Seroepidemiologic Survey of Hepatitis B Virus Infection in a Rural Thai Village

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OBJECTIVES :

1. To determine the prevalence of hepatitis B surface antigen (HB_sAg) and antibody to hepatitis B surface antigen (anti-HB_s) in a well-defined rural Thai population.

2. To determine if there is a familial clustering of either HB_sAg or anti-HB_s.

BACKGROUND : A study on well defined urban Thai population (1) has shown an average prevalence of HB_sAg of 8.2% (determined by radioimmune assay) and anti-HB_s of 46.1% (determined by passive hemagglutination). In this population of 697 people age one year to 75 years, the prevalence of HB_sAg was similar throughout all age groups. For anti-HB_s, on the other hand, the prevalence rose from 15.4% in the 1-4 age group to a plateau level of 50 to 65% after the age of 20. A stable rural Thai population was sought to determine the prevalence of HB_sAg and anti-HB_s for comparison with that found in the Bangkok population.

METHODS : The village of Tablan was selected for study. This village was located in Prachinburi province in the Bhu Phram valley. Its population had been included in malaria drug prophylaxis studies for two years. Sera from a portion of the population had been collected for malaria studies at approximately yearly intervals in 1974 and 1975.

A census of the village conducted in early 1976 showed the total population to consist of 1,014 people, 503 males and 511 females. Sera were assayed for HB_sAg and anti-HB_s serology by radioimmune assay (AUSRIA II and AUSAB supplied by Abbott Laboratories, North Chicago, Ill.).

RESULTS :

Prevalence Data : The age-and sex-specific prevalence rates of HB_sAg for 1976 as detected by RIA are presented in Table 1. While the prevalence rate in males is relatively constant after infancy, the prevalence of HB_sAg is significantly lower in females mainly because of the near total lack of antigenemia in those women over 30, and secondarily because of generally lower prevalence rates in the younger age groups. Although the prevalence rates of HB_sAg for three of the four groups of females from age 5-29 are lower than those of the corresponding males groups, none of these individual differences were sufficient to be

termed significant. Age adjustment does not change the prevalence rates to a large degree.

A completely different distribution has been noted for the prevalence of anti-HB_s determined on the same sera. Table 2 presents the age-and sex-specific prevalence rates for anti-HB_s. The prevalence rates rose progressively with age in both sexes. Except for the very young and the very old, male rates again were uniformly higher than their female contemporaries, but no significant difference was evident in any individual groups nor in the overall prevalence rate. Age adjustment did not influence the prevalence rates of anti-HB_s in males or females.

Family Interactions : Antibody prevalence tended to cluster in those families with one or more HB_sAg carriers in the family. Table 3 points out the association in children under the age of 18. On the other hand, there was no evidence of the clustering of HB_sAg positive individuals in the family group. As can be seen in the final column of Table 4, the average number of antigenic individuals changed very little with variation in family size.

In an effort to identify the status of intra-familial transmission, families in which a single parent was HB_sAg positive were sought. Fifteen such families, in which the HB_sAg status of both spouses was known, were found. In all 15 families, it was the father who was antigen positive. This was not surprising, considering the relative lack of female HB_sAg carriers of maternal age as demonstrated in Table 1. In those 15 families, three of 41 children (7.3%) were HB_sAg negative, 13 of 244 children (5.3%) were HB_sAg positive. There were no families in which both spouses were HB_sAg positive.

There was no evidence that intra-familial transmission was taking place from child to either parent. In families in which one or more children were HB_sAg positive, two of 12(16.7%) fathers were also positive. In families in which all children tested were HB_sAg negative 14 of 96(14.6%) fathers were HB_sAg positive. The corresponding figures for mothers were zero out of 20(0%) and three out of 107(2.8%), respectively.

Incidence Data : Table 5 presents relationship of time on the various combinations of HB_sAg and anti-HB_s extant in Ban Tablan in 1975. The time period covered averaged 19 months between blood samples and those 1975 samples which could not be repeated in concert with the corresponding 1976 specimen were eliminated from analysis.

During this period, ten of 79(12.7%) anti-HB_s negative individuals gained antibody and four of 76(5.3%) lost a positive antibody titer. Three of 138(2.2%) HB_sAg negative individuals acquired antigenemia and none of 17 antigenemic individuals became seronegative.

The above figures would translate into a minimum of an 11.8% annual infection rate (10 acquisitions of anti-HB_s + 2 of HB_sAg out of 64 seronegative individuals over a period of 19 months).

Table 1. Prevalence of HB_sAg in residents of Ban Tablan

Age (Year)	Male			Female			Total		
	No. Tested	Positive No.	Positive %	No. Tested	Positive No.	Positive %	No. Tested	Positive No.	Positive %
0-4	33	0	0	39	1	2.56	72	1	1.39
5-9	59	7	11.86	69	4	5.79	128	11	8.59
10-14	64	3	4.68	66	6	9.09	130	9	6.92
15-19	39	5	12.82	34	3	8.82	73	8	10.96
20-29	56	9	16.07	67	3	4.48	123	12	9.76
30-39	40	5	12.50	45	0	0	85	5	5.88
40-49	36	3	8.33	28	0	0	64	3	4.69
50-59	21	2	9.52	26	2	7.69	47	4	8.51
60+	11	2	18.18	12	0	0	23	2	8.69
Total	359	36	10.03	386	19	4.92	745	55	7.38
Age adjusted prevalence			10.07			4.92			

Table 2. Prevalence of anti-HB_s in residents on Ban Tablan

Age (Year)	Male			Female			Total		
	No. Tested	Positive No.	Positive %	No. Tested	Positive No.	Positive %	No. Tested	Positive No.	Positive %
0-4	33	2	6.06	39	7	17.94	72	9	12.50
5-9	59	12	20.33	69	13	18.84	128	25	19.53
10-14	64	24	37.50	66	23	34.84	130	47	36.15
15-19	38	21	55.26	34	9	26.47	72	30	41.67
20-29	56	27	48.21	67	26	38.80	123	53	43.09
30-39	40	20	50.00	45	22	48.89	85	42	49.41
40-49	36	24	66.67	28	12	42.86	64	36	56.25
50-59	21	13	61.90	26	14	53.85	47	27	57.45
60+	11	8	72.73	12	10	83.33	23	18	78.26
Total	358	151	42.18	386	136	35.23	744	287	38.58
Age adjusted prevalence			41.56			35.29			

Table 3. Anti-HB_s prevalence in children (under 18 years of age) by the presence of a HB_sAg carrier in the household

No. of HB_sAg positive individuals in the family	No. of children	Anti-HB_s positive No.	Anti-HB_s positive %
0	284	74	26.1
1 or more	76	31	40.8

df = 1

X^2_y = 5.61

$p < .0125$

Table 4. HB_sAg prevalence by family size

Family size	No. of families	% of families with at least one HB_sAg positive individual	No. of people in families of this size	% of individuals HB_sAg positive	Mean No. of HB_sAg positive individuals in an HB_sAg positive family
2-3	54	24.1	132	11.4	1.2
4-5	56	19.6	254	5.5	1.3
6-7	38	28.9	245	6.1	1.4
8-9	7	14.3	59	1.7	1.0
10+	4	25.0	41	4.9	2.0
	159	23.3	731	6.4	1.3

Table 5. Serologic status HBV Ban Tablan, Thailand

Status 1975	Total	Status 1976	Total
Ag-Ab-	64	Ag-Ab-	52
		Ag-Ab+	10
		Ag+Ab-	2
		Ag+Ab+	0
Ag-Ab+	74	Ag-Ab-	3
		Ag-Ab+	70
		Ag+Ab-	0
		Ag+Ab+	1
Ag+Ab-	15	Ag-Ab-	0
		Ag-Ab+	0
		Ag+Ab-	15
		Ag+Ab+	0
Ag+Ab+	2	Ag-Ab-	0
		Ag-Ab+	0
		Ag+Ab-	1
		Ag+Ab+	1

REFERENCE :

1. Grossman, R.A., Benenson, M.W., Scott, R.M., Snitbhan, R., Top, F.H., and Pantuwatana, S. : An Epidemiologic Study of Hepatitis B Virus in Bangkok, Thailand. Am. J. Epid. 101: 144-159, 1975.