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To Correlate Ultrasound Abdomen Findings in Assessing Severity and Outcome of Dengue Infection in Paediatrics Population

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Abstract: ***Background and Objective: Dengue infection, the most prevalent arthropod - borne viral illness in humans is caused by dengue virus which belongs to Flaviviridae family and is one of the most important tropical infectious diseases of the world. Several outbreaks of dengue infection have been reported from India. In the past 50 years, the prevalence of dengue fever has increased 30 - fold with increasing geographic expansion to new countries and, in the present decade, from urban to rural setting. Aim was Early prediction and anticipation of severe dengue infection and monitoring outcome at a tertiary care centre. Materials and method: The study was conducted in the Department of Pediatric, ACS medical college and hospital chennai and it's a observational study. Children with Dengue who were admitted in the Department of Paediatrics, satisfying the inclusion criteria were enrolled into the study and admitted after getting informed consent from the parents/guardians, between age of 1 month - 18 years. Results: Among the study population, the association between of warning signs on ultrasound was statistically significant with P value of <0.0000001. The area under ROC curve is 0.96. Conclusion: USG warning signs are better indicators of severity of Dengue.***

Keywords: Dengue Infection, Ultrasound Findings, Pediatric Dengue, Severity Prediction, Clinical Outcome

1. Introduction

Dengue infection, the most prevalent arthropod - borne viral illness in humans is caused by dengue virus which belongs to Flaviviridae family and is one of the most important tropical infectious diseases of the world. Several outbreaks of dengue infection have been reported from India. In the past 50 years, the prevalence of dengue fever has increased 30 - fold with increasing geographic expansion to new countries and, in the present decade, from urban to rural setting.

The 2009 World Health Organisation (WHO) criteria classify dengue according to levels of severity: dengue without warning signs; dengue with warning signs (abdominal pain, persistent vomiting, fluid accumulation, mucosal bleeding, lethargy, liver enlargement, increasing hematocrits with decreasing platelets); and severe dengue (dengue with severe plasma leakage, severe bleeding, or organ failure).

An estimated 50 - 100 million dengue infections occur annually and approximately 2.5 billion people live in dengue endemic countries. Case fatality rates vary from 1% to 5%, but can be < 1% with appropriate treatment [1]. In its most severe form, it manifests itself clinically as dengue with warning signs and severe dengue. Unusual clinical manifestations of dengue fever have become more common in the last few years. Although the liver is not a major target organ, hepatic dysfunction is a well recognised feature, often characterised by acute hepatitis, with pain in the right hypochondriac, hepatomegaly, jaundice and raised amino transferase levels [2 - 11]. The degree of liver dysfunction varies from mild injury with elevation of transaminase activity to severe injury with liver cell failure. The severity of liver dysfunction varies according to the type of clinical presentation of dengue fever, and is more common in children with severe dengue fever. Liver dysfunction as a result of dengue infection can be a direct viral effect on liver cells or an adverse consequence of dyes regulated host immune response against the virus.

Abdominal ultrasound can detect gall bladder thickening, ascites in addition to hepatomegaly, pleural effusion which usually occurs in severe dengue. There are very few studies done in children to predict the severity and outcome of dengue infection. Hence the present study is intended to predict the severity and outcome of dengue infection based on abdominal ultrasound.

2. Methodology

Children with dengue satisfying the inclusion criteria were enrolled into the study and admitted after getting informed consent from the parents/guardians between Age 1 month – 18 years and Children fitting into the diagnostic criteria of dengue – NS1 positive or IgM positive.

- Diagnostic criteria for Dengue:
- For Dengue Fever: Patients confirmed by NS1 for dengue infection and presenting with high grade fever, headache, skin rash (dengue triad), exhaustion, severe muscle, joint pain.
- For Dengue Hemorrhagic Fever: Patients confirmed by NS1 and ultrasound (in case of capillary leakage) for dengue infection and presenting with hemorrhagic rash or hemorrhagic manifestations in addition to high grade fever, headaches, skin rash (dengue triad), exhaustion, severe muscle and joint pain.
- For Dengue Shock Syndrome: Patients confirmed by NS1 and ultrasound (in case of capillary leakage) for

dengue infection and presenting with hypotension, altered mental status and delayed capillary filling.

The following investigations were done at admission (baseline):

- Complete Blood Picture
- Liver Function Tests
- Chest X ray
- Ultrasound

- The treatment and investigations were documented.
- All the children were followed till they were discharged

Data Entry and Statistical Analysis

The data was entered in Microsoft Excel 2010 version. Data was analyzed using Microsoft Excel 2010 and Epi Info 7.2.0. Descriptive and inferential statistical analysis were used in the present study. Results on continuous measurements were presented on Mean±SD (Min - Max) and results on categorical measurements were presented in Number (%).

Significance was assessed at 5% level of significance. Student t - test is used to compare inter - group variation for continuous variables.

3. Results

The results of the study are as follows:

Table 1 showing age wise distribution among dengue cases:

Age	Frequency	Percentage
Less than a year	2	3.08
Up to 5 years	23	35.38
6~10 years	19	29.23
11 - 15 years	21	32.3
Total	65	100

Among the study population, majority (35.38%) of them were between 1 to 5 years, followed by 11 - 15 years (32.30%), 6 - 10 years (29.23%).3% of the study population were of age less than a year

Table showing the distribution of cases according to other ultrasonography findings:

USG finding	Frequency	Percentage
Normal	26	40
Ascites	24	36.9
Pleural Effusion	10	15.38
GB edema	20	30.76
Hypoplastic left kidney	1	1.53

Among the study population, USG was normal in 40%. Ascites was present in 36.9%, Pleural effusion was present in 15.38%, Gall bladder edema was present in 30.76%. Hypoplastic left kidney was present in 1.53%

Table showing the association of USG findings with severity:

Severity of dengue	USG findings	USG findings	Total	P value
	Normal	Abnormal (warning signs present)		Chi square: 57.13 Dof: 2 P value <0.0000001
Mild	24	0	24	
Moderate	2	34	36	
Severe	0	5	5	
Total	26	39	65	

Among the study population, the association between of warning signs on ultrasound was statistically significant with P value of <0.0000001. The area under ROC curve is 0.96

4. Discussion

Author	Findings
Present study	The association between the severity of dengue and presence of warning signs on ultrasound was statistically significant with P value of <0.0000001.
Chacko and Subramaniyan (12)	The ultrasound features are associated with severity of dengue with P value of 0.0002
Santosh VR (13)	Sonographic features of thickened GB wall, pleural effusion (bilateral or right side), ascites, hepatomegaly and splenomegaly should strongly favor the diagnosis of dengue fever in patients presenting with fever and associated symptoms, particularly during an epidemic. The degree of thrombocytopenia showed a significant direct relationship to abnormal ultrasound features.

The present study was conducted in the department of paediatrics ACS Medical College, Chennai. It is the largest tertiary care centre in the state of Tamilnadu, situated in the heart of chennai. The objectives of the study were to To correlate ultrasound abdomen findings in assessing severity and outcome of dengue infection. Association between severity of dengue and USG findings, In the present study, among the study population, the association between the severity of dengue and presence of warning signs on ultrasound was statistically significant with P value of <0.0000001. The area under ROC curve is 0.96 again statistically significant.

5. Conclusion

Ultrasound findings are critical, in management of dengue patients and it's a good investigation in addition to clinical finding.

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Conflict of interest

The authors declare There is no conflict of interest in publication of this article

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