

## ABSTRAK

### Hubungan Antara Kejadian *Acute Kidney Injury* Dengan Derajat Keparahan Dan Kejadian Kematian Pasien Covid-19 (Studi Kasus Di RSUP Dr. Kariadi Semarang)

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**Latar Belakang:** COVID-19 adalah penyakit menular yang disebabkan oleh *Severe Acute Respiratory Syndrome Coronavirus-2* (SARS-CoV-2), yang memasuki sel melalui reseptor *angiotensin converting enzyme 2* (ACE2). Keberadaan reseptor ACE2 di ginjal, terutama sel tubulus, glomerulus dan endotel, menyebabkan berbagai gangguan struktur dan fungsi. *Acute kidney injury* (AKI) terjadi pada sekitar 30% pasien COVID-19 (kisaran 4%–81%), dengan 5% memerlukan terapi pengganti ginjal (0,8%–14,7%). Tingkat kematian mencapai 52% (kisaran 7%–100%). Penelitian bertujuan untuk membuktikan hubungan antara kejadian AKI dengan derajat keparahan dan kejadian kematian pada pasien COVID-19 yang dirawat di RSUP Dr. Kariadi Semarang.

**Metode:** Penelitian kohort prospektif terhadap pasien terkonfirmasi positif COVID-19 yang dirawat inap di RSUP Dr. Kariadi Semarang pada Agustus 2020-Januari 2021. Evaluasi dilakukan pada kejadian AKI dengan luaran derajat keparahan COVID-19 dan kematian. Analisis menggunakan uji Chi-square dan Fisher exact dengan perhitungan nilai estimasi risiko (*relative risk*). Hasil signifikan apabila  $p < 0.05$ .

**Hasil:** Analisis mendapatkan hubungan signifikan antara kejadian AKI dengan derajat keparahan COVID-19 ( $p < 0.001$ ) dan kematian ( $p < 0.001$ ). Pasien dengan AKI memiliki risiko 1.75x (RR 1.42, CI95% 1.36 – 2.24) lebih besar untuk memiliki COVID-19 derajat berat-kritis dan 1.93x (RR 1.93, CI95% 1.35 – 2.75) lebih besar untuk mengalami kematian. Usia ( $p = 0.005$ ;  $p = 0.009$ ), kebutuhan ventilator mekanik ( $p < 0.001$ ;  $p < 0.001$ ), kadar D-dimer yang tinggi ( $p < 0.001$ ;  $p < 0.001$ ), dan kadar CRP yang tinggi ( $p < 0.001$ ;  $p = 0.017$ ) menjadi faktor perancu derajat keparahan COVID-19 dan kematian COVID-19, secara berturut-turut. Keganasan ( $p = 0.004$ ) menjadi faktor perancu yang secara khusus berhubungan dengan derajat keparahan COVID-19.

**Simpulan:** Kejadian AKI pada pasien COVID-19 merupakan faktor risiko derajat keparahan dan kematian COVID-19.

**Kata kunci:** *acute kidney injury*, keparahan COVID-19, kematian COVID-19

## **ABSTRACT**

### ***The Association between Acute Kidney Injury with Disease Severity and Mortality in Covid-19 Patients***

***(Study at Dr. Kariadi General Hospital Semarang)***

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**Background:** COVID-19 is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), which enter cells via angiotensin-converting enzyme 2 (ACE2) receptor. The presence of ACE2 receptors in kidney, particularly in tubular cells, glomeruli, and endothelium, contributes to structural dan functional damage. Acute kidney injury (AKI) occurs in about 30% of COVID-19 patients (range: 4%–81%), with 5% needing renal replacement therapy (range: 0.8%–14.7%). The mortality rate for COVID-19 patients with AKI is around 52% (range: 7%–100%). This study aims to investigate the association between the incidence of AKI and both the severity and mortality of COVID-19 patients.

**Methods:** This was a prospective cohort study involving patients with confirmed COVID-19 who were hospitalized at Dr. Kariadi General Hospital, Semarang, from August 2020 to January 2021. The study evaluated the occurrence of AKI in relation to the severity of COVID-19 and patient mortality. Statistical analyses were performed using the Chi-square test and Fisher's exact test, with relative risk (RR) estimates calculated. A  $p$ -value  $<0.05$  was considered statistically significant.

**Results:** There was a significant association between the incidence of AKI and COVID-19 severity ( $p<0.001$ ) and mortality ( $p<0.001$ ). Patients with AKI had a 1.75x (RR 1.42, CI95% 1.36 - 2.24) greater risk of having severe-critical COVID-19 and 1.93x (RR 1.93, CI95% 1.35 - 2.75) greater risk of death. Age ( $p=0.005$ ;  $p=0.009$ ), mechanical ventilator requirement ( $p<0.001$ ;  $p<0.001$ ), high D-dimer levels ( $p<0.001$ ;  $p<0.001$ ), and high CRP levels ( $p<0.001$ ;  $p=0.017$ ) were confounding factors for COVID-19 severity and COVID-19 mortality, respectively. Malignancy ( $p=0.004$ ) was a confounding factor specifically associated with COVID-19 severity.

**Conclusion:** The occurrence of AKI in COVID-19 patients is a risk factor for both greater disease severity and mortality among COVID-19 patients.

**Keywords:** acute kidney injury, COVID-19 severity, COVID-19 mortality