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Dysnatraemia, Easy to Manage but not Considered for Diagnosis in Children in Emergency Department.

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Abstract

Sodium abnormality (dysnatraemia) is a common problem in paediatric population. Being part of LMIC (low to middle income country), our resources are limited. Most of the patients with dysnatraemia present with signs and symptoms mimicking sepsis or meningitis. Limited investigations are ordered based on these signs and symptoms resulting in delayed or missed diagnosis. This results in lack of improvement, worsening of patient condition, prolonged hospitalization or referral to other health care facility. Retrospective chart review were done of paediatric patients who visited paediatric emergency department of Aga khan university hospital from Jan. 2009 to Dec. 2014, with dysnataremia. Percentages and frequency were used for descriptive statistics and mean and standard/median and IQR(Inter quartile ranges) used for continuous variables. During the 5 years period, dysnatraemia was seen in 38 patients. Out of these, 22 were with hyponatraemia and 16 with hypernatremia. Sepsis was the provisional diagnosis considered in hyponatraemia and meningitis in children with hypernatraemia. So this study highlights the importance of sodium in paediatric population.

Keywords: *Hyponatraemia; Hypernatraemia; Children*

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Introduction

Dysnatraemia (sodium abnormality), is a common problem in childhood [1]. Children are at increased risk of dysnatraemia due to immature renal function, increased insensible water loss or impaired thirst mechanism. Improper intravenous fluid administration and syndrome of inappropriate antidiuretic hormone [2] secretion are important risk factor of dysnatraemia in hospitalized children. Monitoring of volume status of a child is important in management [3,4]. Hyponatraemia, is sodium level less than 135mg/dl and hypernatraemia is sodium concentration greater than 145mg/dl [5]. Signs and symptoms of dysnatraemia are varied but the neurological symptoms are quite common. If not identified and treated appropriately patient fails to improve and develop neurological complications [6].

There is no data available for frequency, clinical presentation and missed diagnosis of dysnatraemia in paediatric emergency room of tertiary care hospitals. The purpose of this study is to highlight the importance of sodium and the need to consider during investigation in children who failed to respond to first line of management. As dysnatraemia is also an important reason of emergency room presentation

other than sepsis and meningitis. Important diagnosis considered by the emergency department physicians are sepsis, meningitis and workup and management also based on it. This result in worsening and require prolonged hospitalization of patient. Thus a single centre study will provide a future platform for studies and help in better identification and treatment outcomes.

Materials and Methods

Aga Khan University hospital is a 600 bedded leading tertiary care hospital in Pakistan serving about 20 million population. This hospital has the privilege of various subspecialists who are trained from accredited fellowships in different pediatric subspecialty.

After approval of ERC (ethical review committee) exemption, retrospective chart review was done. Children from 1 month to 16 years of age presenting to pediatric emergency room from January 2009 to December 2014 with laboratory abnormality of sodium that is less than 135 and more than 145 were included in the study. Their ages, clinical presentations and initial diagnosis were collected in the proforma.

Data was collected in a proforma by data collectors and analyzed using SPSS (statistical programme of social sciences). Percentages and frequency were used for descriptive statistics and mean and standard/median and IQR used for continuous variables.

Results

During the 5 years period, dysnatraemia was seen in 38 patients. Hyponatremia was observed in 22 and Hypernatraemia in 16 children's. The median age was 16.50 months (IQR 6.0-126.00). Minimum age was 1 and maximum was 192 months. Males were 24 (63.2%) and females were 14 (36.8%).

Out of 22 patient with hyponatraemia, 15 (68.2%) were males and 7 (31.8%) were females. Minimum sodium was 108 and maximum was 132 with median 119.50 (IQR110-124.75). Initial diagnosis and clinical presentations are showed in table 1. 18 patients got admitted in ward and 4 in special care unit. Median length of stay was 2 (IQR 1.00-3.50), no relation with sodium level was found.

Initial diagnosis	Frequency	Percent
Gastroenteritis	1	4.5
sepsis	20	91
Abdominal Pain	1	4.5
Symptoms	Frequency	Percentage
vomiting	11	50
lethargy	6	27.3
Irritability	1	4.5
Fever	6	27.3
Drowsiness	3	13.6
Seizure	2	9.1
Loose stools	3	13.6

Table 1: *Table showing initial diagnosis & symptoms in 22 patient with hyponatraemia.*

Out of 16 patients with hypernatraemia 9 were males and 7 were females. The minimum age was 3 months and maximum was 156 months with median age was 8.50 (IQR 6.00-13.75). Minimum sodium was 153 and maximum was 195 mg/dl with median of 165.50 (IQR 157.75-183.25). Initial diagnosis and clinical presentations are showed in Table 2. Three patients were admitted in ward and 13 in special care unit. Median (IQR) length of stay was 5 (3.25-9.75) days.

Initial Daignosis	Frequency	Percent
Meningitis	2	12.5
Encephalitis	3	18.8
Sespsis	5	31.2
Gastroenteritis	6	37.5
Symptoms	Frequency	Percentage
Vomiting	9	56.3
Lethargic	3	18.8
Fever	15	93.8
Loose stool	8	50
Seizure	1	6.3
Decrease intake	1	6.3

Table 2: *Table showing initial diagnosis and symptoms of hypernatraemia in 16 patients.*

Discussion

This study was carried out in the Department of Emergency Medicine at Aga Khan University Hospital, which is a pioneer in introducing emergency services in Pakistan. It has 10 designated beds in paediatric section where varied range of emergencies are dealt with. The Department has urgent diagnostic facilities like laboratory and radiology.

Dysnatraemia is a common problem in children and its presentation is similar to sepsis or meningitis. But diagnosis like sepsis, meningitis and encephalitis are considered in emergency department. Being part of LMIC, limited laboratory investigations are ordered and electrolytes are ignored in pediatric population in emergency department. This results in lack of improvement, worsening of patient condition, prolonged hospitalization or referral to other health care facility.

In our study, patient of hyponatraemia outnumbers hypernatraemia with a slight male predominance and affected population are the younger age group. Different studies around the world for hyponatremia also showed a male predominance [4,7]. Our study was conducted on pediatric patients which is similar to the study conducted in Sultan Qaboos University by Al-Lamki., *et al*. [4] but contradicted with the study conducted in Taiwan by Lee., *et al*. [7] on the adult population [4,7].

Vomiting was the predominant symptoms in our study as compared to nausea, vomiting, irritability and seizure in study conducted by Al-Lamki., *et al*. [4] A study, conducted by Lee., *et al*. on hyponatraemia different systems were involved including gastrointestinal (24%), urogenital (17%), respiratory (15%), haematopoietic (9%), cardiovascular (6%), endocrine (5.5%) and central nervous (3.4%) [7]. the similar study findings was reported by Al-Lamki., *et al*. with respect to low sodium level. The length of stay of patients with hyponatraemia was 2 days as compared to 6 days reported by Howanitz., *et al*. [2].

Fever was the predominant symptoms in our sudy whereas Finberg., *et al*. [8] showed diarrhea, as most common symptoms in patients with hypernatraemia. There were 16 patients in our study with hypernatraemia whereas in the study by Finberg., *et al*. 81 patients had hypernatremia [8]. In patients with hypernatraemia, mean length of stay was 5 days as compared to 6 days or longer in 85% of patients in study conducted by Howanitz., *et al*.

Conclusion

Dysnatraemia, owing to non specificity leads to initial misdiagnosis. Resultant outcomes determined the morbidity and mortality with different conditions in children. Laboratory investigation should include electrolytes especially sodium in children who failed to improve with management in the line of provisional diagnosis like sepsis or meningitis.

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