

Prevalence of Some Viral Infections in the Residents
of Phnom—Penh

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OBJECTIVE: To survey the experience of residents of Phnom—Penh with polioviruses, mosquito—borne arboviruses and hepatitis B virus (HBV).

BACKGROUND: The question of transmission of hepatitis B virus remains an enigma. It has been shown that virus may be passed by the parenteral route, and contaminated needles or parenteral preparations were implicated in the transmission of disease. Recently the question of arthropod transmission has been raised as a mode of transmission in the tropics. Non—parenteral transmission has also been demonstrated experimentally. Epidemiological investigations have implicated this mode of transmission in tropical areas.

Sera from a Cambodian population were collected by the National Blood Transfusion Center and the Institute of Biology, Phnom—Penh, in a pre—polio immunization study to determine the optimum age of polio immunization in this population. This population resided in a tropical area with generally poor sanitation, and no known recent polio immunization. Biting arthropods are prevalent in Phnom—Penh and many of these are known to be virus vectors. Prior studies had indicated that this population should have a high prevalence of hepatitis B surface antigen (HB_sAg) carriers (1). This information suggested that a comparison of the experience with polio, arboviruses and hepatitis B infections in this population might shed some light on the mode of transmission of HBV in the tropics.

DESCRIPTION: This study was done in collaboration with the National Blood Transfusion Center and the Institute of Biology, Phnom—Penh at the request of Dr. Rene Sansonnens, a WHO representative. Questionnaires were completed by 370 Cambodians presenting themselves for immunization against polio. Sera were obtained from all 370 people prior to immunization. Sera were screened at a dilution of 1:10 for antibody against polio types one, two and three using a metabolic inhibition technique with LLC—MK₂ cells (2). Antibody to mosquito—borne arboviruses found in Southeast Asia were detected by a hemagglutination inhibition test (2) using Chikungunya (Ross) virus as representative of group A arboviruses, Dengue 2 (New Guinea) and Japanese Encephalitis (Nakayama) viruses as representative of group B arboviruses. Sera with no antibody detectable at a 1:10 dilution were considered to be negative. Hepatitis B surface antigen (HB_sAg) was detected by immunoelectrophoresis (IEOP) using high titered human antiserum. The technique of this test has been previously described (3).

Antibody to hepatitis B surface antigen will be detected by either a radioimmune assay inhibition (RIA) or a passive hemagglutination test (PHA, Electronucleonics).

PROGRESS: Polio antibody was present in approximately 25% of children under one year of age (Table 1). Prevalence of antibody increased rapidly, approached 100% by the age of four years and remained between 90 and 100% in all older age groups studied. At least 50% of the children between the age of six to nine years had acquired antibody to all three types of polioviruses. By the age of 15, approximately 85% of the population had antibody to type one, 92% to type two and 28% to type three. These data indicate a high incidence of orally transmitted polio infection in this population over the first few years of life.

Almost 50% of children under the age of one year had experience with group B arbovirus infections (Table 2). This figure dropped significantly in the second year of life to 38% but rose rapidly approaching 100% by the fourth year of life. Antibody to group A arboviruses rose more slowly, being present in 26% of children studied under one year of age. As with group B arboviruses, antibody prevalences fell during the second year. After that, group A antibodies rose more slowly than group B, approaching 100% by 13 years of age.

Twenty-nine individuals or 8% of this population were found to be HB_s antigenemic at the time of collection (Table 3). HB_sAg was found in 4.6% of children under four years of age and rose to about 19% by the age of 15-19. The age specific point prevalence of anti-HB_s remains to be determined.

DISCUSSION: A conclusion from this work is that vaccination against poliomyelitis in this population is indicated for children under the age of four years.

These data indicate extremely rapid transmission of both polio (acquired by the oral route) and group A and B arboviruses (acquired by the parenteral route). HB_sAg appeared in very young children but it reached a peak prevalence later than that of polio or arbovirus antibody (Figure 1).

The prevalence of antibody to HB_sAg has not yet been determined. It remains to be seen whether the transmission rate of HBV is similar to that of polio or arboviruses or occurs at a slower rate. Experience in Bangkok, with a lower socio-economic housing development suggests that the latter might be the case.

REFERENCES:

1. Snitbhan, R., et al: SEATO Medical Research Laboratory Annual Progress Report, 1973-1974.
2. Lennette, E.H. and Schmidt, N.J. (ed.): Diagnostic Procedures for Viral and Rickettsial Infections, ed. 4, New York: American Public Health Association, Inc. 1969.
3. SEATO Medical Research Laboratory Annual Progress Report, 1971-1972.

Table 1. Age Specific Point Prevalence of Polio Neutralizing Antibody in Residents of Phnom-Penh

Age (years)	No. Tested	Negative all 3 types		Positive Ab all 3 types		Positive Neutralizing Antibody to					
						Polio 1		Polio 2		Polio 3	
		No.	%	No.	%	No.	%	No.	%	No.	%
0-1	20	15	75.00	2	10.00	3	15.00	3	15.00	3	15.00
1-2	29	12	41.38	1	3.45	10	34.48	6	20.69	11	37.93
2-3	15	1	6.67	2	13.33	8	53.33	4	26.67	10	66.67
3-4	22	7	31.82	4	18.18	11	50.00	10	45.45	8	36.36
4-5	25	1	4.00	2	8.00	14	56.00	17	68.00	12	48.00
5-6	36	1	2.78	9	25.00	26	72.22	29	80.56	20	55.56
6-9	36	2	5.56	18	50.00	23	63.88	31	86.11	25	69.44
9-12	21	1	4.76	13	61.90	15	71.42	18	85.71	17	80.95
12-15	40	0	0	26	65.00	34	85.00	37	92.50	33	82.50
15-20	30	1	3.33	16	53.33	23	76.67	28	93.33	20	66.67
20-25	50	2	4.00	26	52.00	36	72.00	45	90.00	32	64.00
25-30	30	3	10.00	15	50.00	23	76.67	26	86.67	16	53.33
30-35	15	1	6.67	7	46.67	12	80.00	14	93.33	8	53.33
35-40	1	0	0	1	100.00	1	100.00	1	100.00	1	100.00

Table 2. Age Specific Point Prevalence of HI Antibody to Mosquito-borne Arboviruses
in Residents of Phnom-Penh

Age (years)	No. Tested	No Ab to both Gr. A and Gr. B		Positive Ab to both Gr. A and Gr. B		Positive Ab to Gr. A		Positive Ab to Gr. B.	
		No.	%	No.	%	No.	%	No.	%
0-1	19	8	42.18	3	15.79	5	26.50	9	47.36
1-2	29	18	62.00	5	17.24	5	17.24	11	37.93
2-3	15	4	26.70	3	20.00	3	20.00	11	73.33
3-4	23	1	4.34	6	26.08	7	30.43	21	91.30
4-5	25	3	12.00	7	28.00	7	28.00	22	88.00
5-6	35	4	11.42	14	40.00	15	42.85	30	85.71
6-9	36	2	5.56	19	52.78	19	52.78	34	94.44
9-12	21	1	4.76	13	61.90	13	61.90	20	95.24
12-15	39	0	0	36	92.30	36	92.30	39	100.00
15-20	29	0	0	24	82.75	24	82.75	29	100.00
20-25	50	0	0	49	98.00	49	98.00	50	100.00
25-30	30	0	0	30	100.00	30	100.00	30	100.00
30-35	15	0	0	14	93.33	14	93.33	15	100.00
35+	1	0	0	1	100.00	1	100.00	1	100.00

Table 3. Age Specific Point Prevalence of HB_sAg in Residents of Phnom -Penh

Ag (years)	Male			Female			Total		
	No. Tested	HB _s Ag+ve		No. Tested	HB _s Ag+ve		No. Tested	HB _s Ag+ve	
		No.	%		No.	%		No.	%
0-4	55	4	(7.3)	53	1	(1.9)	108	5	(4.6)
5-9	35	2	(5.7)	46	3	(6.5)	81	5	(6.2)
10-14	20	4	(20.0)	31	4	(12.9)	51	8	(15.7)
15-19	9	2	(22.2)	23	4	(17.4)	32	6	(18.8)
20-29	3	1	(33.3)	68	4	(5.9)	71	5	(7.0)
30-39	2	0	(0)	16	0	(0)	18	0	(0)
Total	124	13	(10.5)	237	16	(6.8)	361	29	(8.0)

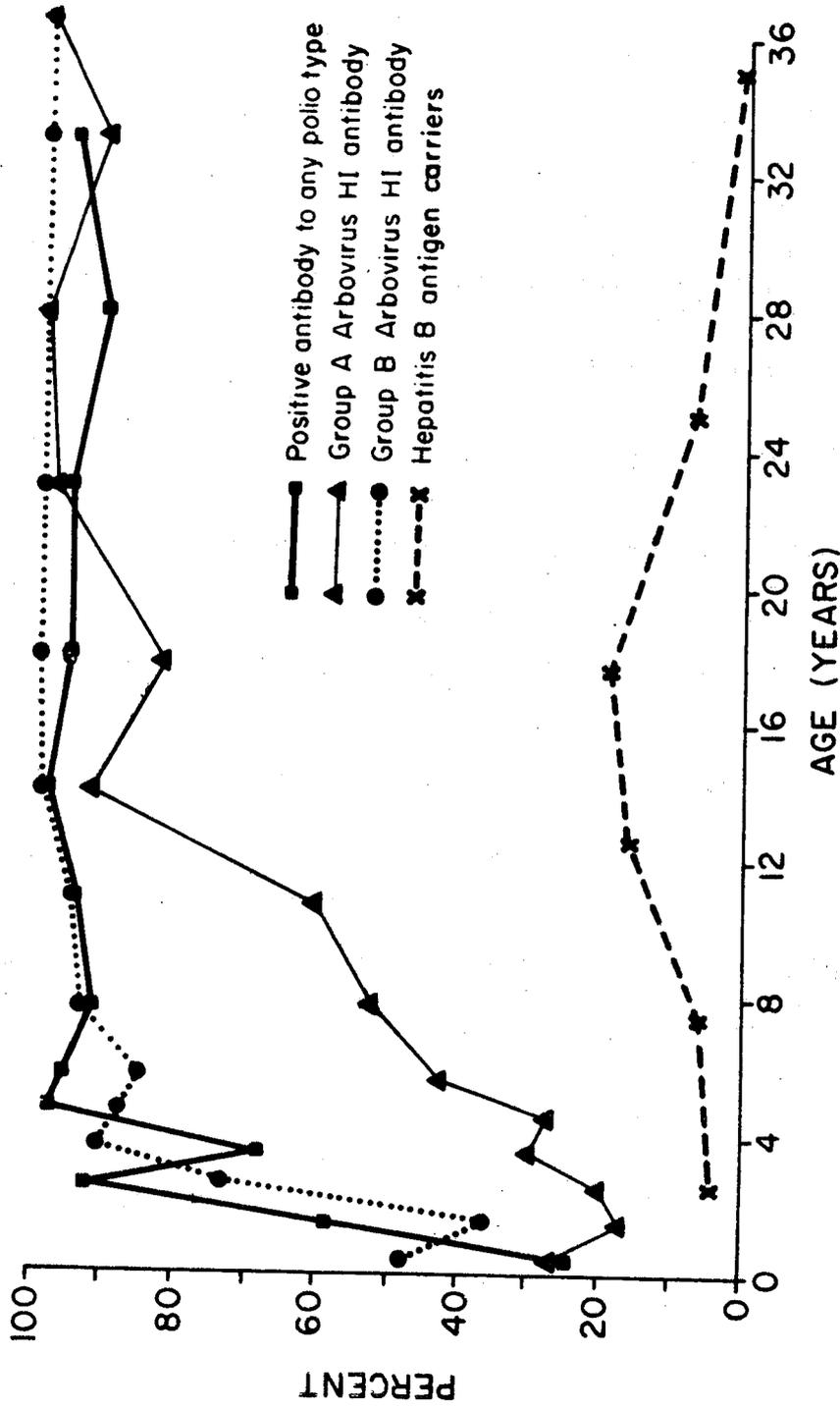


FIGURE 1 AGE SPECIFIC POINT PREVALENCE OF HI MOSQUITO-BORNE ARBOVIRUSES, POLIO NEUTRALIZING ANTIBODIES AND HEPATITIS B ANTIGEN CARRIERS IN RESIDENTS OF PHNOM-PENH (JUNE 1973)