

RESEARCH NOTE

RICKETTSIAL INFECTION IN FIVE REMOTE ORANG ULU VILLAGES IN UPPER REJANG RIVER, SARAWAK, MALAYSIA

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Abstract. People in 5 Orang Ulu villages in Sarawak, Malaysia were tested for rickettsial infection by Weil-Felix reaction and by indirect immunoperoxidase reaction. Of those surveyed 9.6% were positive for typhus. Of the positives, 3.8% were positive for tick typhus (7/11), scrub typhus (4/11) or endemic typhus (1/11). The incidence of typhus was higher among semi-nomadic Penans compared with the settled Kayans.

INTRODUCTION

Typhus, an acute fibrile illness caused by infection with various *Rickettsia* species such as *Rickettsia (Orientia) tsutsugamushi*, *R. typhi* and TT118 rickettsiae is common in many Southeast Asian countries (Frances *et al.*, 1997; Corwin *et al.*, 1997; Shirai *et al.*, 1982). In Malaysia, the yearly incidence of typhus in rural West Malaysia is more than 3% with high prevalence rate among forest and oil palm workers (Robinson *et al.*, 1976; Brown *et al.*, 1977; 1984; Tee *et al.*, 1999). Among forest dwelling Orang Asli (aborigines) the monthly incidence of typhus is about 3.5% (Brown *et al.*, 1978).

In East Malaysia although the incidence of scrub typhus in Sabah is low 16.5% of forest dwellers surveyed were seropositive for tick typhus (Taylor *et al.*, 1986). In Sarawak more than 24% of febrile illness in rural areas may be due to typhus with tick typhus being more common than scrub typhus (Ho *et al.*, 1997; Tay *et al.*, 1999). In remote interior villagers in Sarawak, tick typhus may be common due to greater contact with small wild rodents infected with TT118 rickettsiae (Tay *et al.*, 1998). This note reports that tick typhus is the most common rickettsial infection among the Orang Ulu (interior tribe) in upper Rejang River Sarawak, and that the incidence of typhus is highest among the semi-nomadic Penans.

The upper Rejang River basin was selected for this study because this demographically unique area, the size of Singapore, is inhabited by nine indigenous interior tribes (Orang Ulu) including the Penans, Ukits, Kayans, Kenyahs, Lahanans, Kajangs, Punans, Badangs and Kejamans. These tribes are dependent on the forest and rivers for their daily meat, fish and jungle vegetable requirement, and are expected to have greater contact with the vectors of typhus in their environment. As the area is undergoing a RM13 billion Bakun hydroelectric project development which necessitate the resettlement of the villages, a baseline study on the prevalence of typhus is essential for future reference point in any follow-up studies of the resettled villagers.

Of the sixteen villages or longhouses in the area (population ~ 9,000), five were selected (population ~ 1,500) for this study, based on their relative accessibility and safety by longboat because of the many dangerous rapids along the rivers (Table 1). Long Ayak and Lesong Laku was selected because the former is the only Ukit village in Sarawak, whereas the later is the only settled Penan village in the area. A total of 261 individual consisting of 134 males and 127 females aged between 14 to 70 years old was included in this study. Most (90%) are adult greater than 22 years of age, of which 60% are between 22-35 years old. School children were excluded from this study because most are away in boarding schools.

Five ml of venous blood was collected from each individual. The serum was separated by centrifugation and stored in -20°C freezer at Belaga

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Table 1
Rickettsial infection in five Orang Ulu villages at upper Rejang River Sarawak, Malaysia.

Villages (Tribe)		Serological test (% positive)				
		Weil Felix (titer >1:320)	Indirect Immunoperoxidase (titer >1:100)			
			TT ^a	ST ^a	ET ^a	Total (%)
Long Murum (Kayan)	(n=96)	9 (9.4)	2	2	0	4 (4.2)
Long Linau (Kayan)	(n=50)	4 (8.0)	1	0	0	1 (2.0)
Long Ayak (Ukit)	(n=44)	3 (6.8)	2	0	0	2 (4.5)
Lesong Laku (Penan)	(n=28)	3 (10.7)	1 ^b	2 ^b	0	3 (7.1)
Long Sah A (Kenyah)	(n=43)	3 (7.0)	1 ^b	0	1 ^b	1 (2.3)
Total	(n=261)	25 (9.6)	7 (58.3)	4 (33.3)	1 (8.3)	11 (3.8)

^aTick typhus (TT), scrub typhus (ST), endemic typhus (ET).

^bTwo individual (a 23 years old Penan man and a 54 years old Kayan women) was concurrently positive for tick typhus and scrub typhus, and tick typhus and endemic typhus respectively.

clinic prior to dispatch to Kuching. Serological screening for evidence of rickettsial infection was done at the Central Medical Laboratory Kuching using the Weil-Felix (WF) tests. An OX19 or OXK titer of greater than 1:320 was taken as indicative of serological evidence of recent rickettsial infection (Brown *et al*, 1983). Rickettsial infection was confirmed using the indirect immunoperoxidase (IIP) test (IgG/IgM titer >1:100) prepared by the Rickettsial Unit, Institute for Medical Research, Kuala Lumpur, Malaysia to diagnose specific typhus (Kelly *et al*, 1988).

Table 1 shows that 9.6% of the individuals surveyed were seropositive for typhus of which 16 were female and nine were male. The IIP test confirmed that 3.8% were seropositive for tick typhus (7/11), scrub typhus (4/11) or endemic typhus (1/11). The seroprevalence of typhus ranged from 2.0 to 7.1% with the highest incidence found among the semi-nomadic Penans of Lesong Laku.

The finding that 3.8% of the Orang Ulu surveyed in upper Rejang River were seropositive for recent rickettsial infection showed that the incidence of typhus in rural Sarawak was similar to that of rural West Malaysia (Robinson *et al*, 1976; Brown *et al*, 1977). In East Malaysia, tick typhus is more common than scrub typhus (Taylor *et al*, 1986; Ho *et al*, 1997). Its incidence among the

Orang Ulu (3.8% by IIP test and 9.6% by WF test) is lower than among forest dwellers in Sabah (16.5%).

In previous studies higher incidence of typhus was found among forest workers, forest dwelling Orang Asli and oil palm workers (Robinson *et al*, 1976; Brown *et al*, 1977; 1978; 1984). In this present study we showed that the incidence of typhus was higher among the semi-nomadic Penans of Lesong Laku (7.1%) compared with the settled Kayans of Long Murum. The higher incidence of typhus among the Penans may be due to greater contact with the vectors of typhus in their forest environment.

The present data taken together with previous data (Ho *et al*, 1997) appear to suggest that tick typhus may be the most common rickettsial infection in rural Sarawak. The high incidence of tick typhus in rural Sarawak may be associated with the high rate of natural infection of small wild rodents with TT118 rickettsiae as previously found in Selangau Sarawak (Tay *et al*, 1998). High prevalence of natural infection of small rodents with TT118 rickettsiae would suggest higher natural transmission of tick typhus. A follow up study to determine the presence of natural infection of small rodents with TT118 rickettsiae in upper Rejang River is required, as the area will be cleared to make way for the Bakun hydroelectric project.

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REFERENCES

- Brown GW, Robinson DM, Huxsoll DL, Ng TS, Lim KJ. Scrub typhus: a common cause of illness in indigenous populations. *Trans R Soc Trop Med Hyg* 1977; 70: 444-8.
- Brown GW, Robinson DM, Huxsoll DL. Serological evidence for a high incidence of transmission of *Rickettsia tsutsugamushi* in two Orang Asli settlements in Peninsular Malaysia. *Am J Trop Med Hyg* 1978; 27: 121-3.
- Brown GW, Shirai A, Jegathesan M, *et al.* Febrile illness in Malaysia – an analysis of 1,629 hospitalized patients. *Am J Trop Med Hyg* 1984; 33: 311-5.
- Brown GW, Shirai A, Rogers C, Groves MG. Diagnostic criteria for scrub typhus: probability values for immunofluorescent antibody and *Proteus* OXK agglutinin titers. *Am J Trop Med Hyg* 1983; 32: 1101-7.
- Corwin AL, Soeprapto W, Widodo PS, *et al.* Short report: surveillance of rickettsial infections in Indonesian military personnel during peace keeping operations in Cambodia. *Am J Trop Med Hyg* 1997; 57: 569-70.
- Frances SP, Eamsila C, Strickman D. Antibodies to *Orientia tsutsugamushi* in soldiers in northeastern Thailand. *Southeast Asian J Trop Med Public Health* 1997; 28: 666-8.
- Ho TM, Tay ST, Rohani MY. A preliminary finding of arthropod-borne rickettsioses in Malaysia. *Intern Med Res J* 1997; 1: 339-44.
- Kelly DJ, Wong PW, Gan E, Lewis GE Jr. Comparative evaluation of the indirect immunoperoxidase test for the serodiagnosis of rickettsial disease. *Am J Trop Med Hyg* 1988; 38: 400-6.
- Robinson DM, Gan E, Donaldson JR. The prevalence of scrub typhus antibodies in residents of West Malaysia. *Trop Geogr Med* 1976; 28: 303-8.
- Shirai A, Coolbaugh JC, Gan E, Chan TC, Huxsoll DL, Groves MG. Serologic analysis of scrub typhus isolates from the Pescadores and Philippine Islands. *Jpn J Med Sci Biol* 1982; 35: 255-9.
- Tay ST, Ho TM, Rohani MY, Devi S. Antibodies to *Orientia tsutsugamushi*, *Rickettsia typhi* and spotted fever group rickettsiae among febrile patients in rural areas of Malaysia [Abstract]. 1st Joint Unimas-Sarawak Medical Department-Osaka University Medical Colloquium, 1999.
- Tay ST, Kaewanee S, Ho TM, Rohani MY, Devi S. Serological evidence of natural infection of wild rodents (*Rattus* spp and *Tupaia glis*) with *Rickettsiae* in Malaysia. *Southeast Asian J Trop Med Public Health* 1998; 29: 560-2.
- Taylor AC, Hii J, Kelly DJ, Davis DR, Lewis GE Jr. A serological survey of scrub, tick, and endemic typhus in Sabah, East Malaysia. *Southeast Asian J Trop Med Public Health* 1986; 17: 613-9.
- Tee TS, Kamalanathan M, Suan KA, *et al.* Seroepidemiologic survey of *Orientia tsutsugamushi*, *Rickettsia typhi*, and TT118 spotted fever group rickettsiae in rubber estate workers in Malaysia. *Am J Trop Med Hyg* 1999; 61: 73-7.