

# A Review of Treatment Options for Electrolyte Imbalance and Dietary Sources to Restore Electrolyte Imbalance: Including Electrolyte Imbalance in Patients with Severe Corona Virus Disease 2019

Seba M C, Anatt Treesa Mathew, Sheeja Rekha, Prasobh G R

Department of Pharmaceutical Chemistry, Sree Krishna College of Pharmacy and Research Centre, Parassala, Kerala

Corresponding Author: Seba M C

## ABSTRACT

Electrolytes are minerals in the blood, tissues, and elsewhere throughout the body. An electrolyte imbalance happens when electrolyte levels in the blood are too high or too low. Such imbalances can cause health issues. In rare cases, they can be fatal.

Early studies have reported various electrolyte abnormalities at admission in patients who progress to the severe form of coronavirus disease 2019 (COVID-19). As electrolyte imbalance may not only impact patient care, but provide insight into the pathophysiology of COVID-19. <sup>(1)</sup> This review shed light on natural ways to resolve electrolyte imbalance in patients including patients with severe coronavirus disease.

**Key words:** Electrolyte imbalance, electrolyte levels, Coronavirus

## INTRODUCTION

Electrolytes are minerals, and the body requires them to, balance its water levels, transport nutrients into cells, eliminate unwanted products, permit nerves to conduct signals, allow muscles to relax and contract normally, keep the brain and heart functioning. People get electrolytes from foods and drinks. The kidneys and liver help keep levels of electrolytes balanced. If a person is eating a variety of

foods and drinking enough fluids, electrolytes usually stay at the right levels.

Examples of electrolytes in the human body include sodium, potassium, calcium, magnesium, phosphate, chloride, bicarbonate. When levels of electrolytes become too high or low, this is an electrolyte imbalance. It is not a disease, but it is a sign of another issue in the body.

Primary case reports and cohort studies have designated various clinical features of patients with coronavirus disease 2019 (COVID-19), an emerging infectious disorder due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). In initial COVID-19 studies, some indication has been provided that electrolyte disorders may also be existing upon patients' presentation, including sodium, potassium, chloride and calcium abnormalities. Others have suggested that patients with more severe COVID-19 tend to show a higher percentage of hypokalaemia at baseline compared with those with less severe forms of disease. Such electrolyte imbalances have significant effects not only for patient management but also for recognizing probable pathophysiologic mechanisms underlying COVID-19, that could motivate novel therapeutic opportunities. <sup>(1)</sup>

There are lot of dietary sources which can resolve the electrolyte

imbalances, which include Breads, Soups, Curd, meats, cold cuts, Cheese, Beans and lentils, Dark leafy greens (e.g., spinach, kale), Apples, Apricots, Potatoes, Squash, Bananas, Dates, Yogurt, Cheese, Milk, Epsom salt, Nuts and seeds (e.g., pumpkin seeds, almonds, peanuts)

### **Causes of electrolyte imbalance**

An electrolyte imbalance can occur when a person is dehydrated or if they have too much water in their body. The things that most commonly cause an electrolyte imbalance are vomiting, diarrhea, not drinking enough fluid, not eating enough, excessive sweating, certain medications, such as laxatives and diuretics, eating disorders, liver or kidney problems, cancer treatment, congestive heart failure.

### **Symptoms**

The body responds to an electrolyte imbalance in a variety of ways. The effects may depend on which electrolyte levels are imbalanced, how severe the issue is, and whether the person has other health conditions. The researchers report that the most common symptoms were fever, shortness of breath, confusion, swelling or bloating, a rapid heart rate, and an irregular heartbeat. Other symptoms can include irritability, fatigue, numbness, tingling, muscle weakness, twitching, spasms, rapid blood pressure changes, and seizures

### **In children**

Children have a higher risk of dehydration than adults because of their smaller size and faster metabolism of fluids and electrolytes. If a child gets sick with severe vomiting or diarrhea, they may develop an electrolyte imbalance that requires medical attention. A child with an underlying health condition-such as thyroid, heart, or kidney disease-may have a higher risk of an electrolyte imbalance.

### **In older adults**

Studies have found that older adults may be highly subject to dehydration and electrolyte imbalances than younger adults.

There are many reasons for this, including, The kidneys may lose some of their function with age, Older adults may take multiple medications, such as diuretics, that can change electrolyte levels, They may not get enough to eat or drink due to disability, lack of appetite or thirst, or because they do not have regular access to food and drink. Signs of dehydration in an older adult can include dryness of the mouth, including the lips and tongue, sunken eyes, skin that seems dry and less firm or stretchy, drowsiness, confusion or disorientation, dizziness, low blood pressure. <sup>(1)</sup>

### **Preventing electrolyte imbalance**

The International Marathon Medical Director's Association offers the following guidelines for maintaining good hydration and electrolyte balance during activity:

- If your urine is clear to straw-colored before a race or workout, you're well hydrated.
- You should drink a sports drink containing electrolytes and carbohydrates if your sporting event or workout lasts longer than 30 minutes.
- Drinking water with a sports drink decreases the beverage's benefits.
- Drink when you're thirsty. Don't feel you must constantly replenish fluids.
- Although the needs of each individual differ, a general rule of thumb is to limit fluids to 4–6 ounces every 20 minutes of a race.
- Seek immediate medical advice if you lose more than 2 percent of your body weight or if you gain weight after running.

Serious emergencies from electrolyte imbalances are rare. But it's important to your health and, if you're an athlete, your performance to maintain a healthy electrolyte balance. <sup>(2)</sup>

### **General functions of electrolytes**

Electrolytes are vital because they are which cells (particularly nerve, heart and muscle cells) use to maintain voltages across their cell membranes. Electrolytes

have diverse functions, and a significant one is to transport electrical impulses amongst cells. Kidneys work to keep the electrolyte concentrations in blood persistent despite changes in the body. For example, through heavy exercise, electrolytes are vanished in sweat, predominantly in the form of sodium and potassium. The kidneys can similarly produce dilute urine to balance sodium levels. These electrolytes must be substituted to retain the electrolyte concentrations of the body fluids constant. Hyponatremia, or low sodium, is the most frequently seen type of electrolyte imbalance. <sup>(3)</sup>

### **General characteristics of patients with electrolyte imbalance admitted to emergency department**

Arif Kadri and co-workers in 2013, conducted a study in 996 patients with electrolyte imbalance, 55% ( $n=545$ ) were male. The average age of patients was  $59.28 \pm 16.79$  years. The most common symptoms of the patients were dyspnea (14.7%,  $n=146$ ), fever (13.7%,  $n=136$ ), and systemic deterioration (11.9%,  $n=118$ ). Most and least frequent electrolyte imbalances were hyponatremia and hypermagnesemia, respectively. Confusion (14%), edema (10%) and rales (9%) were most frequently seen in physical examination. ECG examinations revealed normal sinus rhythm in 62% of the patients, and most frequent pathological findings were tachycardia (24%) and atrial fibrillation (7%)<sup>(4)</sup>

### **Home remedies**

Certain studies have found that sports drinks and oral rehydration solutions provided good results in people who had exercised in hot weather. The World Health Organization (WHO) recommends making an oral rehydration solution at home, rather than purchasing a prepared drink. The recipe involves mixing 1 liter of water with 1 teaspoon of salt and 2 tablespoons of sugar. A person can use this recipe in place of a store-bought electrolyte solution.

Because electrolyte imbalances can be life threatening, do not try home

remedies if a person has severe symptoms or any underlying health conditions. Babies, young children, and older adults may also have a higher risk of serious complications. <sup>(5)</sup>

### **Treating electrolyte disorders**

Treatment differs subject on the kind of electrolyte disorder and on the basic condition that's causing it. In general, definite treatments are used to return the proper balance of minerals in the body. These include:

#### **Intravenous (IV) fluids**

Intravenous (IV) fluids, typically sodium chloride, can support rehydrate the body. This treatment is generally used in cases of dehydration due to vomiting or diarrhea. Electrolyte supplements can be also added to IV fluids to restore deficiencies.

#### **Certain IV medications**

IV medications are able to restore electrolyte balance of the body rapidly. They can similarly protect from negative effects while treated by another method. The medication which is used depend on the electrolyte disorder a person have. Medications that may be administered include calcium gluconate, magnesium chloride, and potassium chloride.

#### **Oral medications and supplements**

Oral medications and supplements are frequently used to restore severe mineral abnormalities in the body. Depending on the electrolyte disorder, medications or supplements used such as calcium (gluconate, carbonate, citrate, or lactate), magnesium oxide, potassium chloride, phosphate binders, which include sevelamer hydrochloride (Renagel), lanthanum (Fosrenol), and calcium-based treatments such as calcium carbonate. They can help restore depleted electrolytes on a short- or long-term basis, depending on the underlying cause of the disorder

#### **Hemodialysis**

Hemodialysis is a type of dialysis that uses a machine to eliminate waste from the blood. Hemodialysis can be used when an electrolyte disorder is caused by sudden kidney damage and other treatments aren't working. Your doctor may also decide on hemodialysis treatment if the electrolyte problem has become life-threatening.<sup>(6)</sup>

### **Dietary sources to restore electrolyte balance**

Diet significantly gives to our electrolyte stores and blood levels. Below are lists of foods that are associated with higher levels of these electrolytes.

#### **Sodium**

It is suggested that an individual consumes less than 2,300 mg of sodium daily as part of a healthy diet. A substantial portion of our sodium intake derives from a just a few types of food, which can be surprising as large sources of sodium may not taste salty. The examples include Breads, Soups, Cured meats and cold cuts, Cheese, Savory snacks (e.g., chips, crackers, pretzels).<sup>(7)(8)</sup>

#### **Potassium**

Good sources of potassium seen in diverse fruits and vegetables. Suggested potassium intake for adults ranges from 2,300 mg to 3,400 mg depending on age and gender. The examples for dietary sources which include rich potassium content include Beans and lentils, Dark leafy greens (e.g., spinach, kale), Apples, Apricots, Potatoes, Squash, Bananas, Dates.<sup>(9)(10)</sup>

#### **Calcium**

Dairy is a chief contributor of calcium to food. The suggested calcium intake for adults range from 1,000 mg to 1,300 mg depending on age and gender. The most important examples for dietary sources rich in calcium involves Yogurt, Cheese, Milk, Tofu, Canned sardines etc.<sup>(11)</sup>

#### **Magnesium**

Magnesium is seen in a variety of vegetables, meats, and grains. Foods rich in fiber generally are a source of

magnesium. The suggested magnesium intake for adults range from 360 mg to 420 mg dependent on age and gender. The vital dietary sources include Epsom salt, Nuts and seeds (e.g., pumpkin seeds, almonds, peanuts), Dark leafy greens (e.g., spinach), Beans, and Fortified cereals.<sup>(12),(13)</sup>

### **CONCLUSION**

Electrolytes are vital minerals, in which body requires them to, balance its water levels, transport nutrients into cells, eliminate unwanted products, permit nerves to conduct signals, allow muscles to relax and contract normally, keep the brain and heart functioning. People get electrolytes from foods and drinks. The kidneys and liver help keep levels of electrolytes balanced. If a person is eating a variety of foods and drinking enough fluids, electrolytes usually stay at the right levels.

Certain studies confirms that COVID-19 severity is associated with lower serum concentrations of sodium, potassium and calcium and suggested electrolytes be measured at initial presentation and serially monitored during hospitalization in order to establish timely and appropriate corrective actions.

This review has fulfilled significant information about the treatment options for electrolyte imbalance, dietary sources to restore electrolyte imbalance including electrolyte imbalance in patients with severe coronavirus disease. It may be concluded that electrolyte imbalance requires certain treatment options along with intake of minerals containing diet.

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