



Demographic and clinical features of suspected dengue and dengue haemorrhagic fever in the Northern Province of Sri Lanka, a region afflicted by an internal conflict for more than 30 years—a retrospective analysis



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SUMMARY

Objectives: The aim of this study was to determine the demographic, clinical, and notification data of suspected dengue fever (DF) and dengue hemorrhagic fever (DHF) cases admitted to Jaffna Teaching Hospital, Sri Lanka.

Methods: The data were collected from bed head tickets of all patients presenting with clinically suspected DF/DHF from October 2009 to September 2010.

Results: A total of 1085 clinically suspected DF/DHF cases were identified, with high numbers occurring during December 2009 to March 2010. The majority of the reported patients were females ($n = 550$, 50.7%) and approximately three-quarters of the patients ($n = 797$, 73.5%) were adults. All had fever, but fever spikes were noted in only 129 cases (11.9%; 95% confidence interval (CI) 10.1–13.9%). Over 50% of cases had vomiting (95% CI 47.5–53.5%). Haemorrhages were noted in 266 (24.5%), with gum bleeding in 99 patients (37.2%). Low white blood cell and platelet counts were noted in 27.1% and 85.6% of cases, respectively. Of the 1085 cases, only 24 (2.2%) were screened for dengue IgM/IgG and only 458 cases (42.2%) were notified to the Epidemiology Unit, Ministry of Health, Sri Lanka.

Conclusions: The absence of laboratory diagnosis and poor notification to the Epidemiology Unit were the major drawbacks noted.

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1. Introduction

Dengue virus (DENV) infection has been affecting humans for many years, with an estimated 50 million DENV infections occurring every year globally. On average, one million dengue fever (DF) and dengue hemorrhagic fever (DHF) cases have been

reported annually in more than 100 countries in the tropical and subtropical regions of the world.¹ Dengue cases across the dengue endemic regions including the Americas, Southeast Asia, and the Western Pacific exceeded 1.2 million in 2008 and 2.3 million in 2010 based on official data submitted by the member states. Over the last 2 to 3 years, overall reported cases of dengue have continued to increase at an alarming rate, and there has been an expansion of the endemic regions.² Moreover, the spread of *Aedes* species mosquitoes and their adaptation to a changing climate, population growth, unplanned urbanization, evolving dengue viruses, and the lack of laboratory diagnostic facilities in several

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dengue endemic countries have not only contributed to the increase in dengue cases, but have also caused difficulties in managing the cases in those countries effectively.^{3,4}

DF/DHF is a mosquito-borne *Flavivirus* infection. DENV-infected individuals experience a spectrum of clinical manifestations, which include an acute self-limiting flu-like illness to a severe disease with haemoconcentration (20% increase in haematocrit) and evidence of plasma leakage, such as pleural effusion and ascites; the latter is termed DHF. Clinically DF is mid-way between mild DENV infection and DHF and is characterized by headache, myalgia, arthralgia, retro-orbital pain, and occasionally a maculopapular rash. In some patients, DHF might progress to hypovolemic shock and this is termed dengue shock syndrome (DSS).

DF/DHF is an increasingly important public health problem in Sri Lanka. Unlike malaria, which is prevalent in the agrarian suburban areas of the island, DF/DHF is prevalent mostly in the urban areas of cities. The four serotypes of DENV have been co-circulating in Sri Lanka for more than 30 years and their distribution has not changed drastically, despite the emergence of new subtypes within a serotype.³ Although the Sri Lankan population had been exposed to DENV for a long time, severe forms of DENV infection (DHF/DSS) were rare before 1989.⁵ Studies have shown the existence of more than one DENV serotype in many parts of the country,³ but the status of the different DENV serotypes and their presence in the Northern Province is not known, as the area was affected by war and was unsettled for more than 30 years. There was a report of an island-wide epidemic of DF associated with DENV serotypes 1 and 2 from 1965 to 1968 that caused DHF in 66 patients and 15 deaths.⁶ Serotypes DENV-1 and DENV-2 were isolated from the outbreaks in 1965 and 1966⁷ and the Northern Province was not affected by this epidemic.

Data from a study conducted between 2003 and 2006 indicated the circulation of DENV-1 serotype in the Western Province of Sri Lanka.⁸ In 2009, Sri Lanka experienced the largest epidemic of DF/DHF (35 008 reported cases and 346 deaths; 170 cases/100 000 population); a study conducted in Colombo determined the cause of this outbreak to be a new strain of DENV-1.⁹ However further investigations are necessary to determine the dynamics of the DENV DF/DHF outbreak of 2009 in the North Province of Sri Lanka. DENV nucleic acid detection by RT-PCR in patients with DF/DHF from August 2010 to December 2010 showed the predominance of DENV-1, accounting for more than 95% of cases in the Western Province of Sri Lanka;¹⁰ the virus type was similar

to that observed by the Epidemiology Unit of the country for the stated period, suggesting a serotype shift in the larger DF/DHF outbreaks in the last 2–3 years in Sri Lanka.

In general, over 1000 DF/DHF cases have been reported in Sri Lanka every year, mostly from the South, West, and Central provinces of the island. However, with the cessation of the 30-year conflict in the Northern Province, there has been a rapid increase in DF/DHF cases in the North (capital Jaffna) starting from the bigger island-wide outbreak in 2009 (Figure 1). Although a lot has been done to understand the circulating types of DENV in resource-limited areas like the Northern Province, we conducted this study to determine certain aspects of the epidemiology and clinical features of clinically suspected DF/DHF in patients admitted to Jaffna Teaching Hospital (JTH). We also sought to assess the accuracy of the case notification process to the Epidemiology Unit of the Ministry of Health, Sri Lanka.

2. Materials and methods

2.1. Study setting

Ethical clearance for the study was obtained from the Faculty of Medicine, University of Peradeniya, Sri Lanka. This was a retrospective study that analyzed the available data from JTH, which is the largest leading state hospital governed by the Central Government of Sri Lanka and is the only teaching hospital in the Northern Province of Sri Lanka. Altogether 2767 patients were admitted with a clinical diagnosis of DF/DHF between October 2009 and September 2010. However, complete data were available for only 1085 patients.

Data were extracted from patient notes to collect socio-demographic factors, clinical characteristics of the presenting illness, laboratory investigations, probable diagnosis, management, and the outcome of the illness. If not indicated in the individual case notes, certain signs and symptoms of DF/DHF were considered to be absent in that particular patient. The white blood cell count (WBC), platelet count, haemoglobin (Hb), packed cell volume (PCV), blood urea (BU), sodium, potassium, and dengue IgM/IgG were obtained from the laboratory reports. If reports were not available for a particular parameter, we assumed that the patient was not investigated for that parameter.

2.2. Notification data

Notification information for the patients with DF/DHF was obtained from the notification register maintained by the infection control unit of the hospital.

2.3. Data analysis

Data were analyzed using SPSS version 17 (SPSS Inc., Chicago, IL, USA); the Chi-square test and Fisher's exact test were used to explain associations. Odd ratios (OR) were used wherever applicable, and *p*-values of <0.05 were considered significant.

3. Results

A total of 1085 DF/DHF cases (with complete records) were identified for the period October 2009 to September 2010. A seasonal association was observed, with the highest number of DF/DHF cases occurring during January 2010. Five hundred and fifty (50.7%) of the reported cases were females. There were significantly more adult suspected DF/DHF cases than child cases ($n = 797, 73.5\%$; $p < 0.001$). Although all patients with DF/DHF had fever, fever spikes were noted on admission in only 129 cases (11.9%; 95% confidence interval (CI) 10.1–13.9%). On average, fever

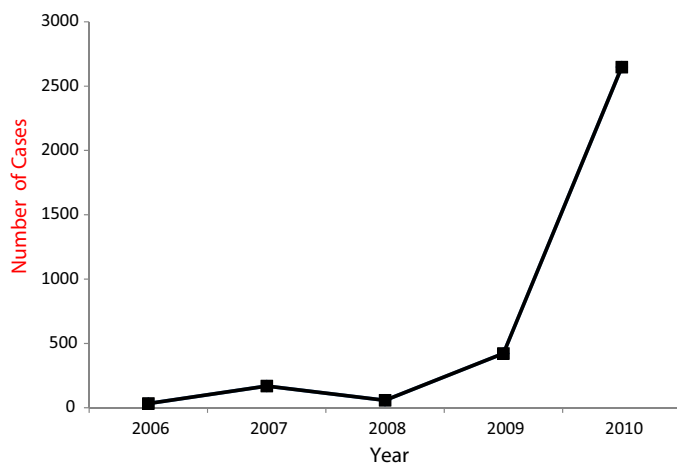


Figure 1. Notification of clinically suspected DF/DHF cases from Jaffna District, 2006–2010.

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