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Research Article

Electrolyte disturbance in Dengue infected patients in Salem,Tamilnadu.

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Abstract

The electrolyte concentration was estimated and analysed in serum of dengue infected patients and the values obtained from dengue (+Ve) were compared with other groups such as IgM (–Ve) denguesuspected, other febrile illness and healthy control. This study was performed by collecting samples from patients who attended the private hospitals with the symptoms of dengue.254 patient with dengue symptoms were enrolled for the study and out of which only 99 were confirmed for dengue with IgM Elisa (Panbio Australia) andthe remaining 155 negative patients were considered asIgM (–Ve) dengue suspected.The concentration of serum sodium, potassium, calcium and chloride was estimated by standard protocols. The study revealed mild hyponatremia in dengue confirmed patients and it was analysedthat mild hyponatremia is a common electrolyte disturbance and renal involvement is mild in patients with DF patients.

Key words: hyponatremia, dengue,electrolyte disturbance,renal involvement.

INTRODUCTION

Dengue infection is one of the most common public problem in Tropical and sub tropical countries. The world Health organization has reported that 2.5 billion people live in areas where dengue virus is transmitted (WHO 2009).The disease is caused by Flaviviridae. Dengue infection is characterized by increase in temperature, headache, nausea, vomiting, abdominal pain, arthralgia, and myalgia and also develops rashes at times[4]. Renal dysfunction and electrolyte disturbance has been reported in previous reports. Decrease in sodium is a common problem in serum of dengue infected patients [11, 7, 5]. Deposition of immune complex in glomerule may be the pathogenesis of glomerulonephritis [2]. Serum potassium level was also found to be less in previous studies made by Lumpaopong*et al.,* 2010 and they reported mild hypokalemia is common in dengue patients. In the present study serum sodium, potassium, calcium and chloride were estimated to find the abnormalities in dengue patients. Electrolyte abnormalities hyponatraemia and hyperkalaemia was reported in previous study[6]. Calcium level is above the normal in dengue patients [3]. In the present study acomparison was made between dengue confirmed patients, Clinically Suspected IgM negative patients and febrile illness other than Dengue with healthy control.

MATERIAL AND METHOD

The study was carried out by collecting samples from private hospitals in and around Salem.Serum samples were collected from the patients attending hospitals and diagnostic centres in and around Salem afterobtaining consent from the individuals. The study group included individuals from age group of 30 days to 55 years.

A total of 254 serum samples from patients having clinical symptoms like dengue,50 serum samples from febrile illness other than dengue infection and 50 serum samples from control were examined for virus specific IgM antibodies against dengue by isotypicIgM capture ELISA (Pan Bio, Australia).Out of 254 suspected samples, 39 were found to have IgM

antibodies against Dengue Virus and 61 % were IgM negative.

Serum samples were used for further estimation sodium, potassium, calcium and chloride.

Sodium and potassium was estimated by Flame photometry[10], chloridewas estimated by titrimetry method [10]and calcium by titration method [1].

P – Value (ANOVA) was calculated by making use by usingGraph Pad Software, Inc, California

RESULT

A total number of 99 cases were confirmed to havedengue during the study period. The mean age of the study group was 20.37 in which 40.4% were adult and 59.6 % were children. 48.5 % of the patients were males 51.5 % were females.Comparison of parameters obtained from dengue positive, dengue negative, other febrile illness and healthy control is given in Table 1. Comparisonwas also done among the study groups and the result is given in Table 2. Similarly comparison of the parameters within all the age groups (Table 3) were done in all the study groups and analysis showed that there is no significant difference in the level of the parameters within different age group which gave a clear idea that the alteration in the level of the electrolyte and the mineral in viral infection and other febrile illness is not influenced by age. The analysis of values obtained was done among children and adult and also among male and female or gender (Table 4). Percentage of children and adults with altered mineral level in dengue confirmed patients is given in Table 5.

DISCUSSION

Hyponatremia (serum sodium level <130meq/L) is commonly found in dengue patients [11,9]. It may cause convulsions, especially in infants [8].Hence, in the present study the mean sodium level of the study population was measured. The mean sodium level of dengue confirmed patients in the present study was found to be 129.38meq/l. Similarly, Mekmullica*et al.,* (2005) found 132.

7 meq/l of sodium in dengue patients in Thailand. Lumpaopong*et al.,* (2010) also found that the serum sodium level in dengue patients in Thailand was 133meq/L.

There was a significant decrease in the mean value of sodium in dengue confirmed patients when compared either to the control group or to the patients with OFI. Similarly, Mekmullica*et al.,* (2005)also observed that the mean serum sodium levels were significantly lower among the dengue patients when compared to the non dengue patients.

The prevalence of dengue patients with hyponatremia was 58 % in the present study. This value was much higher than the value (18.4 %) obtained by previous researcher [7]but almost similar results was obtained by other researcher[5]who found that it was 61 %. In the present study, the prevalence of hyponatremia was 5 times higher in dengue patients than in OFI patients (58 % Vs 12 %) Similarly, previous study [7]reported that it was 9.7 times more common in dengue patients than in non dengue patients.

The reason for hyponatermia 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 into the cells as a result of dysfunction of sodium potassium pump.

In general, dengue infection leads to mild hypokalemia due to poor intake and an increase in renal excretion due to activation of rennin - angitension and aldosterone system secondary to volume depletion. Mild hypokalemia (serum potassium less than 3.5meq/L) in DF patient was reported by previous researcher[5]. However, in the present study hypokalemia was not observed. Mean value of potassium in dengue confirmed patients were 5.4 meq/L. The reason for the significant increase in potassium level in dengue patients was not known.In a previous study [12] it wasreported that an elevation of serum potassium level in only one patient out of 26 patients studied in Srilanka The present study confirms only the hyponatremia in dengue confirmed patients but not hypokalemia. The study also reported a significant increase in chloride level and a significant decrease in calcium level in dengue confirmed patients as compared to OFI patients or control groups.

In conclusion, mild hyponatremia is a common electrolyte disturbance and renal involvement is mild in patients with DF patients. Careful monitoring of electrolytes, acid-base status, and renal function are necessary for the early diagnosis of dengue infection.

Table 1
Comparison of values in different study group

Sl No	Parameters	Control	Confirmed Dengue	Clinically Suspected IgM negative	Febrile illness other than Dengue	P-Value
1	Sodium	137±4.677	129.38±18.702	136.36±5.22	138.9±4.022	< 0.0001***
2	Potassium	4.126±0.6546	5.4636±1.948	4.255±0.497	4.196±0.4629	< 0.0001***
3	Chloride	103.44±5.51	115±24	98.8±11	101.38±8	< 0.0001***
4	calcium	9.112±0.802	7.908±1.848	9.584±5.037	11.098±11.504	0.0082**

ns - Not significant, *-Significant, ** -highly significant , *** -Extremely Significant

Table 2
Analysis of mean value of minerals among the study group

Sl No	Parameters	Sodium	Potassium	Chloride	Calcium
1	Control Vs Confirmed	< 0.001***	< 0.001***	< 0.001***	> 0.05(ns)
2	Control Vs Laboratory negative dengue	> 0.05(ns)	> 0.05(ns)	> 0.05(ns)	> 0.05(ns)
3	Control Vs OFI	> 0.05(ns)	> 0.05(ns)	> 0.05(ns)	> 0.05(ns)
4	Confirmed Vs Laboratory negative dengue	< 0.001***	< 0.001***	< 0.001***	> 0.05(ns)
5	Confirmed Vs OFI	< 0.001***	< 0.001***	< 0.001***	< 0.01**
6	Laboratory negative dengue VsOFI	> 0.05(ns)	> 0.05(ns)	> 0.05(ns)	> 0.05(ns)

Table 3
Comparision of values of all age group in dengue confirmed group

Sl No	Parameters	0-10yrs (Mean)	11-20yrs (Mean)	21-30yrs (Mean)	31-40yrs (Mean)	41 and above (Mean)	P-Value
1	Sodium	138.6±21.936	127.12±19.83	137.08±24.72	143.78±24.12	133.09±22.14	0.2014*ns*
2	Potassium	5.512±1.693	5.864±1.856	5.8166±2.02	4.71±2.145	5.49±2.23	0.4473 *ns*
3	Chloride	119±23.056	109.08±23.888	116±28.82	112.57±22.73	122.545±23.74	0.5184 *ns*
4	calcium	8.184±2.116	8.004±1.728	8.1125±2.220	7.4928±1.25	7.145±1.012	0.4853 *ns*

*** - extremely significant ,*ns*- not significant

Table 4
Mean level of minerals in dengue confirmed children and adults, males and females

Minerals	Mean Value of minerals					
	Children (N=40)	Adult (N= 59)	P-Value	Male (N=48)	Female (N= 51)	P-Value
Sodium (MEq/L)	127.06±11.20	128.50±10.6	0.4964 (*ns*)	128.48±12.32	129.06±9.50	2.447 (*ns*)
Potassium (MEq/L)	5.91±2.00	5.62±1.90	0.4659 (*ns*)	5.59±1.50	5.93±2.40	0.3939 (*ns*)
Chloride (MEq/L)	110.73±21.09	122.75±27.90	0.0165*	118.47±26.80	112.55±22.40	0.2338 (*ns*)
Calcium (mg/dl)	8.07±2.086	7.71±1.69	0.3502 (*ns*)	7.82±1.85	7.96±1.19	0.7161 (*ns*)

ns - Not significant, *-Significant

Table 5
Percentage of dengue confirmed children and adults, males and females with altered minerals

Minerals	Percentage of patients with altered minerals					
	Children (N=40)	Adult (N= 59)	P-Value	Male (N=48)	Female (N= 51)	P-Value
Sodium	90.0 (36)	37.3 (22)	<0.0001***	64.6 (31)	52.9 (26)	0.1135 (*ns*)
Potassium	40.0 (16)	49.2 (29)	0.2550 (*ns*)	56.3 (27)	60.8 (30)	0.561 (*ns*)
Chloride	42.5 (17)	28.8 (17)	0.0551 (*ns*)	25.0 (12)	43.4 (22)	0.0109*
Calcium	72.5 (29)	79.6 (45)	0.4079 (*ns*)	75.0 (36)	78.4 (40)	0.7390 (*ns*)

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