

Subtypes of Hepatitis B Antigen in Southeast Asia

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OBJECTIVE : This is a continuing study to determine the frequency of each hepatitis B antigen subtype in different study populations.

BACKGROUND : Hepatitis B surface antigen (HBsAg) has specific antigenic determinants which permit the differentiation of subtypes by immunologic techniques. An attempt was made to determine the subtype of as many antigens as possible detected by this laboratory. New abbreviations for designating antigen subtypes have been adopted as recommended by the U.S. National Academy of Sciences (1). Hepatitis B surface antigen is referred to as HBsAg and antibody as anti-HBs.

DESCRIPTION : The method for determining subtypes by immunodiffusion using standard reference antigens and hyperimmune rabbit antisera has been previously described. (2)

The following study populations have been sampled and tested :

1. Thai and American patients with acute viral hepatitis based on clinical symptoms, signs and serum biochemical tests of liver function.
2. Thai professional blood donors living in Metropolitan Bangkok.
3. Pregnant Thai women at the time of delivery.
4. Randomly selected residents of an urban low socioeconomic housing area in a Bangkok subdivision (Huay Khwang).
5. Residents of a rural and semi-rural area of Northern Thailand (Chiang Mai province).
6. Young Thai female companions (service girls) of foreign military personnel in South-Central Thailand. Most of the girls reported having had intimate contact with Americans.
7. American military personnel entering and leaving the Republic of Vietnam. This group included people with limited or no prior exposure to the intrinsic infections of Southeast Asia.
8. Vietnamese blood donors kindly provided by Mr. William S. Adams, Public Health Advisor, United States Consulate General, Danang.

PROGRESS:

The prevalence of HBsAg in Thai and non-Thai people

Table 1 shows the prevalence of HBsAg in each study population. Among asymptomatic Thai people, the prevalence of HBsAg was higher in professional blood donors than in service girls or pregnant women. Members of the randomly collected urban Thai population had a prevalence of HBsAg almost twice that of the rural population studied. The Vietnamese blood donors showed a higher prevalence of HBsAg than the Thai blood donors; however, the number tested was very small. A very low prevalence of HBsAg was observed in asymptomatic Americans entering and leaving the Republic of Vietnam. 53% of Thai and 39% of American cases of acute hepatitis were associated with HBsAg. The prevalence of HBsAg in cases of acute hepatitis was not significantly different between Thais and Americans ($\text{CHI}^2 = 5.0$; $P < 0.5$).

Table 1. Prevalence of HBsAg in Various Populations Studied in Southeast Asia

Nationality	Study Population	No.	HBsAg Positive		Antigen subtyped			
			No.	(%)	No. tested	%	No. subtyped	%
Thai	Acute Hepatitis	113	60	(53.1)	60	(100)	24	(40)
	Blood Donors	8801	958	(10.9)	101	(10.5)	80	(79.2)
	Pregnant Women	1625	93	(5.7)	51	(54.8)	42	(82.3)
	Service girls	681	51	(7.5)	45	(88.2)	43	(95.5)
	Urban (Bangkok)	695	59	(8.5)	59	(100)	48	(81.3)
	Rural (Chiang Mai)	606	28	(4.6)	23	(82.1)	20	(86.9)
Vietnamese	Blood Donors	35	5	(14.3)	5	(100)	3	(60)
American	Acute Hepatitis	174	68	(39.1)	60	(88.2)	40	(66.6)
	Entering Vietnam	1293	11	(0.85)	11	(100)	10	(90)
	Leaving Vietnam	1072	5	(0.47)	5	(100)	4	(80)

Table 2. Distribution of HBsAg Subtypes in Populations Studied in Southeast Asia

Nationality	Study Population	Antigens Subtyped	Subtype Frequency (%)				
			adr	adw	ad	ayw	other
Thai	Acute Hepatitis	24	92	0	8	0	0
	Blood Donors	80	81	9	10	0	0
	Pregnant Women	42	71	10	19	0	0
	Service girls	43	81	9	9	0	0
	Urban (Bangkok)	48	81	13	6	0	0
	Rural (Chiang Mai)	20	95	0	5	0	0
Vietnamese	Blood Donors	3	67	0	33	0	0
American	Acute Hepatitis	40	20	5	52	23	0
	Entering Vietnam	10	30	30	30	10	0
	Leaving Vietnam	4	25	0	25	25	25*

* Unconfirmed adyw

The distribution of HBsAg subtypes in people of different nationality

Table 2 shows the results of subtyping of HBsAg found in Thais, Vietnamese and Americans in Southeast Asia. In the Southeast Asian populations, the d determinant was predominant. Among the Thais, the ratio of HBsAg/adr to HBsAg/adw (approximately 8:1) was quite similar in all groups of asymptomatic carriers with one exception. In the rural sample from Chiang Mai, the w determinant was not found. No correlation was observed between socioeconomic status and subtypes of HBsAg. The y determinant was not found in any Thai population sampled, not even in the service girls who had the closest contact with potential y carriers (U.S. military personnel). In the small sample of Vietnamese blood donors studied, only the HBsAg/adr subtype was found. On the other hand, both d and y determinants were found in American servicemen. A different distribution of subtypes was also found in persons of different nationality with acute hepatitis; Thais had only adr while Americans had adr, adw and ayw.

DISCUSSION: These data suggest that d is the predominant subtype determinant in Thailand. The y determinant was not found on any antigen obtained from Thais and Vietnamese. The third determinant was r in approximately 80% and w in approximately 10% of antigens, but could not be detected in the remainder.

This study suggests that clinical disease is not related to subtype but is caused by the organism prevailing in the population studied. The absence of the y determinant in all Thais and the w determinant in Northern Thais supports earlier observations that the distribution of subtypes fits into geographic patterns, with ad being the predominant combination in the Far East. For residents of Southeast Asia, determinants w and r are more useful epidemiologic markers than y and d.

REFERENCES:

1. Committee on Viral Hepatitis, National Academy of Sciences: The Public Health Implication of the Presence of Hepatitis B Antigen in Human Serum. *Morbidity and Mortality Weekly Report* 21:133, 1972.
2. SEATO Medical Research Laboratory Annual Report 1972—1973.