

Outcomes of Kidney involvement with COVID-19 infection

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Abstract

The recent pandemic caused by the Covid19 / SARS-CoV-2 virus cause disease severity by damaging different organs of human body, kidney is one of the most affected organs. This viral infection may target the kidney in addition to the respiratory system. This peculiar condition is the cause of many health hazard but information on renal involvement in COVID-19 is still limited. As, renal involvement causing several renal damages such as glomerulonephritis, acute kidney damage/injury (AKI) several other nephropathies in COVID-19 growing at a rapid pace, so the best way to manage the effect on individuals with chronic renal disease cases can be studied.

Key words: Kidney Covid-19. AKI, CKD.

Introduction

The severe acute respiratory syndrome coronavirus 2 (SARSCoV-2), a novel strain of human coronavirus has spread over the world since its first case was reported from Wuhan, China in December 2019 and quickly this virus infecting people from all over the world. When persons got infected with COVID-19 they produce symptoms like fatigue, fever, sore throat, congested chest, dyspnea, and diarrhea, coughing up phlegm or blood, cough, or sneeze, they release respiratory droplets that carry the virus that causes the disease. Healthcare facilities are

struggling to keep up with the influx of patients due to the rapidly deteriorating global economy. There have been some cases of transmission through feces or direct contact, but most of the human-to-human transmission happens through aerosols. According to the China CDC's findings, the incubation period typically lasts three to one week of period but can last up to 2 weeks of time period in extreme cases. This article aims to shed light on the damaging effects of COVID 19 on kidney by highlighting the plight of dialysis and kidney transplant recipients who are particularly at risk.

1. Importance of kidneys and their impairment with COVID-19 infection

COVID-19, which is primarily responsible for acute respiratory sickness, can harm not only the respiratory system but also the kidneys, heart, gastrointestinal tract, immune system, blood, and nervous system [1-3]. Human kidneys are the major organ for blood filtration and these organs also helps in reabsorption of water in elimination of urine or urine excretion [4-6]. When kidneys are injured suffered from kidney injuries, artificial kidneys are ultimate option for performing the function of kidneys [7]. The kidney injury can be cause of mortality in COVID infected cases, the major risk population are old age and immunocompromised cases [8-9].

2. Infection with COVID-19 can cause kidney damage

In two of A study by Cheng et al [8], did show that high creatinine level, blood urea nitrogen levels (BUN), proteinuria and hematuria were the major cause of renal damage [8]. It was reported among 710 AKI cases positive with COVID-19 infections; where proteinuria and hematuria were observed in 44% and 26% high creatinine level observed in 15.5% respectively. Similar kinds of findings were observed in another study by Li et al., observed that 63% of the patients had proteinuria, and 19% had elevated serum creatinine and blood urea nitrogen levels (BUN), respectively. Similar results were reported in Proteinuria and hematuria were found in 65.5 % and 41.7 % from 333 COVID-19 infected patients who were hospitalized to the intensive care unit (ICU), [10,11,18].

3. COVID-19 kidney damage mechanism

Kidney cells faced cytopathic effect of coronavirus, angiotensin-converting enzyme II (ACE2) has good role in disease severity, the immunocomplex deposition, viral antigen and antibody produced by viral infection deposition of viral antigen or virus-induced antibody may also cause injury to kidney. High level of IL-2, IL-7, IL-10 and TNF alpha, GSCF, MCP1 are the cause of cytokine storm and severity of COVID19 infection with injury in kidney, lungs, heart, other organs having normal cells to be damaged. This COVID19 infection is the major cause of single or multiple organ damage, which is a peculiar mechanism that helps the infection to spread all over the body, decrease of human immunity.

This rapid immunity suppression leads to the cause of human mortality. In this process patients suffered from chronic lungs, heart, kidney, or other important organ failure cases are the major population faced high morbidity and mortality. The major population belongs to old, aged people. Diabetes and hypertensives were also the major population who faced the disease severity [5-18].

It was reported in a previous autopsy study that virus particles are found in podocyte and tubular epithelium that causes damage of renal endothelium and progress damage of kidneys which leads to dysfunction in renal filtration, reabsorption, protein leakage in Bowman's capsule, dysfunction in mitochondrial level. Inside kidney of COVID-19 infected patients Proximal tubule brush border apical membrane and lower levels of ACE2 in the podocytes are more common in the kidney than in the lungs. During failure of kidney renal replacement therapy by artificial kidneys are the only option for the survival of kidney failure patient [7].

As a result of kidney damage caused by infection of COVID-19, some patients required renal replacement therapy (RRT), resulting in elevated serum creatinine levels, proteinuria, hematuria, and AKI. As per KDIGO criteria AKI defined as other definitions of kidney injury represented by reduced eGFR or glomerular filtration rate. There are many stages ranges from stage 1-4, But majority of severity cases were observed by Acute tubular necrosis or ATN [8]. Renal replacement therapy (RRT) required for the survival of chronic kidney disease (CKD) and dialysis patients who are suffered with kidney disease [7]. Proteinuria and hematuria are common in COVID-19 patients who are hospitalized. Proteinuria and hematuria were found in majority of patients among 333 COVID-19 patients who were hospitalized to the intensive care unit (ICU), respectively [13-14].

4. Diagnosis of patients

Major cases were diagnosed by laboratory tests such as leukopenia, CT scans, nucleic acid detection (IgM/IgG), and enzyme-linked immunosorbent assays (ELISA) to make the diagnosis of COVID-19 (ELISA). SARS-CoV-2 testing requires RT-PCR and gene sequencing as the vital tools in the field of nucleic acid detection by collecting nasopharyngeal swab specimen as per CDC guidelines. Complete blood count, platelet count, liver and kidney function test, D-dimer 16, C-reactive protein, interleukin-6, amyloid A, lactate dehydrogenase, lymphocytes are the major biomarkers that have been examined in patients with COVID19. Patients with disease severity were also observed with low lymphocyte, platelet count [19,20].

5. Ending thoughts

An independent predictor of mortality in COVID-19 patients is kidney impairment. Involvement of the kidneys in COVID19's pathophysiology is broad and complex. To stop future kidney damage, critical diagnosis of kidney disease should be implemented in early stage. The risk of infection in dialysis patients can be minimized by

strictly adhering to protocol. Updated kidney therapy and treatment procedure provided by authenticate clinical council, CDC, WHO should be followed. In near future new treatment procedure and drugs will be available to protect these kinds of critical cases, especially to protect from severity of kidney impairments with Covid19, but it requires extensive clinical studies in this concern. Early detection and quick treatment are the best options to control severity of the disease.

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6. References

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