Mini Review

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Potential Pharmacological Therapies for Patients with Renal Disease Affected by Coronavirus Disease-19

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Abstract

Due to renal dysfunction and pre-existing comorbidities, people with chronic kidney disease (CKD), including dialysis and transplant recipients, are more likely to catch SARS-CoV-2. There is currently no recognised protocol for treating these COVID-19-infected high-risk patients. Since most of the medications used to treat COVID-19 are currently experimental, the authors' goal is to inform readers about dose modifications for kidney failure at various stages and significant renal side effects. We conducted a non-systematic review of the COVID-19 medications already on the market by using a number of different clinical trial databases and search engines. When treating COVID-19, a number of antivirals and monoclonal antibodies need to have their dosages adjusted. Nephrologists must carefully evaluate the adverse effects of various treatment combinations in a pandemic environment to determine the right dosage based on renal function and to provide the best therapeutic impact while preventing further renal damage. To ascertain the security and effectiveness of these medications in renal patients, additional research is necessary.

Keywords: Renal disease • Kidney disease • Chronic kidney disease • Nephropathy • Kidney biopsy • Dialysis

Introduction

The kidney is now one of the potential target organs due to the ability of the severe acute respiratory syndrome coronavirus (SARS-CoV-2) to connect with the angiotensin-converting enzyme receptors. Acute kidney damage (AKI) is correlated with disease severity and poor prognosis in COVID-19. Direct viral damage to the renal tubules and the activation of pro-inflammatory cytokines that result in endothelial dysfunction and renal hypo perfusion are what cause COVID-19-associated AKI. A larger percentage of AKI occurs in severely sick patients with COVID-19, where it may affect 0.5–80.3% of patients. Meanwhile, the prevalence of chronic kidney disease (CKD) increases infection vulnerability by causing immune system malfunction and immunodeficiency. Additionally, comorbidities such advanced age, diabetes, and hypertension are known risk factors for death associated with COVID-19. Because they use immunosuppressants on a regular basis, transplant recipients are also more likely to get serious infections.

This population could also be more likely to pass away from COVID-19. In the intensive care unit (ICU), 57.1% of COVID-19 patients had pre-existing CKD, which increased their chance of developing severe COVID-19 by thrice. Patients who were infected with COVID-19 and had CKD stages 3-5, hemodialysis (HD), or had undergone a kidney transplant died at rates that were much higher than those in the general population (28.4%, 16.2%, and 11.1% vs. 4%, respectively). Similarly, compared to non-COVID patients, the presence of COVID-19 considerably raised the death rates for dialysis patients (20.2% vs. 0.2%) and transplant recipients (21.2% vs. 1.2%) [1].

Any disorder that hinders the kidneys' natural ability to function is referred to as renal disease, often known as kidney disease. The body's electrolyte and fluid balance is controlled by the kidneys, which are also in charge of filtering waste from the blood. These processes may not be efficiently carried out by the kidneys when they are ill or injured, which can cause

a variety of symptoms and consequences. Numerous conditions, including diabetes, hypertension, and infections, autoimmune diseases, and hereditary factors, can result in renal disease. An overview of renal illness, including its causes, symptoms, diagnosis, therapy, and prevention, will be given in this research article [2].

A condition in which the kidneys are harmed or not working properly is referred to as renal disease, often known as kidney disease, The kidneys are in charge of filtering waste materials and extra fluid from the blood as well as controlling the body's electrolyte and other substance levels. These functions are compromised by kidney disease, which can result in a variety of health issues. Renal disease can be classified into a number of different subtypes, such as acute kidney damage, chronic kidney disease, and end-stage renal disease. Dehydration, drug toxicity, infection, or other conditions can all contribute to acute kidney injury, which is an abrupt loss of kidney function. A long-term disorder called chronic kidney disease causes the kidneys to gradually lose function over time. When kidney function is completely lost and dialysis or a kidney transplant is necessary, the condition is known as end-stage renal disease [3].

Depending on the stage and severity of the disorder, renal disease can present with a variety of symptoms. Fatigue, nausea, vomiting, changes in urine output, ankle and foot edoema, and high blood pressure are typical symptoms. In other circumstances, renal illness may not show symptoms until it is well advanced. Diabetes, high blood pressure, smoking, being obese, and having a family history of kidney disease are some of the risk factors for developing renal illness. Renal disease risk might also be increased by specific drugs and medical conditions [4].

The stage and severity of renal illness affect the course of treatment. Changes in lifestyle, such as eating healthily and exercising frequently, may be sufficient to halt the course of kidney disease in its early stages. Medication, dialysis, or a kidney transplant can be required in later stages. Renal disease must be prevented, especially for those who are more vulnerable. Kidney disease can be prevented by leading a healthy lifestyle that includes eating a balanced diet, getting regular exercise, and quitting smoking. For people with diabetes or high blood pressure, it's also crucial to monitor blood pressure and blood sugar levels [5].

Discussion

An independent predictor of in-hospital mortality in COVID-19 patients presenting with hematuria and proteinuria is renal involvement. AKI is a frequent consequence of severe COVID-19, and CKD is a known comorbidity of severe COVID-19, making it difficult for doctors to manage COVID-19 in this population. Two Italian centres have discussed their management of COVID-19 in the nephrology ward. In order to treat COVID-19, both authors used a two-phase pharmacological strategy: (1) antivirals and azithromycin for the early stages of the infection (within 7–10 days of the beginning of symptoms), and (2) immunosuppressive and immunomodulatory medications for the later stages. Since patients receiving in-center dialysis are more susceptible to developing COVID-19, dialysis centres should implement tight isolation procedures. Additionally, continuous renal replacement therapy with the hemodiafiltration method is advised for critically ill COVID-19 patients who developed AKI or had other indications for receiving RRT. Alternatively, medium cutoff membranes should be used in patients undergoing dialysis to increase the removal of inflammatory mediators [6].

The COVID-19 care of PD patients is identical to the management of other patients, according to the International Society of Peritoneal Dialysis guideline. Patients with mild to moderate disease can keep using PD; however, patients with severe or critical disease should be temporarily switched to automated PD, continuous renal replacement therapy, or intensified ultrafiltration if they choose to stay on PD. Telehealth should also be heavily utilised to communicate with PD patients remotely. Donors of kidneys should be tested for COVID-19, and those who have symptoms or a history of travel to high-risk locations should postpone organ donation for a period of 14 to 28 days. Since there are different recommendations regarding the use of immunosuppressants in COVID-19, there is no established protocol for managing transplant patients who are infected. In general, the selection of immunosuppression should be based on the unique clinical situation. For the best time to stop taking immunosuppressants

and start them back, more information is required [7].

Because of the potential renal adverse effects, managing COVID-19-infected renal patients is a problem for nephrologists. In the case of a global pandemic, a drug repurposing strategy is required to find effective therapy. The majority of the medications in this study can be used by people with renal failure because they are not eliminated by the kidneys. The renal elimination of a number of antivirals and monoclonal antibody drugs, such as remdesivir, favipiravir, ribavirin, oseltamivir, baricitinib, and tofacitinib, necessitates dosage adjustment, and their usage is typically contraindicated in patients with eGFR lower than 30 ml/min. The information at hand did not indicate a higher incidence of renal adverse effects in remdesivir-treated individuals with AKI, CKD, or those undergoing dialysis [8].

Medications including lopinavir/ritonavir, azithromycin, and adalimumab are frequently linked to acute interstitial nephritis (AIN), which calls for careful monitoring of renal function and prompt withdrawal if AIN is suspected. Individuals receiving tocilizumab may experience potential nephrolithiasis, while prior research indicated that the occurrence occurred less frequently than 2% of individuals. HCQ and CQ, two formerly widely used antimalarial drugs, are largely eliminated by the kidney (40–50%), necessitating careful kidney function monitoring in renal patients. Furthermore, although it is unlikely to happen with short-term usage, both medications have been shown to cause renal phospholipidosis that mimics Fabry disease [9].

Overall, the brief course of treatment (5–14 days) may imply that these adverse renal outcomes are not common. However, renal function should be carefully monitored to prevent aggravating kidney damage when deciding to prescribe these drugs, particularly those with immunosuppressant properties, based on the expert judgement that the benefits may outweigh the potential risks. Kidney diseases are characterised by impairment of the host immune system. Patients with kidney dysfunction are frequently excluded from trials, which limits the efficacy and safety of these drugs in renal patients. This calls for the inclusion of this particular demographic in next COVID-19 drug trials [10].

Conclusion

A person's health and quality of life may be significantly impacted by renal illness, a serious ailment. In order to encourage early discovery and efficient management of the problem, it is crucial to comprehend the causes, symptoms, diagnosis, therapy, and prevention of renal disease. People can lower their chance of acquiring renal disease and keep their kidneys functioning at their best for the duration of their lives by leading a healthy lifestyle and controlling any underlying medical issues.

Conflict of Interest

None

Acknowledgement

None

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