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ROLE OF ULTRASONOGRAPHY- CHEST AND ABDOMEN IN THE EARLY ASSESSMENT OF SEVERITY OF DENGUE FEVER

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Introduction : Dengue fever, caused by the dengue virus, stands as the most prevalent arboviral disease globally, with its incidence surging significantly in the past five decades due to factors such as rapid urbanization, evolving lifestyles, and insufficient water management. Particularly in tropical and subtropical regions like India, dengue fever has become endemic, posing a considerable public health challenge.

Distinguishing dengue fever from other common causes of acute febrile illness, such as malaria, typhoid, and enteric fever, is crucial for timely and accurate diagnosis. While serological tests are pivotal in diagnosing dengue, they often entail delays. Recent literature highlights the utility of early ultrasonography in aiding diagnosis, with reported findings including gallbladder wall thickening, pleural effusion, ascites, and organomegaly.

To further explore the diagnostic potential of ultrasonography in dengue fever, this study aims to investigate its correlation with clinical and biochemical parameters. Informed consent will be obtained from all participants, and relevant data will be collected using a standardized proforma. Adult patients presenting with fever and positive IgM dengue serology will undergo ultrasound examination of the abdomen and chest. Platelet and hematocrit values, as well as blood pressure, will be closely monitored throughout the study.

Thrombocytopenia, defined as a platelet count below 100,000/mm³, significant rise in packed cell volume (PCV) by 20%, and a decrease in pulse pressure below 20 mmHg will be considered indicative parameters. Additionally, bleeding manifestations reported in the patient's history will be taken into account. The study aims to analyze the correlation between these clinical parameters and ultrasonographic findings, thereby enhancing our understanding of the diagnostic utility of ultrasonography in dengue fever. Hemorrhage is the outcome of the blood vessels becoming brittle due to the reduced platelet function[1-4] .

Aim: To study the usefulness of ultrasonography in the early assessment of severity of Dengue Fever.

Objectives:

1. To find out the USG findings in serologically proven Dengue positive cases

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2. To find out clinical and laboratory parameters like fall in pulse pressure, any bleeding manifestation in history, rised pcv and thrombocytopenia,
3. Comparing the USG findings with clinical and laboratory parameters.

Study design: Cross-sectional study.

Study setting: All patients were enrolled from the Department of General Medicine, Government General Hospital, KADAPA

Sample size: 100
Study period: JUNE 2022 to NOVEMBER 2023
Inclusion criteria:

- IgM dengue positive
- History of fever
- Age > 13 years

Exclusion criteria:

- Chronic liver disease
- Cholilithiasis
- Chronic renal failure
- Congestive cardiac failure
- ITP

PROCEDURE:
In the patients who fulfilled the inclusion criteria , detailed history and clinical examination was done. They are subjected to biochemical investigations:
1. Complete blood picture with peripheral smear and haematocrit.
2. Liver function tests.
3. Blood sugar by glucose oxidase method.
4. Blood urea.
5. Serum creatinine.
6. Serum sodium by ion specific electrode method
7. Ultrasonography of chest and abdomen.
8. Dengue Serology [5,6]
Ethical clearance: Before collection of data, all subjects were briefed about the purpose of the study and written informed consent was obtained. All investigations were done free of cost and no financial burden imposed on the patient. Ethical clearance was obtained from the institutional ethics committee.
Statistical analysis: Statistical analysis was carried out for 100 subjects .Age, sex, BMI, haematocrit ,bleeding manifestations ,ultrasonographic findings were analyzed. Results were

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expressed as Mean and Standard Deviation (SD). The difference in means between the two groups was calculated using the Student t-test and the significance of the difference in proportions using the chi-square statistic. Statistical significance was taken when $p<0.05$. All variables with significant associations were entered in Cox Proportional Hazard Model for multivariate analysis with 95% confidence intervals. Pearson's correlation was used to analyze the correlation between variables found significant in multivariate analysis. All statistical analysis were performed using SPSS (Statistical package for social sciences) software for windows.

RESULT:

	Present		Absent	
	N	%	N	%
Thickened gall bladder	72	72%	28	28%
Pericholecystic fluid	65	65%	35	35%
Pleural effusion	49	49%	51	51%
Ascites	44	44%	56	56%
Perinephric edema	35	35%	65	65%
Hepatomegaly	23	23%	77	77%
Splenomegaly	21	21%	79	79%

In our study the most frequent ultrasound finding is thickened gall bladder with 72%followed by pericholecystic fluid(65%)and pleural effusion (49%) and the least common finding is splenomegaly (21%).

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Table: Haematocrit rise and Ultrasound findings

		<20 (n=70)		>20 (n=30)		P value
		N	%	N	%	
Thickened gall bladder	Present	43	61.4 %	29	96.7 %	<0.003*
	Absent	27	38.6 %	1	3.3%	
Pericholecystic fluid	Present	43	61.4 %	22	73.3 %	0.23
	Absent	27	38.6 %	8	26.7 %	
Pleural effusion	Present	31	44.3 %	18	60.0 %	0.13
	Absent	39	55.7 %	12	40.0 %	
Ascites	Present	22	31.4 %	22	73.3 %	0.0001*
	Absent	48	68.6 %	8	26.7 %	
Perinephric edema	Present	23	32.9 %	12	40.0 %	0.43
	Absent	47	67.1 %	18	60.0 %	
Hepatomegaly	Present	13	18.6 %	10	33.3 %	0.11
	Absent	57	81.4 %	20	66.7 %	
	Present	11	15.7 %	10	33.3 %	

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Splenomegaly	Absent	59	84.3 %	20	66.7 %	0.04*

Table: Fall in pulse pressure and Ultrasound findings

		<20		>20		P value
		N	%	N	%	
Thickened gall bladder	Present	31	93.9 %	41	61.2 %	0.0006*
	Absent	2	6.1%	26	38.8 %	
Pericholecystic fluid	Present	25	75.8 %	40	59.7 %	0.11
	Absent	8	24.2 %	27	40.3 %	
Pleural effusion	Present	23	69.7 %	26	38.8 %	0.003*
	Absent	10	30.3 %	41	61.2 %	
Ascites	Present	25	75.8 %	19	28.4 %	<0.0001*
	Absent	8	24.2 %	48	71.6 %	
Perinephric edema	Present	14	42.4 %	21	31.3 %	0.27
	Absent	19	57.6 %	46	68.7 %	
Hepatomegaly	Present	12	36.4 %	11	16.4 %	0.02 *
	Absent	21	63.6 %	56	83.6 %	
	Present	11	33.3 %	10	14.9 %	

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Splenomegaly	Absent	22	66.7 %	57	85.1 %	0.03 *

Table: Bleeding manifestations and Ultrasound findings

		Yes		No		P value
		N	%	N	%	
Thickened gall bladder	Present	27	96.4 %	45	62.5 %	0.0007*
	Absent	1	3.6%	27	37.5 %	
Pericholecystic fluid	Present	23	82.1 %	42	58.3 %	0.02 *
	Absent	5	17.9 %	30	41.7 %	
Pleural effusion	Present	19	67.9 %	30	41.7 %	0.01 *
	Absent	9	32.1 %	42	58.3 %	
Ascites	Present	20	71.4 %	24	33.3 %	0.0006*
	Absent	8	28.6 %	48	66.7 %	
Perinephric edema	Present	15	53.6 %	20	27.8 %	0.01 *
	Absent	13	46.4 %	52	72.2 %	
Hepatomegaly	Present	9	32.1 %	14	19.4 %	0.17
	Absent	19	67.9 %	58	80.6 %	
	Present	11	39.3 %	10	13.9 %	

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Splenomegaly	Absent	17	60.7 %	62	86.1 %	0.005*

Discussion: In our study mean age was 37.54 + 15.58 ,with maximum number of patients in the 14-30 years age group.

Adil b et al [7] the mean age was 33+13 ,study by Xin tian c et alhad mean age of 34.6+14.23 ,mean age in Gayatri et al [8] was 34.14+2.5.

The most common finding in our finding is Thickened gall bladder wall with 72% followed by pericholecystic fluid with 65% .The least common finding in our study is Splenomegaly.

Ultrasoundof chest and abdomen findings in our research include ;Thickened gall bladder ,Pericholecystic fluid ,Pleural effusion ,Ascites, Perinephric edema, Hepatomegaly ,and Splenomegaly

Harshavardhannagolu et al [9]study reported Ascites, thickened gallbladder wall, pleural effusion, hepatomegaly Splenomegaly and pericardial effusion as their ultrasound findings

In Parmar et alstudy [10] GBWT patterns, splenomegaly,hepatomegaly, , pancreatic enlargement, ascites, pleural effusion, findings were recorded .

The typical sign of dengue fever was observed to be thickening of the gall bladder wall. which included 72 individuals.

InKumar kdetal [11] study the most typicalultrasonography findings in dengue fever cases was edema of gallbladder wall.

Prashanth et al study reported that thickened gallbladder wall of 5mm has sensitivity of 93.7% and specificity of 70% to predict progress to dengue.

In present study we compared individual ultrasound findings with platelet counts.We found out there is statistically significant association between thrombocytopenia and all of the ultrasound findings except for perinephric edema.

According to a study by Gayatri et al. [8] who connected the ultrasonography results with platelet count, gall bladder wall thickening was most prevalent in patients with platelet counts under 40,000 and between 40,000 and 80,000. In their investigation, a statistically significant correlation between low platelet count and ultrasound findings was found.

In our study haematocrit rise of >20% was taken as cut-off to detect hemoconcentration. In present study Out of 100 patients ,30 patients(30%)had haematocrit rise>20% .

Xin tian c et al [12] study reported 46 patients out of 83 had Haemoconcentration .

Ascites and gall bladder wall thickening were statistically associated with a rise in hemocrit (>20%). 29 patients out of 30 with a haematocrit increase (>20%) had GBWT.

Study by Xin tian et [12] alreported that serial bed side ultrasound was able to identify plasma leakage earlier compared to Haemoconcentration. Ultrasound findings of plasma leakage in their study includes gall bladder wall thickening , ascites and pleural effusion. Out of 83 patients 46 patients had Haemoconcentration. Out of these 46 patients 34 had ultrasound evidence of plasma leakage .so there is statistically significant association between Haemoconcentration and ultrasound evidence of plasma leakage. This is similar with our study where we found.

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. In our study we have taken < 20 mm of hg as criteria for narrow pulse pressure . Out of 100 patients 33 have fall in pulse pressure .

Study by Kumar et al. on the clinical characteristics and prognosis of dengue fever patients admitted Out of 306 cases of dengue fever, 78 patients had narrow pulse pressure, according to the report.

The most frequent ultrasound finding connected to narrow pulse pressure is gall bladder wall thickening (GBWT), along with pleural effusion and ascites, which we found to be statistically significant associations. With narrow pulse pressure, GBWT was seen in 31 out of 33 patients (93.9%).

Study done by sudhakarhegade et al confirmed statistically significant association between narrow pulse pressure and Severe manifestation.

In present study, Out of 100 dengue fever patients 28 patients had bleeding manifestations

Study done by sudhakarhegade et al found 31 out of 201 dengue fever cases having bleeding manifestations.

In present study we compared all the ultrasound findings In our study with bleeding manifestations .we found statistically significant association between most of the ultrasound findings with bleeding.

Thickened gall bladder wall.27 patients out of 28 with bleeding manifestations were associated with GBWT . Most of the patients with bleeding manifestations had associated with any of the ultrasound findings .Hence we can say that the patients with ultrasound findings are at risk for developing bleeding manifestations and are prone for severe dengue

Conclusion:

- In this study, we compared clinical and laboratory indicators such narrow pulse pressure, bleeding symptoms, thrombocytopenia, and increase in haematocrit to the ultrasonography results in dengue patients.
- Gall bladder wall thickening (72%) is the most frequent ultrasonography finding in our study, followed by pericholecystic fluid and pleural effusion. Hepatomegaly, Splenomegaly, and perinephric edoema are further findings.
- 30 patients out of 100 reported Haemoconcentration in the form of rise in haematocrit>20%
- 33 patients out of 100 reported fall in pulse pressure <20mm of hg
- 28 patients out of 100 reported bleeding manifestations
- In our study we found statistical significance between most of the ultrasound findings with bleeding manifestations, narrow pulse pressure, rise in haematocrit, thrombocytopenia

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