

# SONOGRAPHIC FINDINGS IN PATIENTS WITH DENGUE HEMORRHAGIC FEVER

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## ABSTRACT

**Objective:** The aim of our study was to document the sonographic findings in serologically proven dengue fever patients having severe infection in the recent outbreak in Peshawar.

**Material and Method:** This was cross – sectional descriptive study conducted at Khyber Teaching Hospital, Peshawar from 15 July to 15 November, 2017. All the serologically diagnosed dengue fever patients with clinical suspicion of dengue hemorrhagic fever/ dengue shock syndrome were admitted in medical wards and ICU of the hospital to look for presence of plasma leak sign. Ultrasound of abdomen and chest of all these patients was performed by two radiologists having more than 5 years experience.

**Results:** A total of 527 admitted patients with severe dengue infection were scanned, the most common ultrasound finding was ascites 492 cases (93%) followed by gall bladder wall edema 483 cases (91%) and pleural effusion 470 cases (89 %) in patients having platelets counts < 80,000. These findings were not seen in patients having platelets count > 150,000 (3 %).

**Conclusion:** Ultrasound findings of edematous gall bladder, pleural effusion and ascites strongly suggest diagnosis of dengue hemorrhagic fever during an epidemic. Thus ultrasound is an easily available, cost effective, time saving and non invasive method to diagnose plasma leak in severe dengue infection during an epidemic and to start treatment before time consuming laboratory tests are available.

**Key words:** Sonographic findings, Dengue hemorrhagic fever.

## INTRODUCTION

Dengue is an important mosquito-borne viral infection, the incidence of which is rising worldwide<sup>1,2,3</sup>. According to the World Health Organization (WHO), every year there are more than 50 million dengue cases worldwide<sup>4,5,6</sup>. Dengue hemorrhagic fever and dengue shock syndrome are the more serious and life threatening types of dengue fever, responsible for upto 5% mortality<sup>4,5,7</sup>. Dengue epidemic struck the province of Punjab in the years of 2010 to 2012, effecting more than 180,000 in the year 2011 and accounting for 350 deaths<sup>5,8</sup>. This year dengue epidemic has hit Peshawar city of Khyber Pakhtunkhwa, affecting more than 17,000 and causing > 60 deaths in only 3 months period.

Clinically dengue infection can result in wide range of manifestation and severity of disease ranging from simple fever to life threatening dengue hemorrhagic fever or dengue shock syndrome<sup>4,5</sup>. There are

four serotypes of dengue virus, fifth one is discovered by India in 2015<sup>9</sup>. Initial infection causes dengue fever while re-infection with another serotype causes dengue hemorrhagic fever<sup>5</sup>. Plasma leak is the mainstay sign of differentiation between dengue fever and dengue hemorrhagic fever. Plasma leak can be diagnosed by laboratory tests and ultrasound. Early diagnosis of plasma leak is crucial for better outcome of the dengue hemorrhagic fever<sup>10,11,14</sup>. As ultrasound is very sensitive and non-invasive investigation to detect mild pleural effusion, ascites and gall bladder wall edema, thus its very helpful in early diagnosis of plasma leak and dengue hemorrhagic fever<sup>11,12,13</sup>.

The purpose of my study is to identify the ultrasound findings in severe dengue infection and the results of this study will help the clinicians in strategizing treatment options.

## MATERIAL AND METHODS

This was a cross sectional descriptive study conducted in Radiology Department of Khyber Teaching Hospital, Peshawar from 15<sup>th</sup> July to 15<sup>th</sup> November 2017. A total of 527 serology positive admitted patients having severe dengue infection were included in the study. All these patients were positive for dengue serology (NS1 antigen / IgM antibody) along with deranged hematocrit, platelets & white blood counts and liver enzymes. All of them underwent ultrasound of abdomen and chest during 1<sup>st</sup> week of illness by two radiologists having more than 5 years experience. The results were

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**Table 1: Gender and Age Group Distribution of Dengue Fever.**

Age Groups	Male	Female	Total	Mean	Standard deviation
15 – 40 years	289	144	433(82%)	27.77	7.71
41 – 60 years	45	21	66(12%)	50.56	5.6
> 60 years	20	08	28(6%)	71.68	8.47

**Table 2: Clinical Features in Dengue Fever.**

S.No.	Clinical Features	Number of Patients
1	Fever	526(99%)
2	Headache	487(92%)
3	Retro-orbital pain	314(59%)
4	Nausea / vomiting	169(32%)
5	Skin rashes	67(12%)
6	Abdominal pain	131(24%)
7	Bleeding	110(20%)
8	Pedal edema	10(2%)

**Table 3: Laboratory findings in dengue fever patients**

Laboratory Findings	Number (%)
Thrombocytopenia <80,000	494 (93%)
Hemoconcentration	186 (35%)
Leucopenia < 4000	199 (37%)
Raised Liver Enzymes (SGPT > 40)	418 (79%)

**Table 4: Ultrasound Findings in dengue fever patients.**

Ultrasound Findings	Number (%)
Gall bladder wall edema	483(91%)
Ascites	492(93%)
Pleural effusion	470(89%)
Splenomegaly	150(28%)
Hepatomegaly	72(13%)
Normal	18(3%)

analyzed by SPSS – version 20 and tables were made

## RESULT

Out of 16891 serologically positive dengue fever patients, 527 patients having severe infection were admitted in hospital and all of them underwent sonography of abdomen and chest. There was significant male preponderance n= 354 (67%). Majority of the patients were in 15 to 40 years of age n= 433(82%) with mean of 27.77 and SD of 7.71 (Table:1). The most common ultrasound finding was ascites 492 cases



Fig 1: shows typical honeycomb pattern of gall bladder wall edema in dengue hemorrhagic fever

(93%) followed by gall bladder wall edema 483 cases (91%) and pleural effusion 470 cases (89%) in patients having platelets counts < 80,000. These findings were not seen in patients having platelets count > 150,000 (3 %).

## DISCUSSION

Dengue is a serious mosquito-borne viral infection transmitted to the humans by female *Aedes* mosquito<sup>14</sup>. In the recent years, dengue fever is an emerging worldwide public health risk on the rise, with an annual incidence of 100 million cases<sup>14,15</sup>. It is endemic in more than 100 countries and almost 40% of world population is at risk of dengue infection each year<sup>14</sup>.

In Pakistan, its risk has increased dramatically in the recent years most probably due to poor water management, lack of public awareness about mosquito breeding habits and lack of proper mosquito protection methods<sup>16</sup>.

Dengue fever starts with the breeding season of the *Aedes aegypti* mosquito during rainy season. Initial infection is usually mild, presenting with fever, chills, headache, muscle and joint pains and backache. Severe form is the result of re-infection with another serotype producing immunological response in the body<sup>17</sup>.

The most common ultrasound findings in den-

gue fever include pleural effusion, ascites, gall bladder wall thickening / edema and hepatosplenomegaly. Laboratory diagnostic methods include viral culture, viral nucleic acid detection and ELISA, which are all time consuming and costly<sup>19</sup>. Moreover these high end laboratory facilities are not available in every hospital. Thus ultrasound features of dengue fever can help in starting appropriate treatment especially in dengue hemorrhagic fever and dengue shock syndrome. In our study we found that there was significant male predominance, male = 354(67%), female = 173(33%). This observation is consistent with a local study conducted by Ahmed et al<sup>20</sup>. Majority of the patients were in age group 15- 40 years n= 433(82%). Similar findings have been noted in studies conducted by Chandak et al<sup>4</sup> and Santhosh et al.<sup>18</sup> Previous studies by Venkata et al<sup>3</sup>, Santhosh et al<sup>18</sup> and Chandak et al<sup>4</sup> conducted for evaluation of sonographic findings in dengue fever, showed that thick walled gall bladder, pleural effusion and ascites in epidemic of dengue strongly favour the diagnosis of dengue hemorrhagic fever. In our study, the commonest ultrasound findings were ascites (93%), followed by gallbladder wall edema (91%) and pleural effusion (89%). These findings are consistent with Khurram et al<sup>14</sup> and Santhosh et al<sup>18</sup>, while Srinivasa et al<sup>14</sup> and Chandak et al<sup>4</sup> showed that hepatomegaly was the most common ultrasound finding in dengue patients. These variations could be due to infection with different serotype and changes in antigenic properties of the virus.

The severity of the disease is directly correlated with the platelets count. We also concluded in our studies that severity of plasma leak in dengue hemorrhagic fever DHF i.e., gall bladder wall edema, pleural effusion and ascites directly correlated with severity of the disease. These findings were similar to Khurram et al<sup>5</sup> and Santhosh et al<sup>18</sup>. Large sample size representing epidemic in Khyber Pakhtunkhwa and comparable results with other local and international studies are important positive points about external authenticity of our study.

## CONCLUSION AND RECOMMENDATIONS

Ultrasound is an easily available, cost effective, time saving and non invasive method to diagnose and document plasma leak in dengue hemorrhagic fever during an epidemic and to start early treatment before time consuming laboratory tests are available. Further research is recommended for evaluating the role of sonography in assessment of severity of dengue fever.

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