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Dr. Sachin Khanduri
Professor and Head of
Department of Radiodiagnosis,
Era's Lucknow Medical College
and Hospital, Sarfarzganj,
Lucknow, Uttar Pradesh,
India

Dr. Riya Jindal
Junior Resident, Department of
Radiodiagnosis, Era's Lucknow
Medical College and Hospital,
Sarfarzganj, Lucknow, Uttar
Pradesh, India

Dr. Ashok Gupta
Junior Resident, Department of
Radiodiagnosis, Era's Lucknow
Medical College and Hospital,
Sarfarzganj, Lucknow, Uttar
Pradesh, India

Dr. Saif Malik
Junior Resident, Department of
Radiodiagnosis, Era's Lucknow
Medical College and Hospital,
Sarfarzganj, Lucknow, Uttar
Pradesh, India

Dr. Aayush Varshney
Junior Resident, Department of
Radiodiagnosis, Era's Lucknow
Medical College and Hospital,
Sarfarzganj, Lucknow, Uttar
Pradesh, India

Corresponding Author: Dr.

Dr. Riya Jindal
Junior Resident, Department of
Radiodiagnosis, Era's Lucknow
Medical College and Hospital,
Sarfarzganj, Lucknow, Uttar
Pradesh, India

Role of gall bladder wall thickening in predicting dengue haemorrhagic fever before it's onset

Dr. Sachin Khanduri, Dr. Riya Jindal, Dr. Ashok Gupta, Dr. Saif Malik and Dr. Aayush Varshney

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Abstract

Aim: The aim of this study is to evaluate role of gall bladder wall thickening in predicting dengue haemorrhagic fever before it's onset.

Material and Methods: Abdominal ultrasound was done for all study participants on admission and during treatment via ultrasound machine (GE LOGIQ P9). Ultrasound was done on an empty stomach (fasting for eight hours or more). This investigation aimed to detect plasma leakage in the form of ascites, pleural effusion, and edematous gall bladder wall and also to detect any visceromegaly.

Conclusion: Gallbladder wall thickening (GBWT) can be used as an early predictor as well as an important prognostic sign for severe dengue infection and dengue haemorrhagic fever (DHF) especially during an epidemic.

Keywords: gall bladder, dengue, haemorrhagic & fever

Introduction

Dengue fever poses a great economic burden worldwide and specifically in South East Asia. WHO estimated that 50-100 million dengue infections occur worldwide annually, with a 30-fold increase in global incidence observed over the past five years ^[1].

Almost 75% of the global population exposed to dengue live in the Asia Pacific, and overall expansion in dengue cases have been noted in the past decade ^[2, 3]. The countries with a high incidence are Indonesia, Thailand, Myanmar, Sri Lanka, Bangladesh and India ^[4].

It is a viral haemorrhagic fever transmitted by *Aedes aegypti* and *Aedes albopictus*. It is caused mainly by dengue virus DENV-2 and DENV-3, although DENV-1 and DENV-4 have also been isolated in recent years ^[5-7], all of which share little cross immunity. Secondary infection by a different dengue serotype has been confirmed as an important risk factor for the development of dengue haemorrhagic fever (DHF) ^[8, 9].

Clinically, dengue fever is characterized by high-grade fever, musculoskeletal pain, retro-orbital pain, headache, joint pain, nausea, vomiting, and morbilliform rash ^[10].

In a small proportion of cases, the virus causes increased vascular permeability that leads to a bleeding diathesis or disseminated intravascular coagulation (DIC) known as dengue haemorrhagic fever (DHF) ^[11]. Clinically many parameters can be used to predict the onset of capillary leakage in DHF, including thrombocytopenia, haemoconcentration, and presence of free fluid in the peritoneal/pleural cavity detected on ultrasound. Dayanand KR, *et al.* reported that the most common ultrasound finding in seropositive is gall bladder wall thickness (86.5%) followed by ascites (41.7%) ^[12].

Nainggolan L *et al.* also documented that 30 out of 46 patients (65.2%) with plasma leakage had GBWT ^[13]. The purpose of this research is to study correlation between gallbladder wall thickening (GBWT) and severity of dengue disease. Also, to find out whether GBWT can be used as a parameter to predict DHF before it's onset so that it can be reported to treating physician for early therapeutic interventions to reduce morbidity and mortality.

Materials and Methods

This is a prospective observational study. A total of 90 patients with dengue fever presented to Era's Lucknow medical college and hospital, Lucknow, India, during the peak of the dengue epidemic in 2021. Approval for the study was obtained from the ethical committee of the hospital. Data were collected during this epidemic prospectively. Analysis was done.

Selection of study participants

Inclusion criteria

Both males and females who had a fever and were confirmed to have dengue fever on the presence of non-structural protein 1 (NS1) or immunoglobulin M (IgM) and immunoglobulin G (IgG) antibodies against dengue were included in the study.

Exclusion criteria

1. Participants with only dengue IgG antibodies positive (whose presence alone signifies the previous infection) were excluded from the study.
2. Pregnant females
3. Subjects with intrinsic gall bladder disease
4. Subjects with history of congestive cardiac failure or chronic liver disease were also excluded from the study.

Informed consent

Consent was taken from all included study participants after explaining to them, the nature and purpose of the research. Clinical history was taken regarding symptoms and recorded. All the data of the patients were recorded.

Ultrasonography

Abdominal ultrasound was done for all study participants on admission and during treatment via ultrasound machine (GE LOGIQ P9).

Ultrasound was done on an empty stomach (fasting for eight hours or more). This investigation aimed to detect plasma leakage in the form of ascites, pleural effusion, and edematous gall bladder wall and also to detect any visceromegaly. GB wall >3mm was classified as GBWT. Hepatomegaly was defined as the right lobe of the liver measuring >15cm in the midclavicular line, and splenomegaly was defined as the spleen measuring >12 cm. Gall bladder wall thickness was estimated by placing callipers over the anterior abdominal wall. All ultrasound examinations were performed by skilled and experienced radiologist. The average values of their findings were used for analysis.



Fig 2: Ultrasonography whole abdomen demonstrating thickened and edematous gallbladder wall

Data analysis

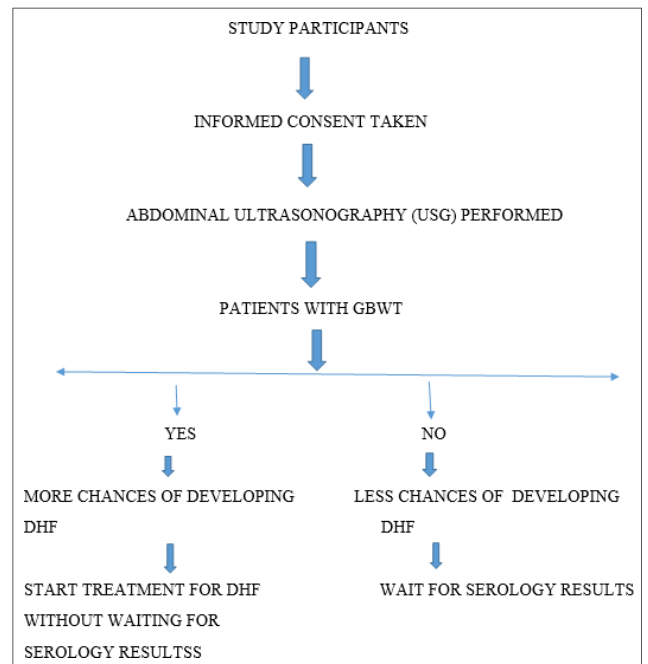


Fig 1: High resolution ultrasonography thorax demonstrating moderate amount of fluid in right pleural space. Pleural Effusion

Results

Table 1a: Total no. of dengue patients-90

GBWT	+	-	% dengue patients with GBWT
	58	32	

Table 1b: Total no. of dengue patients with GBWT - 58

DHF	+	-	% patients with GBWT developing DHF
	53	5	

Total number of patients enrolled were 90. Out of 90 patients, 58 (64.4%) patients were found to be with GBWT, and out them 53 (91.3%) patients developed DHF.

Table 2: Gender

Gender		Percentage
Male	53	58.8%
Female	37	41.1%

Out of 90 patients enrolled in the study majority were males (58.8%), rest 41.1% were females.

Table 3: Age

Age		
Age group	No. of study participants	Percentage
0-10	1	1.1%
10-20	5	5.5%
20-30	54	60%
30-40	13	14.4%
40-50	8	8.8%
50-60	5	5.5%
60-70	2	2.2%
80-90	2	2.2%
90-100	0	0%

Range of patients enrolled in the study were 5 to 90 years. Majority of the patients were aged between 20-30 years of age (60%).

Table 4: USG findings

USG findings		
USG findings	No. of dengue patients presenting with findings	Percentage
Hepatomegaly	35	38.8%
Splenomegaly	20	22.2%
Pleural effusion	15	16.6%
Ascitis	13	14.4%
GBWT	58	64.4%

On the basis of USG findings hepatomegaly is found in 35 (38.8%) patients and splenomegaly is found in 20 (22.2%) patients. Pleural effusion and ascites is found in 15 (16.6%) and 13 (14.4%) patients respectively. GBWT is found in 58 (64.4%) patients.

Data analysis

All data collected were entered on SPSS version 24 (IMB Inc., Armonk, USA). Variables like age, gender, diagnosis, serology, ultrasound findings were represented as percentages. Study participants were grouped into two groups: GBWT ≤3mm and GBWT more than 3mm. ap-value of less than 0.005 was considered statistically significant. The sensitivity and specificity of GBWT for the diagnosis of DHF was evaluated to be 91.4% and 96.9%.

Results

The results of our study favoured the fact that GBWT is directly related to disease severity. Also, GBWT can be used as a parameter to predict DHF before it’s onset.

Discussion

DHF and DSS cause huge morbidity and mortality, however, at the same time, they are preventable. The focus of our study was to establish relationship between GBWT and severity of dengue fever. Also, the study was focused to identify whether GBWT can be used as a predictor of DHF. The results of our study favoured the fact that GBWT is directly related to severity of dengue fever. Also, we could identify GBWT as a parameter to predict DHF before it’s onset, so that treating physician could take necessary steps to prevent morbidity and mortality.

Dengue classification

Table 5: WHO 1997 dengue classification

Dengue classification criteria	
Dengue fever (DF)	
Acute febrile illness with two or more of the following	Headache
	Retro-orbital pain
	Myalgia
	Leukopenia
	Arthralgia
	Rash
	Supportive serology or occurrence at the same location and time as other confirmed cases of dengue fever
Dengue haemorrhagic fever (DHF)	
All of the following must be present	Fever or history of acute fever, lasting 2-7 days, occasionally biphasic
	Haemorrhagic manifestations: (positive tourniquet test, petechia, ecchymosis, purpura or bleeding from the mucosa, hematemesis/melena)
	Thrombocytopenia (<100000 platelets/mm ³)
	Evidence of plasma leakage due to increased vascular permeability
Dengue shock syndrome (DSS)	
DHF with hypotension for age or narrow pulse pressure (<20mmHg), plus	Rapid and weak pulse
	Cold clammy skin, restlessness

Source: [14]

2009 who dengue classification

Differentiates features of severe and non-severe dengue

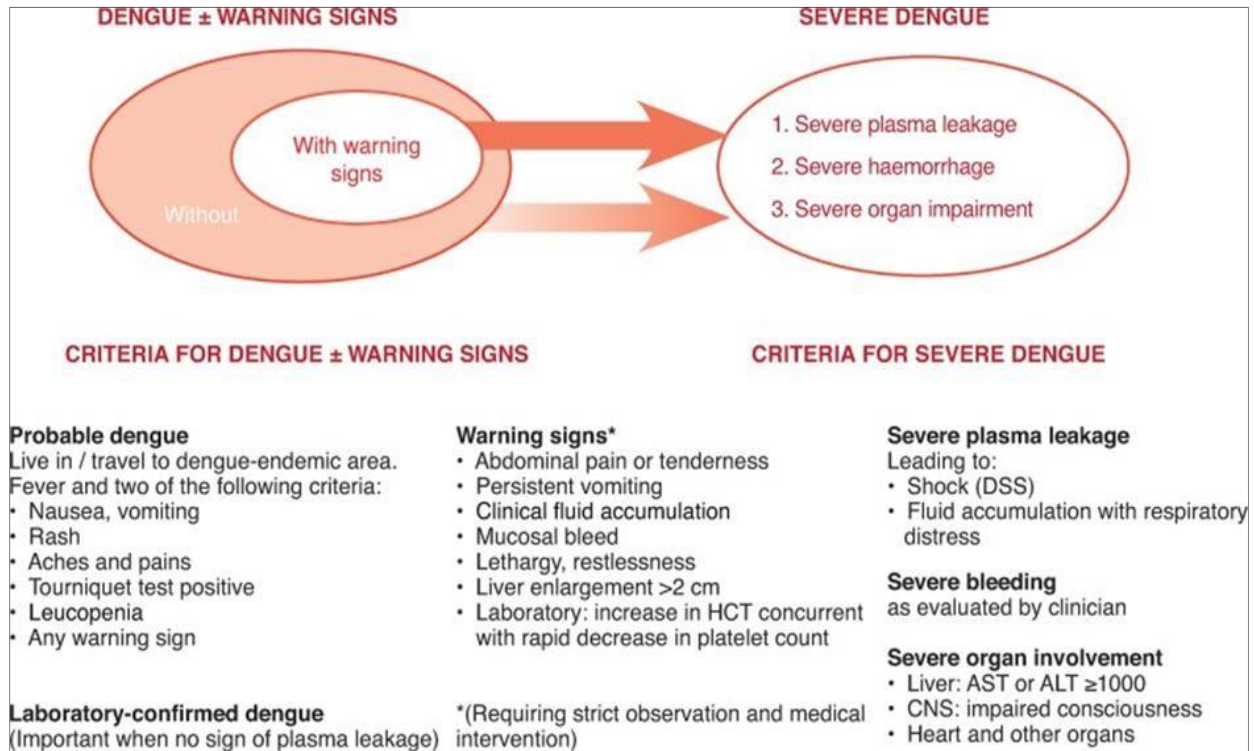


Fig 3: 2009 WHO Dengue Classification (Differentiating Features of Severe and Non-Severe Dengue).

Conclusions

Gallbladder wall thickening (GBWT) can be used as an early predictor as well as an important prognostic sign for severe dengue infection and dengue haemorrhagic fever (DHF) especially during an epidemic.

References

1. Guo C, Zhou Z, Wen Z, *et al.* Global epidemiology of dengue outbreaks in 1990-2015: a systematic review and meta-analysis. *Front Cell Infect Microbiol.* 2017;7:317. [PMC free article] [PubMed] [Google Scholar]
2. World Health Organization. Press. Geneva: WHO Press; 2012. Global strategy for dengue prevention and control. 2012-2020. [Google Scholar]
3. Murugesan A, Manoharan M. Emerging and Reemerging Viral Pathogens. Academic Press; Dengue virus. 281-359. [Google Scholar]
4. New Delhi: Regional Office for SEAR; 2008. WHO. Health Situation in South East Asian Region. 2001-2007. [Google Scholar]
5. Serotype and genotype analysis of dengue virus by sequencing followed by phylogenetic analysis using samples from three mini outbreaks-2007-2009 in Pakistan. Fatima Z, Idrees M, Bajwa MA, *et al.* *BMC Microbiol.* 2011;11:200. [PMC free article] [PubMed] [Google Scholar]
6. Multiple dengue serotypes and high frequency of dengue haemorrhagic fever at two tertiary care hospitals in Lahore during the 2008 dengue virus outbreak in Punjab, Pakistan. Humayoun MA, Waseem T, Jawa AA, Hashmi MS, Akram J. *Int J Infect Dis.* 2010;14:54-59. [PubMed] [Google Scholar].
7. Mahmood N, Rana MY, Qureshi Z, Mujtaba G, Shaukat U. Prevalence and molecular

- characterization of dengue viruses serotypes in 2010 epidemic. *Am J Med Sci.* 2012;343:61-64. [PubMed] [Google Scholar]
8. World Health Organization. Geneva: WHO Press; 2010. Working to overcome the global impact of neglected tropical diseases. First WHO report on neglected tropical diseases. [Google Scholar]
9. Dengue virus type 1 clade replacement in recurring homotypic outbreaks. Teoh BT, Sam SS, Tan KK, *et al.* *BMC Evol Biol.* 2013;13:213. [PMC free article] [PubMed] [Google Scholar]
10. Factors Associated with Dengue Shock Syndrome: A Systematic Review and Meta-Analysis. Huy NT, Van Giang T, Thuy DHD, *et al.* *PLoS Negl Trop Dis.* 2013. [PMC free article] [PubMed] [Google Scholar] <https://doi.org/10.1371/journal.pntd.0002412>
11. Meta-analysis of dengue severity during infection by different dengue virus serotypes in primary and secondary infections. Soo KM, Khalid B, Ching SM, Chee HY. *PLoS One.* 2016. [PMC free article] [PubMed] [Google Scholar]
12. Correlation of ultrasound (usg) findings with serological tests in dengue fever. Dayanand KR, Kavitha K, Anilesh PS, Chiranth N. *J Evid Based Med Healthc.* 2016;3:371-374. [Google Scholar]
13. Gallbladder wall thickening as an early detection of plasma leakage in dengue infected adult patients. Nainggolan L, Wiguna C, Hasan I, Dewiasty E. <http://www.actamedindones.org/index.php/ijim/article/view/786/pdf>. *Acta Med Indones.* 2018;50:193-199. [PubMed] [Google Scholar].
14. JB Kathiriya, NM Shah, JS Patel, BB Javia, MM Tajpara, SN Ghodasara, DB Barad. Epidemiological surveillance of Dengue fever: An overview. *Int J Vet Sci Anim Husbandry* 2020;5(6):01-10.