

# An Early Dengue Virus Fever Diagnostic Tool

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**Abstract** - The dengue virus is a persistent and very prevalent pathogenic threat in underdeveloped nations such as India. In order to create effective management and treatment plans, it is necessary to continuously monitor the spread and diagnosis of dengue infections due to their variable types and frequencies. The dengue virus is a very complicated illness that presents in many ways. Using standard laboratory techniques to define the dengue virus infection is challenging. NS1, however, might be a useful diagnosis in the initial several days of fever. In this study, the presence of the dengue-specific NS1 antigen was examined in 88 patients from the Raipur regions of Chattisgarh who had been ill for one to thirty days. A kit based on ELISA was used. The collected data was analyzed and the percentage frequency of both IgM positive and negative and NS1 positive and negative results were expressed for each dengue fever patient. Notably, 36.3% of the population had dengue infection. Early in the infection period, the NS1 antigen was effectively measured. In every participant who tested positive for NS1 on the second day of fever, IgM was negative. Nevertheless, when the temperature increased, this correlation became less strong. It was determined through analysis that leucocytopenia and thrombocytopenia were random states unrelated to NS1 positive. It is clear that diagnosing dengue is extremely difficult and that the antigenic profile drastically shifts as the fever progresses over a period of days. By using a diagnostic approach based on a thorough examination of the subjects, clinicians can reduce the possibility that dengue shock syndrome would cause hemorrhage.

**Key Words:** India's dengue outbreak, dengue virus fever, or virally transmitted diseases

## 1. INTRODUCTION

Infectious fever caused by a virus that is common in tropical and subtropical regions of the world is known as dengue (1). Dengue fever is thought to cause approximately 100 million illnesses, 500,000 cases of dengue hemorrhagic fever (DHF), and 12,000 deaths globally each year (2). As of now, DENV is the most significant virus transmitted by arthropods that infects humans (3). When a person has a dengue infection, their viremia typically peaks two to twelve days after the sickness

begins, or sometimes even before. The quantity of virus-infected cells directly correlates with peripheral leukocyte antibody dependent enhancement (ADE) infection and can be used to gauge the severity of a disease

It is often important to refer back (or forward) to specific sections. Such references are made by indicating the section number, for example, "In Sec. 2 we showed..." or "Section 2.1 contained a description..." If the word Section, Reference, Equation, or Figure starts a sentence, it is spelled out. When occurring in the middle of a sentence, these words are abbreviated Sec.

Additionally, it is hypothesised that in patients with secondary dengue virus 1 and dengue virus 2 infections, there is a relationship between dengue viremia illness and disease outcomes; however, no such relationship was observed in patients with primary dengue virus 1 infection. Dengue virus 3 viremia (defined as dengue virus 3 genome equivalent levels) and the ensuing immunological activation are closely correlated with illness severity. Additionally, there is a clear correlation between the amount of plasma leakage and the level of viremia. Quantitative RT-PCR that is both sensitive and repeatable Assays have proven to be a dependable method for determining the viremia level and disease severity (4, 5). Positive-sense RNA-enveloped viruses with a single strand are called flaviviruses. Ten genes encoding three structural proteins (capsid [C], envelope [E], and membrane [M]) and seven non-structural proteins (NS1, NS2a, NS2b, NS3, NS4a, NS4b, and NS5) are found in their roughly 11 kb long genomic RNA (6). At its 5' and 3' ends, non-coding sections encircle the polycistronic coding region. Although the biological action of the highly conserved glycoprotein known as NS1, the non-structural protein, remains unknown. The flavivirus NS1 protein is produced during in vitro infection as either a cell surface-associated form that may be involved in signaling or as an internal membrane-associated form that is necessary for viral replication (7). It was discovered that the DHF patients had elevated serum levels of the NS1 protein; as a result, NS1 may serve as a helpful prognostic indicator in DHF. During the clinical phase of dengue virus infection, produced NS1 protein circulates and accumulates in the sera of patients; in solution, it exhibits hexamer behavior (9, 10). According to a recent study, the soluble NS1 protein attaches to endothelial cells and is identified by

anti-NS1 antibodies. As the dengue virus infection worsens, this may lead to plasma leakage (11). A novel method for identifying acute dengue infection is the measurement of released NS1 protein.

## 2. MATERIAL AND METHODS.

Sample Gathering Blood samples from 88 children who had fever and were thought to have been infected with the dengue virus during the 2011 dengue epidemic in Chattisgarh india, were gathered for the descriptive, prospective, and retrospective questionnaire-based investigation. Samples were taken from the Children's Hospital's Dengue Ward on Chattisgarh india. A comprehensive physical assessment was conducted, and all accessible blood test results were obtained. The child's biographical information, the clinical presentation of the disease, the Complete Blood Count (CBC) record, and any further investigative material that was available were all duly entered into the questionnaires. The study excluded children with kidney disease, diabetes, cirrhosis, cardiovascular disease, or other illnesses.

### Analysis of Biochemistry

The University of Chattisgarh Centre for Research in Molecular Medicine handled all of the biochemical analyses. The serum was separated and stored at -20 °C after being centrifuged for 10 minutes at 4000 rpm. Using commercial ELISA kits from BioRad, the serum concentration of NS1 antigen was determined (per manufacturer procedure).

### Statistical Analysis:

Using a 2-tailed Student's t-test, the significance of the difference between the quantitative variables was examined. The Pearson test was utilized to determine the correlation between the relevant variables. P-values less than 0.05 were deemed statistically significant. The SPSS version 19 program was used for all calculations.

## 3. Discussion

Studies in the past have shown that dengue fever can be diagnosed with a sensitivity of more than 90%. The individuals were then divided into dengue positive and dengue negative groups based on the results of the test. The WHO classifies fever episodes into three phases: acute (2–7 days after fever onset), afebrile (8–11 days after fever onset), and convalescent (18 days after fever onset). Of the 73 patients in the first phase, 28 had

dengue infection (76.71% of total), and 43 had dengue negative (58.0% of total). Every individual, both positive and negative for NS1 antigen, had their assessments reevaluated in relation to the day that their fevers first appeared. Early in the febrile phase, NS1 was clearly recognized, and as the fever increased in severity, the capacity to detect it reduced.

## 4. CONCLUSIONS

The timely detection of acute dengue virus infection in the laboratory is crucial for the patient's appropriate therapy. If this crucial element is disregarded, the patient may pass away from complications within the first 24 hours of treatment. There are currently several techniques for diagnosing the disease's severity. Nonetheless, there is a serious lack of comprehensive information regarding the pathophysiology and diagnosis of the virus in relation to the duration of disease. Furthermore, there is a paucity of knowledge regarding the antigenic presentation of dengue fever in Indian children. Children with fever in the current study were thought to have a dengue virus infection. To diagnose dengue, they underwent testing using NS1 ELISA kits specific to the disease.

The dengue virus is an extremely complicated illness with a wide range of symptoms. Using different tests to characterize the condition is challenging. NS1, however, may be a useful diagnostic tool during the initial few days. The recent study also revealed that leucocytopenia and thrombocytopenia are caused by serotype and not specifically linked to any single antigen or antibody.

## 5 . Results:

There were 88 patients in all that were part in the study. Male respondents made up 53.5% of the total with a frequency of 47, while female subjects made up 45.5% of the total with a typical frequency of 41. The ratio of men to women was determined to be 1.17:1. Based on the day of fever, the participants who underwent NS1 antigen analysis were descriptively examined. On the second day of fever, it was noted that 71.43% of all participants had NS1 identified. However, as the number of days increased and more samples were found to be negative by NS1 ELISA, this efficiency reduced. On day 2, it was also noted that there was a 100% correlation between IgM and NS1.

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