

Hepatitis B Virus in Bangkok Families

Principal Investigators: William H. Bancroft, LTC, MC
Vanich Vanapruks, MD, MAJ, RTA¹
Robert McNair Scott, MAJ, MC
Dumrong Chiewsilp, MD, MAJ, RTA

Associate Investigators: Majuree Balankura, MD, COL, RTA¹
Pramoon Sookwatana, MD, LTC, RTA¹

OBJECTIVE: To determine when young urban Thai children are first exposed to hepatitis B virus (HBV) and to search for the most common routes of transmission to infants in the first year of life.

BACKGROUND: A recent study showed that 19.9% of the residents of Huay Khwang had Hepatitis B surface antigen (HB_sAg) or antibody (anti-HB_s) between the ages of one to five years (1). HBV infection in children was closely related to the presence of HB_sAg in their mothers. Another study of women who delivered at Women's Hospital, Bangkok, showed 12% of 93 mothers with HB_sAg had antigen in their cord blood by radioimmune assay (RIA). Furthermore, mothers with anti-HB_s always had antibody in their cord bloods (2).

The current study was designed to follow infants in the first year of life and to compare the incidence and effects of HBV infection in infants whose mothers had HB_sAg or anti-HB_s to those whose mothers were negative.

DESCRIPTION: An attempt was made to interview and sample as many women as possible who delivered at Phra Mongkutklao Hospital (PMKH) between 1 February 1974 and 31 January 1975. Blood was collected from the mother and the carefully wiped umbilical cord at the time of delivery for testing for HB_sAg and anti-HB_s. A questionnaire interview of the mother was conducted in the early postpartum period. Study subjects were selected by 1) the presence of HB_sAg or anti-HB_s in the mother's blood; 2) residence within the metropolitan Bangkok area; and 3) willingness to allow home visits and to bring the baby to the PMKH Well Baby Clinic for follow-up. Control mothers were selected if they had no HB_sAg or anti-HB_s in their blood but delivered on the same day as a positive mother. Control mothers also had to meet criteria 2 and 3 listed above.

HBV serology used a solid phase RIA (Ausria I) and immunoelectroosmophoresis (IEOP) as the primary screening tests for HB_sAg and a radioimmune assay inhibition (RIAI) test to detect anti-HB_s. Passive hemagglutination (PHA) was used when available to confirm the RIAI results and to test small volume samples. All blood samples were tested for serum transaminase (SGOT and SGPT) levels as well.

Serial serum samples were drawn by venipuncture at approximately two, three, six, nine and 12 months of age in the Well Baby Clinic after examination by a pediatrician. Blood samples were drawn from the mothers at the same time intervals. An attempt is being made to collect blood samples from all other people living in the home during home visits at three, six and 12 months after delivery.

During home visits, information was gathered on the home environment by questionnaire and inspection and samples of breast milk, saliva and mosquitoes were collected from some families. The priority of sample testing is to test sera first, then saliva, breast milk and mosquitoes.

¹ Royal Thai Army Hospital, Bangkok, Thailand.

PROGRESS: A comparison was made of 300 women delivering at PMKH to 300 women at Women's Hospital to see if the two hospital populations were similar. The prevalence of HB_sAg detected by IEOP was 4.3% at PMKH and 3.7% at Women's Hospital. The groups were very similar in terms of parent ages, number of people in the home and home location within Bangkok. A notable difference was that the mean family income was 25% greater at PMKH than at Women's Hospital. For the purposes of this study, the two hospitals seemed similar.

Interviews and blood samples were obtained from 1042 (43%) of the women who delivered over a 12 month period. From this group, 42 women with HB_sAg, 44 with anti-HB_s and 77 negative controls are being followed. For most mothers with antigen or antibody, a satisfactory negative control was identified who delivered two days before to two days later. In seven instances, mothers who were initially thought to be negative were later shown to actually have antibody at the time of delivery after they had been matched to HB_sAg positive mothers. These seven pairs of antigen positive mothers mismatched to antibody positive mothers are being followed that way.

A preliminary review was made of the serological results for 64 mothers, including 12 with HB_sAg, 20 with anti-HB_s and 32 time matched controls. Only families that had been followed at least six months or sero-converted before being lost to follow-up were reviewed. All mothers with antigen or antibody remained positive (Table 1). Three negative mothers developed low level antibody activity by 10-19 weeks suggesting they may have been exposed to HBV in the recent past.

The infants showed dramatic serological changes (Table 2). One infant of an HB_sAg positive mother was found to have antigen in the cord blood and in every follow-up serum throughout the next 12 months. This infant had the only antigen positive cord blood detected by IEOP. Other infants of antigen positive mothers frequently developed antigen or antibody by the age of 20-29 weeks, indicating that these infants are at risk of infection very early in life.

All of the infants with antibody positive mothers had anti-HB_s in their cord bloods. The frequency of anti-HB_s declined steadily during the first six months as was expected for passively acquired maternal antibody. Several of these infants came from families with an HB_sAg positive father, sibling or other member; some may show evidence of infection with HBV after the maternal antibody is gone. None of the infants of negative mothers have developed antigen or antibody yet. The prevalence of HB_sAg carriers seems to be the lowest in this group of families.

SUMMARY: A prospective study was started of HBV infection of infants selected on the basis of their mother's serological findings at the time of delivery. A preliminary review indicates children of HB_sAg positive mothers have a high likelihood of becoming infected in the first six months of life. Children of antibody positive mothers have maternal antibody at birth which may afford protection during the first six months. After losing their maternal antibody, these children as a group may be at a higher risk of infection with HBV than children of negative mothers since the families of the former often include an antigen carrier.

REFERENCES:

1. Grossman, R.A., Benenson, M.W., Scott, R.M., Snitbhan, R., Top, F.H., Jr. and Pantuwatana, S.: An Epidemiological Study of Hepatitis B Virus in Bangkok, Thailand. *Am. J. Epidemiol.* 101: 144-159, 1975.
2. Chiewsilp, D., Scott, R.M., Mansuwan, K. and Bancroft, W.H.: SEATO Medical Research Laboratory Annual Report, March 1974.

Table 1. Frequency of HB_sAg and Anti-HB_s in 32 Pairs of Mothers.

Mother		Maternal Category								
Blood Spec.	Weeks After Delivery	HB _s Ag			Anti-HB _s			Negative		
		No.	Ag+	Ab+	No.	Ag+	Ab+	No.	Ag+	Ab+
1	Delivery	12	12	0	20	0	20	32	0	0
2	4-9	8	8	0	16	0	16	24	0	0
3	10-19	9	9	0	18	0	18	27	0	3
4	20-29	7	7	0	14	0	14	21	0	2
5	30-39	2	2	0	1	0	1	3	0	0

Table 2. Frequency of HB_s Ag and Anti-HB_s in 32 Pairs of Infants.

Infant		Maternal Category								
Blood Spec.	Weeks After Delivery	HB _s Ag			Anti-HB _s			Negative		
		No.	Ag+	Ab+	No.	Ag+	Ab+	No.	Ag+	Ab+
1	Delivery	12	1	0	20	0	20	32	0	0
2	4-9	8	0	0	16	0	15	24	0	0
3	10-19	9	3	1	18	0	10	27	0	0
4	20-29	7	4	1	14	0	2	21	0	0
5	30-39	2	1	0	1	0	0	3	0	0