

CHANGING EPIDEMIOLOGY OF DENGUE PATIENTS AT VACHIRA PHUKET HOSPITAL, THAILAND

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Abstract: Between 2009 and 2015, 7,030 dengue patients, 3,580 male and 3,450 female, were admitted to Vachira Phuket Hospital, Phuket Province, Thailand. Among these patients, there were 2,257 with dengue fever (DF), 4,725 with dengue hemorrhagic fever (DHF), and 48 with dengue shock syndrome (DSS) with 22 deaths. The diagnosis of dengue patients adhered to clinical and laboratory criteria for the diagnosis of dengue patients established by the World Health Organization. The disease was seen all year round with higher incidence in the rainy season. A trend of shift in age group towards older children and adults was seen. Our study indicated that admissions of dengue patients to Vachira Phuket Hospital are common, causing a heavy burden on the health system. The trend towards higher age of dengue patients may have implications for further prevention and control of dengue.

Keywords: dengue, epidemiology, Phuket, Thailand

INTRODUCTION

Dengue is the most common arboviral infection in humans and is transmitted by *Aedes* mosquitoes, principally *Aedes aegypti*. There are four antigenically distinct serotypes of dengue virus (DEN 1-4), which can cause a continuum of disease: dengue fever (DF) causes fever, rash, muscle or joint pain, headache, and eye pain; dengue hemorrhagic fever (DHF) causes abnormal hemostasis and increased vascular permeability, with severe cases leading to dengue shock syndrome (DSS) and death. Because of factors such as environmental and climate change and human movement, a global increase in dengue cases has occurred, and there is also the potential spreading of the disease to non-endemic areas.

Main public health preventive interventions consist of mosquito control, which is currently used in endemic countries, and use of vector repellents.

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These interventions have generally had limited results. A dengue vaccine is seen as the best hope to fight this disease. In Thailand, dengue patients were first reported in Bangkok in 1958, and then appeared in other parts of the country (Thisyakorn and Thisyakorn, 2015a). The aim of this study was to describe the changes in the epidemiological pattern of dengue patients at Vachira Phuket Hospital, Phuket Province, Thailand.

MATERIALS AND METHODS

Dengue patients admitted to Vachira Phuket Hospital, Phuket Province, Thailand during 2009-2015 were studied. Vachira Phuket Hospital is a provincial hospital in southern Thailand. The diagnosis of dengue patients adhered to clinical and laboratory criteria for the diagnosis of dengue patients as established by the World Health Organization (WHO, 1997). The study was approved by the ethics committee of Vachira Phuket Hospital.

RESULTS

Between 2009 and 2015, 7,030 dengue patients, 3,580 male and 3,450 female, were admitted to Vachira Phuket Hospital, Phuket

Province, Thailand. Among these patients, there were 2,257 with dengue fever (DF), 4,725 with dengue hemorrhagic fever (DHF), and 48 with dengue shock syndrome (DSS) with 22 deaths. The disease was seen all year round with higher incidence in the rainy season, which begins in June and usually lasts until October (Fig 1).

Fig 2 describes the incidence by age group. Rates were constantly high among children with a trend of increasing mean age with time. Rates in older children and adults increased dramatically throughout the period of study. Fig 3 describes the severity of dengue disease by age group. It shows that all dengue severity can be seen in all age group with the trend of higher DSS cases in older children and young adults.

DISCUSSION

Dengue epidemics are known to have occurred regularly during the past decades in Phuket, Thailand, which causes a heavy burden on the health system. The population growth together with the remarkable degree of urbanization has allowed dramatic expansion of the mosquitoes through an increase of urban breeding sites. This may explain the explosive growth of reported

cases. A greater awareness and better reporting could have contributed to some of the increase over time. The reasons for the apparent upsurge in dengue are probably multifactorial.

Feeding efficiency of *Aedes aegypti* vectors increases with increasing temperature (Watts *et al*, 1987; Kuno, 1995). This may explain the increasing dengue patients during the dry hot season. Global warming may also contribute to greater spread of dengue infection (Patz *et al*, 1996). The availability of water and higher humidity, including higher biting rates, may augment an epidemic during the rainy period (Pant and Self, 1993). Weather patterns, with average temperatures and increases in rainfall, are classically seen as factors. Many other factors may influence the epidemiologic patterns of dengue beside climate, such as movements of mosquitoes, the type of circulating dengue viruses, environmental factors such as temperature and humidity, and human behavior and development.

Well-targeted research, such as population-based epidemiological studies with clear operational objectives, is needed to make progress in control and prevention. Dengue remains predominantly a pediatric disease, but the trend towards higher rates in older children and adults during the last

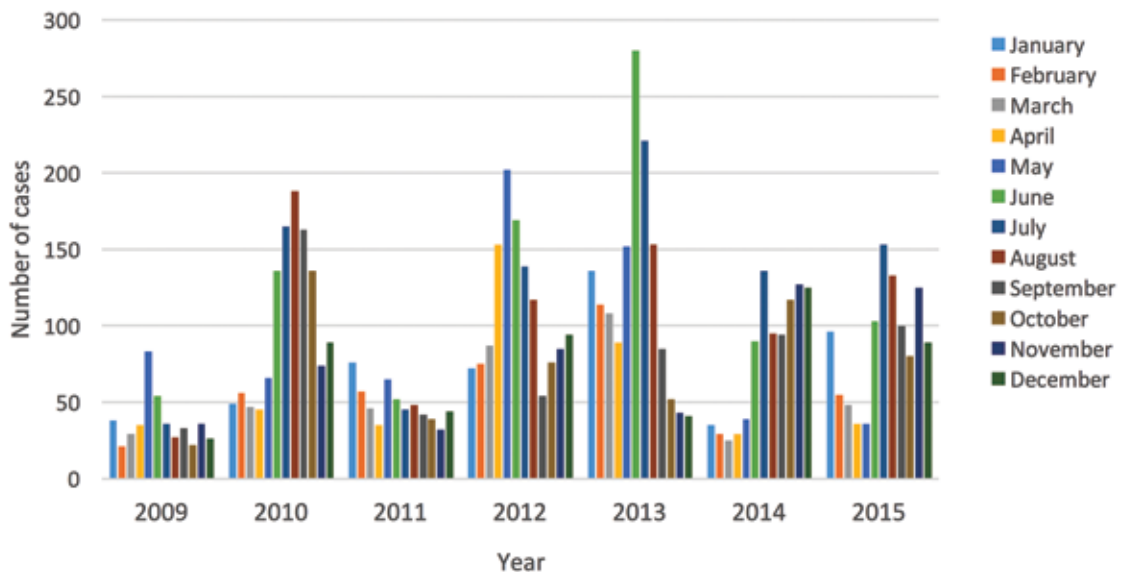


Fig 1–The seasonal distribution of dengue patients at Vachira Phuket Hospital, Thailand between 2009-2015.

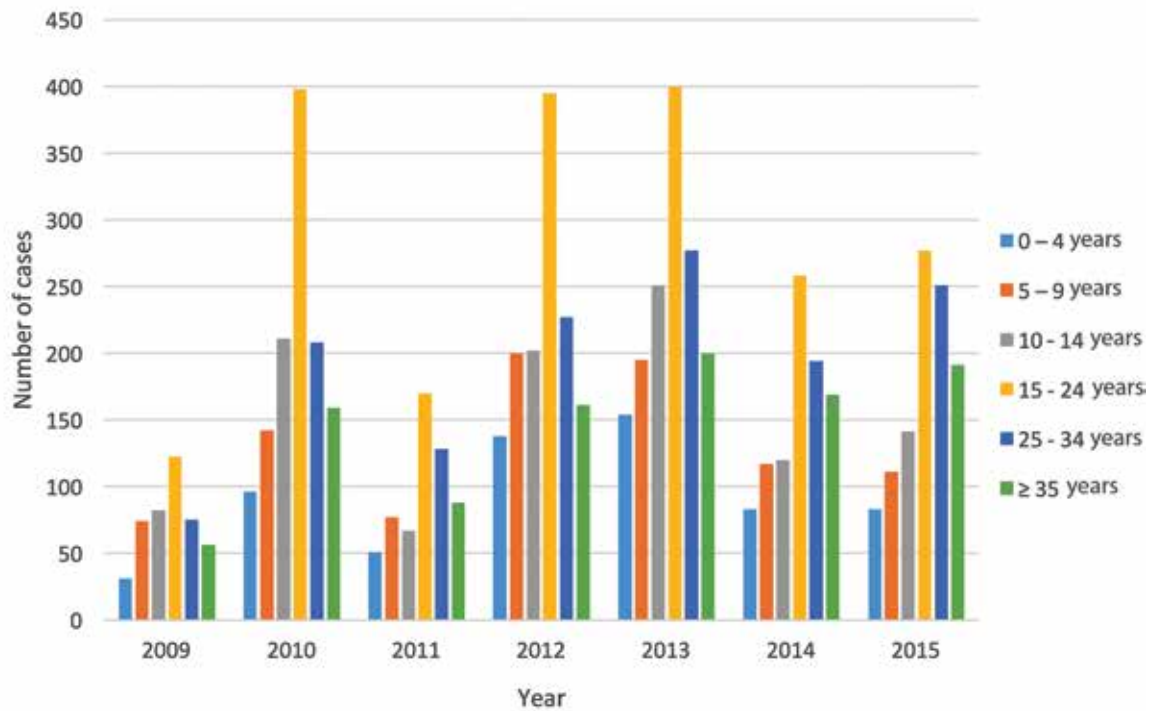


Fig 2–Age distribution of dengue patients at Vachira Phuket Hospital, Thailand between 2009-2015.

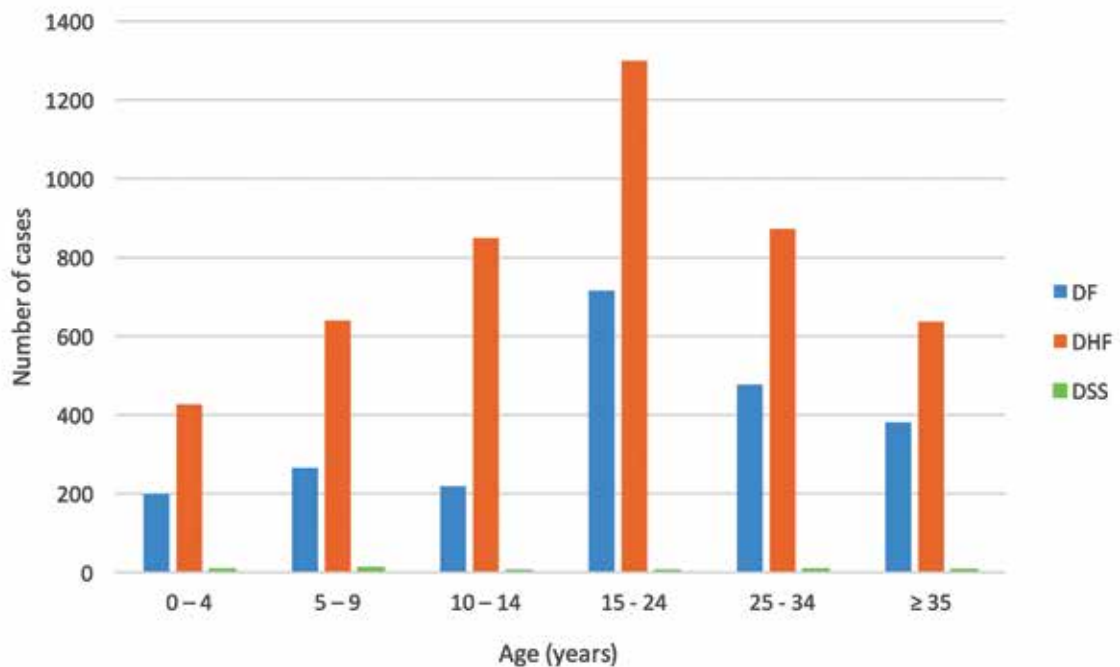


Fig 3–Severity of dengue patients by age group at Vachira Phuket Hospital, Thailand between 2009-2015.

decade is incompletely understood; possibly, it may be the result of less frequent epidemics in the last decades so that second exposure to dengue virus is postponed. Several studies in both Latin America and Southeast Asia have reported this age shift, which indicates an epidemiological change in dengue infection in those locations.

The trend for increased incidence among adults has important implications for effective control and prevention, which involves demographic, economic, behavioral, and social factors (Guha-Sapir, and Schimmer, 1999). Generally, the percentage of DHF in adults is lower than in children. Adults with DHF have a course similar to that in children. However, some studies have mentioned less severe plasma leakage in adult patients. Yet there are some countries where most deaths are seen in adults, which could be explained by the late recognition of the disease. In addition, comorbidities in adult patients such as peptic ulcers disease, preexisting liver disease are more likely to be present in adults than in children and can aggravate the disease severity (Tantawichien, 2015).

In the 1960s the case fatality rate was as high as 6-8% and it has decreased with time (Chareonsook *et al*, 1999). The case fatality rate less than 1% throughout the period of study indicates early recognition and improved management of dengue patients in Vachira Phuket Hospital. Prevention of dengue by vector control has achieved only limited success in reducing the transmission of dengue. The use of a safe and effective dengue vaccine may be a major means to effectively control dengue with the high feasibility of a dengue vaccine (Thisyakorn and Thisyakorn, 2015b). This study shows that dengue patients are common in Vachira Phuket Hospital, Thailand. The low case fatality rate throughout the period of study indicates early recognition and improved management of patients. The trend towards higher age in dengue patients during the past decade has important implications for control and prevention.

Better understanding of new paradigms for a

changing dengue epidemiology will not only feed into operational policy for dengue control, but also provide fertile terrain for vaccine application strategies in the future. Epidemiological data of this kind will be both valuable for dengue vaccine efficacy trials and for consideration of age group to be vaccinated, which will lead to universal dengue vaccine implementation in the future.

These data indicated that dengue is common in Vachira Phuket Hospital, which causes a heavy burden on the health system. The low case fatality rate throughout the period of study indicated early recognition and improved management of dengue patients. The trend towards higher age in dengue patients during the past decade is a problem of concern and need further clarification.

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