Acute kidney injury in corona virus disease

Lakshminarayana GR[1*], Sahiba E Ummer[2], Raghunath KV[3], Muthukumar R[4]

[1,3]Consultant Nephrologist, [2,4] Resident Medical Officer, Dept. of Nephrology, EMS Memorial Cooperative Hospital and Research Centre, Perinthalmanna, Malappuram, Kerala, India

***Corresponding Author: Lakshminarayana GR**
Email: drlng23@gmail.com

Abstract
This article aims to review the available literature regarding the renal disease in corona virus disease 2019 (COVID 19), in the midst of ongoing pandemic. There is no available published data from India, regarding acute kidney injury (AKI) in COVID 19. There are only few studies are published from China, with a reported risk of AKI varying from 0.5 to 23 % and 0.8 to 9 % of them needed renal replacement therapy (RRT). There was higher risk of mortality in those with AKI needing RRT.

Keywords: COVID 19, AKI.

Introduction
Coronaviruses are a large family of viruses which may cause illness in animals or humans. Several coronaviruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The name "coronavirus" is derived from Latin *corona*, meaning "crown" or "wreath". The name refers to the characteristic appearance of virions by electron microscopy, which have a fringe of large, bulbous surface projections creating an image reminiscent of a crown or of a solar corona. This morphology is created by the viral spike peplomers, which are proteins on the surface of the virus.[1,2] On February 11th 2020 the World Health Organization (WHO) officially named disease caused by SARS-CoV-2 as "Coronavirus Disease 2019" (COVID-19). This new virus and disease were unknown before the outbreak began in Wuhan, China, in December 2019. There is scarcity of literature regarding the renal disease in COVID 19, which will be reviewed in this article.

Discussion
The studies published from China, have reported incidence rates of AKI varying from 0.5 to 27.06 % and 0.8 to 9 % needing renal replacement therapy (RRT). There was higher risk of mortality in those with AKI needing RRT.[3-8]

In one of largest multicenter (552 centers) reports from China by Guan et al, involving 1099 patients with Covid-19, AKI was reported in 0.5 % of patients with 0.8 % of them needing RRT. Those with non-severe COVID 19 (926 patients) had lower incidence (0.1 vs 2.9%) of AKI than those with severe disease (173 patients). The primary composite end points (admission to an intensive care unit (ICU), the use of mechanical ventilation, or death) were higher (6%) in those with AKI than those without AKI (0.2%). Moreover, the presence of any coexisting illness increased the risk of developing severe COVID 19 (38.7% vs. 21.0%) and primary composite end points in comparison those without comorbidities (58.2 vs 21.5 %). [3]

In another prospective cohort study of 701 patients with COVID-19 from a tertiary hospital the prevalence of elevated serum creatinine, elevated blood urea nitrogen and estimated glomerular filtration rate (eGFR) less than 60 ml/min/1.73m2 were reported in 14.4, 13.1 and 13.1%, respectively. The AKI was reported in 5.1% patients and those with AKI had a significantly higher risk for in-hospital death. Cox proportional hazard regression showed that elevated baseline serum creatinine, elevated baseline blood urea nitrogen, increasing stages of AKI (1 to 3), worsening proteinuria (1+ to 3+) and hematuria (1+ to 3+) were independent risk factors for in-hospital death after adjusting for age, sex, disease severity, comorbidity and leukocyte count.[4]

Another study from Cheng Y, et al involving 710 patients, reported AKI incidence was reported in 3.2% patients and its presence increased the risk for in-hospital death. AKI was associated with proteinuria (44%), hematuria (26.9%) suggesting an underlying glomerular disease in this fraction of cases. [5]

A retrospective analysis of eGFR along with other clinical parameters from 85 in-patients with laboratory confirmed COVID-19, showed that 27.06 % patients exhibited AKI. The elderly patients and those with

comorbidities such as hypertension and heart failure had higher incidence of AKI. [6]

In a retrospective, multi-center cohort study, by Fei Zhou et al, involving 191 adult in-patients (≥18 years old) with laboratory-confirmed COVID-19, AKI was seen in 15 % of them, and cases needing RRT had higher mortality. The patients with comorbidities had higher incidence of AKI and other complications. The comorbidity was present in 48% patients had with hypertension being the most common (30%), followed by diabetes (19%) and coronary heart disease (8%). Multivariate regression analysis showed increasing odds ratio for in-hospital death with older age, higher Sequential Organ Failure Assessment (SOFA) score, d-dimer greater than 1 µg/mL on admission.[7]

In a study by Da Xu et al, to identify the potential mechanisms of acute kidney injury in COVID-19, it was found that, ACE2 expression in kidney cells was no less than that in the lung, esophagus, small intestine and colon, suggesting that the kidney may be an important target organ for SARS-CoV-2. [8] Another published report showed presence of SARS-CoV-2 NP antigen accumulation kidney tubule cells on immunohistochemistry and infiltration macrophages into tubulointerstitium, and complement C5b-9 deposition on renal tubules on postmortem examinations, suggesting AKI by multiple mechanisms in COVID 19.[6]

Treatment of AKI in COVID 19

Only supportive therapy, in the form of avoiding nephrotoxics, maintenance of hydration, and treatment of other complications. RRT may be started as per usual indications (oliguria, hyperkalemia unresponsive to medications, metabolic acidosis, pulmonary edema, or uremic encephalopathy). The modes of RRT which have tried in different studies are SLED, CRRT or conventional hemodialysis, and the patients needing CRRT had lesser chances of survival. [3-7]

Conclusions

The persons with COVID 19, can present with wide spectrum of symptoms ranging from asymptomatic cases to those MODS. Those with older age, co-morbidities have higher incidences of AKI or other complications and mortality. AKI in COVID 19 is multifactorial in origin. Those patients with AKI needing RRT have higher mortality.

Source of funding

None.

Conflict of interest

None.

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How to cite: Lakshminarayana GR, Ummer SE, Raghunath KV, Muthukumar R, Acute kidney injury in corona virus disease. *IP J Urol Nephrol Hepatol Sci* 2019;2(4):