ORIGINAL ARTICLE

An Epidemiological Cluster Pattern of Dengue Outbreak Amongst Close Contacts in Selangor, Peninsular Malaysia

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Summary

Dengue fever is major public health problem especially among the highly urbanized states of Malaysia, such as, Selangor and Kuala Lumpur Federal Territory. We report an epidemiological cluster pattern of dengue outbreak in the district of Gombak, Selangor that may mimic other acute febrile illnesses in which the transmission mode is via close contact. This dengue outbreak consisted of two waves, an initial cluster of three cases (including the first deceased, JI) which occurred between 20th and 21st of July, followed by a later larger cluster of 11 cases that occurred between 1st and 8th of August 2005. This epidemiological clustering pattern of acute dengue virus infection among close contacts suggests an intense rate of dengue virus transmission within the vicinity of the first deceased's house.

Key Words: Dengue fever, Cluster pattern, Outbreak

Text

Dengue fever is major public health problem in Malaysia, particularly in an urban state like Selangor. In 2004, a total of 9,182 dengue fever cases were reported to the Selangor Health Department, of which 94.6% were clinically diagnosed as dengue fever while 5.4% were dengue haemorrhagic fever. The district of Gombak was among one of the worst affected districts with 1,818 cases or 19.8% of total dengue cases reported in Selangor. As of the year 2004, 46.6% of the cases reported in Selangor were serologically confirmed as acute dengue virus infections, a figure that is comparable to other states in the country.[1-3] Dengue is caused by any of the known 4 serotype of dengue virus. The dengue virus is transmitted to human host through the bite of an infective Aedes mosquito[4-7]. The epidemiological pattern of dengue outbreak tends to scatter within a locality that closely follow the density and dispersion of the infective vectors[8,9]. This report reviews an epidemiological cluster pattern of dengue outbreak which may mimic the epidemiological pattern of other viral haemorrhagic illnesses with the mode of transmission through close contact.

The patient, JI, a 44 years old Malay man was brought in dead, to General Hospital Kuala Lumpur on 26/7/2005. History taken from his relative indicated that JI was febrile and unwell since 21/7/2005. He developed breathing difficulties, drowsiness and collapsed at home prior admission to hospital. There was no history of recent visit to oversea countries and neither was there any recent trip to jungle. His cause of death was recorded in his death certificate by a local police was bronchial asthma, as all deaths occurring outside the hospital are certified by the police. On 5th

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of August 2005, JI's nine years old daughter was brought to the same hospital in a collapsed state, and died soon after before admission. Her blood tests showed dengue specific IgM was positive and post-mortem findings indicated bleeding diathesis.

The consecutive deaths of two household members within a short span of ten days caused substantial concern and alarm among the relatives of the deceased. As a result, all those who developed fever and had been in contact with JI during his death were immediately admitted to Selayang Hospital for investigation. During the period from 5th to 8th of August 2005, 13 patients (11 relatives and two neighbours) from six different families, residing at various places in Selangor state, who had the history of contact with JI were noted to have fever and hence admitted for management. Ten of these 13 patients were subsequently diagnosed as dengue fever based on dengue serology results. The ages, their relationship to JI, and place of residences of these ten patients are shown in Table I. All the affected relatives of JI had a common history of spending at least a day in JI's house. The clinical profiles of the ten patients who were tested positive for dengue specific IgM in their acute-phase blood samples are shown in Table II.

A subsequent epidemiological field investigation revealed that two other patients (a 29 year old man and a 15 year old girl) from the same housing garden (Gombak Setia) and a close neighbour of JI were admitted to two separate private hospitals in Kuala Lumpur at about the same time when JI fell sick on 21st July 2005. Both patients developed high fever with bleeding diathesis and subsequently laboratory confirmed to be due to acute dengue virus infection.

This small dengue outbreak within a closely knit community showed that the outbreak consisted of two waves; an initial cluster of three cases which occurred between 20th and 21st of July, followed by a later larger cluster of 11 cases which occurred between 1st and 8th of August 2005, including JI's nine year old daughter who died (Figure 1). This clustering pattern of acute dengue virus infection among close contacts suggests an intense rate of dengue virus transmission within the vicinity of the first deceased's house. This high intensity of dengue virus transmission was supported by the finding of 11 patients, related to the index case but staying at different places (Table I), who came down with dengue after a short period of stay in the house of the first deceased. This clustering pattern of acute febrile illness may also mimic other illnesses in which transmission is via close contact.

Transmission of dengue virus requires the presence of infective mosquitoes and susceptible human hosts. The viraemic hosts in turn serve as the source of virus for non-infective mosquitoes. Dengue is known to present as a wide spectrum of disease ranging from asymptomatic and mild subclinical infection to fatal haemorrhagic illness[7-9]. The presence of numerous walking viraemic hosts (asymptomatic, mild subclinical and undiagnosed symptomatic cases) in an area that has high dengue vector density creates an ideal environment for dengue outbreak. Thus, these factors couple with a high population density in states such as Selangor and Kuala Lumpur Federal Territory resulted in a higher rate of dengue virus infection and dengue cases in these two states.

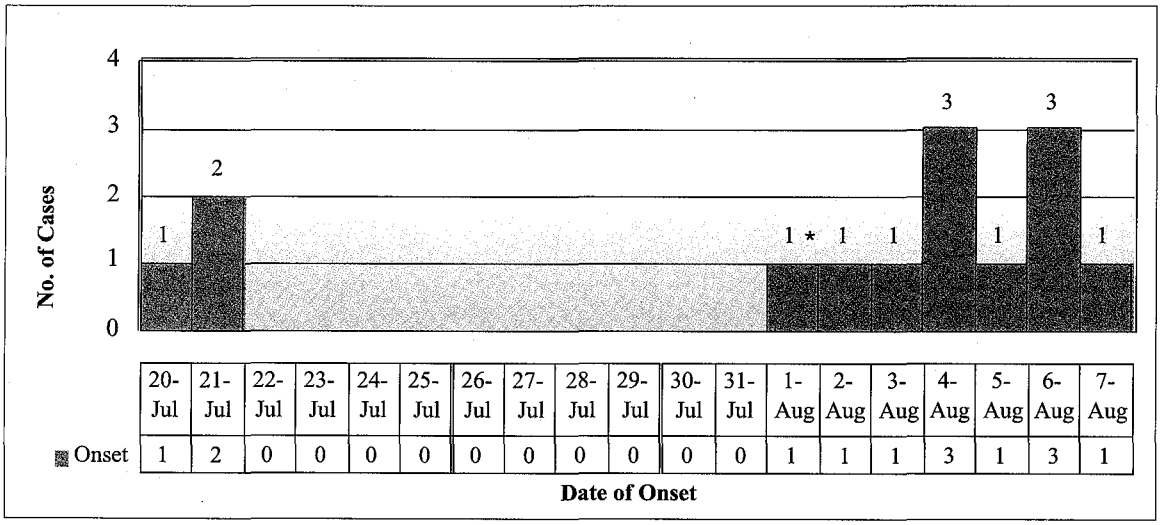
Table I: The epidemiological profile of ten patients with acute dengue following close contact with an index case of dengue.

Patient	Age (year)	Place of Residence	Relationship
1.	16	Desa Aman, Kepong	Nephew*
2.	16	Flat Trengganu, Sentul	Nephew
3.	15	Desa Aman, Kepong	Niece *
4.	13	Desa Aman, Kepong	Niece*
5.	39	Desa Aman, Kepong	Sister In-Law*
6.	19	Rawang	Nephew
7.	11	Desa Aman, Kepong	Nephew*
8.	4	Gombak Setia	Daughter
9.	43	Gombak Setia	Neigbour
10.	9	Gombak Setia	Neigbour

* - indicate the type of relationship within the same family

Table II: The clinical profile of ten patients tested positive for dengue specific IgM in their acute-phase blood samples following close contact with an index case of dengue

Patient	Fever	Headache	Retro Orbital Pain	Myalgia	Arthralgia	GI symptoms	Rash	Bleeding diathesis
1.	High	+	-	-	-	-	-	-
2.	High	+	-	-	-	-	-	-
3.	High	+	-	-	-	+	-	+
4.	High	+	-	+	+	-	-	-
5.	High	+	+	-	-	+	-	-
6.	Mild	-	-	-	-	-	+	-
7.	High	+	+	+	-	-	+	-
8.	Mild	+	-	+	-	+	-	-
9.	High	+	-	+	+	+	+	-
10.	High	-	-	-	-	-	+	-
Total		**8**	**2**	**4**	**2**	**4**	**4**	**1**



Note : Total of II cases. Figure include cluster include JI's nine year old daughter who died. Onset was on 1/8/05

Fig. 1: Cluster of Dengue Outbreak - Date of Onset

References

1. Skae FM. Dengue fever in Penang. Br Med J 1902; 2: 1581-2.
2. Rudnick A, Tan EE, Lucas JK, Mohamed bin Omar. Mosquito-borne haemorrhagic fever in Malaysia. Br Med J 1965; 1: 1269-72.
3. Ministry of Health Malaysia. Annual Reports of Vector borne Disease Control Programme, 1988-2001.
4. Monath TP, Heinz FX, Flaviviruses. in: Fields BW, Knipe DM, Knipe PM, etc, (Eds). Field's Virology. Volume 1, Third Edition. Lippincott-Raven Press, New York, 1990, 961-1034.
5. WHO. Dengue Haemorrhagic Fever: diagnosis, treatment and control. Handbook of the World Health Organization. Geneva. (2000) 1-84.
6. Gubler DJ, Meltzer M. Impact of dengue/dengue hemorrhagic fever on the developing world. Adv Virus Res 1999; 53: 35-70.
7. Guzman MG, Kouri G. Dengue: an update. The Lancet Infect Dis 2002; 2(1): 36.
8. Liew C; Curtis CF. Horizontal and vertical dispersal of dengue vector mosquitoes, Aedes aegypti and Aedes albopictus in Singapore. Med Vet Entomol 2004; 18(4): 351-60.
9. Platt KB; Linthicum KJ; Myint KS; Innis BL; Lerdtusnee K; Vaughn DW. Impact of dengue virus infection on feeding behaviour of Aedes aegypti. Am J Trop Med Hyg 1997; 57(2): 119-25.