

Original Research Article

A comparative study of in clinico-pathological profile in dengue shock syndrome versus other types childrens at tertiary health care center

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ABSTRACT

Background: Dengue a mosquito borne arboviral disease is caused by one of the serotypes of dengue virus (DEN-1, DEN-2, Den-3, DEN-4) belonging to the family Flaviviridae. The objective of this study was to study clinico-pathological profile of Dengue shock syndrome versus Other types childrens at tertiary health care center.

Methods: This was Cross sectional observational study was conducted in a tertiary care hospital in the Department of Pediatrics after obtaining approval from the institutional Ethical Committee. The study was carried out over a period of one & half years from January 2015 to June 2016 Statistical analysis done by Chi-square, ANOVA, Paired t test SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyze data.

Results: Mean age of patients were 8.08 ± 2.72 years, majority of cases were females (51.9%) and 48.1% were males, the clinical features like hepatomegaly, Ascites Pleural Effusion significantly present in DSS ($P < 0.001$). In the study, there was no significant difference in symptoms and severity of dengue fever except for convulsion Thrombocytopenia (platelet < 1 lakh/cmm) was observed in 74% of cases, leucopenia (total leukocyte count < 4000 /cmm) was observed in 56% of cases, haemocrit more than 40 was observed in 21.27% cases. Dengue shock syndrome had acute kidney injury, CCF and encephalopathy. This observation of complications between dengue severity was statistically significant. There was significant difference in haematocrit values between three diagnoses of dengue fever from day 1 till day 4. Initially higher haematocrit was observed in Dengue shock syndrome, later goes on decreasing.

Conclusions: It can be concluded from our study that significantly dengue shock syndrome had acute kidney injury, CCF and encephalopathy. There was significant difference in hematocrit values between three diagnoses of dengue fever from day 1 till day 4. Initially higher hematocrit was observed in dengue shock syndrome.

Keywords: Complication of dengue fever, Dengue hemorrhagic fever (DHF), Dengue shock syndrome (DSS), Laboratory profile of dengue fever

INTRODUCTION

Dengue a mosquito borne arboviral disease is caused by one of the serotypes of dengue virus (DEN-1, DEN-2, Den-3, DEN-4) belonging to the family Flaviviridae. These serotypes are antigenically distinct but closely related to each other. Globally 50 million dengue infections are reported annually with annual incidence of 7.5 to 32.5 million cases in India.¹ The first case of

dengue fever was reported from Vellore and dengue haemorrhagic fever from Kolkata.² The disease is endemic in more than 100 tropical and sub-tropical countries and 2.5 billion people live in these countries which is of major international public health concern. The case fatality in dengue fever is roughly around 5%.³ Mortality is more reported in cases of dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). Mortality can be reduced to 1% in cases with

early intervention. Dengue fever presents as a common fever with dangerous complications. Infection with dengue virus (DENV) provides lifelong immunity to the serotype affected providing partial and transient protection against re infection with the other three serotypes. Studies have documented that sequential infection with different DENV serotypes increases the risk of DHF.⁴ The common clinical presentations in dengue fever are High grade fever, myalgia, headache, and vomiting, retro bulbar pain which are similar to many viral illnesses. But these manifestations are variable from adults and children. Children in addition to normal signs and symptoms present with epistaxis, melena and hepatomegaly. More cases of DHF are reported from children than adults. Dengue remains as puzzling disease in many aspects such as virus - host relationship and clinical expression variability.⁵

METHODS

This cross sectional observational study was conducted in a tertiary care hospital in the Department of Pediatrics after obtaining approval from the Institutional Ethical Committee. The study was carried out over a period of one and half years from January 2015 to June 2016. All data is collected after admission to our institute. The clinically suspected children (below 12 years age) of dengue virus infection as per WHO guidelines 2009 admitted in a tertiary care hospital and serologically confirmed by dengue IgM positive test and those ready to give informed written consent were included into study while cases of fever which are proved dengue IgM Negative. As per Grades of DHF19: Grade I: Fever and haemorrhagic manifestation (positive tourniquet test) and evidence of plasma leakage, Grade II: As in Grade I plus spontaneous bleeding. Grade III: As in Grade I or II plus circulatory failure (weak pulse, narrow pulse pressure (≤ 20 mmHg), hypotension, restlessness). Grade IV: As in Grade III plus profound shock with undetectable BP and pulse Grade III and IV DSS. The statistical analysis done by Chi-square test, ANOVA (Analysis of Variance) Paired t test by Statistical software: MS Excel, SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyze data.

RESULTS

Mean age of patients were 8.08 ± 2.72 years. Majority of subjects were in the age group 6 to 10 years (55.8%), 25% were in the age group <5 years and 19.2% were in the age group >10 years.

Table 1: Age distribution among cases.

	Count	Percentage (%)
Age	< 5 years	13 25.0%
	6 to 10 years	29 55.8%
	> 10 years	10 19.2%
	Total	52 100.0%

Table 2: Gender distribution of cases.

	Count	Percentage (%)
Gender	Female	27 51.9%
	Male	25 48.1%
	Total	52 100.0%

Majority of cases were females (51.9%) and 48.1% were males with male to female sex ratio was 0.92.

Table 3: Dengue classification among cases.

	Count	Percentage (%)
Dengue classification among cases	Dengue fever without warning signs	27 51.9%
	Dengue fever with warning signs	21 40.4%
	Dengue shock syndrome	4 7.7%
	Total	52 100.0%

In the study 51.9% had only dengue fever without warning signs, 40.4% had dengue fever with warning signs and 7.7% had dengue shock syndrome.

Table 4: Association between dengue classification and clinical examination findings.

		Dengue classification						P value
		Dengue fever without warning signs (n=27)		Dengue fever with warning signs (n=21)		Dengue shock syndrome (n=4)		
		Count	Percentage (%)	Count	Percentage (%)	Count	Percentage (%)	
Hepatomegaly	Present	7	25.9%	16	76.2%	4	100.0%	$<0.001^*$
Splenomegaly	Present	0	0.0%	2	9.5%	0	0.0%	0.215
Ascites	Present	0	0.0%	16	76.2%	3	75.0%	$<0.001^*$
Pleural effusion	Present	0	0.0%	21	100%	4	100.0%	$<0.001^*$

Among cases with dengue fever without warning signs 25.9% had hepatomegaly, no ascites and pleural effusion.

Among cases with dengue fever with warning signs 76.2% had hepatomegaly, 9.5% had splenomegaly, 76.2% had ascites and 100% had pleural effusion.

Among cases with dengue shock syndrome, 100% of them had Hepatomegaly, 75% had ascites and 100% had pleural effusion.

This observation in examination findings between severities of dengue fever was statistically significant.

Table 5: Association between dengue classification and symptoms at presentation.

		Dengue classification						P value
		Dengue fever without warning signs (n=27)		Dengue fever with warning signs (n=21)		Dengue shock syndrome (n=4)		
		Count	Percentage (%)	Count	Percentage (%)	Count	Percentage (%)	
Fever	Present	27	100.0%	21	100.0%	4	100.0%	-
Myalgia	Present	8	47.05%	5	23.80%	0	0.0%	0.436
Rash	Present	6	23.1%	5	25.0%	0	0.0%	0.554
Pain abdomen	Present	4	14.8%	8	38.1%	0	0.0%	0.086
Cough	Present	1	3.70%	4	19.04%	2	50.0%	0.025
Vomiting	Present	2	7.4%	3	14.3%	0	0.0%	0.575
Convulsion	Present	0	0.0%	3	14.3%	2	50.0%	0.004*
Loose stool	Present	1	3.7%	2	9.5%	0	0.0%	0.606
Head ache	Present	1	3.7%	1	4.8%	0	0.0%	0.900

Table 6: Association between dengue classification and clinical examination findings.

		Dengue classification						P value
		Dengue fever without warning signs (n=27)		Dengue fever with warning signs (n=21)		Dengue shock syndrome (n=4)		
		Count	Percentage (%)	Count	Percentage (%)	Count	Percentage (%)	
Hepatomegaly	Present	7	25.9%	16	76.2%	4	100.0%	<0.001*
Splenomegaly	Present	0	0.0%	2	9.5%	0	0.0%	0.215
Ascites	Present	0	0.0%	16	76.2%	3	75.0%	<0.001*
Pleural effusion	Present	0	0.0%	21	100%	4	100.0%	<0.001*

Table 7: Association between dengue classification and symptoms at presentation.

		Dengue classification						P value
		Dengue fever without warning signs (n=27)		Dengue fever with warning signs (n=21)		Dengue shock syndrome (n=4)		
		Count	Percentage (%)	Count	Percentage (%)	Count	Percentage (%)	
Fever	Present	27	100.0%	21	100.0%	4	100.0%	-
Myalgia	Present	8	47.05%	5	23.80%	0	0.0%	0.436
Rash	Present	6	23.1%	5	25.0%	0	0.0%	0.554
Pain abdomen	Present	4	14.8%	8	38.1%	0	0.0%	0.086
Cough	Present	1	3.70%	4	19.04%	2	50.0%	0.025
Vomiting	Present	2	7.4%	3	14.3%	0	0.0%	0.575
Convulsion	Present	0	0.0%	3	14.3%	2	50.0%	0.004*
Loose stool	Present	1	3.7%	2	9.5%	0	0.0%	0.606
Head ache	Present	1	3.7%	1	4.8%	0	0.0%	0.900

In the study, there was no significant difference in symptoms and severity of dengue fever except for convulsion, 50% of cases with dengue shock syndrome had convulsions, 14.3% of cases with dengue warning signs had convulsions.

Among cases with dengue fever without warning signs 25.9% had hepatomegaly, no ascites and pleural effusion.

Among cases with dengue fever with warning signs 76.2% had hepatomegaly, 9.5% had splenomegaly, 76.2% had ascites and 100% had pleural effusion.

Among cases with dengue shock syndrome, 100% of them had Hepatomegaly, 75% had ascites and 100% had pleural effusion.

This observation in examination findings between severities of dengue fever was statistically significant

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Table 8: Laboratory investigation.

		Frequency	Percentage (%)
Platelet count (n=50)	< 50,000	13	26
	50,001-1,00,000	24	48
	> 1,00,000	13	26
TLC count/ cmm (n=50)	< 4000	28	56
	4001-11,000	18	36
	> 11,000	4	8
Haematocrit (n=47)	< 30	4	8.51
	31-40	33	70.21
	> 40	10	21.27

Thrombocytopenia (platelet<1lakh/cmm) was observed in 74% of cases, leucopenia (total leukocyte count <4000/cmm) was observed in 56% of cases, haemocrit more than 40 was observed in 21.27% cases.

Table 9: Association between dengue classification and complications.

		Dengue classification						P value
		Dengue fever without warning signs (n=27)		Dengue fever with warning signs (n=21)		Dengue shock syndrome (n=4)		
		Count	Percentage (%)	Count	Percentage (%)	Count	Percentage (%)	
acute kidney injury	Absent	27	100.0%	21	100.0%	3	75.0%	< 0.001
	Present	0	0.0%	0	0.0%	1	25.0%	
congestive cardiac failure	Absent	27	100.0%	21	100.0%	3	75.0%	< 0.001
	Present	0	0.0%	0	0.0%	1	25.0%	
Encephalopathy	Absent	27	100.0%	21	100.0%	3	75.0%	< 0.001
	Present	0	0.0%	0	0.0%	1	25.0%	

Table 10: Comparison of haematocrit between three groups during follow-up.

	Dengue classification						P value
	Dengue fever without warning sign (n=27)		Dengue fever with warning signs (n=21)		Dengue shock syndrome (n=4)		
	Mean	SD	Mean	SD	Mean	SD	
Day 1	36.91	4.57	36.30	4.23	37.00	3.61	<0.001*
Day 2	34.00	3.90	34.31	7.20	34.33	5.03	<0.001*
Day 3	33.95	4.64	34.05	5.38	34.00	5.19	<0.001*
Day 4	33.84	4.52	33.84	6.16	32.33	4.61	0.0006*
Day 5	33.66	2.93	33.66	5.09	31.66	4.93	0.0047
Day 6	32.33	3.60	32.60	3.30	31.50	6.36	0.056
Day 7	32.00	.	33.50	0.78	31.33	1.155	0.064

Above mentioned complications were found in 1.9% of cases. None of the cases with dengue fever without warning signs and dengue fever with warning signals had

these complications, were as 25% of subjects with dengue shock syndrome had acute kidney injury, CCF and Encephalopathy. This observation of complications between dengue severity was statistically significant.

From the Table 10 and Figure 1 it can have observed that there was significant difference in haematocrit values between three diagnoses of dengue fever from day 1 till day 4. Initially higher haematocrit was observed in dengue shock syndrome, later goes on decreasing.

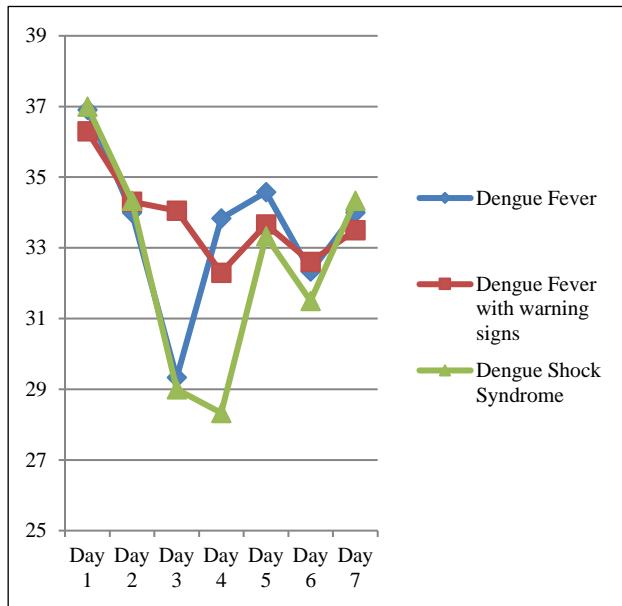


Figure 1: Line diagram showing comparison of haematocrit between three groups during follow-up.

DISCUSSION

Dengue is the most rapidly spreading mosquito-borne viral disease in the world. In the last 50 years, the incidence of the disease has increased by 30 folds with the increasing geographic expansion to new countries, and in the present decade, its incidence extends from urban to rural settings. Some 1.8 billion (more than 70%) of the population who are at risk of dengue worldwide live in the member states of the World Health Organization (WHO), South-east Asia region and Western Pacific region, which bear nearly 75% of the current global disease burden due to dengue.¹⁷ Recently, an increasing trend of outbreaks of dengue fever (DF) and its complicated forms have been reported in India. Dengue viral infections are known for presenting a diverse clinical spectrum, ranging from asymptomatic illness to fatal dengue shock syndrome (DSS).¹⁶

In our study, we have found that the mean age of the patients was 6.5±3.5 years with age range of 6 months to 15 years in Alam AS et al study.⁶ Malavige GN et al found mean age of the patients 7.9±2.9 years and their age range was from 1 month to 12 years⁸ while Ahmed et al, found mean age 9.0±2.8 years with an age range of 2.5-12 years.^{7,9} The majority patients affected were female, distribution among cases were females (51.9%) and 48.1% were males. Male to female sex ratio was 0.925 but in most other studies male preponderance was

found. Our study is comparable with Doke et al (1.1:1), Alam AS et al (1:1), Kamath et al (1:1).^{6,10,12}

In our study, most common examination finding is hepatomegaly 51.9%, 3.8% had splenomegaly, 36.5% had ascites and 50% had pleural effusion.

In study, by Alam AS et al hepatomegaly was observed in (31.5%), pleural effusion in (27.8%), ascites in (14.8%).⁶

In study done by Kamath et al. Ascites was detected clinically in (0.7%) patients and on ultrasound of abdomen in (2.5%) patients. Pleural effusion (clinically according to study done by Srinivasa et al. Hepatomegaly was observed in (33.5%), splenomegaly (2%), pleural effusion (46.5%), ascites (37%).

Prathyusha CV et al, observed hepatomegaly (33.75%) was the commonest clinical sign we detected followed by an evidence of increased capillary permeability in the form of ascites, pleural effusion and edema (25%), splenomegaly (5%).¹⁴

Acute kidney injury, congestive cardiac failure, encephalopathy were found in 1.9% of total cases. None of the subjects with dengue fever and dengue fever with warning signals had complications, whereas 25% of subjects with dengue shock syndrome had acute kidney injury, CCF and Encephalopathy. This observation of complications between dengue severity was statistically significant (p value 0.001).

Our study comparable with Kamath et al, found encephalopathy in (5.6%), Malavige et al, observed encephalopathy in 5.8%, myocarditis (manifested as tachycardia, triple rhythm, and heart failure) was seen in (2.9%).^{7,18}

According to study done by Prathyusha et al, DIC (7.5%), encephalopathy (2.5%), pancreatitis (1.25%) and ARDS (1.25%).¹⁴

In our study, the Mean haematocrit at day 1 was 36.62±4.31 and it reduced gradually to 33.80±5.03 at day 4, on day 6 and day 7 mean haematocrit was 32.00±3.57, 32.00±0.98, this significant decrease in haematocrit is a response fluid therapy.

In study done by Gomber et al, the mean haematocrit value of 202 dengue patients and of 283 healthy children was 38.34±6.02 and 32.03±2.98%, respectively.¹⁵

In this study haematocrit more than 40 was observed in 21%, 70% cases had between 31-40 and only 8.51% had less than 30 and comparable with study by Prathyusha et al who found haematocrit more than 40 in 41.25% cases, 53.75% had haematocrit between 30 to 40 only 5% of confirmed dengue cases have haematocrit less than.^{14,15}

CONCLUSION

It can be concluded from our study that significantly Dengue shock syndrome had acute kidney injury, CCF and encephalopathy. There was significant difference in hematocrit values between three diagnoses of dengue fever from day 1 till day 4. Initially higher hematocrit was observed in dengue shock syndrome.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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