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# A STUDY ON THE PRESCRIBING PATTERNS OF IV FLUIDS ON ELECTROLYTE IMBALANCED PATIENTS AT A TERTIARY CARE HOSPITAL

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## ABSTRACT

### Background

Intravenous (IV) fluid therapy is most widely used in in-patients to manage altered fluid intake, increased fluid losses, or acid–base and electrolyte imbalances. Critically ill people may lose fluid because of serious conditions, infections (e.g., sepsis), trauma, or burns, and need additional fluids urgently to prevent dehydration or kidney failure

### Methods

Total 300 consecutive patients of either sex from January 2018 to June 2024 were included and blood reports were drawn to determine the baseline sodium, potassium, calcium, magnesium and phosphorous (Those who had imbalance at admission or on subsequent repeat labs on hospital stay). This was an ambi directional observational study conducted in Mallige Hospital, Karnataka after approval from IRB (Institutional Review Board).

### Results

The mean age was ±54.5years and high dyselectrolytemia was seen in patients aged between 61-70years. A total of 3 ADRs related electrolyte imbalance among the 300 patients were recorded and the ADR were reported by the patients or by the healthcare provider whereas ADR related to IV fluids administration were not found. Hyponatremia was the main

electrolyte disturbance found in these patients and the common IV fluid used was 0.9%NS.

**Conclusions**

This was a study to evaluate the prescription pattern of IV fluids and also to evaluated the common type of electrolyte imbalance seen in humans. Monitoring and evaluating the prescription pattern in electrolyte imbalance patients can enable modifications in the prescribing pattern and analysis of risk factors and mortality can improve the patients-quality of life.

**Keywords: IV fluids, electrolyte imbalance, ADR, type of IV fluids**

## INTRODUCTION

Intravenous (IV) fluid therapy is most widely used in in-patients to manage altered fluid intake, increased fluid losses, or acid–base and electrolyte imbalances. Many patients receive IV fluids during the hospital stay to treat or prevent dehydration and/or hypovolemia or to deliver nutritional elements or drugs. Sometimes IV fluids are needed for patients who cannot meet their normal fluid or electrolyte needs by oral or enteral routes **[1]**. Critically ill people may lose fluid because of serious conditions, such as infections (e.g., sepsis), trauma, or burns, and need additional fluids urgently to overcome dehydration or kidney failure. Crystalloids or colloidal solutions may be used for this purpose. Crystalloid solutions have small molecules, are cheap, easy to use, and provide immediate fluid resuscitation, but it may increase oedema. Colloids have larger molecules, cost more, and may provide swifter volume expansion in the intravascular space, but may induce allergic reactions, blood clotting disorders, and kidney failure **[2]**.

There are three major indications for intravenous fluid administration that is resuscitation, replacement, and maintenance. Resuscitation fluids are used to correct an intravascular volume deficiency or acute hypovolemia, replacement solutions are prescribed to correct existing or developing deficits that cannot be compensated by oral administration and maintenance solutions are used in hemodynamically stable patients who are not able or allowed to drink water in order to cover their daily required amount of water and electrolytes. In addition to these classical indications, the quantitative relevance of fluids administered also as drug diluents. And the final step in fluid therapy is to withhold/withdraw fluids when they are no longer required, thus reducing the risk of fluid overload and related deleterious effects **[3]**. They are also medicines, and like any other medicinal product and they can have serious or fatal consequences if not prescribed and administered properly. One of the serious

adverse effects of IV fluids is hyponatraemia (< 135 mmol/L) caused by inappropriate treatment with hypotonic fluids. Hypotonic fluids are characterised by lower concentration, or tonicity, of electrolytes (mainly sodium) to plasma and, therefore, have the ability to dilute plasma and lower the plasma sodium **[4]**. Hypotonic hyponatremia is the most common electrolyte disorder encountered in clinical practice **[5]**. Hyponatremia, a common electrolyte imbalance, can arise from various underlying etiologies such as diuretics, diarrhea, vomiting, congestive heart failure, and liver and renal disease **[6]**. Traditionally used hypotonic fluids have been associated with hyponatraemia and subsequent morbidity and mortality. Use of isotonic fluid has showed to reduce complications. Isotonic intravenous maintenance fluids with sodium concentrations similar to that of plasma reduce the risk of hyponatraemia when compared with hypotonic intravenous fluids **[7]**. Ever since 2018, the American Academy of Pediatrics had been recommending isotonic solutions for intravenous maintenance fluid therapy in children in order to avoid hyponatremia. Lethal hyponatremia or severe brain injury has been reported in children receiving hypotonic intravenous fluid therapy, specially in postoperative patients receiving high amounts of hypotonic fluids **[8]**. Hyponatremia, hypokalemia, hyperkalemia, hypercalcemia, and hypomagnesemia are one of the most common electrolyte disorders seen in the cancer patients and they often encounter with different electrolyte disorders and additionally, they cause a delay in chemotherapy or even an interruption. Hence it is an important aspect to diagnose these complications and treat them **[9]**.

Metabolic acidosis is a common acid-base disturbance in daily clinical medicine. An exact definition of “acute” metabolic acidosis (aMA) is not understood. Nevertheless, the term acute may be used if acidosis or acidemia evolves within minutes to days, and it can also occurs as a result of net loss in bicarbonate ions. The latter has been observed in inflammatory intestinal diseases and after the administration of so-called carbonic anhydrase inhibitors, Metabolic acidosis occurs if there an increase in extracellular hydrogen ion concentration will not result from net accumulation of carbon dioxide. Both the pH and serum bicarbonate decrease **[10]**.

Hyperkalemia is one of the most common electrolyte disorders in patients with cardiovascular disease (CVD). Apart from the drugs interfering with potassium metabolism and food intake, several conditions can also cause or worsen hyperkalemia, such as advanced age, diabetes, and chronic kidney disease.

Mortality, cardiovascular morbidity, and hospitalization are higher in patients with hyperkalemia. Hyperkalemia represents a major contraindication or a withholding cause for disease-modifying therapies mineralocorticoid receptor antagonists. Hyperkalaemia can be also classified according to the onset as acute and chronic, Acute hyperkalemia is most often a life-threatening emergency requiring immediate treatment to avoid lethal arrhythmias. The main therapy goal is cell membrane stabilisation by calcium administration, cellular intake, shift of extracellular potassium to the intracellular space (insulin, beta-adrenergic agents, sodium bicarbonate), and increased elimination with diuretic drugs or dialysis. Chronic hyperkalaemia was often managed by dietary counselling for prevent potassium-rich food intake and tapering of potassium-increasing drugs, mostly RAASi. Sodium polystyrene sulphonate, a potassium binder, which was the only therapeutic option. Recently, new drugs such as patiromer and sodium zirconium cyclosilicate give new opportunities for the treatment of hyperkalaemia, as they proved to be safe, well tolerated, and effective **[11]**. There are numerous causes of hypokalemia, which can be categorized into increased excretion (e.g. diarrhea, sweating), renal loss (due to diuretics, mineralocorticoid excess as seen in primary aldosteronism, Cushing's syndrome, distal tubular acidosis, hypomagnesemia), transcellular shifts (e.g., alkalosis, thyrotoxic crisis, hormonal causes like insulin, α-agonists, exogenous or endogenous β2-agonists), and reduced intake (malnutrition, artificial nutrition, and alcoholism. Cardiac arrest (CA) can result from electrolyte disturbance or potentially reversible causes is among these causes. One such reversible cause is hypokalemia, which is indicated by a serum potassium (K+) level <3.5 mmol/L (1). Mild hypokalemia is defined when the potassium levels range between 3-3.4 mmol/L, moderate when it falls between 2.5-3 mmol/L, and severe if it is <2.5 mmol/L.[12]

Hypocalcemia is a medical condition characterized by an abnormally diminished concentration of calcium (Ca+) in the bloodstream. Suboptimal levels of calcium can have profound effects on bodily functions, particularly on the heart, potentially resulting in the occurrence of CA. Common signs and symptoms include: muscle cramps and twitching; numbness and tingling; fatigue; mood changes and cognitive impairment **[12]**. Continuous renal replacement therapy (CRRT) is known to induce better hemodynamic stability, fluid balance, and removal of solutes and cytokines, and subsequently to facilitate renal recovery in critically ill patients with hemodynamic instability.

Because of the higher clearance and incessant nature of CRRT, overcorrection of electrolytes such as hypophosphatemia and hypokalemia occur repeatedly. Hypophosphatemia and hypokalemia are common electrolyte disturbances in patients receiving CRRT, with a reported incidence as high as 65 and 24%, respectively. Hypophosphatemia can cause respiratory muscle dysfunction, weaning failure from mechanical ventilation, myocardial dysfunction, arrhythmia, and rhabdomyolysis. Hypokalemia can increase cardiac arrhythmia and muscle weakness. Phoxilium contains 1.2 mmol/L phosphate and 4.0 mmol/L potassium can be used for patients at risk of hypophosphatemia and hypokalemia. Hypokalemia can be corrected with intravenous potassium supplementation and use of CRRT fluid containing 4.0 mmol/L of potassium **[13]**.

**Study Objectives**

The aim of the present study was to determine the prescribing patterns of IV fluids, type of IV fluids, electrolyte imbalance related to co-morbidities and physical problems, adverse drug reaction, drug induced electrolyte imbalance and its management in electrolyte imbalanced patients presenting to a tertiary care.

**MATERIALS AND METHODS**

This is an Ambi-directional Cohort Observational study to assess the prescribing patterns of IV fluids on electrolyte imbalanced patients.

The primary outcome is to evaluate the prescribing management, assessment of ADR and other Pharmacist intervention of IV fluids. Patients who were prescribed with IV fluids and with electrolyte imbalance were selected and the purpose of the study was fully explained to the participants and they were asked to sign the informed consent form.

In this study 300 patients diagnosed with electrolyte imbalance and or who fulfilled the inclusion criteria were screened and included and whereas the pregnant women were excluded. The eligible participants underwent detailed assessment for this study and data of patient is collected using the data collection form if the patient gives the data voluntarily after signing the consent form or from medical record department after their approval. After collecting of the data, distribution of Antiepileptic drugs in patient is analyzed from their medication chart and interacting with the patient or their legal representative.

**Study Setting and Population**

The study was conducted at Mallige Hospital, Crescent Road, Bangalore, Karnataka, India patients above 10 years of age were considered in the study. A total of 300 subjects have participated in the study (163 males and 137 females).

## DATA ANALYSIS

The data obtained from the study was analysed using version 27 of SPSS statistical software, qualitative data is represented in numbers and frequencies, and quantitative data is represented in mean+- SD and the association between the variables is assessed using Pearson and Spearman's correlation.

### Criteria

Among the 300 study participants, of all age were screened and then enrolled for study after satisfying the inclusion exclusion criteria.

## DISTRIBUTION OF IV FLUIDS AMONG DIFFERENT AGE GROUPS

Patients were categorized according to their age groups in the range width of 10 years and the mean was found to be ±54.5 years. Out of 300 patients, majority of them belonged to the age group between 61 to 70 years 66(22%), followed by 51 to 60 years 58(19.3%). With aging there are degenerative changes in many organs and in the kidneys, hence there can be increase in cortical glomerulosclerosis and a decline in both glomerular filtration rate and renal plasma flow. These changes can lead to the inability to excrete excess electrolyte and maintain the hemostasis **(Figure 1)**.

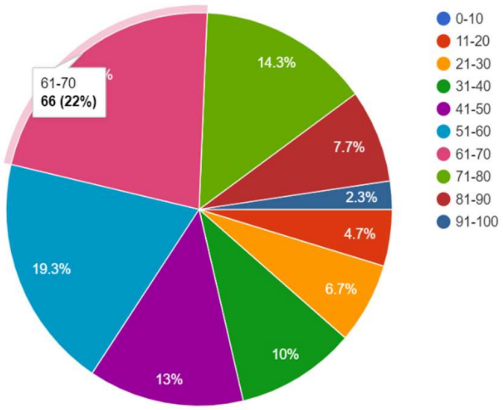


**Figure 1: Age distribution of IV fluids**

## ASSOCIATION BETWEEN GENDER AND USE OF IV FLUIDS

Out of 300 patients included in the study, 163 were males (54.4%) and 137 were females (45.6%).

Male are having higher risk of having electrolyte imbalance due to alteration caused by their social history such as smoking and alcohol consumption.

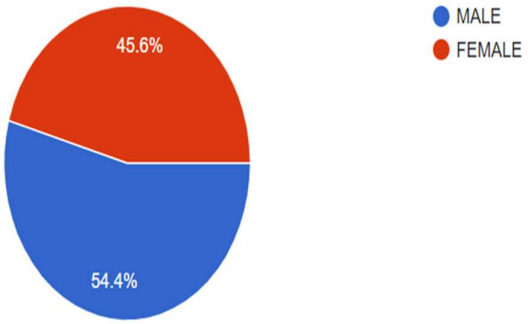


**Figure 2: Gender distribution**

## TYPE OF IV FLUIDS USED

Out of 300 patients participated in the study majority of the patients was administered with Crystalloids 296(98.7%) and remaining patients were administered Colloids 4(1.3%).

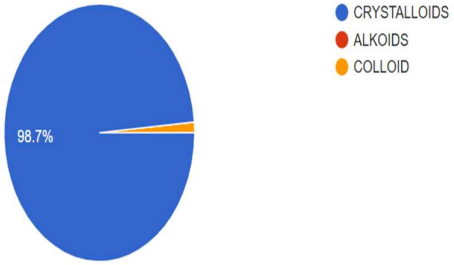


**Figure 3: type of IV fluids used**

## TYPE OF ELECTROLYTE IMBALANCE

The most common electrolytes in an human body are sodium, potassium, chloride, calcium, phosphate, bicarbonate and magnesium. Electrolytes play vital roles in nerve conduction, muscle contraction, hormone secretion and enzyme activity. Some bodily functions rely on several electrolytes being within a specified range (e.g. muscle contraction is affected by sodium, potassium, calcium and magnesium concentrations).

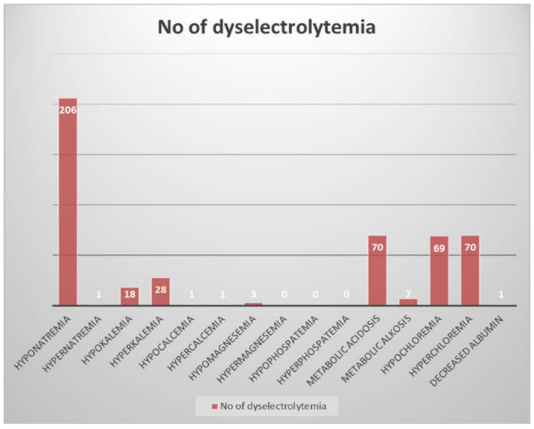


**Figure 3 A: type of Electrolyte imbalance**

Out of 300 patients with electrolyte imbalance it found that 206 patients were having hyponatremia (68.9%) followed by hyperchloremia 70(23.4%), Among which 253 patients were admitted with complaints related to dyselectroytemia on admission whereas 47 patients experienced electrolyte imbalance during the stay in the hospital.

## DRUG ASSOCIATED ELECTROLYTE IMBALANCE

Certain drugs are having higher chances of cause electrolyte imbalance, such as, Chemotherapy drugs, Diuretics(torsemide, furosemide), Antibiotics etc. These reactions can be due to changes in pharmacokinetics or pharmacodynamics of the drugs or by changing the physiology of the body.

Out of 300 patients 3 patients were found to have drug induced electrolyte imbalance. In which 2 patients had furosemide induced hypokalemia and ACE inhibitors induced Hyponatremia

The ADR were recorded from both inpatients and outpatients. It was found using the Naranjo Scale and almost all the ADR was found Possible and Probable.

**Table 1: Drug induced Electrolyte imbalance**

| TYPE OF ELECTROLYTE IMBALANCE | INDUCED DRUG | *MANAGEMENT* |
|---|---|---|
| Hypokalemia | Furosemide | Inj. Potassium Chloride in 100ml NS (2 cycles) |
| Hypokalemia | Furosemide | Syrup Potassium Chloride TID |
| Hyponatremia | Ramipril | 3% NaCl |

Pearson correlation coefficient of 0.060 suggested that there is a very weak relationship between electrolyte imbalance and drug-induced adverse reactions. The p-

value of 0.297 indicates that the correlation is not statistically significant at 0.05 level. Electrolyte imbalance not only occurs due to drugs but also due to some physical conditions hence it is not correlated. Not all drugs can cause electrolyte imbalance but the chance of causing is on the lower side.

**ASSOCIATION BETWEEN AGE AND ELECTROLYTE IMBALANCE**

The rate of hyponatremia, hypokalemia, hyperchloremia, metabolic acidosis for patients aged between 11-20 years increased from 3.97%, 5.55%, 4.14% and 2.92% to 28.97%, 22.22%,10.35% 12.41% in patients aged between 61-70years respectively whereas hypochloremia was increased from 1.38% to 9.66% in patients aged between 71-80years.

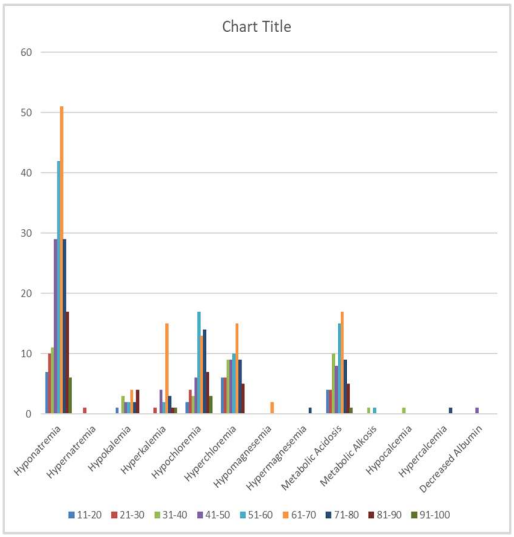


**Figure 4: Association between age electrolyte imbalance**

In our analysis we found that, age >60 years was a at risk for the presence of hyponatremia, hyperkalemia and metabolic acidosis as was current use of diuretic medication. The positive Spearman's rho value of 0.240 suggests that as age increases, the level of electrolyte imbalance tends to increase as well. The significance level p-value < 0.001 indicates that the correlation is statistically significant at 0.05 level.

**ASSOCIATION BETWEEN GENDER AND ELECTROLYTE IMBALANCE**

Many literatures have attributed the reasons for these sex differences is the immune response, differences in the prevalence of smoking/alcohol subjects among men and women and genetics.

Male gender was associated with a decreased prevalence of hypokalemia, hyperchloremia, and hypomagnesemia, while it was a found to have increased prevalence of hyperkalemia, hyponatremia, metabolic acidosis and hypochloremia.

Among the females the highest prevalence was associated with hyponatremia and followed by hyperchloremia, metabolic acidosis and hypokalemia respectively.

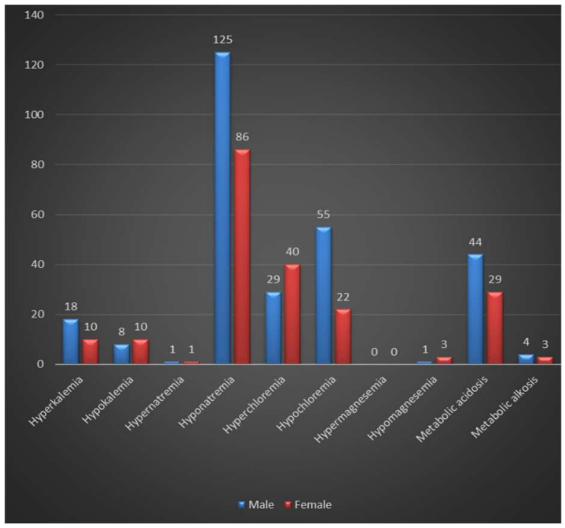


**Figure 5: Association between gender electrolyte imbalance**

The correlation coefficient of -0.065 suggests that the relationship between Gender and Electrolyte Imbalance is very weak. This indicates that changes in gender have a negligible impact on the levels of electrolyte imbalance. The p-value of 0.258 indicates that the observed correlation is not statistically significant. The p-value of 0.892 confirms that the correlation is not statistically significant.

**PRESCRIBING PATTERN OF IV FLUIDS**

The prescriptions that prescribed with IV fluids to correct the electrolyte imbalance were taken and recorded. On analysis it was found at 277 patients were treated with 0.9% NS and followed by 3% NS in 21 patients.

In our study it was found that majority of subjects enrolled in this study were diagnosed with Hyponatremia. Hyponatremia was classified into Mild hyponatremia: 130-134mmol/L, Moderate hyponatremia: 125-129mmol/L, Severe hyponatremia: <125mmol/L and Clinically significant hyponatremia <130mmol/L.

Moderate and Severe hyponatremia patients were prescribed with 3% NS and mild hyponatremia was prescribed with 0.9% and 0.45% NS. Injection KCl was prescribed for 6 patients who were diagnosed with hypokalemia and among which KCl was administered along with 100ml NS and patients with hyperkalemia, human insulin in dextrose was administered.

Metabolic acidosis in 70 patients was treated by administering sodium bicarbonate and hypomagnesemia 3 patients by injection magnesium sulphate.

All the patients were prescribed according to their dyselectrolytemia and IV fluids helps in correcting the electrolyte imbalance in almost all aspect.

The p-value of 0.009 is less than 0.05, which means that there is a statistically significant relationship between Electrolyte Imbalance and the Type of IV Fluids Used

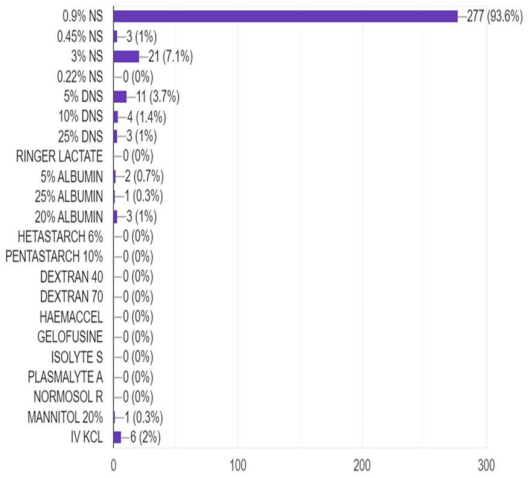


**Figure 6: Prescribing patterns of IV fluids**

This suggests that electrolyte imbalance does have a significant impact on the type of IV fluids prescribed All the patients were prescribed according to their dyselectrolytemia and IV fluids helps in correcting the electrolyte imbalance in almost all aspects.

**ELECTROLYTE IMBALANCE ASSOCIATED PHYSICAL COMPLAINTS**

Electrolyte disturbances can change the normal functioning of the body, which may lead to serious complications. n electrolyte imbalance can happen if a person becomes dehydrated or if they have too much water in their body. Electrolyte imbalances are most often due to vomiting ,diarrhea, no proper intake of food and water, excessive sweating, certain medications, such as laxatives and diuretics, eating disorders, liver or kidney problems, cancer treatment, congestive heart failure etc.

Older patients may be more susceptible to dehydration and electrolyte disturbance than younger patients and the common physical complaints related electrolyte imbalance are dry mouth, including the lips and tongue, sunken eyes, dry skin, drowsiness, confusion or disorientation, dizziness, low blood pressure

In our study the common type of physical complaint was found to be Diarrhea (28%) and Vomitting (19%). The most severe type of physical complaint was altered sensorium and seizures.

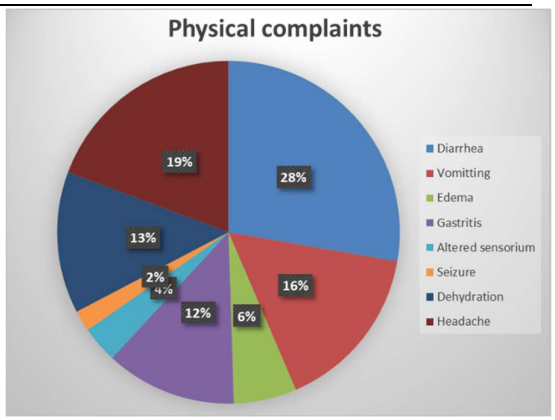


**Figure 7: Association between physical complaints and electrolyte imbalance**

The correlation coefficient of 0.026 indicates that the relationship between electrolyte imbalance and physical complaints related to it is very weak. The change in electrolyte imbalance does not relate to changes in physical complaints.The p-value of 0.659 shows that the correlation is not statistically significant at 0.05 level.

**DISCUSSION**

Among 300 enrolled patients, electrolyte abnormalities were present in all the cases. Since the six electrolytes and albumin were considered together and imbalance among any of them was noted, this might be the reason for the high incidence. Most of previous studies focused on only one or two electrolytes.

All the patients was enrolled in this study once they satisfied the inclusion and exclusion criteria. The details were recorded from the medication chart and case reports, and their history was noted and entered in the MS Excel. The patients were frequently visited for recording any adverse drug

reaction either because of the IV fluids or the drugs administered.

Blood samples were drawn on admission to find out the initial serum levels of sodium, potassium, calcium, magnesium and phosphorus. There after the levels were repeated every twenty four hourly or earlier (if needed). Any value below or above the following cut off values was considered abnormal indicating electrolyte imbalance.

Sodium: 136- 145 mEq/L

Potassium: 3.5-5.1 mEq/L

Calcium (Total): 8.60-10.0 mg/dl

Phosphorus: 2.8-4.5 mg/dl

Magnesium: 1.60-2.60 mg/dl

Chloride: 98.0- 107.0 mEq/L

Bicarbonate-22.0-29.0 mmol/L

Types of intravenous fluid given to patient, use of diuretics, steroids, inotropes and positive pressure ventilation were noted. Complications during stay like development of acute kidney injury (AKI), multi organ dysfunction syndrome (MODS), congestive cardiac failure (CCF), and syndrome of inappropriate secretion of ADH (SIADH) were noted. The final outcome i.e. discharges or expiry along with length of stay was also noted.

Among all the patients majority of them had gastroenteritis (36.38%), dehydration (31.80%), respiratory (30.69%), neurological (25.74%) and infective/sepsis (19.80%) on admission and etiology were also noted in which hypertension, diabetes mellitus and kidney diseases were common. Although majority had abnormality of a single electrolyte, mixed disorders with combination of two, three, four and all five electrolytes were also seen. Majority i.e. 253 (84.33%) had the abnormalities at the time of admission, 47 of them developed additional imbalances during stay. While five patients who were free of imbalance at admission developed them later, indicating the possible mechanism pointed earlier. Regarding the patterns of electrolyte imbalance, hypocnatremia was the most frequent abnormality noted in 206 (68.9%) cases.

The presence of dysnatremias (either hypo or hypernatremia) in patients has been reported to be around 43%. Most of the literature has reported hyponatremia to be more prevalent than hypernatremia. We found hypernatremia in only one patient and hyponatremia in 206 cases.

Hypokalemia was observed in 30.58% cases and hyperkalemia in 18.82% cases. Hypophosphatemia was noted in 35.29% cases. As far as magnesium is concerned, we found less cases of hypermagnesemia up to 21% than hypomagnesemia in 7%. Most of the published data showing hypomagnesemia to be more common than hypermagnesemia.

Morbidity was significant in cases of electrolyte imbalance both in terms of required level of care and emergence of complications. Ventilatory support was required in 12% of patients. Similarly diuretics, inotropes and steroids were used indicating the need for high level of care.

It is claimed that medications commonly used in patients may contribute to the electrolyte disturbances as they can interfere with the absorption of electrolytes, alter hormonal responses affecting hemostasis and can directly affect the organ function as well. Their requirement however indicates the severity of illness and they continue to be an important risk factor for later development of electrolyte imbalance.

Mortality during first 48 hours of stay was seen in 14 cases, among which 12 (85.71%) had electrolyte imbalance again pointing towards its significant role in poor outcome. Both single and mixed electrolyte disorders were noted and the mortality was increased in ascending order with the number of electrolyte involvement.

Length of stay less than 48 hours was seen in 32 (37.64%) cases of electrolyte imbalance (high early mortality) whereas it was seen in 10 (62.50%) cases without imbalance (indicating high rates of recovery). However, the length of stay was increased in all other categories in patients with electrolyte imbalance (Table-III). This was consistent with studies conducted in the past.5,11,12 This makes electrolyte imbalance a major drain on limited health resources of poor and developing countries. The duration of fluid therapy, measured as the number of days for which the patient received IV fluids, and the occurrence of systemic adverse events (eg, fluid overload, edema, hyperglycemia) and local adverse events (eg, phlebitis, other fluid-related adverse events) were measured. The signs, symptoms, and causes (eg, rate and type of fluid) of the adverse events were also collected. s. This tool was divided into 4 parts: (1) patients' demographic and clinical data; (2) extemporary (data collected on the day of the audit and/or in the previous 24 hours) or systematic (on a daily basis) fluid balance chart use, weight (even reported by the patient for extemporary assessment), and serum electrolyte and renal function measurement; (3) reasons for IV fluid therapy prescription and type and volume of delivered fluids; and (4) duration of fluid therapy and possible systemic and local adverse event.

**CONCLUSION**

An electrolyte imbalance occurs if the body has too much or too little water. Common symptoms of an imbalance include headaches, nausea, and fatigue. Electrolytes are minerals that the body needs to balance water levels, move nutrients into cells, remove waste

products, allow nerves to send signals, enable muscles to relax and contract effectively and maintain brain and heart functioning. People get electrolytes from food and beverages. The kidneys and liver help maintain electrolyte balance.

This was a study to evaluate the prescription pattern of IV fluids and also to evaluated the common type of electrolyte imbalance seen in humans. Monitoring and evaluating the prescription pattern in electrolyte imbalance patients can enable modifications in the prescribing pattern and analysis of risk factors and mortality can improve the patients-quality of life. Electrolyte imbalance can often be successfully treated by IV fluids. Treatment usually requires a proper diet and life style modification. Patients with mild disturbances may be asymptomatic, but severe disturbances can result in medical emergencies. A total of 300 prescription were analysed in the study including both the genders. Prevalence of electrolyte imbalance among male patients was higher than females showing that men are more susceptible to electrolyte imbalance then females. 61-70 years aged patients are more susceptible to electrolyte imbalance.

In the current study, the common chief complaints on admission were found that gastroenteritis, dehydration, kidney disease related problems such as fluid overload, decreased GFR and the common etiology was Hypertension, followed by Diabetes mellitus. Electrolyte imbalance was recorded highest in the age between 61 to 70 years 66(22%), followed by 51 to 60 years 58(19.3%) which indicate that patients above 61 years were more susceptible to electrolyte disturbances and these can be due to the changes in their diet, decreased intake of foods, physiological changes, change in lifestyle etc.

Among all the IV fluids 0.9% NS was used commonly and followed by 3% NS in crystalloids and albumin in alkoids. And 206 patients were having hyponatremia and among which 21 patients had severe hyponatremia and hence 3% NS was administred to correct the electrolytes. Male gender were having decreased risk of hypokalemia, hyperchloremia, and hypomagnesemia, while it was a found to have increased prevalence of hyperkalemia, hyponatremia, metabolic acidosis and hypochloremia. The rate of hyponatremia, hypokalemia, hyperchloremia, metabolic acidosis were high in patients aged between 61-70 years. The study concluded that Hyponatremia and 0.9% NS were the most common electrolyte disturbance and prescribed IV fluids respectively. Clinical pharmacist needs to play an import role in evaluating the dyselectrolytemia based on standard

treatment guidelines, as well as in evaluating the rationality of prescription.

**ACKNOWLEDGEMENT**

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