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SERUM SODIUM LEVEL IN CHILDREN WITH DENGUE INFECTION ADMITTED IN TERTIARY CARE CENTRE

Pediatrics

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ABSTRACT

Introduction: Dengue is the most common arboviral disease worldwide and is usually endemic, but several epidemics have been recorded. Dengue fever is associated with different clinical manifestations. **Objective:**The purpose of this study was to document the serum Sodium level in dengue infected children in a tertiary care center. **Material and methods:** This prospective observational study included 112 patients with uncomplicated dengue fever and dengue haemorrhagic fever admitted to the medical wards and casualty of a tertiary care teaching hospital. Serum sodium levels were estimated in all the study subjects **Results:** The serum Sodium level in dengue varies according to the different groups. In group A (dengue with no warning signs) the serum Sodium level was normal, whereas in case of group B (dengue with warning signs), there was significant hyponatremia. In group C, severe dengue the serum Sodium was normal. **Conclusion:** Mild hyponatremia is a common electrolyte disturbance in patients with dengue with warning signs. Hence, the lower the serum Sodium levels the higher is the incidence of complications associated with dengue fever.

KEYWORDS

hyponatraemia, dengue fever,

INTRODUCTION:

Dengue fever is a viral illness caused by one of the four of Dengue viruses belonging to the flaiviviridae family. It has four serotypes DENV 1, DENV 2, DENV 3 and DENV 4. According to World Health Organization (WHO) more than 2.5 billion people are at risk of Dengue infection. Dengue has been identified as a disease of the future owing to trends toward increased urbanization, scarce water supplies and possibly environmental change(1). Dengue is the most common arboviral disease worldwide and is usually endemic, but several epidemics have been recorded (2). Dengue fever is associated with electrolyte disturbances. Hyponatemia are the commonest electrolyte disturbances. Sodium is an essential nutrient in humans; regulate blood volume, blood pressure, osmotic equilibrium and pH. Hyponatremia is defined as a serum Sodium level <130 mEq/L. Hyponatremia is frequent in DHF, especially in shock patients (3). The reason for hyponatremia in classic dengue fever patients was uncertain. However, it might be the consequence of salt depletion, excess water from increased metabolism, decreased renal excretion, transient inappropriate antidiuretic hormone or the influx of Sodium in the cells as a result of dysfunction of Sodium potassium pump(4).

MATERIALAND METHODS

This was a cross sectional study. The study was done in a Dept of Paediatrics, Jawaharlal Nehru Medical College and Hospital Bhagalpur, Bihar over a period of 1 year. The study was approved by the hospital ethics committes. Children between 0-15 years admitted with the clinical diagnosis of dengue infection on the basis of history of fever and constitutional symptoms and found positive to any one of Dengue NS I antigen and anti-dengue IgM antibodies (card test) or enzyme-linked immunosorbent assay (ELISA) were included in the present study. Dengue specific IgM antibody was detected using Dengue IgM capture ELISA. Children with dengue card test positive for IgG, Children with dengue and with other concurrent infections like leptospirosis etc, incomplete records were excluded from the study. Severity of dengue was graded as per WHO criteria. Based on the WHO case definition, cases were classified as dengue fever without warning signs, dengue fever with warning signs and severe dengue.

Cases who presented with or developed abdominal pain or tenderness or had vomiting or any bleeding manifestations or edema were taken as with warning signs and those with shock, plasma leak or any organ involvement were classified as severe dengue. We included 112 patients diagnosed of dengue fever from June 2013 to May 2014 in the study. The demographic details and the clinical details at the time of admission were noted and the relevant investigation was taken. Serum Sodium level was noted. Normal level of serum Sodium 135-145 mEq/L. Mild hyponatremia was taken as serum Sodium between 130-134.9 mEq/L. Moderate hyponatremia being 125-129.9 mEq/L and severe < 125 mEq/L. Hypernatremia was considered when the serum Sodium was >145 mEq/L. Hyponatremia is defined as a serum Sodium < 135 mEq/L. Results were analysed statistically using SPSS (Statistical package for social sciences) software version 24.0. p Value was calculated. A p -Value < 0.05 was considered statistically significant. Results were analysed statistically with chi square test done by using SPSS.

RESULTS

Table 1: Demographic characteristics.

Charectures	No.of patients	Percentage
Age in year		
0-5	20	17.86
5-10	42	37.50
10-15	50	44.64
Sex		
Male	64	57.14
Female	48	42.86
Epidemiological feature		
Urban	48	42.86
Rural	64	57.14

Table 2: Symptoms and number of patients.

Symptoms	No. of patients (n)	Percentage
Fever	112	100
Headache	58	51.78
Arthralgia/Myalgia	30	26.78
Vomitting	44	39.28
Abdominal Pain	26	23.21
Bleeding	3	2.68
Altered sensorium	2	1.79
Seizure	2	1.79
Rash	12	10.71

The demographic details are depicted in Table 1; different clinical features of these patients are shown in Table 2. 57.14% of the patients were male. Most patients were from rural area. Fever was present in all 112 patients (100%), next common symptom was headache (51.78%) followed by vomiting (39.28%) and myalgia (26.78%). Bleeding from different sites of the body was evident in 3 patients (2.68%). Among these, two patients had gum bleeding and other one had gastrointestinal bleeding in the form of hematemesis and both of them had expired. 12 patients (10%) had rash, which was erythematous maculopapular type.

Table 3: Type of dengue and number of patients.

Type of dengue	No of patients (n)	Percentage
Group A	76	67.86
Group B	31	27.68
Group C	5	4.46

Most of the patients admitted were in group A (67.86%) followed by group B (27.68%) and only 5 patients (4.46%) were under group C as shown in Table 3.

Table 4: Sodium levels.

Sodium Level	Number	Percentage
Normal (135-145)	67	59.82
Mild hyponatremia (130-134.9)	4	3.57
Moderate hyponatremia (125-129.9	2	1.78
Severe hyponatremia (<125	0	0
Not done	39	34.83

Table 5: Comparison of sodium level in different groups of dengue.

Sodium level	Group A	Group B	Group C
Normal	43	23	5
Mild hyponatremia	2	2	0
Moderate hyponatremia	1	1	0
Severe hyponatremia	0	0	0
Not done	30	5	0

Out of the total 112 patients, serum Sodium level was not done for 34.83% (n = 39) of the study population and 59.82% had normal levels of Sodium while 3.57% had Mild hyponatremia and 1.78% Modrate Hyponatremia. None of them had hypernatremia as shown in Table 4 and Table 5. Only 29.46% were treated with iv fluids as shown in Table 6.

Table 6: Comparison of sodium level with dengue.

Dengue	Received iv fluids (% of row total)	Not received iv fluids (% of row total)
Group A	2(2.63)	74(97.37)
Group B	26(83.87)	5(16.13)
Group C	5(100)	0
Total	33(29.46)	79(70.54)

One child had dengue encephalitis which recovered without any neurological deficits, and one had co infection with malaria.

Two children had generalized seizure of which one was diagnosed to have encephalitis and other had febrile seizure. Two children died due to severe dengue (shock with multi organ dysfunction).

Table 7: Comparison of sodium level with IV fluids.

Sodium	Received IVF	Not received IVF
Normal	28	39
Hyponatremia	2	4
Hypernatremia	0	0

Out of the total 29.46% of the sample population who received IV fluids, only two patient received iv fluids in the group A as in Table 7.

DISCUSSION

We noted that serum Sodium level was not done for 34.83% of the dengue infected children as per the physician's decision. All of them had come under dengue fever with no warning signs. We have also noted some neurological manifestations like convulsions during the dengue - one diagnosed to have encephalitis and other had febrile seizure, and both of them had normal levels of serum Sodium. The child who had dengue encephalitis, MRI showed brainstem hyper intense lesion had recovered without any neurological deficits with disappearance of intensities on follow up scans. Neurological involvement in dengue may occur because of neurotropism of the virus, immunologic mechanism, cerebral anoxia, intracranial haemorrhage, hyponatremia, cerebral oedema, fulminant hepatic failure with portosystemic encephalopathy, renal failure or release of toxic products. In a study by Kamath SR et al, neurological manifestations were noticed in 20% of the patients (5). We found them only in 0.76 % of our cases. Many studies revealed mild hyponatremia is common in dengue confirmed patients(3,4,6).This study shows that Serum Sodium was normal in dengue in group A, whereas hyponatremia was common in dengue with warning signs which is similar to the study by Varavithya et al, where hyponatremia was common among dengue patients(7). A study by Pancharoen et al, found that the hyponatremia in dengue patients can cause convulsions, especially in infants (8). In the present study we noted that in severe dengue (Group C) Sodium levels were normal.

One of the limitations of the present study was, we had not taken the serum Sodium at different stages of dengue. Only two patients were under severe dengue. In previous studies, the alteration in serum Sodium levels in dengue was not influenced by the sex of the child and also the incidence of dengue associated complications.

Future studies should include serum Sodium level in different stages of dengue - febrile, critical and recovery stages. Careful monitoring of electrolytes, acid-base incidence of dengue associated complications. Future studies should include serum Sodium level in different stages of dengue - febrile, critical and recovery stages. Careful monitoring of electrolytes, acid-base status and renal function are necessary.

CONCLUSION

Serum Sodium levels are normal in dengue with no warning signs. Whereas there is mild hyponatremia in children classified as dengue with warning signs. Hence careful monitoring of serum Sodium helps to determine the severity of dengue infection.

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