Profile of Hepatic Dysfunction in Dengue Patients of Western Rural Maharashtra

Dr Mohammed Arif, Dr Sandhya Dhambore
Pediatrics department of Pravara Rural Hospital, Loni.

ARTICLE INFO	ABSTRACT	ORIGINAL RESEARCH ARTICLE

This study was conducted at the Pediatrics department of a rural hospital in Maharashtra. The aim was to investigate the correlation between serum aminotransferase levels and dengue serology in pediatric patients. Dengue fever is a viral illness transmitted by mosquitoes, causing a range of clinical symptoms including fever, myalgia, rash, and leukopenia. Severe cases can lead to fluid loss, liver damage, bleeding, and altered consciousness. The study included 100 patients aged 1 to 12 years diagnosed with dengue fever based on positive NS1 or IgM tests.

The results revealed that a significant proportion of cases were in the age group of 1-5 years and 6-10 years. Males were more affected compared to females. Dengue serology indicated that a majority of cases were IgM positive and the remaining were NS1 positive. The study analyzed liver function tests, showing elevated levels of SGOT, SGPT, and ALP.

Comparisons with previous studies highlighted similarities and variations in age and gender distributions as well as liver function test results. The study concluded that abnormal liver function markers, particularly SGOT and SGPT, could serve as early indicators of severe dengue cases. However, it emphasized the need for further research and comprehensive analysis to confirm the association and its predictive value. The study acknowledged limitations such as the lack of follow-up and recommended continued investigation to understand the multifactorial interplay underlying liver dysfunction in dengue cases.

In summary, this study contributes valuable insights into the profile of hepatic dysfunction in dengue patients, emphasizing the importance of early detection and management of severe cases to prevent adverse outcomes. Further studies are warranted to validate and expand upon these findings.

*Corresponding author
Dr. Mohd. Arif

2023, www.medrech.com

INTRODUCTION:

Dengue fever is benign syndrome caused by several arthropods born viruses and is characterized by biphasic fever, myalgia or arthralgia, rash, leukopenia and lymphadenopathy. A revised case definition adopted by the WHO in 2009 includes as severe dengue those cases accompanied by fluid loss leading to shock, fluid loss with respiratory distress, liver damage evidence by elevation of ALT or AST to >1000 U/l, severe bleeding and alter consciousness or significant heart abnormalities[1]

An estimated 500,000 cases with severe dengue require hospitalization every year;2.5% patient die. The spread of dengue is attributed to expanding geographic distribution of 4 dengue viruses. It is transmitted to human by bites of infected female Aedes mosquitoes.

Level of transaminase are raised; higher increase in SGOT than SGPT suggests dengue rather than other virus infection[2].

History:

Dengue fever was first referred as "water poison" associated with flying insects in a Chinese medical encyclopedia in 992 from the Jin Dynasty (265-420 AD)[3]

The word "Dengue" has an African origin10,11,12 and derived from the Swahili phrase KA-DINGA PEPO which means ―Cramps like seizure. [4]

First description of dengue was given by Benjamin Rush in 1780 during an epidemic in Philadelphia and coined the term BREAK BONE FEVER.[5] Dengue viral serotypes were discovered in 1944[6]

Diagnosis of dengue:[7]

Diagnostic method	Timing of test (after disease onset)	Validity
Virus isolation (culture)	1–5 days	++++
Genome detection (PCR)	1–5 days	++++
Antigen detection (NS1)	1–5 days	+++
Antibody detection (IgM) after 5 days*		++
IgG (paired sera)**	Acute sera 1–5 days; convalescent sera after 15 days	+

*IgM positivity rates: by 3–5 days (50%), 5–7 days (80%), 10 days (90%). IgM appears between 3 days and 10 days and disappears by 2–3 months.
**IgG appears after 1–2 weeks and may persist for life.

NEED FOR THE STUDY:

A rapid rise in urban population is bringing greater numbers of people in contact with vector where household water storage is common and solid waste disposal services are inadequate. Dengue infection has varying clinical presentation and often unpredictable clinical evaluation and outcome. Higher increase in SGOT than SGPT suggests dengue rather than other virus infection.

AIMS & OBJECTIVES:

To correlate the serum aminotransferase levels in patients with dengue infection with dengue serology, presenting to Pediatrics department of Pravara Rural Hospital, Loni.

MATERIALS AND METHODS:

Study area: Department of Pediatrics, Dr Vitthalrao Vikhe Patil Pravara Rural Hospital, Loni.

Study period: Period of 6 months, January 2022 to October 2022

Study population: Patients diagnosed with dengue fever who are in-patients in department of Pediatrics of Dr Vitthalrao Vikhe Patil Pravara Rural Hospital, Loni.

Sample size: 100

Source of data: Detailed history, physical examination, pathological, biochemical investigations, microbiological investigations of the children diagnosed with dengue fever.

Inclusion criteria:
1. Patient positive for dengue NS1 or IgM
2. Age 1 to 12 years

Exclusion criteria
1. Patient positive for dengue IgG
2. Age <1 year or >12 year
3. Child with pre-existing liver disease.

METHOD

All the selected patients were subjected to detailed history taking, clinical examination, pathological, biochemical and microbiological investigations.

The following methodology was standardized for the purpose of the study. A structured performa was designed as attached to Annexure: to collect information and data regarding:
● Name:
● Age:
● Sex:
● Date of Admission:
● IPD No:
● Address:
General examination
● Pulse:

● BP
● Temperature:
Investigations:
● Haemoglobin:
● Hematocrit:
● TLC:
● Platelet count:
● Dengue serology - NS1: IgG: IgM:
● Total bilirubin:
● Direct bilirubin:
● SGOT:
● SGPT:
● ALP:

DATA COLLECTION:

The data of each patient was collected on a proforma specially designed for this study and which included demographic details of patient, detailed history, chief complaints, vitals, addiction history, blood investigations - hemoglobin, hematocrit, TLC, platelet count, Dengue serology, liver function test consisting of total bilirubin, direct bilirubin, serum aminotransferases

SAMPLE COLLECTION:
- Blood sample was collected by venipuncture and sent to our central clinical laboratory.
- In EDTA bulb, hemoglobin, Total leucocyte count and differential leucocyte count were sent.
- In plain bulb total bilirubin, direct bilirubin, serum aminotransferases, Dengue serology were sent.

SGPT/ALT [8]

	Conventional Units	SI Units
0 to <1 year	5-33 U/L	5-33 U/L
1 to <13 years	9-25 U/L	9-25 U/L
13 to 19 years (male)	9-24 U/L	9-24 U/L
13 to < 19 years (female)	8-22 U/L	8-22 U/L

SGOT/AST [8]

|	Conventional Units	SI Units
0-14 Days	32- 162 U/L	32- 162 U/L
15 Days to <1 year	20-67 U/L	20-67 U/L
1 to <7 years	21-44 U/L	21-44 U/L
7 to <12 years	18-36 U/L	18-36 U/L
12 to< 19 years (male)	14-35 U/L	14-35 U/L
12 to<19 years (female)	13-26 U/L	13-26 U/L

OBSERVATIONS AND RESULTS:

The study was done in department of Pediatrics, Dr Vitthalrao Vikhe Patil Pravara Rural Hospital. 100 dengue positive patients were included in the study after they had fulfilled the inclusion and exclusion criteria

Table 1: Distribution of dengue positive patients according to age group.

Age range	Frequency (N)	Percentage (%)
1-5	52	52
6-10	45	45
>11	3	3
Total	100	100

52 dengue positive patients are in age group of 1-5 years, 45 patients in age group of 6-10 years and 3 patients in > 11 years of age group.
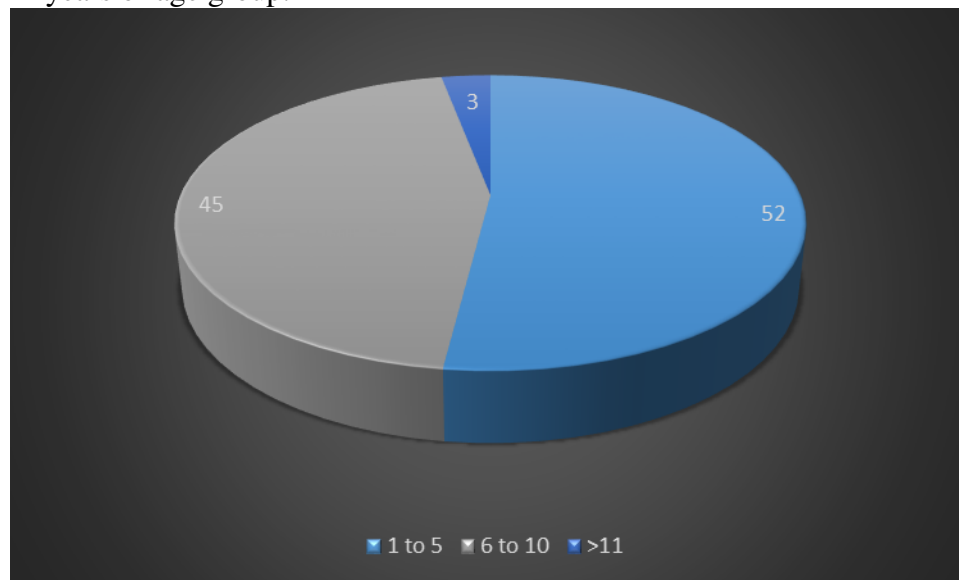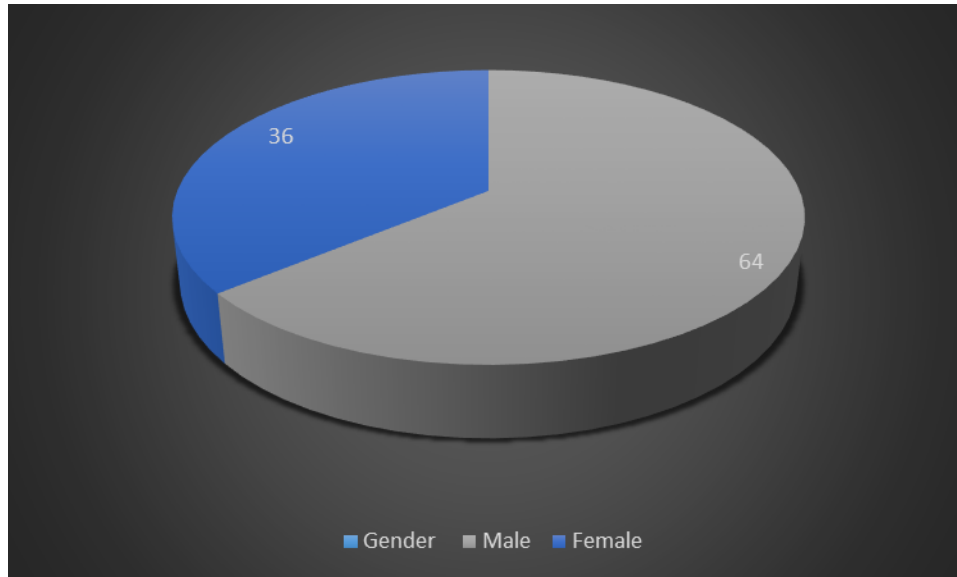

Graph 1: Distribution of dengue positive patients according to age group.

Table 2: Distribution of dengue positive Patients according to gender

Gender	Frequency (N)	Percentage (%)
Male	64	64
Female	36	36
Total	100	100

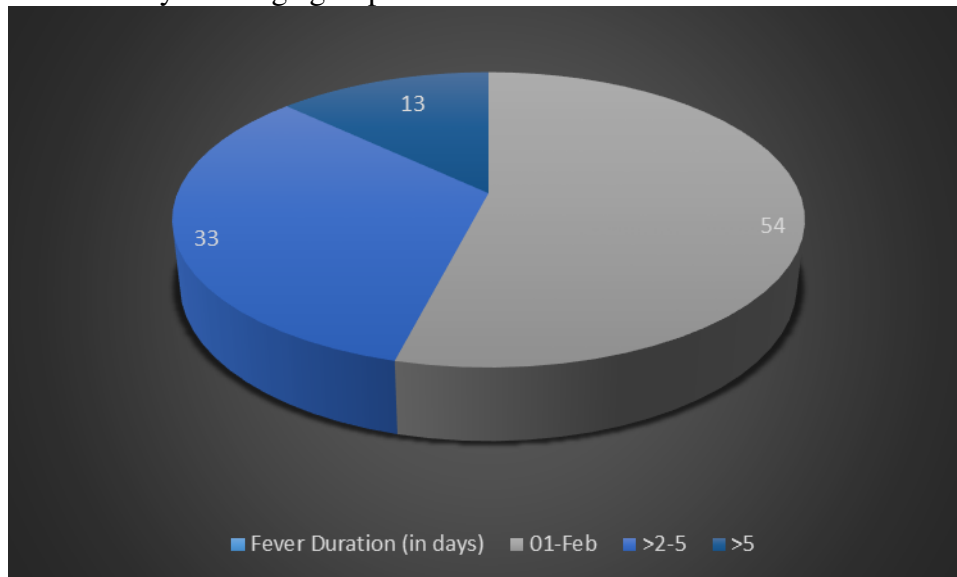There are 64 males and 36 female dengue positive patients.

Graph 2: Distribution of dengue positive Patients according to gender

Table 3: distribution of dengue positive patients according to duration of fever

Fever Duration (in days)	Frequency (N)	Percentage (%)
1-2	54	54
>2-5	33	33
>5	13	13
Total`	100	100

There are 54 dengue positive patients are in 1 – 2 year of age group, 33 are in >2 -5 years, 13 dengue positive patients are in > year of age group
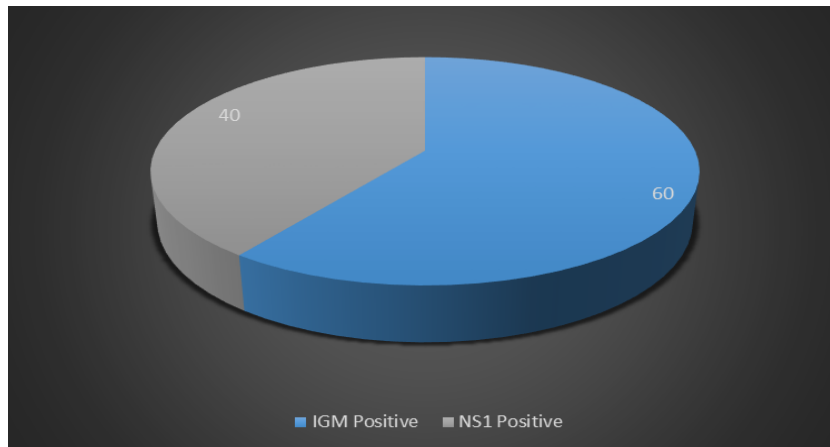

Graph 3: distribution of dengue positive patients according to duration of fever

Table 4: Distribution of dengue positive patients according to serological tests

Dengue	Frequency (N)	Percentage (%)
IGM Positive	60	60
NS1 Positive	40	40
Total`	100	100

Out of 100 dengue positive patients, 60 are IgM Positive and 40 are NS1 Positive

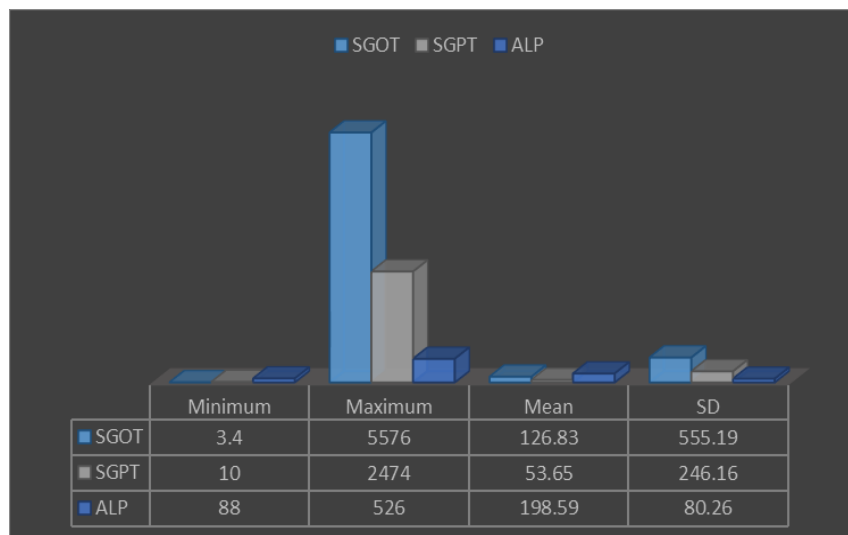**Graph 4:** Distribution of dengue positive patients according to serological tests

Table 5: Descriptive analysis of LFT profile

| Parameters	Minimum	Maximum	Mean	SD
SGOT	3.4	5576.0	126.83	555.19
SGPT	10.0	2474.0	53.65	246.16
ALP	88	526	198.59	80.26

Descriptive analysis of LFT profile shows, mean SGOT is 126.83, mean SGPT is 53.65 and mean ALP is 198.59.

Graph 5: Descriptive analysis of LFT profile

Table 6: Comparison of LFT profile according to Dengue outcome

Dengue Outcome		SGOT	SGPT	ALP
IGM Positive	Mean	158.007	67.967	196.07
	SD	715.218	317.149	82.14
NS1 Positive	Mean	80.062	32.17	202.37
	SD	69.749	29.338	78.224
t test		0.47	0.51	0.15
p value		0.49	0.48	0.70
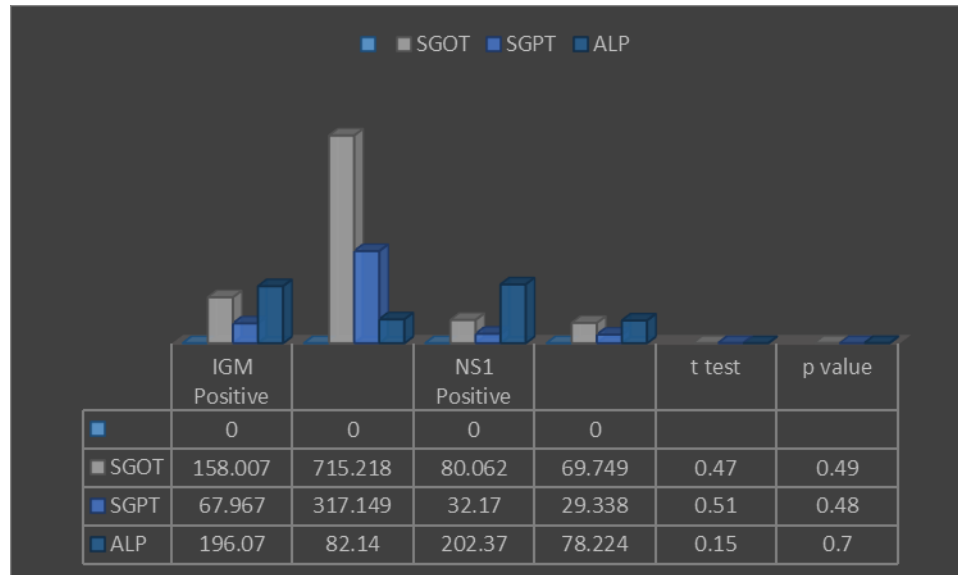
Graph 6: Comparison of LFT profile according to Dengue outcome

SUMMARY OF OBSERVATON:

A total of 100 patients were included in the study who were having dengue fever. The patients included were 1 to 12 years of age. Patients positive for Dengue NS1 or IgM admitted in PRH were included in the study. The patients were interviewed for a detailed medical history including the presence of comorbid conditions and were examined in detail. All the selected patients were subjected to detailed pathological, biochemical and microbiological investigations. Investigations like Hb, hematocrit, TLC, Platelet count, Dengue serology: NS1, IgG, IgM, total bilirubin, SGOT, SGPT, ALP

Distribution of cases according to age:
• Maximum number of patients were seen in the age group of 1-5 years i.e. 52 patients (52%) and 45 patients (45%) were in age group of 6-10 years and 3 patients (3%) in >10 years of age

Distribution of cases according to gender:
Included 64 males and 36 females, with male to female ratio was 1.7:1

Distribution of patients according to dengue serology:
• NS1 were 40 patients (40%).
• IgM were 60 patients (60%)
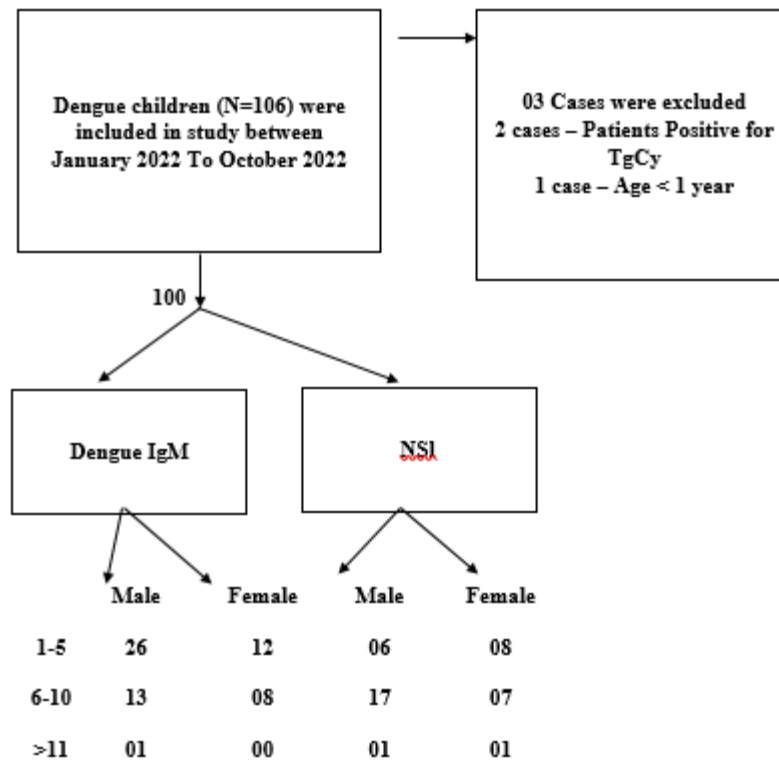
DISCUSSION

The present research entitled **"Prevalence of hepatic dysfunction in children with dengue fever between 1 to 12 years of age",** was conducted on 100 patients as per the inclusion criteria during the period of 10 months from January 2022 to October 2022 at the Pediatric ward of Medical College of India.

Table 7: comparison of age wise distribution of cases among various studies

Age group (years)	Present study	Yashwanth et all (2019)[11]	Siddappa et al (2019)[10]	B. Manohar et al (2015)[9]
1-5	52%	13.3%	30.7%	44%
6-10	45%	53.3%	30.7%	46%
>10	3%	30%	25%	-

Present study shows maximum number of patients are in 1-5 year of age group which is 52%, the study done by yashwanth et al shows 53.3% which is in 6-10 years, siddappa study shows 30.7% in 1-5 year and 6-10 year of age group, B. Manohar et all shows 46% in 6-10 year of age group.

Table 8: Comparison of distribution of Gender among various studies

Gender	Present study	Yashwanth et all (2019) [11]	Siddappa et al (2019)[10]	B. Manohar et al (2015)[9]
Male	64%	65%	65.38%	56%
Female	36%	35%	34.62%	44%

In this study shows there is male preponderance with male 64%, and female 36%, similar to the findings of Yashwanth et all where males 65% & females 35% and also in study done by Siddappa et al with males 65.38% and females 34.62%, in a study done by B. Manohar et al shows male 56% and females 44%.

Table 9: comparison of Serum Aminotransferase level among various studies

Parameters	Present study	B. Manohar et al (2015)[9]	ChinnaRs et al (2008) [12]	Prakash et al (2010)[13]	Wong M et al (2008)[14]
SGOT/AST	126.83	231.31	353.7	174	163.18
SGPT/ALT	53.65	201.14	218.6	88.5	144.58
ALP	198.59	145.1	135.2	80	70.08

In our study, SGOT is more than SGPT, similar to other study.

CONCLUSION

As this study and statistics points out that there is a significant association with biomarkers such as SGOT & SGPT; as that patients under careful supervision and management can able to prevent them from progressing to severe dengue. As early alterations of these biochemical markers can predict progressing to SEVERE DENGUE in patients with acute fever caused by dengue.

LIMITATIONS

1) Repetition of liver function test not done.
2) There is no follow up of cases included in the study.

RECOMMONDATION

The present study shows significant association between abnormality of liver function tests and severity of dengue fever. Although it shows statistically significant association between liver function test and severity of dengue, it is not enough to confirm the association. It appears that liver function test in each population varies with multifactorial inter-relationship.

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