A Serological Survey for Togaviruses (Arboviruses) in a Well Defined Rural Thai Population

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OBJECTIVE : To study the seroepidemiology of Togavirus (arbovirus) infections in a well defined rural Thai population.

BACKGROUND : Dengue virus was first specifically identified as a cause of illness in Thailand in the early 1950's. At that time, and for many years thereafter, it was felt that dengue infections were endemic only in the large cities. More recently, it has been recognized that dengue infections also occur in rural populations. However, little is known of the prevalence of arbovirus antibody in rural Thailand, as most studies done outside of cities involved areas of epidemic illness.

As sera were already being collected from village populations for malaria and hepatitis studies, a serological survey for arbovirus infection was included.

MATERIALS AND METHODS : The materials and methods for this study are outlined elsewhere in this report (Seroepidemiologic Survey of Hepatitis B Virus Infection in a Rural Thai Village). Serum was submitted for routine hemagglutination inhibition tests using an alpha virus (arbovirus group A) antigen, specifically Chikungunya (Chik) and flavivirus (group B arbovirus) antigens, specifically types Dengue 1-4 (DEN 1-4) and Japanese encephalitis (JEV).

RESULTS : Of a total population of 993 people over the age of 1 year in the village, sera from 526 had been tested by the time of this report. Of these, 230 sera were obtained from people from age 1 to 10. This age group made up over 60% of the village population. The prevalence of antibody to Chikungunya antigen in the whole population was 19.2%; it was 6.1% in the tested children ten years old or less and rose to 54.5% by the 40-49 year age group, remaining at that level in the few older persons studied. The flavivirus antibody, on the other hand, rose rapidly, starting at 20% in the few one year olds bled but reaching 89.2% by the age of four years and remaining over 80% for all but one of the remaining age groups.

This data serves as a good comparison to that collected in Bangkok in 1962 and 1977 and illustrates that flavivirus transmission is much more rapid in rural environments than in Bangkok. The antibody prevalences to flaviviruses are very similar to those found in Phnompenh in 1974 (1).

Table 1 presents the arboviral serology results of the sample of villagers tested. The prevelences of the various arboviral agents are significantly different from those found in urban Thai populations (2). Table 2, however, demonstrates the association between evidence of Hepatitis B virus exposure (HB_sAg and/or anti-HB_s) and the prevalence of evidence of previous arbovirus infection. The associations appear to be age and sex dependant. Children under the age of 10, especially females, represent the majority of the correlation between Hepatitis B virus and Japanese encephalitis virus infections (Table 3). Table 4 presents similar data for Group A arbovirus antibody. With alphaviruses, concurrent markers of previous infection in males are responsible for the increased correlation between the two agents. While the age difference still exists, it is not as large as that found for JEV. Possible explanations include :

1. Proportion of population susceptible to all infection diseases.

    a. by constitution
    b. by increased interaction with their environment.

2. Similar mechanism of disease transmission

    a. focus of disease by location
    b. similar vector.

3. Interaction between antibody to all diseases

    a. similar antibody induced by one disease
    b. laboratory test not specific.

The collection of materials from the village of Tablan is finished. This report presents preliminary data as the laboratory tests are still underway.

REFERENCES :

1. Scott, R.M., Snitbhan, R., Bancroft, W.H., Prevalence of Some Viral Infections in the Residents of Phnompenh. SEATO Medical Research Laboratory Annual Report, 1975, pp. 82-83.

2. Halstead, S.B., *et al.* Dengue and Chikungunya Virus Infections in Man in Thailand. Am. J. Trop. Med. Hyg. 18: 997-1021, 1969.

Table 1. Prevalence of togavirus antibodies in a well defined Thai rural population

Age	No. Tested	Alpha Virus* Antibody		Flavivirus** Antibody	
		No.	%	No.	%
1	5			1	(20.0)
2	15			4	(26.0)
3	23			6	(21.0)
4	37	2	(5.4)	33	(89.2)
5	21			17	(80.9)
6	35	2	(5.7)	29	(82.9)
7	35	4	(11.4)	30	(85.7)
8	24	1	(4.1)	17	(70.8)
9	24	3	(8.3)	20	(83.3)
10-14	54	13	(24.0)	47	(87.0)
15-19	52	6	(11.5)	45	(86.5)
20-29	92	22	(23.9)	85	(92.4)
30-39	55	20	(36.4)	541	(98.2)
40-49	33	18	(54.5)	33	(100.0)
50	22	12	(54.5)	20	(90.9)
	526	103	(19.6)	441	(83.8)

* Chikungunya
** Dengue 1-4 and Japanese encephalitis

Table 2. Association between previous exposure to Hepatitis B virus and arboviral agents

Evidence of HBV Exposure	Total Villages Tested	Evidence of Exposure to Arboviral Agent					
		Dengue		JEV		Group A	
		+	-	+	-	+	-
+	179	162	17	162	17	61	118
-	307	260	47	228	79	62	245
		$X^2_y = 2.85$		$X^2_y = 17.79$		$X^2_y = 10.81$	
		N.S.		$P < .0005$		$P < .002$	

Table 3. Relative risk of concurrent evidence of Japanese B encephalitis virus exposure and Hepatitis B virus exposure

Age	Sex	Hepatitis Exposure	Group A JEV Exposure +	Group A JEV Exposure -	RR*
≤10	Female	+	18	4	1.49
		-	46	38	
	Male	+	16	6	1.32
		-	42	34	
>10	Female	+	93	3	1.01
		-	115	5	
	Male	+	35	4	0.97
		-	25	2	

* RR = relative risk. RR* for : all males 1.29 all females 1.19 all villagers 1.22 all ≤ 10 1.40 all > 10 1.00

Table 4. Relative risk of concurrent evidence of group A arbovirus exposure and Hepatitis B virus exposure

Age	Sex	Hepatitis Exposure	Group A Arbovirus Exposure +	Group A Arbovirus Exposure -	RR*
≤10	Female	+	0	22	indeter-
		-	5	79	minate
	Male	+	4	18	2.76
		-	5	71	
>10	Female	+	38	58	1.16
		-	41	79	
	Male	+	19	20	1.20
		-	11	16	

* RR = relative risk. RR* for : all females 1.43 all males 2.43 all villagers 1.69 all ≤ 10 1.45 all > 10 1.19