



## ULTRASONOGRAPHIC FINDINGS OF THORAX AND ABDOMEN AND ITS ASSOCIATION WITH SEVERITY OF DISEASE IN DENGUE FEVER

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**ABSTRACT** **OBJECTIVES** – To assess the ultrasound thorax and abdomen findings and its association with severity of disease in dengue fever **METHODS** – Between June 2022 and September 2022, patients admitted to our hospital those who tested positive for dengue serology and were older than 12 years underwent a prospective observational study. A total of 90 patients who tested serologically positive for dengue IgM after meeting the inclusion criteria were enrolled in the trial from a pool of 171 patients who had symptoms and indications of dengue fever. **RESULTS** – The most frequently impacted age range was 20 to 30 years. The most frequent ultrasonography finding (61.1%) was thickening of the GB wall. The three most frequent combination findings were pleural effusion, ascites, and thickening of the GB wall. In patients under 40 years old, GB wall thickening was the most frequent finding (62.8%), whereas ascites was the most frequent finding in those over 40 years old (66.7%). There was a substantial direct correlation between the level of thrombocytopenia, bleeding symptoms, and length of hospital stay. **CONCLUSION** – When patients come with fever and other symptoms, especially during an epidemic, sonographic findings such as thickening GB wall, pleural effusion, ascites, hepatomegaly, and splenomegaly should strongly favour the diagnosis of dengue fever. Ultrasound can be used as a diagnostic aid, a severity prediction, and a tool for prioritising patients during an epidemic.

**KEYWORDS :** Ultrasound, dengue fever, GB wall thickening, ascites, pleural effusion

### INTRODUCTION

The dengue virus, a flavivirus, which causes dengue fever, is spread by mosquitoes. Dengue can induce a variety of illnesses, from mild hemorrhagic fever to severe subclinical sickness. *Aedes aegypti* and, to a lesser extent, *Aedes albopictus* mosquitoes are the main carriers of dengue. Clinically, organ failure, retro-orbital discomfort, myalgia, nausea, vomiting, rashes, and high-grade fever are the symptoms of dengue fever. (World Health Organization, 2011)

Untreated severe dengue disease has a 20% mortality rate. Dengue fever has no specific therapy. Dengue fatality rates are reduced to under 1% with early diagnosis of the disease's progression in cases of severe dengue and access to quality medical care. Our goal in this study is to evaluate the various abdominal and thoracic ultrasonographic findings and determine whether they are related to the dengue fever's disease severity. So that during an epidemic, ultra-sonography can be employed as a screening method for illness detection and early disease severity detection.

### MATERIALS AND METHODS

A prospective observational study was conducted on patients who were admitted at the Govt. Royapettah Hospital between June 2022 and August 2022. 90 serologically positive patients were enrolled in the study out of a total of 171 patients who had symptoms and signs suggestive of dengue fever and were older than 12 years. On the day of admission, a complete blood count and an abdominal and chest ultrasound were performed. Radiologists with experience performed the ultrasound. Inter-observer variance was not measured using a repeat USG. IgM ELISA serological testing was used to confirm the diagnosis of dengue and only positive cases were included in the analysis.

### STATISTICAL ANALYSIS OF DATA

All data were entered in Microsoft excel and analyzed using SPSS software version 20.0. Quantitative variables were expressed as mean and standard deviation whereas qualitative variables were expressed

as proportions and percentages.

### RESULTS

90 participants in all were enrolled in the trial, of whom 68 (76%) were men and 22 (24%), women. The study population's average age was 26.7, with a standard deviation of 10.5 years. The study population's median age was 13 and its maximum age was 60. In our study, the 20–30 year age group had a high prevalence of dengue fever.

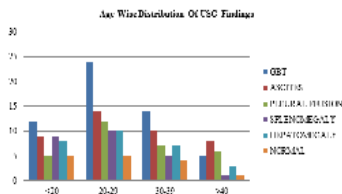
**Table 1**

Ultrasound Findings	Number	Percentage
GB wall thickening	55	61.11%
Ascites	41	45.56%
Pleural effusion	30	33.33%
Splenomegaly	26	28.89%
Hepatomegaly	28	31.11%
Normal	15	17.78%

In our analysis, (table 1) GB wall thickening, ascites, pleural effusion, splenomegaly and hepatomegaly were the ultrasonographic findings in dengue fever. Gall bladder wall thickening (61.1%) and Ascites (45.6%) were the two most frequent findings. Thirty (33.3%) individuals had pleural effusion. Hepatomegaly (31.1%) was the next common finding followed by splenomegaly which was the least frequent finding (28.9%). 15 (17.8%) of the study population had normal ultrasound results.

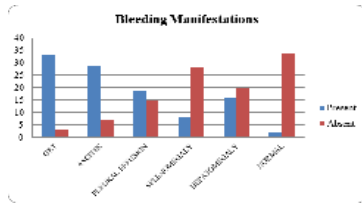
In this study, (figure 1) GB wall edema was the most common documented ultrasonographic finding under 40 years of age (62.8%), which was more pronounced in the age group of 20-29 years (70.6%). Ascites was the most frequent finding in those over 40 years old (66.7%).

### Figure 1



Ascites, pleural effusion, and thickening of the GB wall were the most typical combinations seen in our study across all age groups.

Figure 2



90 patients were investigated, and 36 (40%) exhibited bleeding signs whereas 54 (60%) did not. (figure 2) 13 (86.7%) of the individuals with normal ultrasonography results had no bleeding symptoms. There were 19 (86.3%) cases with bleeding symptoms among the most frequent combination of findings (GB wall thickening, ascites, and pleural effusion).

There was a clear correlation between the degree of thrombocytopenia and the ultrasonography results (figure 3). The patient in our study had a platelet count ranging from 4000 to 150000. Except for hepatomegaly, all ultrasonography results had a maximum platelet count of less than 50,000. In 9 (53%) of the patients with a platelet count greater than 100000, the ultrasonography results were normal.

Figure 3

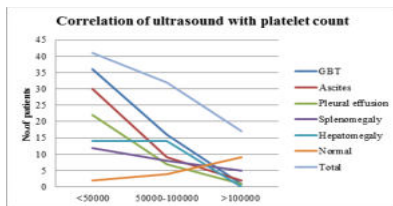
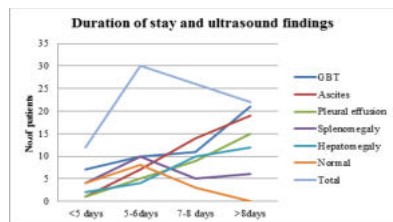


Figure 4



Additionally, (figure 4) there was a clear correlation between ultrasound findings and hospital stay length. The average hospital stay was 6.9 days, with a 2.1 standard deviation. The average length of hospitalisation for patients with normal ultrasonography results was 4.7 days, while it was 9.5 days for those who had the most frequent combination of findings (gall bladder wall thickening, ascites, and pleural effusion).

**DISCUSSION**

Dengue fever is one of the most important emerging diseases of tropical and sub-tropical countries. The classic symptoms of dengue fever include an abrupt start of fever and chills, as well as a strong headache, muscle discomfort, retro-orbital pain, and back pain. The average duration of a fever is 5 days, seldom lasting longer than 7. When a patient contracts a different dengue virus for a second time, severe dengue is most frequently the result. Rapid urbanisation, changing lifestyles, and inadequate water management have all contributed to an increase in dengue fever risk in India in recent years. (World Health Organization, 2011)

when dengue fever first appears. The post-monsoon season from September to November sees an increase in dengue cases. Particularly in DHF and DSS cases, early diagnosis of DHF/DSS can significantly improve patient management and lower death and morbidity rates.

The mainstay for diagnosing dengue disease is serology. By day 5 or 6, antibodies are evident in a febrile illness. Hepato-splenomegaly, minor ascites, pleural effusion, and GB wall thickening are ultrasound findings in the earlier, milder stages of the disease. (Santhosh et al., 2014) The accumulation of fluid in the perirenal and pararenal regions, hepatic and splenic subcapsular fluid, pericardial effusion, pancreatic enlargement, and hepato-splenomegaly are all symptoms of severe versions of the disorders. (Ibrahim et al., 2022) However, even in severe cases of dengue fever, none of the aforementioned sonographic characteristics were observed in our investigation.

Additionally, ascites, hypoalbuminemia, congestive cholecystitis, patients with cirrhosis of the liver, and portal hypertension are all associated with GB wall thickening. When taken alone, it is a fairly general finding, which is a significant flaw in this study.

The diagnosis of dengue fever can be made with a fair amount of accuracy by imaging characteristics include thickening of the GB wall, ascites, pleural effusion, hepatomegaly, and splenomegaly. (Ibrahim et al., 2022) This helps in centres where high quality laboratory facilities may not be accessible for serological confirmation to begin proper care of the patient as soon as ultrasound is done. While ultrasound can be useful in determining the severity of dengue fever, serological testing are confirming in the diagnosis of the disease. (Low et al., 2018)

The most common age group affected in a study of a similar nature conducted by V.R. Santosh et al. was 20-39 years, (Santhosh et al., 2014) whereas in our study, it was 20-30 years. Ascites (64.5%), pleural effusion (26%) and GB wall thickening (66.5%) were the three most frequent ultrasound findings in their study. Ascites (45.5%), pleural effusion (33.3%), and GB wall thickening (61.15%) were the most typical ultrasonography findings in our investigation, respectively. Although the frequency of pleural effusion was high and ascites was low, the order of predominance was identical to that of their study. Of the 17.7% who had ultrasounds that were normal, 60% had platelet counts more than 100,000. Patients with higher ultrasonographic findings exhibited the highest rates of bleeding symptoms. Similarly, drop in platelet count and duration of hospital stay was also highest among patients with more ultrasound findings.

**CONCLUSION**

When patients come with fever and other symptoms, especially during an epidemic, sonographic findings such as thickening GB wall, pleural effusion, ascites, hepatomegaly, and splenomegaly should strongly favour the diagnosis of dengue fever. Simple ultrasound testing can rapidly speed up the diagnosis of dengue fever and, pending serological confirmation, allow for the start of particular treatment. Patients aged 20 to 30 were most frequently afflicted. The combination of GB thickening, ascites, and pleural effusion was the most prevalent across all age groups. There was a substantial direct correlation between the level of thrombocytopenia, bleeding symptoms, and length of hospital stay. So, during an epidemic, ultrasonography can be utilised to help with patient triage, as well as an addition to diagnosis and a forecast of severity.

**LIMITATIONS**

There were few limitations for this study. Sample size is very small. Its an observational study. USG was not repeated in the study, only admission day USG was taken into consideration. Serial USG may have more predictive value for severity of disease n dengue fever.

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The rainy season, when vector mosquito breeding is typically high, is