

A Longitudinal Epidemiological Study of Dengue Virus Infections in a School Population

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OBJECTIVE : To conduct a longitudinal study of dengue virus infections in a lower socioeconomic school population.

BACKGROUND : Dengue hemorrhagic fever remains among the greatest known causes of hospitalization and death among children in Thailand. Examination of the age distribution of reported dengue cases admitted to hospitals over a ten year period has shown an increase in the median age of patients from three years ten months during the years 1962-1965 to five years and seven months in 1971-1973 (1). This suggested a change in the transmission rate of dengue viruses and possibly a change in the number and age of children susceptible to dengue infection.

A study of dengue antibody prevalence, conducted before and after the transmission season, was made in Bangkok in 1962 (2). At that time, there was a preseasonal prevalence of Dengue 1 antibody of approximately 60% in the 4-15 year age groups drawn from a mixed socioeconomic population. The prevalence rose from approximately 40% in the four year olds to 80% at 15 years of age.

Based upon 1962 studies, a hypothesis was developed relating severity of dengue infection to a second exposure to dengue viruses. This has come to be called the secondary exposure hypothesis. This hypothesis is now being questioned as it does not fully explain the findings of severe disease in patients with no evidence of prior dengue infection (3). A study was undertaken to examine the epidemiology of dengue fever in a lower socioeconomic school population throughout a dengue transmission season to ascertain the relationship of severity to secondary infection.

METHODS : Students attending the Pibulprachasan School in the Dindaeng area of Bangkok were studied. Students were asked to obtain a signed consent form from their parents. All children volunteering for this study were bled prior to the dengue transmission season in May and June 1976. From May through September all children absent from classes for more than two days for physical reasons were visited by a public health nurse. A history of the student's disease was obtained from the family and blood samples were drawn from the student and from members of his family. Approximately 15 days after the initial

bleeding, all concerned family members were bled again.

Hospital records were obtained on students whose illness led to hospitalization.

Sera were submitted for hemagglutination inhibition testing against dengue Japanese encephalitis and chikungunya antigens using standard methods.

RESULTS : Blood samples were drawn from 1975 children, 933 males and 1042 females between the ages of four and 15 years (Table 1).

Table 1. Population Structure of School Population that was selected for Dengue Virus Epidemiology Studies.

Age	Male		Female		Total	
	No.	(%) ^a	No.	(%)	No.	(%)
4	15	(0.7)	33	(1.7)	48	(2.4)
5	29	(1.5)	33	(1.7)	62	(3.1)
6	56	(2.8)	35	(1.8)	91	(4.6)
7	85	(4.3)	103	(5.2)	188	(9.5)
8	115	(5.8)	88	(4.4)	203	(10.2)
9	116	(5.8)	110	(5.5)	226	(11.4)
10	123	(6.2)	127	(6.4)	250	(12.6)
11	108	(5.4)	107	(5.4)	215	(10.8)
12	115	(5.8)	131	(6.6)	246	(12.3)
13	111	(5.6)	168	(8.5)	279	(14.0)
14	42	(2.1)	79	(4.0)	121	(6.1)
15	18	(0.9)	28	(1.4)	46	(2.3)
Total	933	(47.2)	1042	(52.9)	1975	(100)

^a Percent of total subjects tested

The prevalence of antibody to any of the four dengue types was 54% (Table). The prevalence rose from 19% in the four year age group to 67% by age 15.

We have prepared a histogram of the prevalence of dengue 1 antibody by year of age in 1977* (Figure 1A) in order to compare this data with that reported from the 1962 study (Figure 1B).

Table 2. Dengue Virus Antibody Prevalence Rates Determined for Students Prior to the Dengue Virus Epidemic Season.

Age	Males			Females			Total		
	Number Tested	Dengue Virus Antibody		Number Tested	Dengue Virus Antibody		Number Tested	Dengue Virus Antibody	
		No.	(%) ^a		No.	(%)		No.	(%)
4	15	5	(33.3)	33	4	(12.0)	48	9	(18.8)
5	29	14	(50.0)	33	13	(39.4)	62	27	(43.5)
6	56	20	(35.7)	35	16	(45.7)	91	36	(39.6)
7	85	35	(41.2)	103	41	(39.8)	188	76	(40.4)
8	115	61	(53.0)	88	38	(43.2)	203	99	(48.8)
9	116	64	(55.1)	110	59	(53.6)	226	123	(54.4)
10	123	75	(61.0)	127	68	(53.5)	250	143	(57.2)
11	108	55	(51.0)	107	54	(50.5)	215	109	(50.7)
12	115	71	(61.7)	131	73	(55.7)	246	144	(58.5)
13	111	74	(66.7)	168	114	(67.9)	279	188	(67.4)
14	42	30	(71.4)	79	49	(62.0)	121	79	(65.3)
15	18	16	(88.9)	29	15	(51.7)	46	31	(67.4)
Total	933	520	(55.7)	1042	546	(52.4)	1975	1064	(53.9)

^a Percent of number tested

The shape of these two histograms is different and the average percent with antibody was 60% in 1962 compared with 42% in 1977. Of the 1975 children studied this year, chikungunya antibody was found in 14.5% and Japanese encephalitis antibody alone was detected in 28 (1.4%).

In the 23 absentees adequately studied at this time, only 2 required hospital out-patient care. These 2 patients had no serological evidence of dengue virus infection but both of them had a four-fold serological rise to chikungunya. There were seven patients exhibiting four-fold rises to dengue virus. None of these seven required hospital care; they all had low antibody titers indicative of probable primary infection. There have been no secondary infections (as defined by HI criteria) detected in the students so far studied.

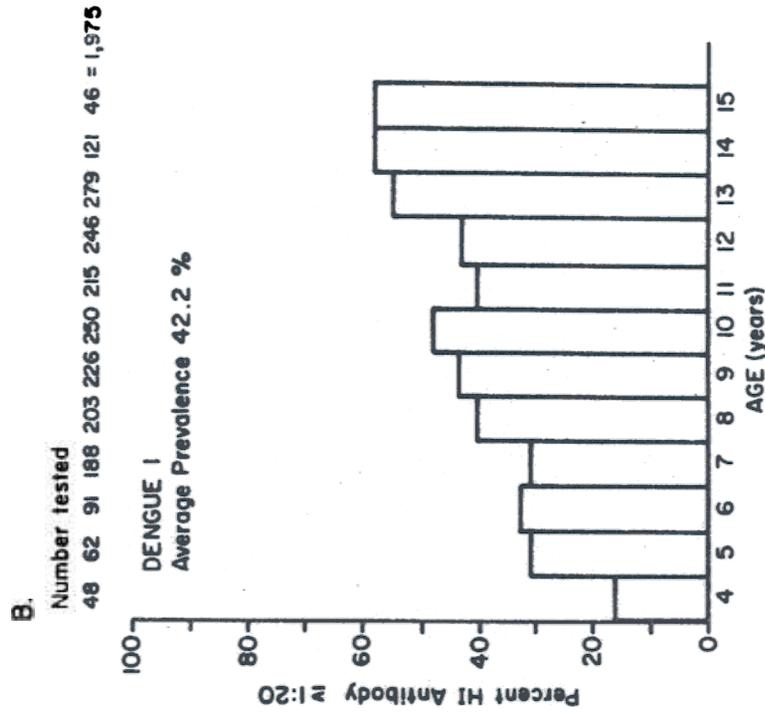
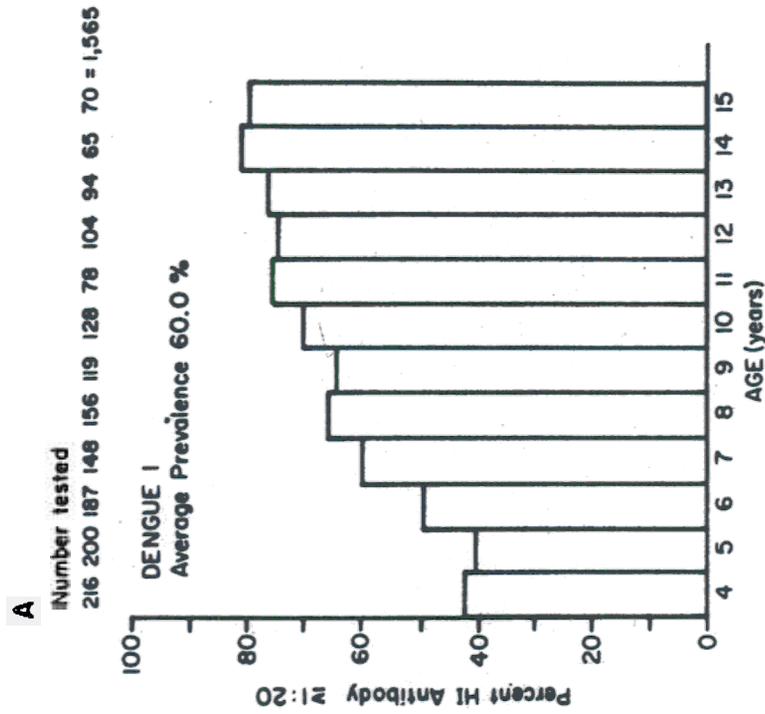


Figure Frequency of of dengue antibody by age in Bangkok Sample Populations
 season 1962 bleed from Bangkok sample taken from Haistead. B. et al. m. Trap Med Hyg
 Pre season bleed from Pibulprachasai Schoo Bangkok THAI ND
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We have presented early and preliminary data on the dengue epidemiology seen in a Bangkok school population. Post transmission season bleeds will be collected in December 1977 and March 1978. Longitudinal dengue antibody data should give some indication of the incidence of clinical and subclinical dengue in this group as well as possibly elucidate the severity of primary and secondary disease.

REFERENCES :

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