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Original Article

# Clinical and Laboratory Presentations in Children Admitted with Dengue Infection

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## Abstract

**Introduction:** Dengue fever, caused by the dengue virus, presents with a spectrum of symptoms, ranging from mild to severe. This study aims to identify common clinical symptoms and laboratory parameter abnormalities in children with dengue infection.

**Methods:** A prospective observational study was conducted at Patan Hospital over three months. Clinical signs, symptoms, and laboratory parameters of seropositive children for dengue were recorded using a structured proforma.

**Results:** During the study period, dengue fever accounted for 24% (104) of admissions in the children's ward. Among these, 61% tested positive for the NS1 antigen alone, 21% for both IgM and NS1, and 17% for IgM only. The male-to-female ratio was 1.6:1, with an average age of 7 years (± 4.37). Forty seven (46.2%) had dengue without warning signs, 57 (51.9%) had dengue with warning signs, and two (1.9%) had severe dengue. Fever was present in all cases, with an average duration of 3.88 days. Vomiting, abdominal pain, head ache and epistaxis was present in 31.7%, 27.9%, 20.2% and 16.3% respectively. Hypotension was noted in eight (7.7%) cases. Laboratory findings showed that 50% had a white blood cell count below 4000, and 54.8% had a platelet count below 150,000, with 12.2% below 50,000. Serial tests indicated elevated hematocrit levels in 35 patients. Most children were hospitalized for 4 - 6 days, with a mean stay of 4.65 days (± 1.90).

**Conclusions:** Dengue fever is a prevalent infection in children, typically presenting with high fever, vomiting, abdominal pain, headache, hypotension, low platelet count, elevated hematocrit, and leucopenia.

## Introduction

Dengue fever is caused by the dengue virus, which belongs to the flavivirus family, and is transmitted through Aedes mosquitoes. While dengue fever typically resolves on its own, it can sometimes lead to severe complications, including shock, hemorrhage, and even death.[1]

Approximately 3.9 billion people worldwide are at risk for dengue infection, with an estimated 390 million cases annually; around 70% of these cases occur in Asian countries.[2] In our region, 76% of dengue infections are asymptomatic.[3] The first reported case of dengue fever in Nepal was in 2006[4], and since then, cases have

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been documented each year.[5-7] From 01 Jan 2023 to 13 Oct 2023, there were 39,360 reported dengue cases in Nepal, resulting in 20 fatalities.[8] In children, dengue can manifest with a range of symptoms, from mild to severe and atypical presentations.[9] This study aims to identify the common clinical symptoms and signs in children with dengue infection, as well as any notable laboratory parameter abnormalities.

## Methods

This prospective observational study was conducted in the Paediatric Department at Patan Hospital, Lagankhel, Lalitpur, Nepal from 10 Sept 2022 to 10 Dec 2022. The study included all children aged between 28 days and 14 years who were diagnosed with dengue fever. Diagnosis was confirmed through a positive NS1 antigen test, positive dengue IgM antibody test, or a four-fold increase in dengue IgG titers. Neonates and children whose parents declined consent were excluded from the study. Ethical clearance was obtained from the Institutional Review Committee (IRC) at PAHS, and data collection was permitted by the Chair of the Paediatric Department. Patient data were collected using a standardized proforma, ensuring complete confidentiality, with the information used solely for research purposes. Additional relevant data were also gathered from the hospital's medical records. Clinical presentations and laboratory parameters were recorded. For children exhibiting warning signs of dengue, a complete blood count, including platelet and hematocrit levels, was performed upon admission and at least every other day (more frequently if clinically indicated). For those with severe dengue, blood tests were conducted twice daily. Management of dengue infection was done following the national guidelines. The follow-up of both laboratory and clinical parameters were continued until discharge. All patients were monitored daily for clinical parameters such as maximum temperature, blood pressure, heart rate, and the development of hemorrhagic or non-hemorrhagic rashes and mucosal bleeding until they were discharged. Data was entered in excel and SPSS version 16 for analysis.

## Results

During the study period, 423 children were admitted to the Paediatric Ward, of which 104 tested positive for dengue fever, representing 24% of total admissions. The average age of the children with dengue was seven years (± 4.37). Among the patients, 64 were males and 40 were females.

**Table1:** Sex and age distribution of cases as per severity

| | | Dengue without warning signs | Dengue with warning signs | Severe dengue | Total |
|---|---|---|---|---|---|
| Male | | 32 | 32 | 0 | 104 |
| Female | | 16 | 22 | 2 | |
| Age (years) | < 1 | 6 | 3 | 0 | |
| | 1 - 5 | 26 | 9 | 1 | |
| | 5 - 15 | 16 | 42 | 1 | |

The highest recorded temperature was 104°F, with an average temperature of 100.75°F (± 1.68). The hematocrit levels ranged from a low of 24 to a high of 49, with a mean hematocrit of 36.45 (± 4.41). The duration of admission varied, with a minimum of one day and a maximum of nine days, resulting in a mean hospital stay of 4.65 days (± 1.90). The average duration of fever was 3.88 days.

**Table 2:** Distribution of clinical symptoms and signs among dengue cases

| Clinical features | Dengue without warning signs | Dengue with warning signs | Severe dengue | Total |
|---|---|---|---|---|
| Fever | 48 | 54 | 2 | 104 |
| Pain abdomen | 1 | 26 | 2 | 29 |
| Vomiting | 5 | 28 | 0 | 33 |
| Anorexia | 6 | 10 | 0 | 16 |
| Loose stool | 5 | 2 | 0 | 7 |
| Body ache | 5 | 8 | 0 | 13 |
| Eye pain | 0 | 5 | 0 | 5 |
| Rash | 2 | 4 | 0 | 6 |
| Nasal bleeding | 0 | 16 | 1 | 17 |
| Headache | 6 | 14 | 1 | 21 |
| Runny nose | 5 | 0 | 0 | 5 |
| Throat pain | 1 | 1 | 0 | 2 |
| Others (photophobia, seizures, edema, cough) | 8 | 3 | 1 | 12 |
| Hypotension | 0 | 6 | 2 | 8 |
| Hepatomegaly | 0 | 3 | 1 | 4 |
| Non hemorrhagic rash | 1 | 1 | 0 | 2 |
| Abdominal tenderness | 0 | 2 | 1 | 3 |
| Conjunctival injection | 0 | 2 | 0 | 2 |
| Congested pharynx | 2 | 0 | 0 | 2 |

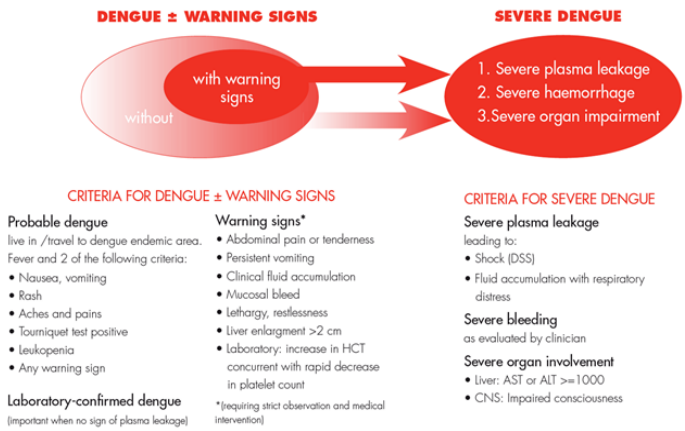


**Figure 1:** Dengue infection as per WHO classification[10]

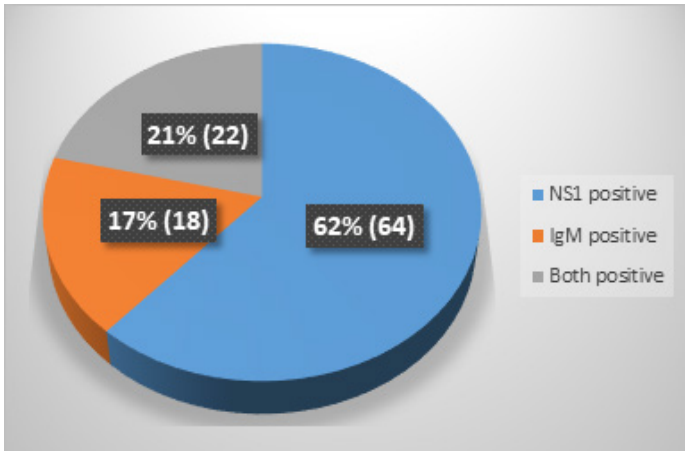


**Figure 2:** Distribution of test results among dengue patients

**Table 3:** Distribution of laboratory results among patients

| | | Dengue without warning signs | Dengue with warning signs | Severe dengue | Total |
|---|---|---|---|---|---|
| Total leucocyte count | < 4000 | 17 | 34 | 1 | |
| | 4000 - 11000 | 18 | 19 | 1 | |
| | < 11000 | 13 | 1 | 0 | |
| Platelet count (per cumm) | < 50000 | 5 | 2 | 0 | |
| | 50000 - 100000 | 7 | 12 | 1 | 104 |
| | 100000 - 150000 | 12 | 13 | 1 | |
| | > 150000 | 25 | 22 | 0 | |
| SGPT (U/L) | < 50 | 6 | 16 | 1 | |
| | 50 - 200 | 6 | 8 | 0 | 45 |
| | > 200 | 2 | 6 | 0 | |
| SGOT (U/L) | < 50 | 4 | 3 | 0 | |
| | 50-200 | 3 | 10 | 1 | 32 |
| | >200 | 4 | 7 | 0 | |

**Table 4:** Frequency duration of hospital stay among different age categories.

| Hospital stay (Days) | Dengue without warning signs | Dengue with warning signs | Severe dengue | Total |
|---|---|---|---|---|
| 0 - 3 | 7 | 16 | 1 | 24 |
| 3 - 6 | 26 | 32 | 0 | 58 |
| > 6 | 15 | 6 | 1 | 22 |

## Discussion

Dengue fever is a significant concern in tropical countries, with an increasing incidence in recent decades.[11] In this study, conducted in accordance with WHO dengue guidelines, we identified 104 children with dengue fever, of whom 46.2% (47) had dengue without warning signs, 51.9% (57) had dengue with warning signs, and 1.9% (2) had severe dengue. This differs from a previous study in Nepal,[12] which reported that 68.5% of cases were without warning signs. This discrepancy may have resulted as the present research has been conducted at a tertiary hospital where more severely ill children are referred.

Fever was the most common symptom in this study present in all 104 cases. Other symptoms included vomiting (31.7%), abdominal pain (27.9%), headache (20.2%), and epistaxis (16.3%). Febrile seizures were more common in children without warning signs, while vomiting and abdominal pain were prevalent in those with warning signs. In children with

severe dengue, abdominal pain, epistaxis, and headache were more frequent. These findings are consistent with a 2019 study at Gandaki Medical College, Pokhara, Nepal,[12] where fever was also reported in 100% of cases. A study by Manjith Narayanan et al [14] also showed that fever and vomiting were the common symptoms in dengue fever. These symptoms were commonly reported in similar other researches too.[11,15,16]

In our study, eight (7.7%) patients experienced hypotension, primarily among those with warning signs. We observed only two cases of severe dengue, both of which developed hypotension during their hospital stay. This is comparable to findings from India,[17] where 7.9% of children with severe dengue had hypotension. Other clinical signs seen in our study population included a congested pharynx in children without warning signs, while hepatomegaly and abdominal tenderness which were more common among those with warning signs. In our population, hepatomegaly was noted in just 3.8%, significantly lower than the 40 - 66% reported in other studies,[15,18] likely due to the limited number of severe dengue cases in the present study.

Our laboratory findings revealed that 50% of the children had a white blood cell count below 4000, with most of these cases having warning signs. This contrasts with a study by S Mishra et al,[11] which found that 50% had normal WBC counts. In the early stages of dengue, a progressive decline in total WBC count is often observed. Only 13.4% of cases had a WBC count above 11,000, predominantly in children without warning signs. Additionally, 54.8% of children had a platelet count below 150,000, with 12.2% below 50,000. These findings are consistent with S Mishra et al's study,[11] which noted that 84.2% of severe dengue cases presented with thrombocytopenia. Leucopenia may be attributed to the virus-induced destruction or suppression of myeloid progenitor cells.[19]

In our cohort, 61% of children tested positive for the NS1 antigen alone, while 21% had both IgM and NS1 positive, and 17% were positive for IgM only. This aligns with findings from KC N et al,[12] although another study[20] reported NS1 positivity in only 38.1% of cases. Serial tests indicated that 35 patients experienced elevated hematocrit levels, with an average increase of 2.97, potentially due to third space loss. Conversely, 26 cases showed a drop in hematocrit levels, averaging a decrease of 2.76, despite no significant overt bleeding observed. In 43 cases, hematocrit levels remained stable.

Among children requiring liver enzyme evaluation, the majority exhibited elevated SGOT compared to SGPT, similar to findings by S Mishra et al.[11] This elevation, particularly in SGOT, may indicate myocyte involvement in dengue fever.[1] Most children in our study were hospitalized for 4 - 6 days, with a mean stay of 4.65 days (± 1.90), consistent with findings in Indian population.[11] Notably, there were no fatalities among the enrolled patients, mirroring results from KC et al.[12] A previous study in Southeast Asia reported a case fatality rate below 1%, while some South East Asian Countries still report rates above 1%.[21] The lack of mortality in our population may be attributed to the low number of severe cases and earlier effective management. Early diagnosis and intervention are critical to reducing morbidity and mortality associated with dengue infection.

## Conclusions

Dengue fever has become a prevalent infection in tropical countries, particularly affecting school-aged children within the paediatric population. A significant number of admissions are due to warning signs rather than severe dengue or cases without warning signs. Common clinical symptoms include high fever, abdominal pain, vomiting, and headache, while laboratory findings frequently show thrombocytopenia, elevated hematocrit, and leucopenia.

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