Dengue Haemorrhagic Fever - A threat to Global Health

by

Somkiat Sopontammarak*

Department of Paediatrics, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla, Thailand

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 (2,3).

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 (4).

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 (5). 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

* For correspondence: ssomkeat@ratree.psu.ac.th; sopontammarak@yahoo.com
visited more than four houses\textsuperscript{(7)}. A study from
India\textsuperscript{(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\textsuperscript{(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\textsuperscript{(10)} and
potentially cause arteritis, including coronary
arteritis, which is the hallmark of KS. A
preliminary study at Songkla
agarind 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\textsuperscript{(4)}. A matched case-control
study in Colorado\textsuperscript{(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.

References

1. Gubler DJ. In: Gubler DJ, Kuno G (eds.). Dengue
   and dengue haemorrhagic fever. Cambridge:
2. Gregson A and Edelman R. Dengue virus infection.
3. Yamada KI, Takasaki T, Nawa M, Nakayama M,
   Arai YT, Yabe S and Kurane I. The features of
   imported dengue fever cases from 1996 to 1999.
4. Monath TP. Dengue: The risk to developed and
devolving countries. Proc Natl Acad Sci U S A,
5. Henchal EA and Putnak R. The dengue viruses.
6. Scott TW, Clark GG, Lorenz LH, Amerasinghe PH,
   Reiter P and Edman JD. Detection of multiple blood
   feeding in Aedes aegypti (Diptera: Culicidae) during
   a single gonotrophic cycle using a histological


