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Mortality Risk Factors of COVID-19 Infection in Kidney Transplantation Recipients: A Systematic Review and Meta-Analysis of Cohorts and Clinical Registries

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Objectives: Kidney transplantation recipients (KTR) with coronavirus disease 2019 (COVID-19) are at higher risk of death than general population. However, mortality risk factors in KTR are still not clearly identified. Our objective was to systematically analyze published evidence for risk factors associated with mortality in COVID-19 KTR.

Methods: Electronic databases were searched for eligible studies on 8 January 2021. All prospective and retrospective studies of COVID-19 in KTR were considered eligible without language restriction. Since data in case reports and series could potentially be subsets of larger studies, only studies with ≥50 patients were included. Random-effects model meta-analysis was used to calculate weighted mean difference (WMD) and pooled odds ratio (OR) of factors associated with mortality.

Results: : From a total 566 articles retrieved, 10 were included in the meta-analysis comprising 1,778 KTR. Of these, 1,349 (76%) were survivors and 419 (24%) were non-survivors. Compared with survivors, non-survivors were significantly older (WMD 10.5 years, 95%-CI 9.0-12.0) and had shorter symptom onset before admission (WMD -1.3 days, 95%-CI -2.2, -0.3). KTR of deceased donor were at higher risk of death (OR 2.08, 95%-CI 1.03-4.20). Comorbidities including diabetes, cardiovascular disease, and cancer significantly increased mortality risk. KTR with dyspnea (OR 3.40, 95%-CI 2.51-4.60) and pneumonia (OR 3.01, 95%-CI 1.63-5.55) at presentation were at higher mortality risk, while diarrhea decreased the risk (OR 0.53, 95%-CI 0.39-0.72). Acute kidney injury was associated with mortality (OR 1.74, 95%-CI 1.01-2.98). Inflammatory markers were significantly higher in the non-survivors, including lactate dehydrogenase, C-reactive protein, D-dimer, pro-calcitonin, and interleukine-6.

Conclusions: A number of COVID-19 mortality risk factors were identified from KTR patient characteristics, presenting symptoms, and laboratory investigations. KTR with these risk factors should receive more intensive monitoring and early therapeutic interventions to optimize health outcomes.