Research Article

Cuestiones de Fisioterapia

General Medicine

CLINICAL PROFILE, COMPLICATIONS, AND RISK FACTORS OF DENGUE FEVER AMONG HOSPITALIZED ADULTS: A CROSS-SECTIONAL STUDY

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Abstract

Background: Dengue is the most rapidly spreading mosquito-borne viral disease in the tropics and a major cause of febrile hospital admission in India. Although often self-limiting, dengue in adults can progress to plasma leakage, severe bleeding, organ involvement and shock, making early clinical characterisation important for triage and management. Objectives: To describe the clinical profile, laboratory features, complications and outcomes of dengue fever among hospitalized adults, and to identify features associated with severe disease, at a tertiary care hospital in South India. Methods: In this hospital-based cross-sectional study, 500 adults admitted with serologically supported dengue (NS1 antigen and/or dengue IgM) were studied. Clinical features, warning signs, haematological and biochemical parameters, complications, and in-hospital outcomes were recorded on a structured proforma using standard/WHO-based definitions. The analysis is based on a synthetic dataset (see Methods). Data were summarised using descriptive statistics. Results: The mean age was 38.9 ± 13.1 years, with an equal sex distribution; the mean duration of fever before admission was 4.9 ± 1.6 days. Fever was universal (100%), followed by myalgia (72.8%), headache (60.0%), nausea/vomiting (51.2%), arthralgia (50.2%), retro-orbital pain (41.8%), rash (21.6%) and abdominal pain (16.8%). NS1 antigen was positive in 55.4% and dengue IgM in 69.2%. The mean platelet count was 79,730 ± 45,948/µL and mean haematocrit 42.8 ± 5.4%; transaminases were elevated (mean AST 103.9 U/L, ALT 84.7 U/L). Complications included pleural effusion (10.4%), ascites (10.2%), shock (4.6%), severe bleeding (2.6%), severe hepatitis (2.4%), myocarditis (2.4%) and acute kidney injury (2.2%). ICU admission was required in 13.2% and platelet transfusion in 19.4%. The mean hospital stay was 5.2 ± 1.9 days; 450 (90.0%) were discharged and in-hospital mortality was 1.6%. Conclusion: Dengue in hospitalized adults presented with a characteristic febrile syndrome, thrombocytopenia and transaminitis, with plasma-leakage phenomena and bleeding accounting for most severe disease. Recognition of warning signs, serial platelet and haematocrit monitoring, and judicious fluid management are central to reducing morbidity and mortality.

Keywords: dengue fever; thrombocytopenia; plasma leakage; transaminitis; hospitalized adults; South India

Introduction

Dengue is a mosquito-borne flaviviral infection transmitted principally by *Aedes aegypti*, and its incidence has risen dramatically over recent decades to make it the most important arboviral disease of humans. India bears a substantial share of the global burden, with recurrent seasonal epidemics—typically in the post-monsoon months—straining hospital services and generating large numbers of adult admissions [1,2,3]. The clinical spectrum ranges from asymptomatic infection and self-limiting dengue fever to severe disease characterised by plasma leakage, haemorrhage, shock and organ impairment.

The clinical presentation of dengue in adults differs in important respects from that in children, with a higher frequency of overt bleeding and hepatic involvement and a lower frequency of the classical shock syndrome in some series [4,10]. The febrile phase is dominated by high fever, myalgia, headache, retro-orbital pain and arthralgia, while the critical phase—usually around defervescence—is when plasma leakage and its complications emerge. Warning signs such as abdominal pain, persistent vomiting, mucosal bleeding, lethargy and clinical fluid accumulation identify patients at risk of progression and are central to contemporary triage [4]. Laboratory hallmarks include leucopenia, progressive thrombocytopenia and haemoconcentration, together with frequently elevated transaminases reflecting the hepatotropism of the virus [8,9,10,11].

Hepatic involvement deserves particular emphasis, since transaminase elevation is almost ubiquitous in adult dengue and correlates with disease severity; occasional patients develop fulminant hepatitis, which carries a high mortality [8,9,10,11]. Other atypical and organ-specific manifestations—including myocarditis, encephalopathy, acute kidney injury and dengue maculopathy—are increasingly recognised and may dominate the clinical picture in a minority of patients [2,12]. Cytokine-mediated endothelial dysfunction is thought to underlie the plasma leakage that defines severe disease, and circulating mediators have been explored as predictors of severity [5].

Dengue is caused by four antigenically related serotypes (DENV-1 to DENV-4); infection with one serotype confers lasting immunity to that serotype but only transient cross-protection against the others, and subsequent infection with a different serotype is an established risk factor for severe disease through antibody-dependent enhancement. This immunological background, combined with the co-circulation of multiple serotypes in hyperendemic settings, contributes to the year-to-year variability in epidemic size and severity and to the shifting balance between classical dengue fever and severe forms. In adults, pre-existing comorbidity such as diabetes and hypertension may further modify the clinical course and the risk of complications.

Because the epidemiology, predominant serotype and clinical pattern of dengue vary between epidemics and regions, locally generated descriptions of the adult clinical profile remain valuable for guiding triage, resource allocation and management [1,3,6,7]. The present study was undertaken to describe the clinical profile, laboratory features, complications and outcomes of dengue fever among hospitalized adults, and to identify features associated with severe disease, at a tertiary care hospital in South India.

Materials and Methods

Study design and setting

This was a hospital-based, descriptive cross-sectional study conducted in the Department of General Medicine, a tertiary care teaching hospital, South India, the study was approved by the Institutional Ethics Committee.

Nature of the dataset

The analysis presented here is based on a synthetic, simulated dataset generated for methodological and illustrative purposes; it does not represent real patient records or laboratory measurements. All values are illustrative and hypothesis-generating. Before this protocol is applied in practice, records must be replaced with approved, de-identified observations, and the ethics approval, institution, recruitment period and laboratory results must be supplied.

A cross-sectional design was selected to characterise, in a consecutive series of hospitalized adults, the contemporary clinical and laboratory profile of dengue and the frequency of its complications. Such descriptive data are most useful when generated locally and periodically, because the dominant serotype and hence the severity mix change between transmission seasons.

Participants and definitions

Five hundred adults admitted with a clinical diagnosis of dengue supported by a positive NS1 antigen and/or dengue IgM antibody were included. Warning signs, severe dengue, shock, severe bleeding, organ involvement and acute kidney injury were classified using protocol/WHO-based definitions applied consistently. Laboratory values were recorded at a protocol-specified time point (admission/worst value), including haemoglobin, haematocrit, white cell and platelet counts, aspartate and alanine aminotransferases (AST, ALT), total bilirubin, albumin, creatinine, urea and coagulation parameters.

Data collection

Demographic details, duration of fever before admission, prior dengue history, comorbidities, symptoms (fever, headache, retro-orbital pain, myalgia, arthralgia, nausea/vomiting, abdominal pain, rash), bleeding manifestations, clinical fluid accumulation, hepatomegaly, serology, laboratory parameters, complications (pleural effusion, ascites, shock, severe bleeding, severe hepatitis, myocarditis, encephalopathy, acute kidney injury, respiratory distress), supportive interventions (ICU admission, platelet and red-cell transfusion) and in-hospital outcome were recorded on a structured proforma.

Statistical analysis

Data were summarised using descriptive statistics; categorical variables were expressed as frequencies and percentages and continuous variables as mean ± standard deviation.

Results

Demographic and clinical profile

The mean age of the 500 patients was 38.9 ± 13.1 years, with a near-equal sex distribution (254 women, 50.8%; 246 men, 49.2%). Patients presented after a mean of 4.9 ± 1.6 days of fever, and 16.2% reported a prior history of dengue. The commonest comorbidities were hypertension (19.0%), diabetes mellitus (16.2%), chronic liver disease (2.8%) and chronic kidney disease (2.6%) (Table 1). Fever was universal (100%), followed by myalgia (72.8%), headache (60.0%), nausea/vomiting (51.2%), arthralgia (50.2%), retro-orbital pain (41.8%), rash (21.6%) and abdominal pain (16.8%) (Table 2; Figure 1). Bleeding manifestations comprised mucosal bleeding (10.8%), other bleeding (5.2%) and gastrointestinal bleeding (1.6%); clinical fluid accumulation was noted in 7.6% and hepatomegaly in 8.2%.

Table 1: Demographic profile and comorbidities (N = 500).

Variable	Category	Value

Age (years), mean ± SD		38.9 ± 13.1
Sex	Female	254 (50.8%)
	Male	246 (49.2%)
Residence	Urban	208 (41.6%)
	Rural	169 (33.8%)
	Semi-urban	123 (24.6%)
Fever duration before admission (days)		4.9 ± 1.6
Prior dengue history		16.2%
Hypertension		19.0%
Diabetes mellitus		16.2%
Chronic liver disease		2.8%
Chronic kidney disease		2.6%

Table 2: Presenting clinical features.

Feature	%
Fever	100.0
Myalgia	72.8
Headache	60.0
Nausea/vomiting	51.2
Arthralgia	50.2
Retro-orbital pain	41.8
Rash	21.6
Abdominal pain	16.8
Mucosal bleeding	10.8
Hepatomegaly	8.2
Clinical fluid accumulation	7.6

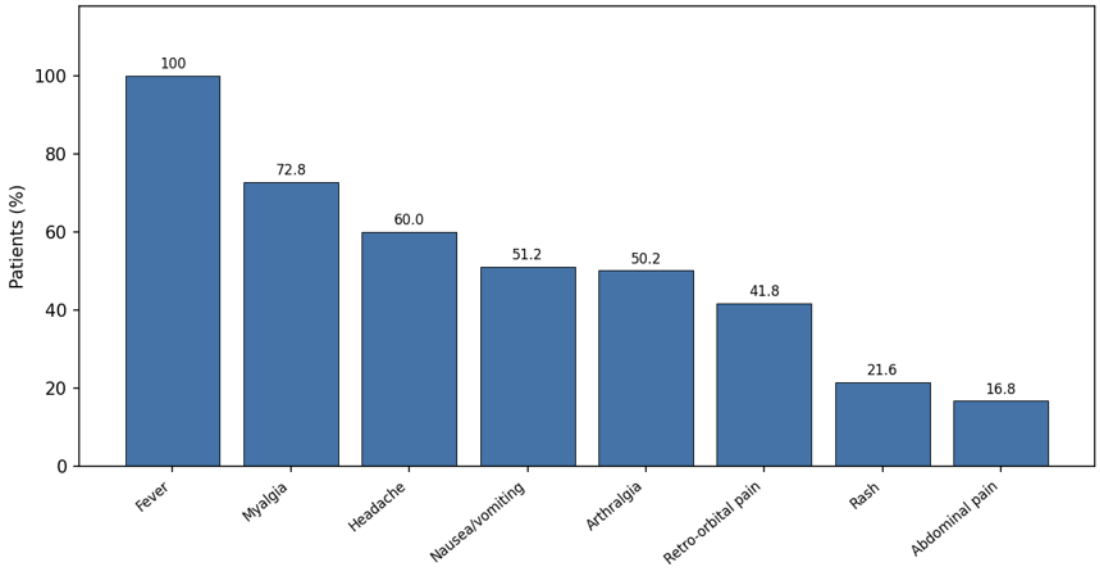

Figure 1: Frequency of presenting clinical features among hospitalized adults with dengue (%).

Serological and laboratory profile

NS1 antigen was positive in 277 patients (55.4%), dengue IgM in 346 (69.2%) and dengue IgG in 188 (37.6%). The mean haemoglobin was 14.3 ± 1.9 g/dL and haematocrit 42.8 ± 5.4%; the mean white cell count was 4,237 ± 1,651/µL and the mean platelet count 79,730 ± 45,948/µL, reflecting the leucopenia and thrombocytopenia characteristic of dengue. Hepatic transaminases were frequently elevated, with a mean AST of 103.9 ± 70.2 U/L and ALT of 84.7 ± 51.9 U/L; the mean total bilirubin (0.9 ± 0.4 mg/dL) and creatinine (1.0 ± 0.2 mg/dL) were within or near the normal range (Table 3).

Table 3: Serological and laboratory profile.

Parameter	Value
NS1 antigen positive	277 (55.4%)
Dengue IgM positive	346 (69.2%)
Dengue IgG positive	188 (37.6%)
Haemoglobin (g/dL), mean ± SD	14.3 ± 1.9
Haematocrit (%)	42.8 ± 5.4
White cell count (/µL)	4,237 ± 1,651
Platelet count (/µL)	79,730 ± 45,948
AST (U/L)	103.9 ± 70.2
ALT (U/L)	84.7 ± 51.9
Total bilirubin (mg/dL)	0.9 ± 0.4
Creatinine (mg/dL)	1.0 ± 0.2

The serological pattern, with NS1 antigen positivity in just over half and IgM positivity in about two-thirds, is consistent with a cohort presenting several days into the illness, since NS1 antigenaemia declines and

IgM rises as the disease evolves; the presence of detectable IgG in a substantial minority is compatible with a proportion of secondary infections. This temporal interplay of markers reinforces the value of combining antigen and antibody testing to maximise diagnostic yield across the phases of illness.

Complications and outcomes

Plasma-leakage phenomena were the commonest complications, with pleural effusion in 10.4% and ascites in 10.2%. Shock occurred in 4.6%, severe bleeding in 2.6%, severe hepatitis in 2.4%, myocarditis in 2.4%, acute kidney injury in 2.2%, respiratory distress in 2.0% and encephalopathy in 1.4% (Table 4; Figure 2). Supportive care included ICU admission in 13.2%, platelet transfusion in 19.4% and packed red-cell transfusion in 2.8%. The mean hospital stay was 5.2 ± 1.9 days. At discharge, 450 patients (90.0%) had recovered, 27 (5.4%) were referred, 15 (3.0%) left against medical advice and 8 (1.6%) died.

Table 4: Complications, supportive care and outcomes.

Variable	Value
Pleural effusion	10.4%
Ascites	10.2%
Shock	4.6%
Severe bleeding	2.6%
Severe hepatitis	2.4%
Myocarditis	2.4%
Acute kidney injury	2.2%
Respiratory distress	2.0%
Encephalopathy	1.4%
ICU admission	13.2%
Platelet transfusion	19.4%
Packed red-cell transfusion	2.8%
Hospital stay (days), mean ± SD	5.2 ± 1.9
Discharged	450 (90.0%)
Death	8 (1.6%)

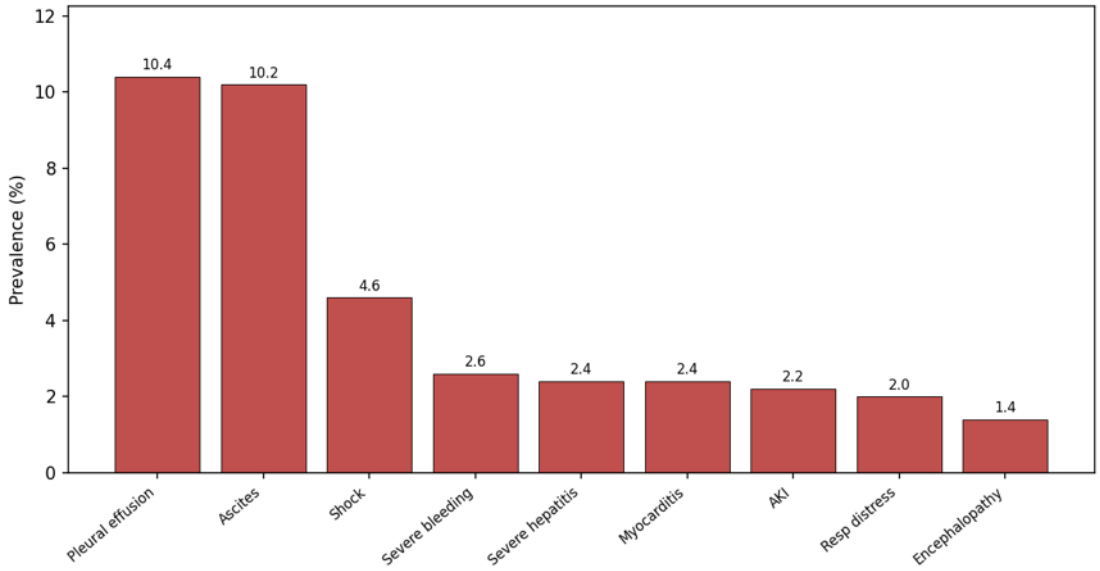

Figure 2: Frequency of complications among hospitalized adults with dengue (%).

Discussion

This cross-sectional study describes the clinical, laboratory and outcome profile of dengue in a large series of hospitalized adults. The presentation—universal fever accompanied by myalgia, headache, retro-orbital pain, arthralgia and gastrointestinal symptoms—reproduces the classical dengue syndrome reported from India and elsewhere, and the mean pre-admission fever duration of about five days is consistent with presentation around the transition to the critical phase [1,2,3,6]. The near-equal sex distribution and young-to-middle-aged profile likewise accord with hospital-based adult series [3,7].

Thrombocytopenia and transaminitis were the dominant laboratory abnormalities, with a mean platelet count below 80,000/μL and mean transaminases more than twice the upper limit of normal. Elevated transaminases are an almost universal feature of adult dengue and correlate with severity, as shown in large prospective cohorts from Vietnam and in comparative studies of dengue fever versus dengue haemorrhagic fever [10,11]. Occasional patients progress to severe or fulminant hepatitis, which is strongly associated with bleeding and carries a high mortality [8,9]. The pattern observed here—markedly elevated transaminases with only mild hyperbilirubinaemia—is typical of the hepatocellular injury of dengue rather than cholestasis.

Plasma-leakage phenomena, manifest as pleural effusion and ascites, were the commonest complications and are the pathophysiological hallmark of severe dengue, arising from cytokine-mediated increases in vascular permeability [5]. Shock, severe bleeding, myocarditis, encephalopathy and acute kidney injury each occurred in a small but clinically important minority, consistent with the recognised spectrum of severe and atypical dengue described in Indian outbreak reports and international series [2,4,12]. The requirement for ICU admission in 13.2% and platelet transfusion in 19.4% reflects the resource intensity of managing this minority, even though the overall in-hospital mortality remained low at 1.6%.

Several features identified here are relevant to risk stratification. Abdominal pain, persistent vomiting, mucosal bleeding, clinical fluid accumulation and hepatomegaly are recognised warning signs that predict progression to severe disease, and their systematic elicitation is central to contemporary triage [4]. Laboratory predictors of severe outcome include marked thrombocytopenia, rising haematocrit and

significant transaminase elevation, all of which were prevalent in this cohort and support serial monitoring of platelet count and haematocrit during the critical phase [4,10]. Because dengue lacks a specific antiviral therapy, outcomes depend heavily on meticulous supportive care—particularly judicious fluid management to counter plasma leakage while avoiding fluid overload—and on the timely recognition of deterioration.

The relatively modest rates of overt bleeding, and the concentration of severe outcomes among patients with plasma leakage, severe thrombocytopenia and marked transaminitis, are consistent with the predictor analyses reported in adult cohorts, in which plasma leakage, severe thrombocytopenia and acute hepatitis each identified subgroups with increased mortality [4,10]. The coexistence of these features in the same patient appears to be particularly hazardous, arguing for intensified monitoring when they cluster. Conversely, the majority of patients, who lacked these features, followed an uncomplicated course and recovered with supportive care alone—an important reassurance that informs bed-management and discharge planning during periods of high caseload.

From a public-health perspective, the recurrent, seasonal and serotype-dependent nature of dengue epidemics in India means that the clinical pattern, severity mix and predominant complications can vary between outbreaks [1,3,6]. Locally generated descriptions such as this therefore complement vector-control and surveillance programmes by informing hospital preparedness, triage protocols and the anticipatory allocation of critical-care and blood-bank resources during epidemic peaks.

A further point concerns fluid management, which remains the cornerstone of dengue care in the absence of specific antiviral therapy. During the critical phase, increased vascular permeability causes plasma to leak into the pleural and peritoneal spaces, producing the effusions and ascites that were the commonest complications in this series; judicious isotonic crystalloid replacement, titrated against haematocrit, urine output and haemodynamic status, is required to maintain circulation while avoiding the fluid overload that can precipitate respiratory distress once leakage resolves and fluid is reabsorbed. The small proportion of patients developing respiratory distress and requiring intensive care in this cohort illustrates the fine balance involved and the importance of frequent reassessment during and after defervescence.

Comparison with regional data situates these findings within the broader literature. Series from Delhi and Karnataka have similarly reported fever, myalgia and headache as dominant symptoms, frequent thrombocytopenia and transaminitis, and a small but consistent burden of severe and atypical manifestations, while outbreak reports have highlighted year-to-year variation in bleeding and organ involvement [1,2,3]. The concordance of the present profile with these reports supports the external validity of the clinical framework, even as absolute rates of specific complications are expected to vary with serotype and season.

Strengths and limitations

The principal limitation is that the study is based on a synthetic, illustrative dataset rather than prospectively collected patient data; the results demonstrate the analytical and reporting framework and are hypothesis-generating rather than definitive. Serotype data and confirmatory RT-PCR were not incorporated, and the cross-sectional design precludes formal multivariable analysis of independent predictors of severe disease. Serological classification cannot fully distinguish primary from secondary infection. Notwithstanding these caveats, the study applies standard WHO-based definitions within a STROBE-compliant framework and provides a structured overview of adult dengue in a tertiary care setting.

Conclusion

Dengue in hospitalized adults presented as a characteristic febrile illness with near-universal

thrombocytopenia and transaminitis, in which plasma-leakage phenomena and bleeding accounted for most severe disease. Although complications requiring intensive care and transfusion occurred in a clinically important minority, most patients recovered and in-hospital mortality was low. Systematic recognition of warning signs, serial platelet and haematocrit monitoring, careful fluid management and preparedness for organ-specific complications are central to reducing dengue morbidity and mortality, particularly during epidemic peaks.

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