



“LIVER FUNCTION TESTS IN DENGUE FEVER PATIENTS” AT ANAND CITY, GUJARAT, INDIA

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Abstract:

Dengue fever, the most serious arthropod-borne disease, is transmitted to people by Aedes mosquitoes. The liver is the most commonly implicated organ in dengue. abrupt dengue infection frequently involves the liver, which can result in abrupt liver failure with lethal consequences. To determine the kinetics of changes in liver function test related to acute dengue infection.

Objectives: Our study aims to elevate the LFT levels in dengue fever and the prevalence of dengue along people of the city of Gujarat state.

Method: A retrospective study was undertaken among ages varied from 2 to 70 age years patients in Gujarat, 80 dengue-positive patients were studied and analyzed. Clinical features, LFT enzyme level, and PT were noted.

Result: Patients were classified as having dengue fever at 75%, and liver function test AST, ALT, ALP, total bilirubin, serum albumin, and PT were deranged in positive patients. In this study data on age, gender, and the enzymes levels of these patients were obtained from the medical laboratory in Gujarat, India. We found that gender is significantly associated with LFT levels. AST/ ALT 41.2%, bilirubin 8.75%, PT 6.25%, and ALP 22.5% were elevated levels respectively.

Conclusion: Liver function test was significant and very common in all dengue fever. AST/ ALT levels raise significantly when compared to PT.

Keyword: Dengue fever, aspartate transaminase, alanine transaminase, prothrombin time.

Introduction:

Dengue fever, the most serious arthropod-borne disease, is transmitted to people by Aedes mosquitoes.

A virus spread by mosquitoes typically causes dengue fever (DF), a self-limiting sickness. One of the four subtypes of dengue infection causes it. It is a single abandoned positive RNA infection. (1)

Through blood-sucking bites, the female Aedes mosquito spreads dengue-causing virus cells from infected persons to healthy people.

The virus then transfers from the vector and enters the host rapidly reproducing a dengue-causing virus. Dengue virus infection has lately become widespread in India, involving all four known dengue serotypes. Aedes aegypti, the yellow fever mosquito, is one of the most common biting insects in the

United States. It can carry several diseases, including dengue fever, chikungunya, zika fever, Mayaro, yellow fever, and more. (10)

The dengue mosquito, *Aedes Aegypti*, is dark in color with white patterns on the legs and lyre-like markings on the thorax. It's significantly tiny, only 4 to 7 millimeters long. Female mosquitos are longer than male mosquitos.

Dengue is caused by a virus of the Flaviviridae family and there are four distinct, but closely related serotypes of the virus that cause dengue (DENV-1, DENV-2, DENV-3, DENV-4). DENV-3 and 4 are the most occurring forms of the virus. (6)

Dengue virus infections can cause:

1. Dengue fever
2. Dengue hemorrhagic fever (DHF)
3. Dengue shock syndrome (DSS)

The dengue virus infection spectrum ranges from undifferentiated fever to dengue fever (DF) with shock and expanded dengue syndrome¹. DHF is distinguished by plasma leakage, which can result in shock. Both DF and DHF may present with bleeding symptoms. (5). A range of factors contribute to Activated partial thromboplastin time (APTT) and International normalized ratio (INR) variations. (14) Extrinsic or intrinsic coagulation system derangement can be demonstrated by performing PT and aPTT. If these values can be determined and predicted to have been prolonged, mortality can be reduced. Liver injuries can range from mild (elevated transaminase activity and hepatomegaly) to severe (jaundice and fulminant hepatic failure). A number of conditions, including a lack of blood supply to the liver, metabolic acidosis, and disseminated intravascular coagulation, may result in liver dysfunction.

Pathogenesis of dengue

The dengue virus enters the body and multiplies in the local macrophages.

Local cells that have contracted the infection move from the infection site to lymph nodes, where they infect monocytes and macrophages.

Consequently, the infection grows, and the virus disperses through the lymphatic system. Numerous mononuclear cells, including blood-derived monocytes, were activated because of this primary viremia.

In the 24 hours leading up to the onset of viremia, the virus spreads throughout the body.

Additionally shown to be susceptible to DENV infection are bone marrow cells.

The viral load can be high in severe cases and impact multiple vital organs.

The signaling proteins interferons, cytokines, and other mediators produced by virus-infected macrophages elicit a range of symptoms, including flu-like symptoms and discomfort.

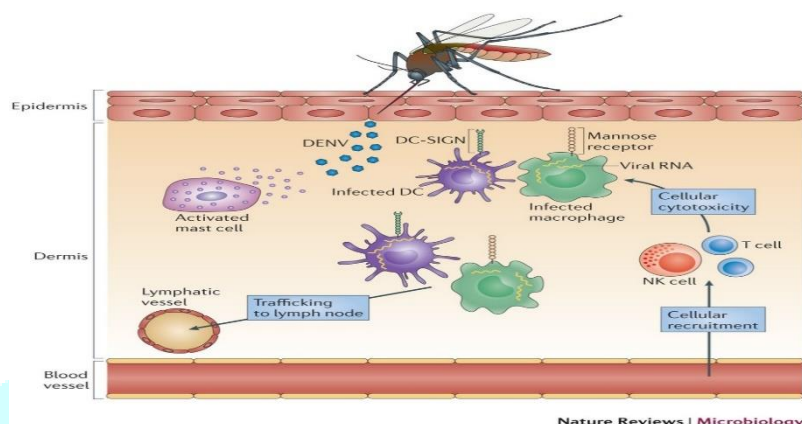
These mediators affect the body's hemostatic system.

Fluid leaks from blood arteries, causing blood volume to decrease and resulting in low blood pressure.

A drop in blood pressure results in an insufficient supply of blood and oxygen to essential organs such as the brain.

Dengue also attacks bone marrow, preventing it from producing enough platelets. Because platelets are required for blood clotting. Dengue infection results in a blood clotting deficiency and an increased risk of bleeding. (15)

PATHOGENESIS OF DENGUE



Clinical manifestation

Dengue fever can be either symptomatic or asymptomatic.

The clinical illness appears 4-6 days after being bitten by an infective mosquito.

Classical dengue fever, dengue hemorrhagic fever (DHF), and dengue shock syndrome are all symptoms of dengue (DSS).

SEVERE DENGUE

Normally, a patient enters what is known as the crucial phase 3-7 days after the commencement of the illness. During the critical phase, a small percentage of patients may have a sudden deterioration of symptoms. When the patient's fever begins to fall (below 38°C/100°F), warning indications of severe dengue can appear. Severe dengue is a potentially fatal consequence that can result from plasma leakage, fluid accumulation, respiratory difficulties, severe bleeding, or organ dysfunction. Doctors should look for the following warning signs:

- Severe abdominal pain
- Persistent vomiting
- Rapid breathing
- Bleeding gums or nose
- Fatigue
- Restlessness
- Liver enlargement
- Blood in vomit or stool

If patients exhibit these symptoms during the critical period, they must be closely monitored for the next 24-48 hours to get the correct medicine for the danger of death. During the recovery period, closer monitoring should also be maintained.

Vaccination against dengue

Sanofi Pasteur's first dengue vaccine, Dengvaxia (CYD-TDV), was licensed in December 2015 and has now received regulatory approval in 20 different nations. In November 2017, the results of a

further inquiry to determine Sera's condition at the time of vaccination were made public. The CYD-TDV vaccine is intended for people aged 9 to 45 who have experienced at least one episode of dengue virus infection in the past and reside in endemic areas because the study showed that those who were inferred to be seronegative at the time of immunization had a higher risk of more severe dengue and hospitalization from dengue compared to unvaccinated people. Ares, further dengue vaccine candidates are currently being assessed.

Liver

Front view of the liver

The liver is a big, meaty organ on the abdomen. The liver is around 3 pounds in weight, reddish-brown in hue, and rubbery to the touch. (12) Because the rib cage protects the liver, it is normally imperceptible.

The liver is divided into two sections called the right and left lobes. The gallbladder, as well as parts of the pancreas and intestines, are housed beneath the liver. These organs, along with the liver, collaborate to digest, absorb, and assimilate food. The fundamental function of the liver is to filter blood from the digestive tract before it is distributed throughout the body. (14)

The liver also detoxifies chemicals and metabolizes medications. The liver secretes bile as it does so, which eventually ends up in the intestines. The liver also makes proteins that are required for blood clotting and other processes.

Liver condition

Types of liver disease include:

Hepatitis: liver inflammation caused by viruses such as hepatitis A, B, C, D, E, G. Hepatitis can also be non-infections factors such as heavy drinking, medicines, allergic reactions, or obesity.

Cirrhosis: long term liver injury from any cause can result in persistent scarring. Known as cirrhosis. The liver cannot function normally.

Liver cancer: hepatocellular carcinoma, the most prevalent type of liver cancer, nearly often occurs after cirrhosis.

Liver failure: liver failure can be caused by factors, including infections, hereditary illness, and excessive alcohol consumption.

Ascites: cirrhosis causes the liver to leak fluid into the abdomen, causing it to become bloated and heavy.

Gallstones: hepatitis and bile duct infection can occur if a gallstone becomes lodged in the bile duct draining the liver.

Hemochromatosis: hemochromatosis causes iron to accumulate in the liver, causing damage to it. The iron also accumulates throughout the body, creating a slew of other health issues.

Primary sclerosing cholangitis: an uncommon disease with unknown etiology that produces inflammation and scarring in the bile ducts of the liver.

Primary biliary cirrhosis: in this uncommon condition, an unknown process gradually damages the bile ducts in the liver. Cirrhosis eventually occurs. (14)

Liver function tests:

Blood tests

Liver function panel: A liver function panel, which consists of numerous blood tests, assesses how effectively the liver is operating.

ALT: An elevated ALT helps identify liver disease or damage from several causes, including hepatitis.

AST: In addition to a high ALT, the AST tests for liver damage.

Alkaline phosphatase: Alkaline phosphatase is found in bile-secreting cells in the liver and bones. High levels often can bile flow out of the liver is blocked.

Bilirubin: High bilirubin levels indicate a liver issue.

Albumin: Albumin, as part of total protein levels, aids in determining how well the liver functions.

Ammonia: When the liver is not working properly, ammonia levels in the blood rise.

Hepatitis A tests: If hepatitis A is suspected, the doctor will perform tests on liver function as well as antibodies to detect the infection.

Hepatitis B tests: Your doctor can check your antibody levels to see if you've been exposed to the hepatitis B virus.

Hepatitis C tests: Blood tests can establish if you have been infected with the hepatitis C virus in addition to monitoring liver function.

Prothrombin time (PT): Prothrombin time, or PT, is widely used to determine if a person is taking the correct amount of blood thinner warfarin. It also looks for blood clotting issues.

Partial thromboplastin time (PTT): A PTT is used to test for blood coagulation issues.

Activated partial thromboplastin time (APTT): The APTT test quantifies and analyzes all of the clotting factors of the intrinsic and common pathways of the clotting cascade by measuring the time it takes for a clot to form when calcium and phospholipid emulsion is added to a plasma sample.

Imaging tests:

Ultrasound: An abdomen ultrasound can detect a variety of liver disorders, including cancer, cirrhosis, and gallstones.

CT scan: A CT scan of the abdomen gives detailed pictures of the liver and other abdominal organs.

Liver biopsy: A liver biopsy is usually performed when another test, such as a blood test or ultrasound, reveals that there may be an issue with the liver.

Liver and spleen scan: this nuclear scan uses radioactive material to help diagnose several conditions including abscessed, tumors, and other liver function problems.

Treatments for the liver:

- Early-stage supportive care: When liver disease is in its early stages, supportive care may be the best option.
- Medication: When the liver damage has progressed to the second or third stage, treatment is advised. The medication is meant to reduce the progression of the damage and aid in the recovery of the liver.
- Liver transplant: This is done at the end when the liver cannot be preserved or the damage is irreversible. The patient's liver or a part of the liver is removed and replaced with a healthier one. (14)

Prevents the liver:

- Moderating alcohol intake
- Regular exercise
- Getting vaccinated for hepatitis B
- Using only prescribed medication
- Avoiding unhygienic food
- Avoiding the use of contaminated syringes

Method and materials:

The test was performed by the IFCC method. The dengue test was performed with a rapid dengue test kit.

LFT test performed on the Mindray -BS 300 biochemical analyzers use.

Inclusion criteria

1. Patients with dengue-positive fever, confirmed NS1 /IgM positive
2. All ages and gender required for the study

Exclusion criteria

1. All the patients have a history of liver disease.
2. Dengue fever disease that NS1, IgM negative
3. Alcoholics, smokers, liver conditions and etc

Data collection

Dengue-positive fever patients' age, gender, and symptoms were collected.

Serum dengue NS1/IgM, and liver function tests such as total bilirubin, AST, ALT, APL, serum albumin, and prothrombin time were performed in the study.

Results:

Table1: Gender-wise distribution of study group

Gender	No. of case	Abnormality of LFT	Percentage
Male	42	23	52%
Female	38	23	48%
Total	80	46	100%

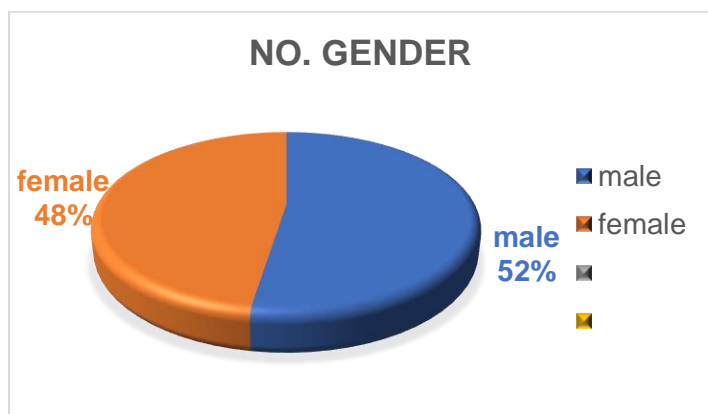


Chart 1: Gender-wise distribution in a study group

Table 2: AGE-wise distribution of study group

AGE /YEAR	Total no. case of LFT enzyme=80	Percentage
2-15	20	25%
16-30	21	26.25%
31-70	39	49%

Table 3: SGOT & SGPT levels in the study group

SGOT/ SGPT	NUMBER OF CASES OF LFT ABNORMALITY	PERCENTAGE
NORMAL (0-40 U/L)	34	43%
ABNORMAL (>40 U/L)	33	41%
SGOT (<40 U/L)	8	10%
SGPT (<40 U/L)	5	6%

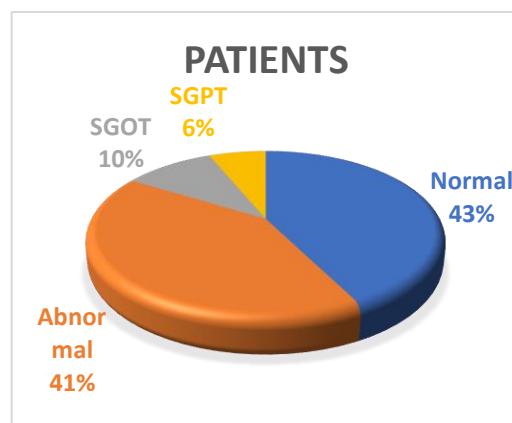
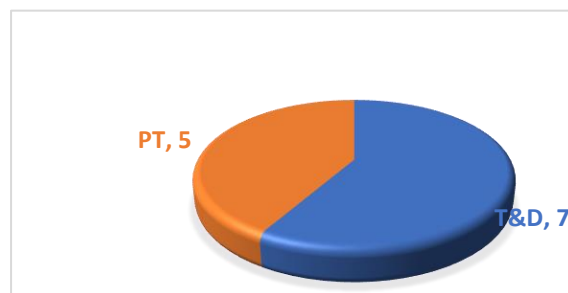
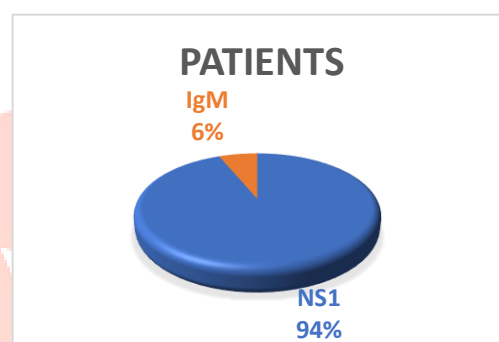


Table 4: total & direct bilirubin and prothrombin time level in the study group

T & D BILI / PT	NO.CASE IN BILI/PT ABNORMALITY	PERCENTAGE
T & D Bilirubin T- upto 1.0 mg/dl D- upto 0.3 mg/dl	07	8.75%
PT 11-15 sec.	05	6.25%

**Table 5: NS1 & IgM dengue-positive cases in the present study**

Serology pattern	No. cases	percentage
NS1 positive	75	94%
IgM positive	5	6%



Conclusion

This data is collected duration of July-2022 to January 2023

- In the present study, a total of 80 patients were included and among them 42 (52%) were males and 38 (48%) were females.
- 34 (42.5%) patient cases were recorded as the normal range in LFT.
- 33 (41.2%) cases were recorded as elevated in LFT enzymes, and 6.25% & 8.75% were recorded T & D BILI. And PT levels elevated.
- The highest incidence of male patients was found in the age group 31-70 years.

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