



Original Research

Comparison of the clinical manifestations exhibited by dengue and nondengue patients among children in a medical center in southern Taiwan

Shih-Tien Pan ^a, Po-An Su ^b, Kuo-Tai Chen ^{a,c}, Hung-Jung Lin ^{a,d}, Wen-Pin Lai ^{a,*}

^aEmergency Department, Chi-Mei Medical Center, Tainan, Taiwan

^bDepartment of Internal Medicine, Division of Infectious Disease, Chi-Mei Medical Center, Tainan, Taiwan

^cDepartment of Emergency Medicine, Taipei Medical University, Taipei, Taiwan

^dDepartment of Biotechnology, Southern Tainan University of Technology, Tainan, Taiwan

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Abstract

Background: Dengue is one of the most important mosquito-borne diseases. Taiwan is located in an epidemic area for dengue, and several dengue outbreaks have been reported in southern Taiwan. Therefore, we conducted this study to determine the incidence and clinical manifestations of symptomatic dengue infection.

Methods: We reviewed the medical records of 177 pediatric patients (age < 16 years) who underwent serum tests for dengue (polymerase chain reaction or capture enzyme-linked immunosorbent assay for dengue immunoglobulin M and immunoglobulin G antibodies) in the pediatric outpatient clinic, the pediatric ward, or the emergency department of the Chi-Mei Medical Center from January 1, 2007 to December 31, 2007. We evaluated the differences in the clinical characteristics and laboratory data between the dengue and nondengue patients.

Results: Most of the dengue cases appeared starting in July and peaked during November. In the dengue group, there were more school-age patients (age > 7 years) and a more frequent history of mosquito contact. There was no difference in the sex distribution. Most of the dengue patients had obvious symptoms including skin rash (79.0%), nausea/vomiting (47.4%), high fever (> 39°C; 44.7%), diarrhea (26.3%), abdominal pain (23.7%), and petechiae (15.8%). Leukopenia, thrombocytopenia, elevated aspartate aminotransferase levels, and elevated alanine aminotransferase levels were found in 78.4%, 79.3%, 34.5%, and 29.0% of the patients, respectively. Nondengue patients showed elevated C-reactive protein levels (57.5%).

Conclusion: Dengue is commonly found in older pediatric patients and is rare in infants. High fever and skin and gastrointestinal manifestations were usually found in dengue patients. The laboratory findings of leukopenia, thrombocytopenia, elevated levels of liver enzymes, and low C-reactive protein levels were common in dengue patients, and these markers could help confirm the suspicion of pediatric dengue infection.

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1. Introduction

Dengue virus is endemic in tropical and subtropical areas and is the most common cause of arboviral disease in the world.^{1,2} In adults, the classical presentation of dengue includes fever,

headache, myalgia, and skin rash.² However, the clinical features of dengue vary with age, and secondary infections are more likely to result in severe symptoms.¹ In addition, the limitations of verbal expression in the pediatric population might influence the presentation of dengue and make the diagnosis of dengue more difficult in children.

Taiwan is located in an epidemic area of dengue, and several dengue outbreaks have been reported in southern Taiwan.^{3,4} The accurate diagnosis and reporting of dengue infection is crucial for public health and disease control.

* Corresponding author. Emergency Department, Chi-Mei Medical Center, 901 Chung-Hwa Road, Yung Kang, Tainan 710, Taiwan.

E-mail address: shumiin@seed.net.tw (W.-P. Lai).

Pediatricians and emergency physicians need clear descriptions of the clinical features and laboratory findings for pediatric dengue patients. Therefore, we conducted a retrospective study to identify the common clinical and laboratory findings for pediatric dengue patients.

2. Materials and methods

This study was approved by the Institutional Review Board for Human Research of the Chi-Mei Medical Center, Tainan, Taiwan. We reviewed the charts of all pediatric patients (age < 16 years) who underwent serum tests for dengue [polymerase chain reaction or capture enzyme-linked immunosorbent assay for dengue immunoglobulin (Ig)M and IgG antibodies] in the pediatric outpatient clinic, the pediatric ward or the emergency department of the Chi-Mei Medical Center from January 1, 2007 to December 31, 2007. These patients were considered clinically suspected dengue cases.

All suspected cases were reported to the Centers for Disease Control (CDC), Taiwan, R.O.C. and blood samples from these patients were sent to the CDC. The diagnosis of dengue was established by the official report from the CDC. The diagnostic criteria for dengue included typical manifestations and positive results for virus isolation, dengue polymerase chain reaction, the presence of dengue nonstructural protein 1 antibody or the presence of paired dengue IgM and IgG antibodies with seroconversion or a ≥ 4 -fold increase. The patients whose first serum test for dengue IgM and IgG antibodies was positive but who did not meet the other diagnostic criteria were classified as probable cases.⁵

We reviewed the cases of 177 patients during the study period and excluded 18 patients because they were probable cases. Among the included patients, 38 patients had dengue, and the other 121 patients had a different disease. We used the Chi-square test to evaluate the differences in the clinical characteristics and laboratory data between the dengue and nondengue patients.

3. Results

3.1. General characteristics and clinical features

The monthly distribution of dengue patients is shown in Fig. 1. The dengue cases appeared starting in July and peaked in November, which is in line with the temporal distribution of dengue infections in Taiwan.⁶ The numbers of dengue and nondengue patients increased simultaneously. A comparison of the general characteristics of the dengue and nondengue patients revealed that both groups showed a slight male predominance (60.5% vs. 55.4%, $p = 0.58$). The age of the dengue patients varied from 1 year to 16 years. None of the dengue patients and 11 of the nondengue patients were younger than 1 year. There were more school-age patients (> 7 years) in the dengue group than in the nondengue group (73.7% vs. 43.8%, $p < 0.05$). There was a trend of more mosquito contact for the dengue patients (39.5% vs. 24.0%, $p = 0.06$; Fig. 2).

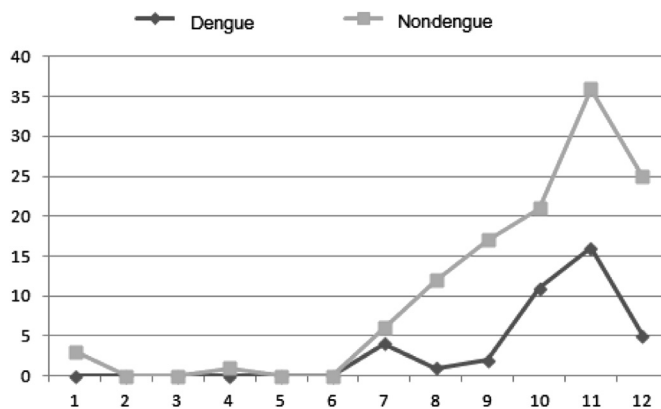


Fig. 1. The monthly distribution of dengue patients.

We selected 10 common clinical features that were present in > 15% of the dengue patients: skin rash, nausea/vomiting, fever > 39°C, cough, anorexia, diarrhea, myalgia/arthralgia, abdominal pain, malaise, and petechiae. A comparison of the frequencies of these clinical features between the dengue and nondengue groups revealed that there were statistically significant differences in the occurrence of skin rash, nausea/vomiting, fever > 39°C, diarrhea, abdominal pain, and petechiae between the groups (Table 1).

3.2. Laboratory findings

Serum tests to determine the complete blood cell count and levels of C-reactive protein (CRP), alanine aminotransferase (AST), and aspartate aminotransferase (ALT) were performed in 154/159 (96.9%), 126/159 (79.2%), and 65/159 (40.9%), respectively, of the reviewed patients. In the dengue group, we found that 27/37 (73.0%) were leukopenic (white cell count < $3.5 \times 10^9/L$), 32/37 (78.4%) were thrombocytopenic (platelets < $150 \times 10^9/L$), 23/29 (79.3%) had elevated AST levels, 10/29 (34.5%) had elevated ALT levels and only 9/31 (29.0%) had elevated CRP levels (> 6 mg/L). By contrast, the nondengue group contained fewer patients with leucopenia (22/

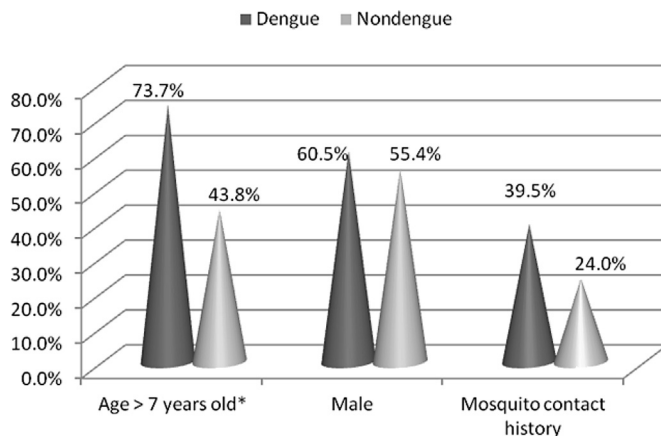


Fig. 2. Comparison of the clinical characteristics of the dengue and nondengue patients.

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