

Fluid and Electrolyte Disturbances in Post Covid-19 Patient and their Complications

Atharva Sarode*, Abhishek Ingole

Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences (DU), Sawangi (Meghe), Wardha, India

ABSTRACT

A global outburst of grave respiratory illness is brought about by the novel corona virus disease 2019 (COVID-19). By adhering to the "ACE 2" receptors the pathogen influences the host. Because ACE2 receptors are located in the renal and the GIT system, patients, may have nephric and alimentary canal impairment as a consequence of the pathogen, which can affect in critical ailments like acute renal injury (AKI) and gastrointestinal issues. Some of the complications of kidneys and alimentary tract involvement in COVID 19 and POST COVID 19 is fluid and electrolyte disturbances. Decrease in levels of sodium, potassium, calcium, chloride in blood and hypo or hypervolemia are the commonest of such disorders, which may result in a variety of issues for the patients & potentially increase the mortality of patients if not treated urgently. In hospitalized and critical care patients, abnormalities in fluid and electrolytes are not rare. Children can potentially develop fluid and electrolyte disruption complications. Changes in levels of fluid and electrolytes may be a strong indicator to check the progression of the disease.

Key words: Fluid and electrolyte disturbance, Post COVID-19, Hypovolemia, Hypervolemia

HOW TO CITE THIS ARTICLE: Atharva Sarode, Abhishek Ingole, Fluid and Electrolyte Disturbances in Post Covid-19 Patient and their Complications, J Res Med Dent Sci, 2022, 10 (10): 167-169.

Corresponding author: Atharva Sarode

e-mail ✉: mpatil98dent@gmail.com

Received: 03-Oct-2022, Manuscript No. JRMDs-22-76721;

Editor assigned: 05-Oct-2022, PreQC No. JRMDs-22-76721(PQ);

Reviewed: 19-Oct-2022, QC No. JRMDs-22-76721(Q);

Revised: 24-Oct-2022, Manuscript No. JRMDs-22-76721(R);

Published: 31-Oct-2022

INTRODUCTION

For the 1st time, the authorities of china designated the new 2019 novel Corona-Virus (2019-nCoV), which is triggering a pulmonary pandemic, as the novel corona virus pneumonia. The emergent disorder was later termed by the WHO as COVID-19 [1]. Over 21.2 crore cases have been documented globally, with over 40 lakh deaths, as of August 24, 2021 [2]. Coronavirus is an enveloped RNA virus with club shaped appendages protruding from its surface, a very big RNA genome, and a unique replicative method. Coronaviruses are accountable for a extensive variety of diseases in animals and birds, including enteritis in cows and pigs, diseases of upper respiratory tract in chickens, and potentially mortal human respiratory infections [3]. In total there are 7 types of the corona viruses causing human infections and Severe Acute Respiratory Syndrome Coronavirus 2 (SARS CoV2) is the 7th and latest type causing human infection [4]. Human coronaviruses (HCoVs) were initially isolated from patients with

common cold in the 1960s. More human coronaviruses have been discovered since then, including those that cause severe acute respiratory syndrome (SARS) and Middle East Respiratory Syndrome (MERS), two infections that can cause deadly lung diseases in people if they are infected [5]. Persistent dry cough, muscular aches, pyrexia, lethargy, dyspnea, indigestion, diarrhea, and headache are the most prevalent symptoms of COVID-19. The critical period of the disease from the onset of symptoms is between six and forty-one days, and the average is fourteen days. If not controlled then in most cases death of the patient is the result. Therapeutic methods to manage symptoms, supporting and protective countermeasures, disrupting the virus transmission cycle by isolating patients, and experience-based treatment are all elements of disease control.

COVID 19 is being reported in many studies to affect the neurological, cardio vascular, gastro intestinal, and genitourinary systems, on top of the pulmonary system. Since the gastrointestinal canal and nephron are so crucial for maintaining electrolytic & fluid equilibrium in the body, any interstice will affect in nonequivalence. If left untreated, altered electrolyte and fluid balance can be fatal.

CASE PRESENTATION

A 55-year-old male presented with chief complaints of cough, cold, fever and diarrhea for 4 days. Patient has a history of post covid status one week back. Patient

had history of COVID19 infection one week ago when had a CT Severity Score of 24/25 with CORAD 6 and had received remdesivir, steroids along with other supportive measures. Patient had persistent body ache and intermittent cough even after recovering from COVID19. He had no history of Diabetes Mellitus Type 2, hypertension, bronchial asthma or any other chronic medical illness. On physical examination pulse was 74 bpm, Blood Pressure was 140/80 mmhg in Rt arm in supine position and SpO2 was 95 on 4lO2. On systemic examination chest had bilaterally minimal crept in lower lobes, heart sounds were normal, patient was conscious & oriented & abdomen was soft & no tender with no organomegaly.

HRCT thorax was repeated and s/o ground glass appearance with CT severity of 24/25. On day 5 of post covid day, patient developed one episode of seizure which was without frothing. Serum electrolytes were repeated and showed hyponatremia, hypokalemia and hypomagnesemia. For which electrolyte corrections were started immediately.

Labs showed sodium of 107, potassium 2.0, magnesium 0.9 patient was started immediately corrections. After few corrections and closely monitoring the electrolytes, latest labs showed Sodium of 118, potassium 3.4 and magnesium of 2.2. After 20 days of admission the patient was discharged on oral supplements and supportive management and is doing well on follow up.

DISCUSSION

The coronavirus family infects people by respiratory droplets and direct contact [6]. The SARS CoV 2, like the SARS CoV, utilizes the ACE2 receptor to cause infection. The spike protein of the SARS CoV is recognized to aid the viral entry in the tissues. The pathogen is anchored to the fusion membrane by spike protein. This protein is crucial in establishing the no. of host tropics and their dissemination ability. Spike protein has mainly two domains, 'S1' and 'S2' that cause binding to receptor and cell membrane adhesion, respectively. 'SARS CoV2' can induce renal damage by having a direct impact on the kidney tissue since ACE2 and members of the serine protease family are abundantly expressed on podocytes and tubule epithelial cells. The cellular trans membrane serine protease 2 induces the spike protein on the viral coating. Virus penetration into alimentary tract lining cells is further aided by S protein on the viral coating, that is produced by cellular Trans membrane serine protease 2. (TMPRSS 2). As a result, COVID 19 could impact the nephron and alimentary canal [7].

The nephric system is responsible for urine generation, hormones production and release, control of blood pressure, acid-alkali homeostasis, and osmotic pressure modulation, among other activities, therefore the proper functioning of renal system is important. Acute renal impairment in the post-covid period is not particularly unusual. SARS-COV-2 impregnate cells by bonding to ACE2 receptors, as initially specified. Considering large

no. of such receptors in nephric cells, the kidney is not immune to corona virus infection. Fluid imbalance caused by reduced fluid intake and fever are 2 possible causes of functional impairment of renal function in POST COVID-19 patients. [8]. Recent studies indicate that impairment of nephric function is more common in POSTCOVID-19 as well as those who have active COVID-19 infection. COVID 19's cytotoxic effects on nephrons may result in acute kidney injury in COVID 19 patients, especially if the pathogen is distinguished in the patient's blood. Bowman's capsule and PCT cells have an important function in kidney function. Bowman's capsule and glomerulus cells are far more vulnerable to pathogenically invasion, making it at risk. To prevent accidental infections, more awareness must be paid in heed of nephric tissue function and urine management in POST COVID 19 patients with acute renal injury. COVID-19 renal diseases are attributed to by a number of different factors. It is critical to note that acute renal injury is associated with a high mortality rate in COVID-19 patients. Electrolyte issues can open up new treatment options by assisting with patient management and identifying the enteropathogenic mechanism underlying COVID-19 infection. Pathogen-kidney interactions can affect a number of systems and lead to a vast plethora of problems, including electrolyte and fluid disproportion. As a result, monitoring nephric function can help POST COVID-19 patients prevent dire consequences & have a crucial role in decreasing mortality. In accordance with a number of recent studies, electrolytic problems, in particular hyperkalemia is the most observed nephric issue in patients hospitalized for COVID 19 infection [9].

COVID-19 and the GI tract

Despite the fact that COVID 19 is a respiratory disease, there is evidence that it can harm the gastrointestinal tract and cause gastrointestinal symptoms. In patients with POST COVID-19, SARS-CoV2 can harm and disturb the normal intestinal mucosa, causing GI discomfort and difficulty absorbing nutrition. SARS-CoV-2 may also have an impact on the normal gut microbiota, disabling digestion and causing gastrointestinal symptoms, particularly diarrhea. As a result of SARS CoV-2 infection, the ileum and colon can become dysfunctional, which may lead in a diversity of alimentary tract signs in individuals. Diarrhea, nausea, vomiting, and gastric irritation being the most predominant symptoms. SARS CoV2 infection is also linked to variations in the intestinal flora, in accordance with researches. Many clinical researches on COVID-19 have shown that alimentary tract symptoms can arise earlier than respiratory symptoms in COVID-19 patients [10]. Disturbances in fluids and electrolytes can occur in COVID 19 patients due to GI problems.

Complications of electrolytes and fluid disturbances

Electrolyte equilibrium is crucial for maintenance of physical & physiological wellbeing. Minute aberrations from standard electrolyte values can affect in a plethora of complications, including mortality. Electrolyte & fluid imbalances necessitate immediate & prompt treatment

[11]. Electrolyte and fluid abnormalities are not uncommon in patients present in to the intensive care. Acute cerebral edema is a potentially fatal complication of hyponatremia. Individuals suffering from decreased sodium levels in blood may experience symptoms such as rhabdomyolysis, convulsions, cyclothymia, & even coma. Clinicians must be cautious because hasty correction of hypo or hypernatremia may affect in Demyelinating Osmotic Syndrome [12]. Hypokalemia has a negative influence on cardiovascular function, neurohormonal stimulation, and other vital organs if left untreated. The commonest complication of Hypocalcemia is amplified Neuro muscular excitability, that manifests as myoclonus, paresthesia, and perioral numbness. In rare cases, Hypocalcemia may result in reversible cardiomyopathy. Chloride ion is one of the serum electrolytes that, if its concentration changes, can cause acute nephric injury, morbidity, and even mortality. Hypovolemia and hypervolemia can occur when patient's bodily fluids are disrupted. If hypovolemia is not treated as soon as possible, it can result in ischemic harm to essential organs and organ failure. Regardless of the severity, hypervolemia is a lethal hazard (peculiarly in younger age groups) [14-18].

CONCLUSIONS

COVID-19 endangers the nephric and gastro intestinal tract, and a wide plethora of problems have been quantified. Fluid and electrolytic abnormalities are a consequence of nephric and gastrointestinal damage in POST COVID19 patients. Because electrolyte and fluid imbalances can effect in a wide plethora of problems, including mortality, doctors must have a keen view on fluid & electrolyte balance in COVID-19 and POST COVID 19 patients, especially those in ICU, because the likelihood of electrolyte and fluid disturbances is higher in these patients and can increase mortality rates. The most prominent abnormalities of electrolytes & fluids in SARS CoV2 infection include decrease in levels of sodium, potassium, calcium, chloride and sometimes increase in sodium and potassium concentrations in blood associated with changes in volume of body fluids. If these conditions are discovered, therapy should commence right away. Electrolyte concentrations in blood and urine and changes in body fluid volumes can be utilized to detect disease evolution since POST COVID 19 reveals fluid and electrolyte abnormalities.

REFERENCES

1. Chan JF, Yuan S, Kok KH, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: A study of a family cluster. *Lancet* 2020; 395:514-523.
2. <https://covid19.who.int/>
3. Fehr AR, Perlman S. Coronaviruses: An overview of their replication and pathogenesis. *Coronaviruses* 2015; 1-23.
4. Zhu N, Zhang D, Wang W, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med* 2020.
5. Su S, Wong G, Shi W, et al. Epidemiology, genetic recombination, and pathogenesis of coronaviruses. *Trends Microbiol* 2016; 24:490-502.
6. Shereen MA, Khan S, Kazmi A, et al. COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses. *J Adv Res* 2020; 24:91.
7. Lv W, Wu M, Ren Y, et al. Coronavirus disease 2019: Coronaviruses and kidney injury. *J Urol* 2020; 204:918-925.
8. Valizadeh R, Baradaran A, Mirzazadeh A, et al. Coronavirus-nephropathy; Renal involvement in COVID-19. *J Renal Inj Prev* 2020; 9:e18.
9. Pourfridoni M, Abbasnia SM, Shafaei F, et al. Fluid and electrolyte disturbances in COVID-19 and their complications. *Bio Med Res Int* 2021; 2021.
10. Crawford AH. Hyperkalemia: Recognition and management of a critical electrolyte disturbance. *J Infus Nurs* 2014; 37:167-175.
11. Lee JW. Fluid and electrolyte disturbances in critically ill patients. *Electrolyte Blood Press* 2010; 8:72-81.
12. Kopač M. Evaluation of hypervolemia in children. *J Pediatr Intensive Care* 2020; 10:4-13.
13. Acharya S, Shukla S, Acharya N. Gospels of a pandemic: A metaphysical commentary on the current COVID-19 crisis. *J Clin Diagn Res* 2020; 14.
14. Arora D, Sharma M, Acharya S, et al. India in 'flattening the curve of COVID-19 pandemic-triumphs and challenges thereof. *J Evol Med Dent Sci* 2020; 9:3252-3255.
15. Bawiskar N, Andhale A, Hulkoti V, et al. Haematological manifestations of covid-19 and emerging immunohaematological therapeutic strategies. *J Evol Med Dent Sci* 2020; 9:3489-3495.
16. Dasari V, Dasari K. Nutraceuticals to support immunity: COVID-19 pandemic-A wake-up call. *J Clin Diagn Res* 2020; 14.
17. Dhok A, Butola LK, Anjankar A, et al. Role of vitamins and minerals in improving immunity during Covid-19 pandemic-A review. *J Evol Med Dent Sci* 2020; 9:2296-2301.
18. Kasturkar PR, Gawai JP. Engaging school going children during COVID-19 lockdown. *J Clin Diagn Res* 2020; 14.