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Epidemiological Profile of Electrolyte Abnormality in Geriatric Emergencies

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Abstract:

Aims: To find out the various electrolyte abnormality seen in the elderly people and the various co-morbid conditions in them.

Objective: To identify the epidemiological profile of electrolyte abnormality among geriatric patients who presented to the emergency department.

Setting: Emergency department of Christian Medical College Vellore.

Design: This study involves retrospective analysis of data from October 15th 2012 to January 31st 2013.

Population: All the patient's ≥ 65 years of age presenting to the emergency department with electrolyte abnormality are taken into the study. Information about the demography, presenting symptoms, vital signs, triage criteria, length of hospital stay, electrolyte imbalance and final diagnosis were collected and were analyzed for average percentage and mean. Descriptive statistics were used in this study.

Results: 851 patients were studied. Males constituted 66%. The commonest presenting symptom was found to be fever followed by dyspnoea and cough. Airway and breathing was compromised in 11% and 1% respectively. 31% patients had hypotension. Temperature was high in 10% of patients. 46% patients were admitted in the hospital. Final diagnosis of ACS constituted 11.2% of patients. CVS problems constituted 16% of problems followed by RS and Infectious diseases. The most common electrolyte abnormality was found to be hyponatremia. 7% of patients died during their hospital stay.

1. Introduction

Electrolyte abnormality is one of the commonest problems encountered in the geriatric age group and the number of geriatric people who visit the emergency department is on the rise. They usually present with vague symptoms. Elderly patients are particularly sensitive to the development of various electrolyte abnormalities.

Studies about the clinical prevalence of electrolyte imbalances often report that these electrolyte imbalances are frequently seen in elderly and chronically ill patients and occur in the progression of disease such as diabetes mellitus, hypertension, chronic renal failure and others.

This retrospective study describes the epidemiological profile of electrolyte abnormality in the geriatric people who visit the emergency department. Literature data available had focused on imbalances of specific electrolytes and are mostly done in settings apart from emergency department.

Till date no data has been available on electrolyte imbalances among geriatric people in the Indian Emergency department. So I hope this study will be helpful in providing useful information about the Indian geriatric population who visit the emergency department. This study was done in Christian Medical College Vellore which is a tertiary care centre in South India.

2. Methodology

2.1. Design

Retrospective study.

2.2. Setting

Department of Emergency medicine, Christian Medical College, Vellore (A 2300 bedded tertiary care centre and a level 1 trauma centre). Our department has an annual census of nearly one lakh.

2.3. Population

All the patients above the age of 65 years who presented to the emergency department during the period of October 15th 2012 to December 31st 2013.

2.4. Participants

The inclusion criteria will be all the patients of age 65 or more with electrolyte imbalance on their presentation to the emergency department. Data was collected about the patients on the basis of a data collection form prepared by the investigator.

The study was started after getting permission from the Institutional Review Board. The data was entered in Microsoft Excel format and then exported to the statistical analysis software. Data was collected from patient's history, OP chart, IP chart and clinical workstation. The reference ranges for the electrolyte value were taken from clinical biochemistry reference ranges of the institution.

2.5. Sample Size

The required sample size to show the prevalence of electrolyte abnormality among the subjects admitted to the emergency unit with a precision of 3% was found out to be 851 subjects with 95% confidence limits.

2.6. Formula

- $N=4 PQ / d^2$.
- P = Prevalence of electrolyte abnormality; Q = 100 – P; d = precision

Descriptive statistics was used to analyze the data.

2.7. Methodology Flow Chart

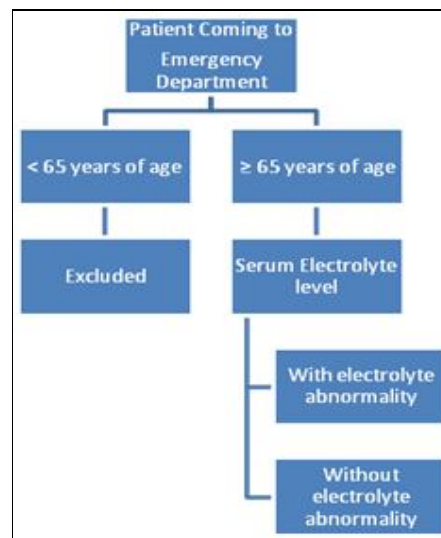


Figure 1

3. Results

In the 851 patients with electrolyte imbalance, 66 % (n=563) were male and 34 % (n=34%) were female. The mean age of the patients was similar male (71.8) and female (72.0).

The most common symptoms were fever (n=285, 33.5%), dyspnoea (n=254, 29.8%), cough (n=170, 20%) and vomiting (n=142, 16.7%).

The most frequent electrolyte imbalances were hyponatremia and none of the patients included in the study had hypermagnesemia. Most of the electrolytes were lower than the normal levels in chronic disease states.

The most frequent co morbidities were hypertension (n=428, 50.3%), diabetes (n=419, 49.2%), chronic kidney disease (n=54, 6.3%) and ischemic heart disease (n=52, 6.1%)

Our hospital follows the three tier system of triage, considering this system of triage, the geriatric patients were mostly placed in priority 2 i.e.: the not so sick but required early intervention. They constituted 53% as compared to priority 2(n=454), priority 1(n=270, 32%) and priority 3 (n=127, 15%).

Airway was compromised in 93 patients who amounted to 10.9 %. Respiratory rate was normal in 341 patients (40%), tachypnoeic in 498(59%), 1% patient had respiratory compromise.

Pulse rate was normal in 224 patients (26.2%), tachycardia (n=564, 66.3%), bradycardia (n=57, 7%), blood pressure was low in 266 patients (31.2%) and high in 251 patients (29.5%).

Temperature was noted to be normal in 764 patients (89.8%). 85 patients (10%) presented with hyperthermia. 2 (0.2%) patients presented with hypothermia.

Diabetes mellitus and hypertension were the most common chronic illnesses affecting the geriatric patients. Final diagnosis of ACS (acute coronary syndrome) constituted 95 patients (11.2%), followed by Acute febrile illness (n=89, 10.5%), CVA- cerebro vascular accident (n=80, 9.4%), COPD-chronic obstructive pulmonary disease (n=58, 6.8%).

CVS problems constituted 16% of all the causes of ED visits among the geriatric population followed by the ID (n=109, 13%), RS (n=109, 13%), CNS (n=89, 11%), Surgery (n=87, 10%), Trauma (n=70, 8%), GIT (n=45, 5%) systems.

394 patients (46%) were admitted in the hospital, 340 patients(40%) were discharged from the hospital, 117 patients(14%) left against medical advice(table 12). 342 patients(40%) had length of stay for less than one day, 224 patients(26%) were admitted for 2-7 days, 108 patients(13%) were admitted for more than 7 days. We were not able to predict the length of stay for 177 patients.

4. Discussion

Electrolyte imbalances are more common in the geriatric age group. In India, data regarding electrolyte imbalances in geriatric patients presenting to the ED was not found, so we intended to find out the epidemiological profile of geriatric patients presenting to the ED in a tertiary care institute in South India. Our study center provides tertiary health services in its region and particularly deals with clinically advanced diseases and complicated patients. Therefore, we particularly investigated electrolyte imbalances in our patients carefully.

The studies done previously have identified multiple factors being responsible for the electrolyte abnormalities (2-5). Syndrome of inappropriate antidiuretic hormone, diuretic use, and congestive cardiac failure are the most common reasons for hyponatraemia (1, 10, and 14). Hyperparathyroidism and malignancy were the most common reasons for calcium disorders (12). Diabetic ketoacidosis, chronic obstructive pulmonary disease, alcoholism, malignancy, and renal failure are found to be associated with phosphorus abnormalities (13), they have also identified that electrolyte disturbances form a risk factor for hospital mortality (14). In our study we had taken six electrolytes (sodium, potassium, bicarbonate, calcium, phosphorus and magnesium) and found that sodium abnormality is more common followed by bicarbonate and potassium. The mortality among geriatric patients with electrolyte abnormality was found to be 7% (n=60).

Sodium imbalance is seen in about 613 patients that correspond to 72%, hyponatremia is the most common electrolyte abnormality noted in our study with 611 patients corresponding to 71.9%. Hyponatremia is commonly associated with critically ill patients and in the presence of various co morbid conditions. This is especially high as our hospital usually receives very sick and terminally ill patients as emergencies.

We divided the patients with hyponatremia into five groups based on the severity of hyponatremia (1). We found that 4.3%(n=37) of patients had severe hyponatremia value of less than 115, 3.1%(n=27) of patients had hyponatremia value between 115 to 119, 8.1%(n=69) of patients had hyponatremia value between 120 to 124, 19.3%(n=164) of patients had hyponatremia value between 125 to 129, 37.1%(n=315) of patients had hyponatremia of value between 130 to 134.

Bicarbonate imbalance is seen in 539 patients (63%). Bicarbonate imbalances are associated with acutely ill patients, and it stands next to sodium imbalance. Potassium imbalance is seen in 302 patients (35%), followed by phosphate (n=16, 1.8%), calcium (n=9, 1.1%) and magnesium (n=6, 0.6%).

We also found out that nearly 40% of patients were discharged from the emergency department; this is an important finding as we can predict that not everyone with electrolyte abnormality needs to be admitted.

Our hospital being a referral centre we receive lots of patients from various parts of the country and abroad, that could contribute to the large number of patients with acute coronary syndrome being treated by us.

5. Conclusion

In this retrospective study on the epidemiological profile of electrolyte abnormality among geriatric patients presenting to the emergency department we found out that electrolyte abnormality is more common in the geriatric age group than expected. Most of the study patients had significant alterations in their vital signs like respiratory rate, blood pressure and pulse rate. Almost 53% of patients were classified under priority 2 of the triage system which meant that they were sick and needed medical attention within a few hours. One third of the population was diagnosed with CVS and RS problems as the reason for ED presentation. Nearly 340 patients (40%) were discharged within one day from the emergency department, this implies that the geriatric patients with electrolyte abnormality even though sick at presentation can be stabilized in the emergency department and discharged from the ED.

6. Limitations

- The socio economic profile was not studied.
- Since this is a retrospective study, seasonal variations could have changed the presenting symptom.
- Focuses only on the geriatric age group.
- The aetiology of the electrolyte abnormality could not be determined in most cases.

Symptom Wise Classification	No. of Patients	%
Fever	285	33.5
Dyspnoea	254	29.8
Cough	170	20
Vomiting	142	16.7
Abdomen pain	107	12.6
Altered sensorium	102	12
Chest pain	89	10.5
Giddiness	77	9.0
Diarrhoea	58	6.8

Symptom Wise Classification	No. of Patients	%
Fatigue	49	5.8
Limb weakness	49	5.8
Not verbalising	46	5.4
Loss of appetite	46	5.4
Burning micturition	41	4.8
Oliguria	39	4.6

Table 1

Co Morbidities	No of Patients	%
Hypertension	428	50.3
Diabetes	419	49.2
Chronic renal	54	6.3
IHD	52	6.1
Malignancy	47	5.5
Coronary	43	5.1
Cerebrovascular	41	4.8
Others	158	18.7

Table 2

Final Diagnosis	Number of Patients	%
Acute coronary	95	11.2
Acute febrile illness	89	10.5
CVA	80	9.4
Pneumonia	58	6.8
COPD	58	6.8
Malignancy	48	5.6
Urinary tract	45	5.3
Ortho trauma	40	4.7
Acute gastro	37	4.3
Chronic kidney disease	34	4
Congestive cardiac failure	31	3.6
Sepsis	30	3.5
Cellulitis	26	3.1

Table 3

Sodium Value	Number	%
<115	37	4.3%
115-119	27	3.1%
120-124	69	8.1%
125-129	164	19.3%
130-134	315	37.1%
Normal	235	27.6%
High	2	0.2%

Table 4: Sodium imbalance classification

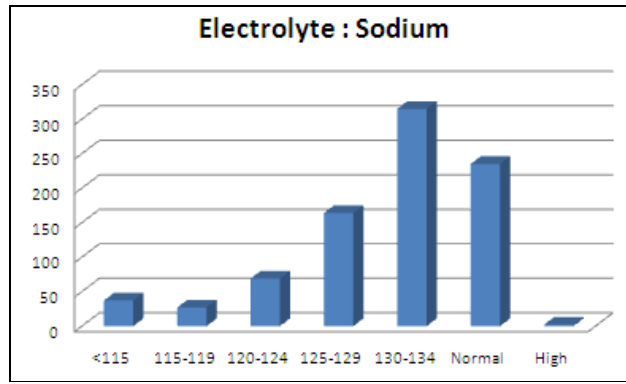


Figure 2

Distribution of Electrolyte imbalance			
	Electrolyte imbalance	No. of Pts.	%
Sodium	Hyponatremia	612	71.9
	Hypernatremia	2	0.2
Potassium	Hypokalemia	198	23.2
	Hyperkalemia	103	12.1
Bicarbonate	Hypo	539	63.3
	Hyper	2	0.2
Calcium	Hypocalcemia	13	1.5
	Hypercalcemia	1	0.1
Phosphorus	Hypophosphatemia	10	1.1
	Hyperphosphatemia	12	1.4
Magnesium	Hypomagnesemia	7	0.8
	Hypermagnesemia	0	0.0

Table 5

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