COVID-19 Associated Acute Kidney Injury: The Incidence and Associated Factors in Different KDIGO Stages Among the Hospitalized Patients

Article *in* Iranian Journal of Kidney Diseases · September 2023

CITATIONS
0

READS
15

5 authors, including:

Jamshid Roozbeh
Shiraz University of Medical Sciences
195 PUBLICATIONS **2,484** CITATIONS
SEE PROFILE

Anahid Hamidianjahromi
Baylor Scott & White Health
17 PUBLICATIONS **83** CITATIONS
SEE PROFILE

Aida Doostkam
Shiraz University of Medical Sciences
28 PUBLICATIONS **201** CITATIONS
SEE PROFILE

Leila Malekmakan
Shiraz University of Medical Sciences
98 PUBLICATIONS **1,978** CITATIONS
SEE PROFILE

same findings were reported by Zhang *et al*.[15] and Hirsch *et al*.[11] Our results also demonstrated that creatine phosphokinase was significantly higher in AKI patients; this is similar to the reports of Cui *et al*.[17] Proteinuria and hematuria were much more prevalent in our AKI patients, consistent with the study of Fisher *et al*.[12] which reported a significantly greater rate of proteinuria among their AKI patients. In this study, patients with AKI were more likely to have comorbidities than patients without AKI, except for those with respiratory diseases; Hirsch *et al*.[11] also found that their AKI patients had a much higher rate of comorbidities.

Patients with AKI had a higher prevalence of moderate, severe or critical COVID-19 cases, and a lower prevalence of mild COVID-19 instances, as compared to patients without AKI. A study conducted by Cui *et al*.[17] showed a higher rate of critical COVID-19 in AKI patients. The mortality rate of our AKI patients was significantly higher than non-AKI ones, which was also observed in similar studies conducted in this area.[11, 13, 16-18]

The mean leukocyte count, blood urea nitrogen and serum creatinine, creatine phosphokinase, proteinuria, and hematuria showed an increasing stepwise pattern in more severe stages of AKI when we evaluated laboratory findings and outcomes of patients in different AKI stages. Also, patients with severe stages of AKI experienced severe COVID-19 and required ventilator support, and eventually showed worse outcomes. Hirsch *et al*.[11] reported similar results to our study that showed an increased stepwise pattern in severe stages of AKI, in which worse outcomes were noted among patients who suffered severe stages of AKI.

The pathophysiology of AKI in COVID-19 has been discussed in several studies. There is evidence that the SARS-CoV-2 virus attacks the surface of renal podocytes and proximal straight tubule cells, where virus cell entrance mediators such as angiotensin-converting enzyme 2 receptors are more abundant.[3, 19-23] Overactivation of immune responses, hypercoagulability, viral sepsis, and drug nephrotoxicity are other contributing mechanisms involved in the pathophysiology of AKI in these patients.[3, 19, 21, 24]

LIMITATIONS

This study had several limitations. Considering the high prevalence of COVID-19 in our country with several peaks due to different SARS-CoV-2 mutations, although our hospital was one of the main COVID-19 referral centers in southern Iran, the measured AKI incidence cannot be generalized to the general population. Also, we did not have kidney biopsy information, 24-hour urine tests, and patients' medications. In addition, we only measured the in-hospital mortality rate.

CONCLUSION

AKI is a common complication in hospitalized COVID-19 patients. There are positive correlations between severity of COVID-19 and incidence and severity of AKI. Therefore, AKI diagnostic measures should be addressed, especially in severe or critical COVID-19 cases. Future research should consider the long-term outcomes in COVID-19 patients with AKI and the rate of chronic RRT requirement in this population.

CONFLICT OF INTEREST

The authors declared that they had no conflict of interest.

FUNDING

The authors received no financial support for this research, authorship, or article publication.

AUTHORS' CONTRIBUTIONS

All authors have contributed to the research's concept and design and the manuscript's writing and revision and have approved the manuscript for submission.

ACKNOWLEDGMENTS

The study was conducted in accordance with the Declaration of Helsinki, and all experiments were performed in accordance with relevant guidelines and regulations. The local ethics committee of Shiraz University of Medical Sciences approved it (Ethical code: IR.SUMS.REC.1399.071). The current retrospective study was conducted on the basis of informed consent obtained at the admission time, including research aspects. The informed consent was obtained again when additional information was needed. The authors thank Shiraz University of Medical Sciences, Shiraz, Iran, the Center for Development of Clinical Research of Nemazee Hospital, and Dr. Nasrin Shokrpour for editorial assistance.