

Continuing Studies of Hepatitis B Antigen Carriers in Thailand

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OBJECTIVE: To compare the age specific point prevalences of hepatitis B surface antigen (HB_sAg) carriers and the HB_sAg subtype distributions in carriers in different parts of Thailand.

BACKGROUND: The presence of HB_sAg or antibody to HB_sAg (anti-HB_s) serves as evidence of prior exposure of hepatitis B virus (HBV). Differences in geographical and environmental status may play an important role in the frequency of HB_sAg carriers and in the distribution of antigen subtypes. This study reports the frequency of HB_sAg carriers found in various parts of Thailand.

DESCRIPTION: HB_sAg carriers were identified using the IEOP test previously described. The method for determining subtypes by the immunodiffusion technique using standard reference antigens and hyperimmune rabbit antisera has also been previously described (SMRL Annual Report 1970-1971). The following well defined populations were sampled and tested:

- (a) Thai residents of Khao Yai National Park (KYNP) in northeastern Thailand (1),
- (b) Randomly selected Thai residents of an urban housing development in Bangkok (2), and
- (c) Thai residents of the village of San Kamphang, in a semi-rural area of Chiangmai province in northern Thailand (3).

PROGRESS: Residents of KYNP included the families of employees of three different agencies working in the park: The Forestry Department, the Highway Department and the Tourist Organization of Thailand (TOT). More than 80% of the estimated total population of the park were sampled and the prevalence of HB_sAg carriers was 9.3%. HB_sAg was found in 10.6% of people associated with the Forestry Department, 9.1% in those associated with the TOT and in only 5.3% of the people associated with the Highway Department.

The prevalence of HB_sAg in males was higher than that in females for every age group. The difference in carrier frequencies between males and females was statistically significant for the total population ($P < .001$). The prevalence of HB_sAg was greatest in children between ages of 10 and 15 years; it fell in older age groups. Of 223 people with multiple blood samples, three acquired HB_sAg between September 1973 and September 1974; the incidence of antigen acquisition was 13.5/1000/year.

Comparison of the above results with the prevalence of HB_sAg carriers in the urban Bangkok housing development (Table 2) revealed that the frequencies of HB_sAg carriers were not significantly different in the two populations. However, in this urban group, there was no significant sex differences in the carrier frequencies of HB_sAg ($0.157 > p > 0.317$). Children of five to nine years had a slightly higher frequency of antigenemia than other age groups with the exception of the small group of people over 60 years of age.

In a village population drawn from northern Thailand, the prevalence of HB_sAg was 8.6% (Table 3). This was not significantly different from those found in the populations described above. None of the 51 sera collected from females was found to contain HB_sAg, but it was found in 15% of those collected from males. The significantly higher prevalence of HB_sAg carriers among males than females was similar to that seen in KYNP ($0.008 > p > 0.014$). San Kampang was one of four villages studied in northern Thailand. In the other three, there was no appreciable prevalence of HB_sAg. If all four villages were taken together, the prevalence of HB_sAg fell from 8.6 to 2.9%.

Subtyping of HB_sAg in carriers was studied in 33 residents of KYNP, 48 of Bangkok and 10 of San Kampang (Table 4). Antigens of adr subtype were present in 86% of the Bangkok carriers, 90% of KYNP carriers and 100% of these in the northern Thai village. The findings suggest that within Thailand, there may be differences in the relative frequency of HB_sAg subtypes from place to place.

Several recent studies have shown that subtypes are consistent within families; however, this information was obtained in the temperate zone where antigen carriers are rare and contact by family members with antigens other than those carried in the family would be unlikely. In KYNP, different subtypes of antigen were present in close proximity. Five conjugal families were studied in which the antigen carried by at least two positive individuals could be subtyped, in four families only the adr subtype was identified and only the adw subtype was found in the other family. Only one subtype was found in any one family. Within the urban Bangkok population, the distribution of subtype again fit into family patterns. In four conjugal families with two to seven HB_sAg positive members, only the adr subtype could be detected; in two other families with two and four HB_sAg positive members, respectively, only the adw subtype was found. Again in no family was more than one subtype identified (4).

Table 1. Age Specific Prevalence of HB_sAg in Residents of Khao Yai National Park (September 1973 - September 1974)

Age (Years)	Male		Female		Total	
	No. Tested	HB _s Ag+ No. (%)	No. tested	HB _s Ag+ No. (%)	No. Tested	HB _s Ag+ No. (%)
0-4	27	1 (3.7)	35	0 (0.0)	62	1 (1.6)
5-9	27	3 (11.1)	26	0 (0.0)	53	3 (5.7)
10-14	14	5 (35.7)	13	0 (0.0)	27	5 (18.5)
15-19	36	3 (8.3)	18	0 (0.0)	54	3 (5.6)
20-29	130	20 (15.4)	57	3 (5.3)	187	24 (12.8)
30-39	60	7 (11.7)	18	1 (5.6)	78	8 (10.3)
40-59	27	3 (11.1)	8	0 (0.0)	35	3 (8.6)
60+	1	0 (0.0)	0	0 (0.0)	1	0 (0.0)
Total	322	42 (13.0)	175	4 (2.3)	497	46 (9.3)

HB_sAg Acquisition Rate = $3/223/\text{year} = 13.5/1000/\text{year}$

Table 2. Age Specific Prevalence of HB_sAg* in Residents of Huay Khwang, Bangkok (July 1971)

Age (years)	Male			Female			TOTAL		
	No. tested	Prevalence		No. tested	Prevalence		No. tested	Prevalence	
		No.	%		No.	%		No.	%
1-4	35	1	(2.8)	31	2	(6.4)	66	3	(4.5)
5-9	54	5	(9.2)	56	7	(12.5)	110	12	(10.9)
10-14	61	8	(13.1)	66	2	(3.0)	127	10	(7.9)
15-19	39	6	(15.4)	54	3	(5.6)	93	9	(9.7)
20-29	38	5	(13.2)	71	4	(5.6)	109	9	(8.2)
30-39	27	0	(0.0)	53	4	(7.5)	80	4	(5.0)
40-59	37	2	(5.4)	56	3	(5.4)	93	5	(5.4)
60+	6	2	(33.3)	13	3	(23.1)	19	5	(26.3)
TOTAL	297	29	(9.8)	400	28	(7.0)	697	57	(8.2)

* Combined results from IEOB and radioimmunoassay(RIA) tests.

Table 3. Age Specific Prevalence of HB_sAg in San Kampong (November 1969)

Age (Years)	Male		Female		Total	
	No. Tested	HB _s Ag+ No. (%)	No. Tested	HB _s Ag+ No. (%)	No. Tested	HB _s Ag+ No. (%)
0-4	3	1 (33.3)	8	0 (0.0)	11	1 (9.1)
5-9	15	4 (20.6)	9	0 (0.0)	24	4 (16.7)
10-14 } 15-19 }	21	2 (9.5)	15	0 (0.0)	36	2 (5.9)
20-29 } 30-39 }	15	3 (20.0)	11	0 (0.0)	26	3 (11.6)
40-59	11	0 (0.0)	8	0 (0.0)	19	0 (0.0)
60+						
Total	65	10 (15.4)	51	0 (0.0)	116	10 (8.6)

DISCUSSION: Comparison of the three populations revealed no significant differences in the frequency of HB_sAg carriers, suggesting a similar rate of exposure to HBV occurred in these three groups. It was interesting to note, however, the marked local differences in the antigen frequency among the villages of northern Thailand. On the one hand, the number of persons studied were small and therefore the phenomena may represent a sampling error. On the other hand, these differences may be due to local environmental and social factors. The high prevalence of HB_sAg carriers among all three groups support the finding of high carrier prevalences in the tropics. The striking difference noted in the HB_sAg carrier prevalence among the rural males and females might be explained by two hypotheses. First the male, through his socially defined role, may have an increased exposure to sources of infection. This has been suggested by the data of Grossman et al (2) who showed increased anti-HB_s prevalences among young urban males. The distribution of anti-HB_s in rural populations remains to be seen. Second, males may be more susceptible than females to the development of the carrier state. This interesting hypothesis could not be evaluated in this study.

The subtype distribution in carriers suggests that local differences in virus subtypes exist within areas of Thailand. Further, the localization of antigen subtypes within family units implies an even smaller unit of HBV transmission.

Table 4. HB_sAg Subtypes in Thais

Population	HB _s Ag adr %	Subtypes adw %
Urban Bangkok	86	14
Khao Yai National Park	90	10
Northern Thailand	100	0

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