SERUM CALCIUM, MAGNESIUM AND POTASSIUM IN ACUTE DIARRHOEA PATIENTS COMING TO PRAVARA RURAL HOSPITAL

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ABSTRACT

Introduction: Diarrhoea is a leading cause of morbidity and mortality across all age groups and regions of the world. Electrolyte imbalances are very common with the severity of acute diarrhoea. The aim of present study was to study the Serum Calcium, Magnesium and Potassium levels in patients of acute diarrhea. **Materials and methods:** This was a descriptive longitudinal study carried out in Department of Medicine, of PRH, Loni. Patients of diagnosed of acute diarrhea of age 18 and above of either gender willing to participate by giving written informed consent were included in the study. Patients with history of electrolyte abnormalities, history of chronic gastroenteritis, irritable bowel disease, congestive cardiac failure, liver cirrhosis, renal diseases, history of any disease deranging serum electrolyte levels and those on diuretics or any drugs which causes electrolyte imbalance were excluded from the study. Patients included in the study were subjected to demographic profile and serum electrolytes before and after treatment. **Results:** 100 patients were included in the study. Male patients were more in number (56) as compared to female patients. Signs of dehydration were present in 70 patients. The patients suffering from hypokalemia, hyponatremia, hypocalcaemia and hypomagnesaemia were 23, 35, 78 and 84 respectively. Thus electrolyte imbalances are quite common in patients suffering from acute diarrhea. On comparing the serum Calcium, Magnesium and Sodium levels before and after treatment, statistically significant difference was seen. It was not significant for serum Potassium levels. **Conclusion:** Electrolyte imbalances are quite common in patients suffering from acute diarrhea. The serum electrolytes of patients suffering from acute diarrhea should be routinely examined to rule out electrolyte abnormalities and prompt treatment.

KEYWORDS: Acute diarrhea; Adults; Serum electrolytes.

INTRODUCTION

Acute diarrhoea is defined as passage of 3 or more loose stools in a period of 24 hours. It is an endemic condition in India with a prevalence of 7%. While it is commonly seen in children, acute diarrhoea is also a major problem in adults [1,2]. Although several studies in India have been carried out with respect to acute diarrhea in less than 5 years children, adult diarrhoea has not been studied.

Dehydration and electrolyte imbalance are the most common squeal associated with acute diarrhoeas. Electrolyte imbalances are very common with the severity of acute diarrhoea. Studies have revealed deficiency in serum Magnesium, Calcium and Potassium levels due to acute diarrhoea [3-9]. If it is recognized in a patient of acute diarrhea, electrolyte imbalance is developing and if the loss of these electrolytes is known, correct replacement can be begun before signs and symptoms of disturbed electrolyte balance appear. In many cases this will prevent development of serious deficiencies of fluid and electrolytes and will hasten recovery [10].

The epidemiology of hospitalization associated with acute diarrhoeas is not well been investigated so far, even though it imposes a major burden on the patient and health care system. The current study is focused to find out changes associated with serum Magnesium, Calcium, Potassium and Sodium levels in acute diarrhoea.

Objective: To study the serum electrolytes of patients suffering from acute diarrhoea in patients presenting in Pravara rural hospital.

MATERIALS AND METHODS

Study design: Longitudinal observational study.

Ethics approval: The study protocol was approved by

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the institutional ethics committee before initiation of the study and informed consent was obtained from the participants

Study period: 2 years (Nov 2015 to Nov 2017)

Study location: The present study was carried out in Department of Medicine, RMC, Loni .

Sample Size: 100 cases.

Study population: Patients diagnosed of acute diarrhoea and admitted in Pravara Rural Hospital, Loni.

Inclusion criteria: Patients of diagnosed of acute diarrhoea (from 2-3days) of age 18 and above of either gender willing to participate by giving written informed consent were included in the study.

Exclusion criteria: Patients with history of electrolyte abnormalities, history of chronic gastroenteritis, irritable bowel disease, congestive cardiac failure, liver cirrhosis, renal diseases, and history of any disease deranging serum electrolyte levels and those on diuretics or any drugs which causes electrolyte imbalance were excluded from the study.

Methodology: Patients were subjected to demographic profile and serum electrolytes before and after treatment. Patients were treated with anti diarrhea and antimicrobials only. They were studied for signs of dehydration, Serum electrolytes (Magnesium, Calcium, Potassium and Sodium).

RESULTS

After screening, the patients admitted in Pravara Rural Hospital, Loni, by inclusion and exclusion criteria, 100 patients included in the study.

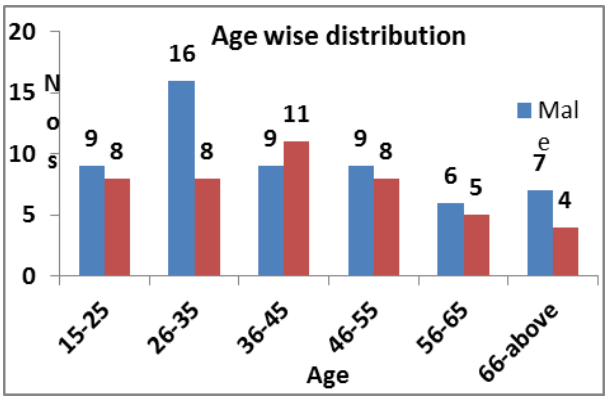

Fig 1. Age wise distribution of patients

Male patients were more in number (56) as compared to female patients. Most of the patients ie, 24 belonged to age group of 26-35, followed by 36-45 (20) and 15-25 & 46-55 years (17).

On ECG examination, the heart rate of most of the patients was in the range of 100-110 beats/minute (33) followed by 91-100 (32) and 81-90 (27). Heart rate above 111 was seen in 5 patients. The average heart rate was 96 with standard deviation of 10.9. Tachycardia was seen in 34 patients.

The systolic and diastolic blood pressure of the patients were 109.64 (SD- 11.45) and 70.26 (SD- 7.21) respectively. All the ECGs of the patients showed sinus rhythm.

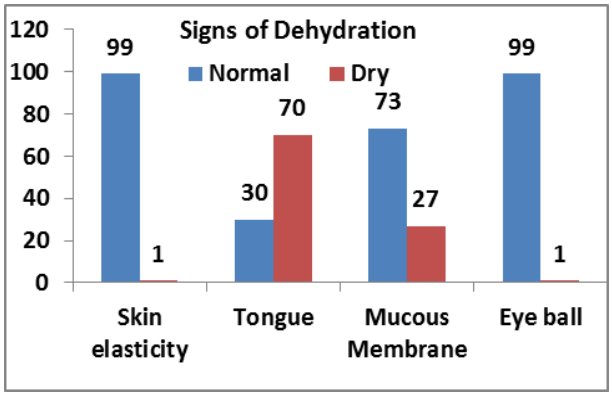

Fig 2. Distribution of patients according to signs of dehydration.

Signs of dehydration in the form of dry tongue and mucus membrane were present in 70 and 27 patients respectively. Dry eye ball and reduced skin elasticity were present only in one patient.

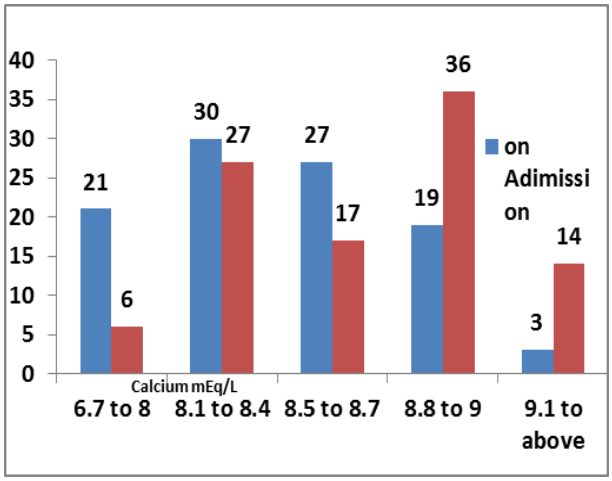

Fig 3. Distribution of patients according to serum Calcium levels.

On admission, the serum Calcium levels of most of the patients were between 8.1-8.4 mEq/L (30). Twenty one patients had Calcium levels between 6.7-8mEq/L, while 3 patients had serum Calcium more than 9.1mEq/L. The mean Calcium level was 8.39 with Standard deviation of 0.45. Thus 78 patients were suffering from hypocalcemia.

At discharge, the serum Calcium levels of most of the patients were between 8.8-9 mEq/L (36). Six patients had Calcium levels between 6.7-8 mEq/L, while 14 patients had serum Calcium more than 9.1 mEq/L. The

mean Calcium level was 8.68 with Standard deviation of 0.41.

On comparing the serum Calcium levels before and after treatment, the results were statistically significant using Wilcoxon matched-pairs signed-ranks test (P = 0.0001)

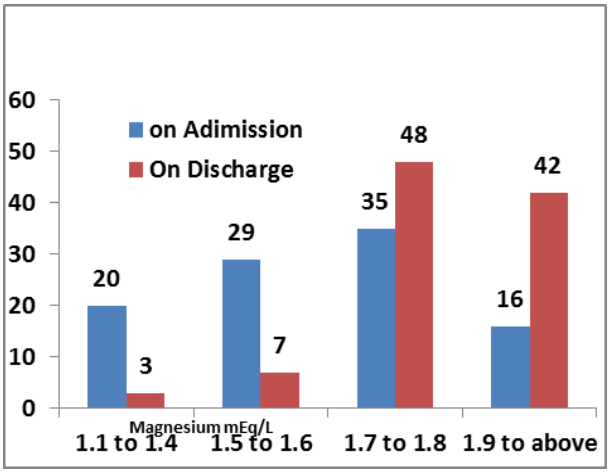

Fig 4. Distribution of patients according to serum Magnesium levels.

On admission, the serum Magnesium levels of most of the patients were between 1.7-1.8 mEq/L (35). Twenty patients were in the range of 1.1-1.4 mEq/L, while 29 were in the range of 1.5-1.6 mEq/L. Sixteen patients had Magnesium levels more than 1.9 mEq/L. Thus 84 patients were suffering from hypomagnesaemia.

At discharge, the serum Magnesium levels of most of the patients were between 1.7-1.8 mEq/L (48). Only three patients were in the range of 1.1-1.4 mEq/L, while seven were in the range of 1.5-1.6 mEq/L. Sixteen patients had Magnesium levels more than 1.9 mEq/L.

On comparing the serum Magnesium levels before and after treatment, the results were statistically significant using Wilcoxon matched-pairs signed-ranks test (P = 0.0001)

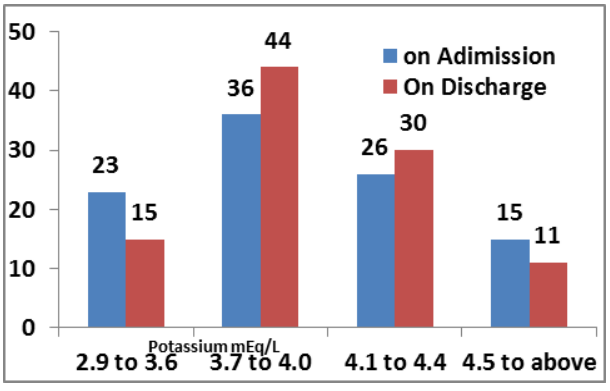

Fig 5. Distribution of patients according to serum Potassium levels (mEq/L).

On admission, the serum Potassium levels of most of the patients were between 3.7-4.0 mEq/L (36). Twenty three patients had Potassium levels between 2.9-3.6 mEq/L, while 15 patients had serum Potassium more than 4.5 mEq/L. The mean Potassium level was 3.99 with Standard deviation of 0.50. Thus 23 patients were suffering from hypokaemia.

At discharge, the serum Potassium levels of most of the patients were between 3.7-4.0 mEq/L (44). Fifteen patients had Potassium levels between 2.9-3.6 mEq/L, while 11 patients had serum Potassium more than 4.5 mEq/L. The mean Potassium level was 4 with Standard deviation of 0.35.

On comparing the serum Potassium levels before and after treatment, the results were not statistically significant using Wilcoxon matched-pairs signed-ranks test (P = 0.1308).

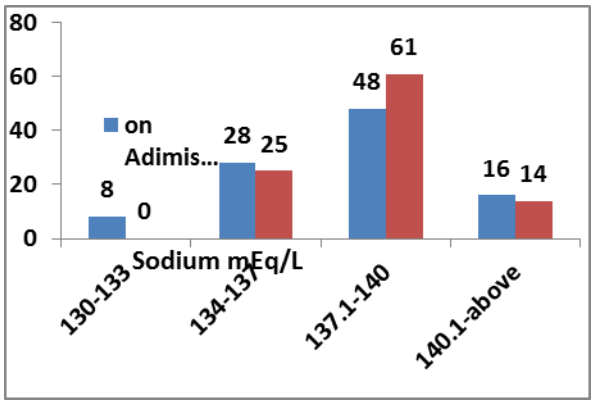

Fig 6. Distribution of patients according to serum Sodium levels (mEq/L).

On admission, the serum Sodium levels of most of the patients were between 137.1-140 mEq/L (48). Eight patients had Sodium levels between 130-133 mEq/L, while 16 patients had serum Sodium levels more than 140 mEq/L. The mean Sodium level was 137.8 with Standard deviation of 2.59. Thus 35 patients were suffering from hyponatremia.

At discharge, the serum Sodium levels of most of the patients were between 137.1-140 mEq/L (61). Fourteen patients had serum Sodium levels more than 140 mEq/L, while 25 patients had level in the range of 134-137 mEq/L. The mean Sodium level was 138.3 with Standard deviation of 1.95.

On comparing the serum Sodium levels before and after treatment, the results were statistically significant using Wilcoxon matched-pairs signed-ranks test (P = 0.0053)

DISCUSSION

Male patients were more in number (56) as compared to female patients. Most of the patients ie, 24 belonged to age group of 26-35, followed by 36-45 (20) and 15-25 & 46-55 years (17).

In a study by Patel etal [11], there were 71 males and 29 females in cases of acute diarrhoea. Maximum numbers of cases were between the ages of 21-50 years. In a study by Rajoor UG [12], Out of 100 patients of acute diarrhoea studied, 57 were males and 43 were females. The age of patients varied from 18-90 years. Maximum incidence (60%) was seen in age group of 21-50 yrs. In the study by KC M etal [13], out of sixty patients investigated for acute diarrhoea, 38 (63.3%) were male and 22 (36.67%) were female. The finding of the above studies supports the observations of current study.

In our study, on ECG examination, the heart rate of most of the patients was in the range of 100-110 beats/ minute (33) followed by 91-100 (32) and 81-90 (27). Heart rate above 111 was seen in 5 patients. The average heart rate was 96 with standard deviation of 10.9. Tachycardia was seen in 34 patients. In the study by Rajoor UG [12], in patients with mild dehydration, pulse rate was 87.80 ± 14.94. In moderately dehydrated patients, pulse rate was 92.55 ± 10.83 and in severe dehydrated patients, it was 103.23 ± 10.69. As most of the patients were having mild dehydration (70) with pulse rate ranging from 81-100, the present findings are in line with study conducted by Rajoor UG [12].

The systolic and diastolic blood pressure of the patients were 109.64 ±11.45) and 70.26 ± 7.21 respectively. All the ECGs of the patients showed sinus rhythm.

In the study by Rajoor UG[12], in mild dehydrated patients, systolic and diastolic blood pressure (BP) was 120.035±19.49 and 78.82±12.43 respectively. In moderate dehydrated patients, systolic and diastolic BP was 97.29±24.27 and 67.10±15.32 respectively. In severe dehydrated patients, systolic and diastolic BP was 78.80±19.16 and 66.00±15.17 respectively. While comparing the blood pressure of mild dehydration of patients of study conducted by Rajoor UG [12], the blood pressure of patients of present study are comparable.

In the present study, Signs of dehydration in the form of dry tongue and mucus membrane were present in 70 and 27 patients respectively. Dry eye ball and reduced skin elasticity were present only in one patient.

In the study by Patel N Etal [11], mild dehydration was observed in 22 (22%) of cases. Moderate dehydration was observed in 68 (68%) of cases. Severe dehydration was observed in 10 (10%) of cases. Study by Sachdev HP et al [14] was carried out in 50 cases of acute diarrhoea in paediatric population, shows 60% cases had mild, 30% cases had moderate and 10% cases had severe dehydration.

In the study by Rajoor UG [12], at the time of admission 42% showed mild dehydration, and 29% each were moderately and severely dehydrated. Krishnamurthy et al [15], noted mild dehydration in 33.33% of cases. Rao SV et al [16], reported moderate and severe dehydration in 59% and 41% cases respectively 9 which is slightly higher than our study. The difference between two groups is probably because of regional influences, different age group or knowledge, attitude and practice of patients.

The serum Calcium, Potassium, Magnesium and Sodium levels were studies before (after admission) and after treatment (during discharge). A study of such type, comparing serum electrolytes in acute diarrhoea in adults, could not be found in literature.

In the study by Patel N et al [11], a study of 100 cases, 28 (28%) had hypocalcemia. While in study by Bhikha R [9], 66 cases and 66 controls, they found hypocalcemia in 94% cases of acute diarrhoea. This difference is because of cut off value for defining hypocalcemia in their study was < 9.0 mg/dl. In our study it was < 8.5 mg/dl. Considering the same criteria, in our study, 97% patients had hypocalcemia.

In a study by Patel et al [11], 55% cases of acute diarrhoea had hypomagnasemia on admission and 6% cases of acute diarrhoea had severe hypomagnasemia. In our study 35% of patients had hypomagnesemia. The difference in the findings could be due to variation in geographic area.

In a study by Patel et al [11], 39% cases of acute diarrhea had hypokalemia on admission and 22% cases had severe hypokalemia. In the study by KC M et al [13], out of 60 patients investigated, 9 (26.47%) patients had potassium level below 3.5mEq/l, 22 (64.70%) patients had potassium level between 3.5-5 mEq/l and 3 (8.82%) patients had level above 5 mEq/l . In the present study, only 23% suffered from hypokalemia, which is supported by Patel etal [11].

In the study by Patel N et al [11], 80% cases had hyponatremia. In the study by KC M etal.[13], out of 60 patients investigated, serum sodium and potassium level were available for 34 patients. Only one (2.9%) patients had sodium level below 135mEq/l, thirty two (94.11%) had sodium level between 135-146 mEq/l and one (2.9%) had sodium level above 146mEq/l. In our study 34 patients suffered from hyponatremia which is comparable with the above mentioned studies.

CONCLUSION

Male patients were more in number (56) as compared to female patients. Signs of dehydration were present in 70 patients. The patients suffering from hypokalemia, hyponatremia, hypocalcaemia and hypomagnesaemia were 23, 35, 78 and 84 respectively. Thus electrolyte imbalances are quite common in patients suffering from acute diarrhea. On comparing the serum Calcium, Magnesium and Sodium levels before and after treatment, statistically significant difference was seen. It was insignificant for serum Potassium levels. **Clinical suggestion**: Hence, the serum electrolytes of

patients suffering from acute diarrhoea should be routinely examined.

Conflict of interest : None declared

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