

BODY OF REPORT

SEATO Medic Study No. 5 Survey for Prevalence of Arbovirus Antibodies
Among Residents of Thailand and Neighboring
Countries

Project No. 3A 025601 A 811 Military Medical Research Program
S. E. Asia

Task 01: Military Medical Research Program
S. E. Asia

Subtask 01: Military Medical Research Program
SEASIA (Thailand)

Reporting Installation: US Army-SEATO Medical Research Laboratory
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Period Covered by Report: 1 April 1964 to 31 March 1965

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Reports Control Symbol: MEDDH-288

Security Classification: UNCLASSIFIED

Objective: To map the distribution of arthropod-borne viruses in Thailand and adjoining nations in Southeast Asia by serologic study of humans.

Description: The study is conducted by performing serologic tests on survey sera obtained from residents of various geographical, climatologic and ecologic habitats in Thailand and environs. Antibody patterns observed are compared with data obtained from intensive study areas and hospital study where infecting agents are known.

Progress: In 1962, 1498 young adult residents of North, Central and Northeast Thailand were bled. Hemagglutination-inhibition tests were performed for chikungunya and group B arboviruses (using dengue 1 as test antigen). Group B antibodies were extremely prevalent in Central and Northeast Thailand (Table 1). Since persons sampled were Army inductees, it is presumed that the population

Table 1

INCIDENCE OF HI ANTIBODIES TO CHIKUNGUNYA AND DENGUE
VIRUSES IN RESIDENTS OF THAILAND

Region	Residence *	Chikungunya		Dengue	
		No. pos./No. sampled	%	No. pos./No. sampled	%
Central	Ayudhaya	24/34	70.59	33/34	97.06
	Nakorn Sawan	169/206	82.04	203/206	98.54
	Pisanuloke	95/153	62.09	142/153	92.81
North	Nan	1/18	5.56	4/18	22.22
	Chiangmai	130/533	24.39	193/533	36.21
North- east	Korat	87/109	79.82	106/109	97.25
	Surin	60/133	45.11	121/133	90.98
	Khonkaen	110/132	83.33	126/132	95.45
	Ubol	29/60	48.33	56/60	93.33
	Udonthanee	45/120	37.5	93/120	77.5
Total		750/1498		1077/1498	

* General area of the residence of studied group.

represents a cross section of the young males in each area sampled. If so, there should be a rural bias to the sample as the Thai population is predominantly rural. From this premise, it was assumed that the group B antibody measured might represent Japanese encephalitis which was thought to be widely distributed in Thailand. However, contradictory evidence was obtained from Japanese encephalitis neutralization tests performed on selected HI positive or negative sera. Of 52 HI positive sera from residents of the North Central Plain, 23, or less than 50% had positive LNI for JE (>1.7) (Table 2). In the Northeast, even fewer HI positive sera had significant neutralizing antibodies for JEV. These data suggest that there may be little human experience with JEV in Thailand. The amount of heterologous neutralizing antibody produced by single or multiple dengue virus infections is not known, but it must be substantial. A group of 83 Bangkok residents ages 1-19, most with a history of clinical dengue virus infection, were studied for JE neutralizing antibody. As Table 3 shows, one half of individuals with detectable group B HI antibody had significant LNI for JEV. No evidence has been obtained to date of transmission of JEV to Bangkok residents. Until this is established it must be assumed that this JE neutralizing antibody is of heterologous origin. This observation strengthens the hypothesis that JEV neutralizing antibody detected in the Thailand serum survey was not stimulated by JEV infection but by dengue viruses or other group B agents.

Chikungunya HI and neutralizing antibody showed a high degree of correlation. Distribution of HI antibodies in Table 1 may be assumed to represent chikungunya virus. Note the high prevalence in Central and Northeast Thailand and lower prevalence in North Thailand.

Table 2

CORRELATION OF HI AND NT ANTIBODY IN THAILAND SURVEY SERA.
CHIKUNGUNYA AND DENGUE 1 USED AS HI ANTIGENS. CHIKUNGUNYA
AND JE VIRUS USED AS NT ANTIGENS. NT TESTS DONE IN HKC
WITHOUT ADDITION OF ACCESSORY FACTOR.

Area of Thailand	Chikungunya				JE			
	HI	Nt (LNI)			HI	Nt (LNI)		
		Neg.	Equiv.	Pos.		Neg.	Equiv.	Pos.
	0- <1.0	1.0-1.6	1.7 and $>$	0- <1.0	1.0-1.6	1.7 and $>$		
Central Plain	+	0	1	4	+	5	1	3
	-	3	3	0	-	1	0	
North Central Plain	+	5	14	26	+	12	17	23
	-	20	0	1	-	3	2	8
Northeast	+	4	9	76	+	67	27	13
	-	26	1	3	-	16	5	2

* HI titer 1:20 or greater

** HI titer less than 1:20

Table 3

CORRELATION TABLE OF JE VIRUS NEUTRALIZING ANTIBODY AND
DENGUE 1. HI ANTIBODY IN RESIDENTS OF BANGKOK, AGES 1-19,
1964

Test Result		JEV Log Neutralization Index		
		< 1.0	1.0-1.6	> 1.7
Dengue 1	$< 1:20$	4	2	5
HI Titer	$> 1:20$	23	12	37

Opportunity has been presented to study sera collected from urban and rural residents of Laos (Vientiane residents and Meo tribesmen) and South Vietnam (Saigon and Phu Bon, Central Highlands). Antibody patterns in Vientiane and Saigon resemble those of Central and Northeast Thailand. The Montagnard tribesmen sampled in Phu Bon, living in a mountain valley habitat, had serologic evidence of JE virus infection but very little chikungunya. Meo tribesmen coming from a remote area of North Laos had no detectable chikungunya antibody and evidence of remote group B experience, perhaps JE (Hi but no CF antibody detected).

Summary and Conclusions: Residents of Bangkok, Thailand, Vientiane, Laos and Saigon, Vietnam have serologic evidence of chikungunya and dengue virus infections while tribal populations from mountainous areas of Laos and Vietnam had little evidence of past chikungunya experience and serologic results suggesting past JE infections rather than dengue. Group B antibodies measured by hemagglutination-inhibition test in residents of Thailand appeared to derive largely from dengue virus infections. The amount of Japanese encephalitis virus infection occurring in residents of Thailand cannot be determined in retrospect by examination of serum by conventional serologic techniques.