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Clinical and Demographic Profile of Pediatric Patients with Dengue Fever Admitted in Three Hospitals in Tagbilaran City

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Abstract

Objective: To determine the epidemiological and clinical features of pediatric patients with laboratory confirmed dengue infection in Bohol.

Methodology: This is a retrospective epidemiological study. The charts of children 0-14 years of age who were admitted to Gov. Celestino Gallares Memorial Hospital, Ramiro Community Hospital and Medical Mission Group-Cooperative Hospital for laboratory-confirmed dengue disease from January 2010 to December 2012 were reviewed. The age, gender, residence, clinical signs and symptoms, as well as outcome on discharge were noted and tabulated. Frequencies and percentages were computed for nominal data.

Results: There were 540 patients enrolled in the study. Results showed that dengue infection was most prevalent in children 4 to 7 years old. Dengue infection was also noted to be more frequent among female children. Tagbilaran City has the highest incidence of dengue disease in the province. Hepatomegaly, abdominal pain, vomiting and headache were the most common signs and symptoms. Most of the patients had either Classical Dengue Fever or Dengue Hemorrhagic Fever Grade I. All patients with Dengue Hemorrhagic Fever Grade IV died.

Conclusion: Among patients with laboratory-confirmed dengue infection in Bohol, the highest proportion was noted among children 4 to 7 years old. Females were more often afflicted with dengue than males. Coastal towns had higher incidence of dengue compared to inland towns. The most common signs and symptoms on admission were hepatomegaly, abdominal pain, vomiting and headache. Majority of children with dengue had either Classical Dengue Fever or Dengue Hemorrhagic Fever Grade I. All patients with Dengue Hemorrhagic Fever Grade IV died.

Keywords: Dengue fever; Demographic profile; Pediatric patients; Blood-feeding mosquitoes

Introduction

Dengue disease is the most prevalent arthropod-borne viral disease in humans. It is caused by four serotypes of single-strand RNA flavivirus (dengue virus [DENV]-1, -2, -3 and -4), which are transmitted by blood-feeding mosquitoes, mainly *Aedes aegypti* [1,2]. This mosquito breeds in open water containers and can survive year round in tropical and subtropical climates.

The global burden of dengue is large and growing [3-6]. Recent estimates put the annual number of dengue infections at 390 million, of which 96 million are asymptomatic [3]. According to an evidence-based concensus study, DENV transmission occurs in 128 countries worldwide, with 3.97 billion people at risk of dengue infection, of which at least 70% live in the Asia-Pacific region [3,7].

Dengue is a growing health concern in the Philippines as well. Outbreaks were reported in 1926 [8,9] and the first recorded epidemic in Southeast Asia occurred in Manila in 1954 [10,11]. Further epidemics occurred in 1966, 1983 and 1998 with increasing reported cases of dengue disease [12-15]. The 1998 epidemic had the highest recorded incidence rate (60.9 cases per 100,000 population) and case fatality rate (CFR; 2.6%) [12].

The rising incidence of dengue disease can be explained by several factors. During World War II, the movement of people and equipment expanded the geographic distribution of *Aedes aegypti* and dengue disease in Southeast Asia [10]. Since then, virus propagation in the region has been facilitated by rapid urbanization, environmental degradation, the lack of a reliable water supply and improper management and disposal of solid waste [10,16]. In the Philippines, the percentage of the population living in urban areas increased from 27.1% in 1950 to 58.5% in 2000 [17].

Approximately 36% of annual dengue infections occur among children aged 1-9 years and the average age of infection is 12 years [18]. Symptoms such as fever and rash in young children and fever, severe headache, pain behind the eyes, rash and muscle and joint pain in adolescents and adults are the more consistent findings [19].

Significance of the Study

This study would like to provide a source of epidemiological data on dengue disease specifically in the Province of Bohol and to identify gaps in epidemiological knowledge requiring further research.

Objectives of the Study

General objective

To determine the epidemiological and clinical features of pediatric patients with laboratory-confirmed dengue infection in Bohol.

Specific objectives

1. To determine the epidemiological profile of pediatric patients admitted for dengue in terms of:

   - Age
   - Gender
   - Residence

1. To determine the common signs and symptoms of pediatric patients admitted for dengue.

2. To determine the outcome of pediatric patients admitted for dengue.

Methodology

Study design

This was a descriptive, retrospective, epidemiological study of dengue disease in the pediatric wards of three hospitals in Bohol, namely, Gov. Celestino Gallares Memorial Hospital, Medical Mission Group-Cooperative Hospital and Ramiro Community Hospital.

Study population

Children 0 to 14 years of age who were admitted for laboratory-confirmed dengue disease from January 2010 to December 2012 were enrolled in the study.

Patients with congenital heart disease, rheumatic heart disease, diabetes mellitus, tuberculosis, hematologic problems and other concomitant conditions were excluded from the study as their manifestations for dengue may be obscured or modified by their co-morbid conditions.

Data gathering

The charts of children who qualified for enrolment to the study were reviewed. Epidemiological data, i.e., age, gender and residence and clinical signs and symptoms were noted. The outcome of these patients on discharge was also noted (Table 1).

Definition of terms

1. Laboratory-confirmed dengue=dengue infection confirmed by serological assay that determines the presence of one or both of the following: NS1 antigen, dengue IgM antibody.

2. Outcome=refers to the WHO 2007 classification and grading of dengue infection as written on the final diagnosis of each patient's chart.

Classification	Grading	Symptoms	Laboratory
Classical dengue/Dengue fever		Fever with two or more of the following signs: Headache, retro-orbital pain, myalgia, arthralgia, plus positive tourniquet test.	Leukopenia occasionally, thrombocytopenia may be present, no evidence of plasma loss.
Dengue hemorrhagic fever	I	Above signs and symptoms.	Thrombocytopenia ≤ 100,000/µL, hematocrit rise ≥ 20%.
	II	Above signs and symptoms plus spontaneous bleeding.	
	III	Above signs and symptoms plus circulatory failure (weak pulse, hypotension, restlessness).	
	IV	Profound shock with undetectable blood pressure and pulse.	

Table 1: The charts of children who qualified for enrolment to the study.

Data analysis

Data were encoded and tallied in SPSS version 10 for Windows. Descriptive statistics were generated for all variables. Frequencies and percentages were computed for nominal data.

Results

There were 540 patients enrolled in the study.

Table 2 shows the age distribution of the subject population. It is shown in here that dengue was most prevalent in children 4 to 7 years old, followed by children 8 to 11 years old.

Table 3 presents the distribution of dengue patients according to gender. This shows that dengue was more prevalent among females.

Table 4 shows the distribution of dengue patients according to residence. This shows that Tagbilaran City had the highest incidence of dengue disease, followed by Panglao, Dauis, Loon, Calape, Maribojoc, Tubigon and Inabanga in decreasing order. Bilar, Loboc and Mabini had the least incidence of dengue disease.

Table 5 shows the common signs and symptoms on admission of pediatric patients with dengue. It is shown by this table that the most common signs and symptoms were hepatomegaly, abdominal pain, vomiting and headache. Petechiae and epistaxis were the more common bleeding manifestations.

Table 6 shows the outcome of dengue patients. Patients with Grade I DHF were most prevalent. These were the patients who had thrombocytopenia or hemoconcentration but without bleeding and who remained stable throughout their hospital stay. Patients with DHF Grade IV were least prevalent; however, these patients all died and contributed to the mortality rate from dengue infection. As it is, the mortality rate was 4.81%, which is high.

Age Group (years)	n	%
0-3	55	10.19
4-7	257	47.59
8-11	162	30.00
12-14	66	12.22
Total	540	100

Table 2: Age distribution of dengue patients.

Gender	n	%
Male	225	41.67
Female	315	58.33
Total	540	100.00

Table 3: Gender distribution of dengue patients.

Municipality	n	%
Baclayon	7	1.29
Balilihan	3	0.56
Bilar	2	0.37
Calape	42	7.78
Carmen	5	0.93
Clarin	9	1.67
Corella	3	0.56
Cortes	5	0.93
Danao	4	0.74
Dauis	68	12.59
Dimiao	6	1.11
Inabanga	23	4.26
Jagna	7	1.29
Loay	4	0.74
Loboc	2	0.37
Loon	62	11.48
Mabini	2	0.37
Maribojoc	41	7.59
Panglao	75	13.89
Sagbayan	7	1.29
Tagbilaran	133	24.63
Talibon	4	0.74

Tubigon	26	4.81
Total	540	100.00

Table 4: Incidence of dengue according to municipality.

Signs and symptoms	n	%
Abdominal pain	213	39.44
Cool extremities	32	5.93
Decreased appetite	43	7.96
Epistaxis	42	7.78
Gum bleeding	21	3.89
Headache	63	11.67
Hematemesis	24	4.44
Hepatomegaly	245	45.37
Hypotension	20	3.7
Melena/hematochezia	20	3.7
Petechiae	52	9.63
Rash	46	8.52
Vomiting	101	18.7
Weakness	33	6.11

Table 5: Signs and symptoms on admission of dengue patients.

Outcome	n	%
Classical dengue	162	30.00
DHF grade I	178	32.96
DHF grade II	127	23.52
DHF grade III	47	8.70
DHF grade IV	26	4.81
Total	540	100.00

Table 6: Outcome of dengue patients.

Discussion

Dengue is the most rapidly spreading mosquito-borne viral disease in the world. An estimated 50 million dengue infections occur annually and approximately 2.5 billion people live in dengue endemic countries [19]. It has emerged as a serious public health problem in the Western Pacific Region [20]. Between 2001 and 2008, 1,020,333 cases were reported in Cambodia, Malaysia, Philippines and Vietnam. The combined death toll for these four countries was 4798. Compared with other countries in the same region, the number of cases and deaths remained highest in Cambodia and the Philippines in 2008 [1].

This study showed that majority of dengue infections occur in the ages 4 to 11 years old, accounting for 77.59% of cases, with slightly more cases in the 4 to 7 years old group. This finding more or less jibes with the national data for dengue that showed that the highest proportion of dengue cases were reported in individuals who were 5-14 years old [21]. This finding is contrary to that found in a study in Mexico which showed that dengue peaks between the ages of 10 and 20 years [22]. The finding in this study also differed from that in a study in Rachaburi, Thailand which showed that there were more cases of dengue in 10-14 years old [23].

This study showed that more females were afflicted with dengue compared to males. This is similar to the data reported in Cardinal

Santos Medical Center from November 2006 to August 2007, in which dengue disease occurred in more females than in males [24]. This finding is also similar to that found in Mexico [22]. Again, this finding is contrary to that found in Thailand, in which the proportion of males and females was 54.6% and 45.4% [23].

The distribution of dengue disease by age group and sex is an important aspect of the clinical picture, particularly for identifying the population most at risk. This in turn has implication on vaccination programs of the government.

This study showed that coastal towns had higher incidence of dengue compared to inland towns. This may be explained in part by population density, with Tagbilaran City having the highest population density of 96,792 population over 3,650 hectares of land area [25]. The other towns with high incidence of dengue also had higher population density compared to those towns with low incidence of dengue. This may also be explained in part by human movement as a result of tourism [26], with Panglao and Dauis having the highest numbers of tourists. However, known factors, i.e., availability of water supply, water storage practices, environmental hygiene practices, etc., which influence the incidence of dengue cannot be ignored and were not looked into in this study.

This study showed that hepatomegaly, abdominal pain and vomiting were the most common manifestations of dengue patients. This finding is similar to that found in Mumbai children, in which hepatomegaly and vomiting were among the predominant clinical features of dengue [27]. Hepatomegaly is also common among Thai children with dengue [28]. Vomiting and headache are also part of the commonest presentation among dengue patients in Jeddah, Saudi Arabia [29]. Headache and abdominal pain are also common among children admitted in three regional hospitals in the Philippines [30]. The implication of this finding is that a high index of suspicion should be maintained when faced with febrile patients having these signs and symptoms.

This study showed that majority of children admitted for dengue had either the classical dengue fever or dengue hemorrhagic fever grade I. Only a few had dengue hemorrhagic fever grade IV. All patients diagnosed with dengue hemorrhagic fever grade IV died. The case fatality rate of dengue, at least for this study, was 4.81%. Although this case fatality rate cannot represent the case fatality rate for dengue for the whole province of Bohol, this however implies a more rigid implementation of dengue prevention and control programs in order to minimize fatality from this dreaded disease.

Conclusion

Among patients with laboratory-confirmed dengue infection in Bohol, the highest proportion was noted among children 4 to 7 years old. Females were more often afflicted with dengue than males. Coastal towns had higher incidence of dengue compared to inland towns. The most common signs and symptoms on admission were hepatomegaly, abdominal pain, vomiting and headache. Majority of children with dengue had either classical dengue fever or grade I dengue hemorrhagic fever. All patients with dengue hemorrhagic fever grade IV died.

Recommendation

This study showed the particular municipalities with high incidence of dengue. The author deems it proper that the Provincial Health Office be furnished a copy of this study to serve as basis for efforts to decrease the incidence of dengue infection in such municipalities.

The author also recommends another study that would try to determine the predictive markers for dengue shock syndrome. This can enhance the clinician's awareness of the probability of a more severe dengue infection and consequently guide him in the management of patients with dengue.

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