Med. J. Malaysia Vol. XXXII No. 4, June, 1978

SEROLOGICAL EVIDENCE OF GROUP B ARBOVIRUS INFECTION IN SABAH

Spencer K. P. Kan

*R. W. W. Kay**
T. W. Lim
V. Chew

Central Laboratory
Queen Elizabeth Hospital
Kota Kinabalu
Sabah

Institute for Medical Research
Jalan Pahang
Kuala Lumpur

INTRODUCTION

DENGUE HAEMORRHAGIC FEVER (DHF) is a serious disease with a mortality rate of 5 – 10% and has recently occurred on the mainland of Peninsular Malaysia (Halstead, 1966; Rudnick, 1966 a, b; Chan *et al.,* 1967). The first large-scale outbreak of DHF in Peninsular Malaysia began in 1973 when 54 deaths had been reported (Lim *et al.,* 1974). In view of this serious outbreak and the prevalence of the primary vector *Aedes aegypti* in Sabah (Macdonald and Rajapaksa, 1972) and the frequent regular communications between Sabah and Peninsular Malaysia the health personnel was alerted for possible outbreak of DHF. As clinical diagnosis is recognised as inaccurate, a practical method is for the serological diagnosis of paired sera from patients with pyrexia of unknown origin to be made. Most of the district hospitals lacked sufficient personnel equipment or logistical support to obtain blood from all fever cases by venipuncture, separate serum aseptically and transport serum chilled to the Central Laboratory, Kota Kinabalu. As testing of paired sera against Group A and B arboviruses is expensive and time consuming only limited and representative number of patients with fever of unknown origin was tested serologically.

MATERIALS AND METHODS

20 patients admitted to the various hospitals in Sabah with a clinical diagnosis of pyrexia of unknown origin were studied. The paired sera were obtained from 2 patients in Sandakan, 7 in Labuan, 9 in Kota Kinabalu and one each in Tawau and Semporna. Blood specimens were obtained by venipuncture shortly after admission and before discharge. The clotted blood was separated aseptically by centrifugation and the serum was stored at −4°C (in district hospitals) and −20°C at the Central Laboratory, Kota Kinabalu. Sera from district hospitals were transported in thermos flask chilled in ice and salt mixture to the Central Laboratory where they were stored at −20°C before despatch to the Virus Division, Institute for Medical Research, Kuala Lumpur. Haemagglutination-inhibition (HI) tests were performed on the paired sera by the procedure of Clarke and Casals, modified for the microtitre technique (Clarke and Casals, 1958; Sever, 1962). Suckling mouse brain antigens were prepared by the sucrose acetone method. 8 antigens were used representing the prevalent group A and B arboviruses occurring in Malaysia. These are Sindbis strain P. 886 in group A and dengue 1 Hawaii strain (Den – 1), dengue 2 Trinidad 1751 strain (Den – 2), dengue 3 strain H. 87 (Den – 3), dengue 4 strain H 241 (Den – 4), Japanese Encephalitis Nakayama strain (JBE), Tembusu strain AMM 1775 (TMU) and Zika strain B24982 (ZIKA) in group B. Serial dilutions from 1:10 to 1:5120 of acetone – extracted sera were tested against 8 units of each antigen. A four-fold rise in titre between paired sera constituted a positive response and a titre of 1:1280 or greater in a single serum was considered a presumptive positive response. Both responses indicated current infection. Serologic results were termed inconclusive when the rise in titre between paired sera was less than four-fold and when the titre of a single specimen was 1:640 or less.

RESULTS

Two of the 20 patients were serologically positive for group B arbovirus infection by the HI

test on the paired sera. The HI antibody titres against group A and B arboviruses for these 2 cases were presented in Table 1. All the patients had no HI antibody to group A (Sindbis virus). 16 patients had HI antibody titres to group B viruses ranging from 10 to 80 while 2 of the patients had residual antibodies ranging from 40 to 1280 against group B viruses. There was no significant rise in titre against the viruses tested for the 18 patients.

DISCUSSION

No cases of dengue haemorrhagic fever have yet been reported from Sabah although dengue fever occurred in Labuan Island, off the West Coast of Sabah in 1969 and this was confirmed by virus isolation and positive serology (Ramalingam, 1970). In our investigation with 7 patients with fever of unknown origin from Labuan Island, there was no significant rise in HI titres against Group B arboviruses in the paired sera. 2 of the 7 patients had residual HI antibodies to Group B arboviruses ranging from 1:40 to 1:1280. This high titre of residual antibodies could possibly suggest past infection with arboviruses.

Two patients were serologically positive for Group B arbovirus infection but the exact type could not be established for certain from the serological investigation. Patient 1 was a female Malay child, aged 3 years from Semporna which is on the south-east of Sabah. She was admitted to the cottage hospital on 3rd August, 1973 with a history of high fever for the past 5 days. On admission she had a temperature of 39.4°C with purpuric rash over the entire abdomen and had joint pains and headache. Patient 2 was a 33 year old male of British nationality who had been in Sabah for a year. He was an Engineer attached to the Tractor Malaysia Company and later on joined Rasnah, a timber firm situated in Keningau, the Interior Residency of Sabah. He travelled extensively throughout Sabah especially in the timber camps. He complained of fever with joint and bone pain lasting for 5 days. No specific treatment was given.

Aedes aegypti the vector for dengue haemorrhagic fever viruses was widespread in urban towns in Sabah especially in 4 major kampungs in Semporna (Hii, 1976) and the presence of Group B arbovirus in Semporna could lead to major outbreaks in the absence of control measures against the potential vector *Aedes aegypti*. Further studies should be undertaken to establish the type of arbovirus in Semporna through virus isolation and the level of transmission by serological investigation of paired sera from patients with fever of unknown origin.

SUMMARY

Paired sera from 20 patients admitted to the various hospitals in Sabah with a clinical diagnosis

Table 1

Haemagglutination-Inhibition antibody titres against Group A and B arboviruses for 2 patients.

VIRUS ANTIGEN	HAEMAGGLUTINATION-INHIBITION TITRE*			
	PATIENT 1		PATIENT 2	
	1st serum 4th day of Disease	2nd serum 14th day of Disease	1st serum 7th day of Disease	2nd serum 21st day of Disease
Group A:-				
Sindbis	<10	<10	<10	<10
Group B:-				
Dengue 1	<10	640	640	640
Dengue 2	10	5120	640	640
Dengue 3	<10	1280	640	1280
Dengue 4	10	⩾10240	1280	2560
Jap. Encephalitis	10	⩾10240	2560	2560
Tembusu	10	5120	5120	5120
Zika	10	5120	⩾10240	⩾10240

* Reciprocal of serum dilution.

of pyrexia of unknown origin were serologically tested against Group A and B arboviruses by the haemagglutination inhibition test. Two of the patients were serologically positive for Group B arbovirus infection.

ACKNOWLEDGEMENTS

We wish to thank Dr. Mechiel K. C. Chan, Director of Medical Services, Sabah, for his kind permission to publish this article. We are grateful to the Laboratory Technicians and Assistants at the respective hospitals for collecting the blood specimens. Our gratitude to Dr. Garcia in Semporna and the respective Medical Officers at the respective hospitals for their keenness in investigating the cases. Finally the typing assistance of Miss Helen Chong is gratefully acknowledged.

REFERENCES

Chan, Y.C., Lim, K.A. & Ho, B.C. (1967). Recent epidemics of haemorrhagic fever in Singapore, *Jap. J. Med. Sci. Biol.*, **20**: 81.

Clarke, D.H. & Casals, J. (1958). Techniques for hemagglutination and hemagglutination-inhibition with anthropod-borne viruses. *Amer. J. Trop. Med. Hyg.*, **7**: 561.

Halstead, S.B. (1966). Mosquito-borne haemorrhagic fever of South and Southeast Asia, *Bull. Wld. Hlth. Org.*, **35**: 3.

Hii, J. (1976). Resurvey of *Aedes aegypti* and *Aedes albopictus* in Sabah, Malaysia. WHO/VBC/76.637 Mimeographed document.

Lim, T.W. *et al.*, (1974). The 1973 epidemic of dengue haemorrhagic fever in Malaysia. A preliminary report. *Southeast Asian J. Trop. Med. Pub. Hlth.*, **5**: 453.

Macdonald, W.W. & Rajapaksa, N. (1972). A survey of the distribution and relative prevalence of *Aedes aegypti* in Sabah, Brunei and Sarawak, *Bull. Wld. Hlth. Org.*, **46**: 203.

Ramalingam, S. (1970). The occurrence of *Aedes aegypti* in Sabah. *Med. J. Malaya*, **25**: 73.

Rudnick, A. (1966 a). Dengue viruses isolated from haemorrhagic fever cases in Malaysia, *Bull. Wld. Hlth. Org.*, **35**: 62.

Rudnick, A. (1966 b). Dengue viruses isolated from mosquitoes in Singapore, 1960 – 61, *Bull. Wld. Hlth. Org.*, **35**: 63.

Sever, J.L. (1962). Application of a microtechnique to viral serological investigations. *J. Immunol.* **88**: 320.