

Electrolyte Disturbance with Severity of Dengue Infected Patient. A Study in Jhalawar Medical College & SRG Hospital, Jhalawar, Rajasthan

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Abstract

Original Research Article

Background: Dengue is considered to be the most rapidly spreading mosquito borne viral disease in the world. The dengue viruses are members of the genus *Flavivirus* and family *Flaviviridae*. Electrolyte imbalance is commonly encountered in this disease. There had been only a few worldwide research studies investigated on electrolyte disturbances with severity of dengue infection. **Methods:** Cross sectional prospective study was carried out in medicine department of Jhalawar Medical College & SRG Hospital, Jhalawar, Rajasthan. All cases of dengue confirmed by detection of either NS1Ag or IgM/IgG by ELISA method during study period will be included in study. This study was conducted to find relation between electrolyte disturbances in patients with dengue fever. **Results:** Out of 90 patients, majority i.e. 48 (53.3%) patients in total had mild hyponatremia, 37 (41.1%) had normal and 3 (3.33%) and 2(2.22%) patients had moderate, severe hyponatremia respectively. The prevalence of dengue patients with hyponatremia was 58.9 % in the present study. Out of 90, 77 Dengue fever patients, 32(41.6%) had normal, 45(58.4%) had mild decrease in sodium level. Out of 90, 50 (55.6%) having normal potassium, 32(35.6%) were mild decrease in level, 4 cases (4.5%) were moderate and 1(1.1%) were severe and 3(3.3%) had Hyperkalaemia. **Conclusion:** This study provides an insight regarding Electrolyte Disturbance with Severity of Dengue Infected Patient. Considering the variations in serum electrolyte levels in patients of dengue and high incidence of dengue in India, it is necessary to have a degree of suspicion in patients of dengue about electrolyte disturbances and treat them accordingly

Keywords: Dengue fever, Electrolyte Disturbances, Hyponatremia, Hypokalaemia.

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INTRODUCTION

Dengue fever is a major international health concern that is prevalent in tropical and sub-tropical countries. According to the World Health Organization, more than 2.5 billion people live areas where dengue viruses can be transmitted (WHO, 2009). In the last 50 years, the incidence of dengue has increased 30-fold worldwide [5]. An estimated 50 million dengue infections occur worldwide annually. An estimated 500000 people with DHF require hospitalization each year. A very large proportion (approximately 90%) of them are children aged less than five years, and about 2.5% of those affected die. The frequent epidemics of dengue in India are due to multiple factors that include the ever-increasing population, increased urbanization, and ineffective vector control especially in the rainy season.

In a developing country like India, with an exploding population, an epidemic of dengue causes a severe manpower and resource crunch. The presence of NS1 antigen positivity, IgM positivity or IgG seroconversion by rapid tests in a clinical setting consistent with dengue fever, cases are treated as positive. Dengue infection is characterized by increase in temperature, abdominal pain, arthralgia, headache, nausea, vomiting and develops rashes at times. In recent years, it has changed its course of the presentation by a range of variety of manifestations and outcome from self-limiting to severe illness and fatal outcomes with increasing frequency of outbreaks. It is high time to determine the trend of electrolyte disturbances with severity of dengue infection in general population to improve outcome and better management in different settings. Therefore, this study aimed to assess the frequency, extent of electrolyte disturbances in dengue

infected patients and to find relation of electrolyte disturbances with severity of dengue infection.

MATERIALS AND METHODS

This was a Cross sectional prospective study, which was carried out on 90 patients, diagnosed to be suffering from Dengue fever. The main aim of this study is to check the frequency, extent of electrolyte disturbances in dengue infected patients and to find out the relationship of electrolyte disturbances with severity of dengue infection to the inpatient ward at Jhalawar Medical College and SRG Hospital, Jhalawar, Rajasthan. This study was conducted over period of ten months between January to November 2020. Exclusion Criteria Patients of all gender aged <18years, Patients with dual infection (like Dengue and malaria, Dengue and typhoid fever, Dengue and leptospirosis etc) and patients with pre-existing renal and hepatic dysfunction and inclusion Criteria Patients with WHO Clinical Criteria of Dengue fever (like An acute febrile illness of 2-7 days duration with two or more of the following manifestations: Headache, Retro-orbital pain, Myalgia, Arthralgia, Rash, Haemorrhagic manifestations, Dengue Haemorrhagic Fever(DHF). This study comprised of 62 males and 28 females with a male to female ratio 2:1. In the study, most of the patients recruited were young adults with gender equality. There were 77 patients with Dengue fever, 11 patients were Dengue Haemorrhagic fever and 2 with Dengue shock syndrome. All patients who meet the inclusion criteria went through clinical examination and investigations after informed consent was taken. The study was ethically approved by the institutional committee. The data collection included the patient's demographic details, clinical history, and blood investigations (hemoglobin, white blood cell count, platelet count and hematocrit) and serum level of

electrolytes (sodium, potassium, calcium, magnesium and) was also observed. Hyponatremia was defined as serum sodium levels less than 135mEq/L; and hyponatremia was graded as Mild: between 130-134mEq/L; Moderate: between 125-129; mEq/L; Severe hyponatremia: less than 125 mEq/L while hypernatremia was classified as >145 mEq/L. Similarly, hypokalemia was defined as serum potassium levels less than 3.5 mEq/L; and graded as Mild hypokalemia: 3.1 to 3.4mEq/L; Moderate Hypokalemia: 2.50 to 3.0 mEq/L and Severe hypokalemia: less than 2.50 mEq/L. While, hyperkalemia reported as serum potassium level more than 5.0 mEq/L. Normal range of chloride was 96-105 mEq/L. Hypocalcemia was defined as 10.5 mEq/L, hypomagnesemia as 2.5 mg/dL.

Statistical Analysis

Data was analysed by using SPSS 21.0 (trial version) software and Chi-square Pearson's correlation. Results on continuous measurements are presented on Mean SD (Min-Max) and results on categorical measurements are presented in Number (%) and other appropriate statistical test like ANOVA Test.

RESULTS

In the present study majority of the patients 46/90 (51.1%) were among the age group between 21-30years of age followed by 15/90(16.7%) in the age group 18-20 years and 14/90(15.6%) in age group 31-40years and out of which 62 (68.9%) were males while 28(31.11%) were female patients. In the present study patients were distributed according to their clinical presentation. Fever was found to be the most common clinical presentation in 87% patients (96.7%) followed by myalgia 71(78.9%), headache in 56 patients (62.2%) and skin rash in 33 (33.3%) dengue patients.

Table 1: Distribution of Cases with Severity of Disease

	Number of Patients	Percentage
Dengue Fever(DF)	77	85.55
Dengue Hemorrhagic Fever(DHF)	11	12.23
Dengue Shock Syndrome(DSS)	2	2.22
Total	90	100

Table 2: Distribution of sodium in Dengue Patients

Serum sodium level	Number of cases
Normal	37
Mild hyponatremia	48
Moderate hyponatremia	3
Severe hyponatremia	2
Mean+ _SD	134.9+ _4.99

Patients were classified as Dengue Fever, Dengue Haemorrhagic Fever, Dengue Shock Syndrome according to WHO criteria. In this study, 77 patients suffered from Dengue Fever. 11 patients suffered from Dengue Haemorrhagic Fever and 2 patients suffered from Dengue Shock Syndrome. RR Rajalekshmy *et al.*, [6] found similar findings. 84 patients out of 90 patients

were found Dengue NS1 Antigen positive. The 6 patients who did not have NS1 positivity have probably presented in hospital after 5 days of onset of fever, thereby concluded the fact that they are IgM positive and NS1 does not become positive after 5th day.

Fever was found to be the most common clinical presentation in 87% patients (96.7%) followed by myalgia 71 (78.9%), headache in 56 patients (62.2%) and skin rash in 33 (33.3%) dengue patients.

Above table reveals that Out of 90 patients, majority i.e.48 (53.3%) patients in total had mild hyponatremia, 37(41.1%) had normal and 3 (3.33%) and 2(2.22%) patients had moderate, severe hyponatremia respectively. The mean+SD of sodium is 134.9+_4.99.

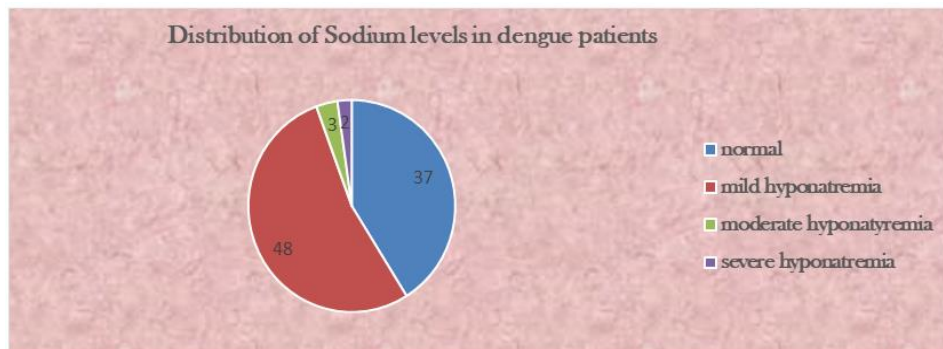


Figure 1: Distribution of sodium levels in dengue

Table 3: Association of Sodium with Severity of Dengue

Level of sodium	DF	DHF	DSS	Total
Normal	32	5	0	37
Mild hyponatremia	45	3	0	48
Moderate hyponatremia	0	2	1	3
Severe	0	1	1	2
Total	77	11	2	90
Mean+_SD	135.28+_4.99	135.18+_9.76	122+_5.65	134.9+_6.02

The mean +_SD value of sodium level in Dengue fever was 135.28+_4.99,135.18+_9.76 in Dengue haemorrhagic fever and 122+_5.65 in Dengue

shock Syndrome. The mean level of sodium was found to be decreasing with the severity of Dengue.

Table 4: Level of Potassium in Dengue Patients

Serum levels of potassium	DF	DHF	DSS	Total
normal	44	6	0	50(55.6%)
Mildhypokalemic	29	3	0	32(35.6%)
moderatehypokalemic	3	1	0	4(4.5%)
severehypokalemic	0	0	1	1(1.1%)
hyperkalemia	1	1	1	3(3.3%)
Mean+_SD	3.7+_0.671	4.1+_0.79	4+_2.54	3.7+_0.738

In above table 50 (55.6%) having normal potassium, 32(35.6%) were mild hypokalemic, 4 cases

(4.5%) were moderate and 1(1.1%) were severe and 3(3.3%) having hyperkalemia.

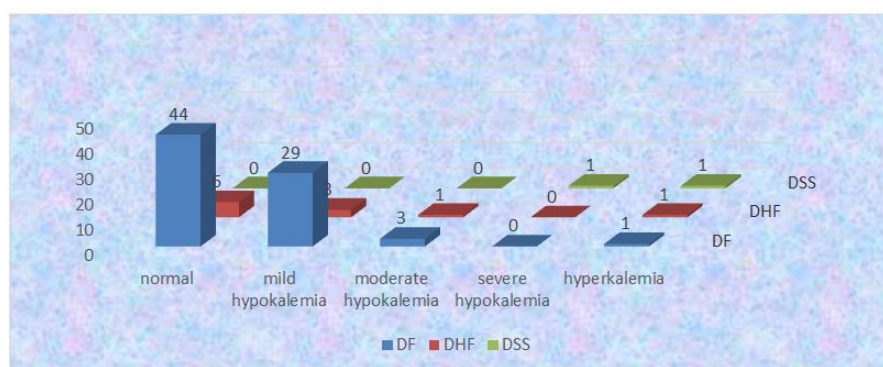


Figure 2: Distribution of Potassium in Dengue

Table 5: Distribution of Potassium according to Dengue Case

		Dengue			Total	Chi sq	P value
		DF	DHF	DSS			
Potassium	Normal	44	6	0	50	61.96	<0.0001*
		57.10%	54.50%	0.00%	55.60%		
	Mild	29	3	0	32		
		37.70%	27.30%	0.00%	35.60%		
	Moderate	3	1	0	4		
		3.90%	9.10%	0.00%	4.40%		
Severe	0	0	1	1			
	0.00%	0.00%	50.00%	1.10%			
Hyper kalemia	1	1	1	3			
	1.30%	9.10%	50.00%	3.30%			
Total		77	11	2	90		
		100.00%	100.00%	100.00%	100.00%		

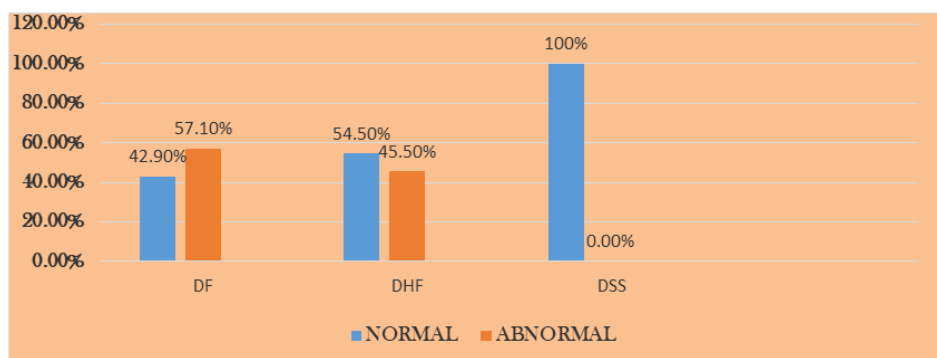
Above mentioned table reveals that there is a Significant association was found between severity of dengue infection and potassium level. Analysis was

done using Chisq and p value found less than 0.0001 which was highly significant. Hence, as severity increases patient having low potassium level.

Table 6: Distribution of chloride in dengue case

Chloride level	DF	DHF	DSS	Total
Normal	33(42.9%)	6(54.5%)	2(100%)	41(45.6%)
Abnormal	44(57.1%)	5(45.5%)	0(0%)	49(54.4%)

Table reveals that Out of 90 Patients, 49(54.4%) patients having abnormal chloride level, 41(45.6%) patients with normal chloride level.

**Figure 3: Chloride level in dengue patients****Table 7: Association of Chloride with Severity of Dengue**

		Dengue			Total	Chi sq	P value
		DF	DHF	DSS			
Chloride	Normal	33	6	2	41	2.975	0.226
		42.90%	54.50%	100.00%	45.60%		
Abnormal	44	5	0	49			
	57.10%	45.50%	0.00%	54.40%			
Total		77	11	2	90		
		100.00%	100.00%	100.00%	100.00%		

Above mentioned table reveals that there is no significant association was observed with chloride level in dengue patients. Analysis was done with Chis q and P value is 0.226. So, abnormality of chloride level was not related to severity of dengue patients.

CONCLUSION

The commonest Electrolyte imbalance found in form of hyponatremia, hypokalemia, hyperkalemia, abnormal chloride level. Mild Hyponatremia was most common finding followed by mild hypokalaemia and severe hypokalaemia was rare. Mild hyponatremia found in 48% cases while mild hypokalaemia in 32% of

cases. Sodium level derangement higher than potassium. *There is no relation found between abnormal chloride level and severity of dengue infection.* Considering the variations in serum electrolyte levels in patients of dengue and high incidence of dengue in India, it is necessary to have a degree of suspicion in patients of dengue about electrolyte disturbances and treat them accordingly

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