

Dengue Haemorrhagic Fever - A threat to Global Health

by

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Introduction

Over the past few years, the mortality rate and the number of dengue haemorrhagic fever/dengue shock syndrome (DHF/DSS) cases have remained high throughout the Kingdom of Thailand. In spite of vector control measures taken to reduce transmission of the virus, the results are poorer than expected. Elsewhere, DHF/DSS is a growing global health problem since dengue infection now occurs in over 100 countries and territories. Currently, 100 million cases of dengue fever and more than 100,000 cases of DHF occur each year⁽¹⁾. Only Africa and the Middle East have thus far been spared large DHF outbreaks^(1,2).

Dengue is endemic in the South-East Asia, Western Pacific and American regions of WHO, with a potential of importation of dengue infection for transmission in areas and countries where *Aedes aegypti* and/or *Aedes albopictus* are present, including the United States and Japan⁽³⁾.

The most important vectors transmitting dengue viruses are *Aedes aegypti* and *Aedes albopictus*^(4,5). In addition, *Aedes polynesiensis* and other members of the subgenus *Stegomyia* transmit dengue in restricted geographical areas⁽²⁾. The presence of *Aedes albopictus*, which adapts well to cold climate and survives round the year, is endemic in the US and Japan, whereas *Aedes aegypti* and *Aedes albopictus* are present in South-East Asia, including Taiwan. There remains a possibility of importing *Aedes aegypti* infected with dengue viruses by air or ship into Japan during summer, with the risk of involvement of *Aedes albopictus* in any subsequent transmission. *Aedes aegypti* mosquitoes normally feed on a single vertebrate host, but a small percentage of each of the two species feed on more than one host during one gonotrophic cycle⁽⁶⁾. Their multiple-feeding behaviour is of epidemiological significance. Despite the fact that the vectors have the ability to travel up to 2.5 km daily in an open environment, in one study, only 0.7% of *Aedes aegypti*

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visited more than four houses⁽⁷⁾. A study from India⁽⁸⁾ showed that most *Aedes aegypti* were from indoor habitats, indicating the endophilic nature of the species. On the contrary, *Aedes albopictus* is exophilic (outdoor habitat) in nature.

The possibility of these vectors transmitting viruses and infectious agents other than dengue viruses exists, as in a case report of concomitant DHF and Kawasaki disease (KD) or Kawasaki syndrome (KS) by Sopontammarak⁽⁹⁾. This raises several possibilities, including the concept that dengue virus may be one of the potential aetiological causes of KD, and *Aedes* mosquitoes may transmit the causative agent of KS along with dengue virus. Dengue viruses induce cell proliferation and morphological changes of endothelial cells from human umbilical cord vein⁽¹⁰⁾ and potentially cause arteritis, including coronary arteritis, which is the hallmark of KS. A preliminary study at Songklanagarind Hospital at Prince of Songkla University revealed that three out of 12 patients with clinical and echocardiographically proved KS (25%) had dengue IgM titer ≥ 40 U.

At present, the causative agent of KD remains elusive⁽⁴⁾. A matched case-control study in Colorado⁽¹¹⁾ indicated that a humidifier in a child's room before onset of KS was significantly associated with KS.

Future research questions should include the following:

- (1) Could dengue viruses be one of the causative agents of KS?
- (2) What is the distribution of dengue vectors in Japan, the US and cold climate countries at present?

Conclusion

DHF/DSS is a growing global health problem. Measures for the prevention and control of dengue have not been effective. Also, a dengue vaccine has not been developed in a timely fashion compared to other infectious diseases. Dengue vectors may potentially cause epidemics of DHF/DSS in Japan and the US and possibly carry the causative agent of KS.

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