOFA-based severity is variably reported. This study evaluated the correlation between PCT/CRP levels and SOFA score among severe burn patients treated at a tertiary referral center in Medan, Indonesia. <sup>1-5</sup>

## METHODS

**Design/setting:** Retrospective observational study using medical records from the Burn Unit, Haji Adam Malik General Hospital, Medan (2019–2023). **Eligibility:** Severe burn patients with sepsis and documented PCT and CRP measurements on hospitalization day 1 and day 5; cases without PCT/CRP data were excluded. **Variables:** PCT (ng/mL), CRP (mg/L), and SOFA score on day 1 and day 5; baseline

characteristics (age group, sex, TBSA category, inhalation injury). Analysis: Descriptive statistics; paired comparisons for day 1 vs day 5; Spearman correlation for biomarker–SOFA associations (two-tailed  $p < 0.05$ ).

## RESULTS

Among 21 severe burn patients, 11 (52.4%) were aged  $\geq 40$  years and 11 (52.4%) were male; 12 (57.1%) had TBSA  $> 40\%$ , and 10 (47.6%) had inhalation injury. Fourteen patients (66.7%) developed sepsis and were analyzed. In the sepsis cohort, mean  $\pm$  SD PCT was  $11.31 \pm 1.27$  ng/mL on day 1 and  $9.36 \pm 1.38$  ng/mL on day 5 ( $p = 0.003$ ). Mean  $\pm$  SD CRP was  $140.25 \pm 20.31$  mg/L on day 1 and  $118.73 \pm 17.89$  mg/L on day 5 ( $p = 0.001$ ). PCT correlated positively with SOFA on day 1 ( $r = 0.62$ ;  $p = 0.015$ ) and day 5 ( $r = 0.57$ ;  $p = 0.021$ ). CRP correlated positively with SOFA on day 1 ( $r = 0.53$ ;  $p = 0.034$ ) and day 5 ( $r = 0.60$ ;  $p = 0.018$ ).

## DISCUSSION

Both PCT and CRP showed moderate, statistically significant positive correlations with SOFA score at two time points, suggesting that higher systemic inflammatory burden accompanies greater organ dysfunction in burn sepsis. The significant decline of PCT and CRP from day 1 to day 5 may reflect overall clinical response, while preserved correlations on day 5 indicate ongoing value for serial monitoring. In clinical practice, combining SOFA-based assessment with serial biomarkers may improve early risk stratification and monitoring in severe burn patients suspected of sepsis. Limitations include the single-center retrospective design and small sample size; prospective studies with outcome endpoints are warranted.<sup>4-6</sup>

## CONCLUSION

In severe burn patients with sepsis treated at Haji Adam Malik General Hospital, both procalcitonin and C-reactive protein levels show significant positive correlations with SOFA score on days 1 and 5 of hospitalization. Serial measurement of PCT and CRP may be used as adjuncts to SOFA-based clinical assessment to monitor sepsis severity and organ dysfunction.

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