



# INTERRELATION OF LIVER & KIDNEY PARAMETER CHANGES ASSOCIATION WITH HEMATOLOGICAL CHANGES OF PATIENTS WITH DENGUE FEVER



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## ABSTRACT

Dengue fever develops with modifications in lab reports beginning the third day. It can appear on the fifth day with values reestablished to typical by the eleventh day. The examination results are applicable within the portrayal of organic markers in the advancement of the infection. They may be utilized as markers for the most severe structures along these lines empowering early assistance with the adaption of helpful lead for explicit patients. Seventy-three patients were analyzed for dengue fever. More significant variation was found in disease courses for the aged in hemoglobin and platelet count values. However, there was no significant difference between groups for the other forms of the disease, and the values were similar through the evolution. During the disease course, lymphocytosis was observed in all states, especially in the under-old age group. In all groups, thrombocytopenia was observed, and an increased AST enzyme occurred at the beginning of the disease.

**Keywords:** Arbovirus, Hyponatraemia, Thrombocytopenia etc.

## 1.0 INTRODUCTION

Four serological types of dengue are caused mainly (DEN-1, DEN-2, DEN-3 AND DEN-4) This is also known as an arbovirus which is belongs to the genus Flavivirus of the Family Flaviviridae (1,2). This is a severe arboviral disease which is distinguish by basic sign such as fever, headache, body pain, weakness, irritation lymphadenopathy and leukopenia which is followed break bone fever. Because of regular temperature changes of level in the patient (3). Haematologically, the most common abnormalities are haemoconcentration, thrombocytopenia, prolonged bleeding time, and a moderately decreased prothrombin level (4). Thrombocytopenia in dengue fever is multifactorial with bone marrow hypocellularity followed by Immune mediated fringe annihilation

of platelets as the most regularly proposed components. The decreasing platelet counts have found to predict the severity of the disease and are associated with increased haematocrit, increased liver enzymes, altered coagulation profile [5].

**1.1 Serum electrolyte abnormalities in dengue virus infections:** Hyponatraemia is the commonest detectable electrolyte abnormality in dengue; the lowest sodium levels are seen in patients with DSS [6,7].

The prevalence of hyponatremia is about 10 times more common among dengue patients compared to non-dengue febrile infections (8). The hyponatremia may be due to: excess water from increased metabolism, transient inappropriate anti-diuretic hormone (SIADH) secretion leading to increased tubular re-

absorption, the influx of sodium into cells due to a dysfunction of the sodium-potassium pump or a combination of these factors [9]. In India dengue virus was isolated in 1945 and poor hygiene and weak health system which is the major problem for spread of this disease (10). Forty Percent of world's population as reported that according to WHO (World Health Organization) that current outline is at risk of chance dengue viral infection (5). The cause behind the dengue is developed as vector borne viral disease which is transmitted in human by the bite of the infected *Aedes mosquito*. The number of Dengue vector (*Aedes mosquito*) develop was also reported that which is also give in the high incidence of Dengue viral infection (6). A particular treatment for the dengue virus is not available but advance observation and fluid replacement therapy and use of painkiller and antipyretics with good nursing care protect marked depletion of the mortality rates 20% to less than 1% due to serious cases (7). Who is infected with dengue virus can be diagnosed by using clinical presentations in the laboratory tests, non-specific tests like hematological parameter such as CBC (Include-Red blood cells, White blood cells, Hemoglobin, Platelet, Mean corpuscular hemoglobin, Mean corpuscular hemoglobin concentration, Mean corpuscular Volume, Packed cell volume etc.) and Biochemical parameters such as LFT, KFT etc. and serum protein concentration and a particular tests like as viral antigen detection test , genomic sequence, and serological tests for antibody detection are used(8,9). Most commonly are used for viral antigen testing is NS1 (Non- Structural protein1) either by rapid testing of ELISA (Enzyme Linked Immuno Sorbent Assay) is most sensitive (55- 66%) in the first three days of the illness (10). Dengue NS1 antigen is a glycoprotein it is make in both membranes related and in excretion forms it is visible in blood at high concentration in sera of dengue infected patients throughout from day 1 Up to day 5 with high thoughtful and it may be spread in primary and secondary both dengue infections (11). Further question in dengue government is the early recognition of patients at risk of difficulty. Patients spread difficulty have the common fundamental feature of increased capillary permeability leading to plasma leakage into the interstitial space. This is generally happening in 5-7 days and lasts for

48-72 h (critical phase) (12). Correct fluid conducted during in this phase is needed to keep away from difficulty. In Capital limited clinical position, the onset of critical phase is estimated by observing serial change in hematocrit (13).

### 1.2 Liver function test abnormalities in dengue:

The liver function tests include in biochemical parameters. The term of liver function test to suggested a set of ordinary plasma parameters is confusing as they do not constitute the useful element of liver excepting for clotting factors which are integrate by the liver. The alanine transferase (ALT), aspartate transferase (AST) and aminotransaminase enzymes, the inscription of liver destruction and correspond with hepatocellular necrosis (14). In liver abnormality tests are mostly occurring in the first days of clinical problem and highly problem will occur in the second week of illness(15). In dengue infection the liver function test result can be the quickest result of the virus on liver cells or the uncontrolled host immune reaction in case of the virus. In dengue condition the liver dysfunction is frequently indicating by soft to common elevate in transaminase enzyme levels (16). The most common abnormalities are observed in the transaminase levels. Elevated AST levels were observed in the 90% cases while high ALT levels we are observed in 80% of cases. Out of total cases, the hyperbilirubenemia was observed in 6% of the cases. Elevated levels of AST, ALT and abnormality in Bilirubin levels has also been reported in a study from the studied area (17).

**1.3 Kidney function Test abnormalities:** In kidney dengue has been similar with different specimen of kidney action. These are comprising proteinuria, glomerulonephritis, IgA nephropathy, hemolytic uremic syndrome and acute tubular necrosis (18). Specific comorbidities as well as Diabetes mellitus, Cardiovascular disease, chronic liver disease, cancer, and multiplex surgery have been related with enlargement of acute kidney injury in group hospital care setting (19,20). Three major mechanism of kidney infections which can affect:1) Bacterial- Bacterial infections may activate monocyte that restoring T-cell and B-cell reaction, which is lead to immune complex-mediated glomerular injury which is seen in children with after infectious glomerulonephristis. This inflammation can respond to secondary infection which can cause to interstitial injury and acute

tubular necrosis. Other mechanisms for acute tubular necrosis is in bacterial infections which is included hypovolemia, intravascular coagulation, hemolysis and complement activation (21). 2) Viral- Viral infection can also activate the immune system develop in interstitial injury and acute tubular necrosis as seen in dengue infection. Glomerular disease is seen only rarely in immune- complex mediated with Hepatitis-C infections (22). 3) Parasitic- There are three pathways for renal injury in parasitic infections which as seen :1) Direct invasion of the kidney 2) renal injury of the acute systemic effects of falciparum malaria 3) immune mediated renal injury (20,21). Proteinuria seems to be associated with the severity of the disease and is elevated in case of severe dengue, showing a positive correlation with the degree of thrombocytopenia (23,24). Hyponatraemia is the commonest detectable electrolyte abnormality in dengue; the lowest sodium levels are seen in patients with DSS (25,26). In 1997, a high incidence of urinary abnormalities [blood (31%) and protein (74%)] were reported among hospitalized dengue patients in Queensland, Australia (27). There was one patient each with nephritic and nephrotic syndrome (urine protein 10.8 g/24 h) in this series. Proteinuria and abnormal urinary sediments were the most common renal manifestations in patients with dengue infections in other series as well (28).

**1.4 Hematological Parameter:** In hematological parameter the CBC test (Includes-Platelet count, MPV, PDW, HCT, WBC count RBC count and absolute neutrophil count were recorded related to blood smears) is one of the detecting method which is used for dengue patient, in dengue patient we observe Leukopenia (Decrease of WBC) thrombocytopenia (Platelets) by the day of the fever, specifically on days 3 to 7 of fever. Hematocrit (Packed cell volume) increase due to hemoconcentration assign to leakage of plasma as a result of increased capillary absorbent which is happen in critical period. It is aids in predict happen and control in dengue (29,30).

## 2.0 MATERIALS AND METHODS

The sample was collected (73 patients) only hospitalized who is suffering from 2-5 days. Exclusion criteria included - lab results for dengue which are indeterminate. Segment, clinical and epidemiological data were recorded on a proforma and assent of the

patient was taken. The sera of all the patient collect to performed rapid (NS1 Ag) positive and will confirmed cases. Seventy-three Patients hospitalized in Yatharth Hospital, Greater Noida, India who were diagnosed dengue during the outbreak in 2020 were enrolled for this study. The dengue patient was diagnosed positive based on the instruction according to the world health organization (WHO) for dengue fever (31). All the patient was confirming positive for (NS1 antigen or/and) Positive for (anti-DENV IgG and IgM) by rapid test. The life history attribute such as age, sex, and clinical data such as hematological parameter and biochemical parameter for all 73 patients.

A full blood tally was performed on anticoagulated entire blood gathered at unsurpassed focuses. EDTA blood were analysed, to determine the complete blood count using Sysmex XN – 1000. Adjustment by inside and outside QC controls was likewise performed consistently. The following parameters were analyzed by the hematology analyser-RBC count, Haemoglobin (Hb), Haematocrit (Hct), Platelet count, WBC count, Neutrophil, Monocytes, Lymphocyte and Eosinophils counts, Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), and Mean Corpuscular Haemoglobin Concentration (MCHC). Current the confirmation dengue was done by in the study, Nonstructural protein 1 (NS1) antigen detection which was performed between day 0 to day 5. For all biochemical parameter test we have collected 4 ml blood is Red top vial and (SST vial yellow color) which was centrifuged in Remi R-8c analyzer. The biochemical parameter were analyzed by fully automated machine (Johnson and Siemens) Such as under LFT parameter- Total bilirubin, Direct bilirubin and Indirect bilirubin by Diazojendrassikgraf method, Alkaline phosphate (ALP), serum glutamic-oxaloacetic transaminase (SGOT), Serum glutamic pyruvic transaminase (SGPT) by is IFCC/Kinetic method Total Protein (TP) by Biuret comparative method and Albumin Protein is by BCG Dye method under KFT parameter- Urea is by GLDH method, Creatinine is by HPLC/IDMS method, Uric Acid is by CDC uricase method, Sodium and Potassium (Na<sup>+</sup> and K<sup>+</sup>) method is by flame photometry method (950 system), Calcium is by Absorption method(750 atomic) and Phosphorous by Subbarow comparative method.

### 3.0 RESULTS

The result of 73 Patient with clinical and laboratory diagnosis of dengue fever were analyzed. 51 were male and 22 were female. In relation values of hemoglobin and platelet count we found that for the aged, there was a greater variation in the course of the disease. However, there were no significant difference between groups for the other forms of the disease, the values were similar through the evolution. Lymphocytosis was observed in all forms, especially in the under old age group, during the course of the disease. Thrombocytopenia was observed in all groups. Increase in the AST enzyme occurred at the beginning of the disease.

### 4.0 DISCUSSION

Physicians must be aware of the most ordinary objective as well as hematological and biochemical demonstration which are major for the clinical management of the patients so it will be deciding for saving a life. So, this study focus to highlight the most ordinary clinical quality of hematological and biochemical cases. Dengue fever is an irresistible infection

which is hard to recognize from other infections pervasive in our area as there are no particular markers that can analyze the sickness early. Since it is a sickness that can develop with genuine results and even be deadly, this examination pointed toward breaking down clinical and epidemiological information and research center elements to attempt to distinguish biomarkers that are prescient of seriousness.

### 5.0 CONCLUSION

Dengue fever develops with lab modifications beginning the third day and getting generally apparent on the fifth day with values reestablished to typical by the eleventh day. The infection was more extreme in people matured 15 years and more established with a more articulated and tenacious presence of liver anomalies (AST, ALT) and hemoconcentration. The examination results are applicable in the portrayal of organic markers in the advancement of the infection and can be utilized as markers for the most serious structures along these lines empowering early assistance with the adaption of helpful lead for explicit patients.

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