

PREVALENCE OF HEPATITIS B INFECTION AS DETERMINED BY THIRD GENERATION TESTS IN THE MALAYSIAN POPULATION

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Summary

The use of Hepatest (Burroughs Wellcome) and RIA (Abbott Laboratories) methods were found to be almost five to six times more sensitive than the counter-immunoelectrophoresis method in the routine testing of blood donors for the HB_sAg. With the Hepatest method, positive results were obtained in 7.4%, 14.8% and 6% among 149 Malay, 149 Chinese, and 149 Indian healthy blood donors respectively. The figures were 5.6% in Malays, 13.1% in Chinese and 4.8% in Indians using the RIA method. In specimens from 770 patients the incidence was found to be 17.7% in Malays, 23.6% in Chinese and 15.9% in Indians. HB_sAb was found in 20.4% of Malays, 21.9% of Chinese and 25.0% of Indians.

The prevalence of infection among staff in the blood bank and haemodialysis unit was not found to be higher than that in the general population. Twenty six per cent of the haemodialysis patients however were found to be positive for HB_sAg and 48% of them had HB_sAb.

Hepatitis B surface antigen (HB_sAg) is regarded as a marker for blood which is potentially infectious for viral hepatitis type B (HBV).¹ Current methods of investigation have been classified under three generations of sensitivity based upon ability to detect degrees of positivity for HB_sAg. Third generation tests have a sensitivity greater than the methods of the other two generations. The relatively insensitive technique of counter-immunoelectrophoresis (CIEP), until recently most commonly used in blood banks, has now been superceded by much more sensitive assays using principles of haemagglutination or radioimmunoassay which are now commercially available. In 1975, the Bureau of Biologics of the U.S. Food and Drug Administration proposed that all HbsAg testing be done by third generation tests.² This followed reports that Type-B Hepatitis continued to occur following transfusions, despite wide spread screening of blood donors by CIEP.^{3,4}

In order to assess the prevalence of HBV infection in our population using these newer techniques, we compared our results obtained with the CIEP method of screening blood donors for HB_sAg with two other screening tests — the Reversed Passive Haemagglutination (RPHA) and radioimmunoassay (RIA).

MATERIALS AND METHODS

Over a period of one year (1974) 11,031 donors were screened routinely for HB_sAg by CIEP using standard methods. Lantern slides were covered with 14 ml of 1.0% Oxoid Ionagar No. 2 suspended in barbital buffer pH 8.6-8.8 and subjected to electrophoresis. A similar study on 9,932 donors, using the same method, has previously been reported.⁵

447 donor samples from 149 Malays, 149 Chinese and 149 Indians were investigated for HB_sAg with a reversed passive haemagglutination technique (Hepatest, Burroughs Wellcome). 352 donor samples from 125 Malays, 122 Chinese and 105 Indians were tested by the solid phase radio-immune procedure (Ausria II, Abbott Laboratories). 270 of these samples were investigated for Anti-HB_sAg antibody (Aus Ab, Abbott Laboratories). In addition, 770 cross-match samples from patients admitted into hospital with a variety of disorders were investigated using Hepatest.

An attempt was also made to assess prevalence of HB_sAg among highly exposed groups, namely the staff of a dialysis unit and medical laboratories, and to compare these results with those obtained in the donor group.

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RESULTS

In a previous study on 9,932 donors using the CIEP method, a total of 146 (1.4%) of donors of all races were found to be positive for HBsAg. The highest number of positives (11.4%) was found in East Malaysians. In Chinese the percentage positives was 2.2%, in Malays 1.6% and in Indians 0.4%. In the present study using the same method, the figures were essentially similar with HBsAg being present in 1.7% of the total number investigated. The percentage positives among Chinese was 2.9%, the Malays 1.8%, Indians 0.6% and East Malaysian 19.7%

The number of positives detected using RPHA was six times that detected with the CIEP method. Using the Hepatest method, positive results were obtained in 7.4%, 14.8% and 6% among 149 Malays, 149 Chinese and 149 Indians respectively. A greater number of positives were seen in the younger age groups in the Chinese. In contrast, positive results among the Indians were more evenly distributed throughout the different age groups (Table I). 770 specimens sent for cross-match tests representing specimens from patients with a variety of disorders showed a highly positivity rate in all ethnic and in all age groups — 17.7% in Malays, 23.6% in Chinese and 15.9% in Indians. (Table II). The comparative prevalence of infection in all age and ethnic groups was essentially similar (Fig. 1).

Using the RIA method, the percentage positives were 5.6% in Malays, 13.1% in Chinese and 4.8% in Indians (Table III). Antibody to the HBsAg was found in 20.4% of Malays, 21.9% of Chinese and 25.0% of Indians, with an overall percentage positivity of 22.4 (Table IV).

Among a small groups of high risk individuals, HbsAg was present neither among 19 members of the staff of the haemodialysis unit nor in 25 members of the blood bank staff, but HbsAb was found in 15% of the former and 8% in the later group. Among haemodialysis patients, however, 26% were found to be positive for HbsAg and 48% were positive for the HbsAb (Table V).

DISCUSSION

The importance of instituting third generation tests as a routine method for screening of HBsAg was stressed by Goldfield et al in 1975.⁶ Similarly our findings show that testing of

donor blood using the CIEP method is unsatisfactory as only strongly reacting sera were detected. The results of the study of patient samples appear to show an early exposure to HBV. It is pertinent to note in this context that Szmuness in 1975⁷ demonstrated that the earlier in life a person is infected, the more likely will he or she become a chronic carrier. The slightly higher values obtained with the RPHA method as compared to RIA may be due to a certain number of false positive results as confirmatory tests were not done.

In a study by Pattison et al in 1973⁸ the percentage of haemodialysis patients with HBsAg was found to be 6% — six times that of their control group. The percentage positivity among their staff of the haemodialysis unit was 2%. The percentage of Malaysian haemodialysis patients positive for HBsAg on the other hand, was 26% — just over three times that of the control blood donor group. None of the staff of the haemolysis unit however, was positive for HBsAg. In the same study mentioned above, antibody to HbsAg was found in 29% of American patients — just over twice that of the control group. Similarly antibody was found in 48% of Malaysian patients — just over twice that found in the control blood donor group among which 22.4% were positive. Antibody to HBsAg was found in only 15% of Malaysian staff working in the haemodialysis unit. Likewise only a small percentage of staff of the blood bank laboratories were positive for antibody whereas in the American group, 35% of staff in the haemodialysis unit had antibody — more than twice that of the control group. The low positivity rate for antibody among the high risk Malaysian staff may indicate adequate precautions taken in handling patients and blood specimens or resistance to infection. The prevalence of antibody to HBsAg in the general population as evident in the present study of blood donors may be a relevant factor in determining infection rate.

It is probable that the incidence of clinical post-transfusion hepatitis is relatively low when compared to other countries in spite of the relatively high incidence of HbsAg positive donors. There are reports that antibody confers some immunity to further infections and that immunity is directly dependent on the titre of circulating HbsAg.⁹ Therefore the relatively high incidence of HbsAb in the population may

TABLE I
DONOR SAMPLES TESTED WITH HEPATITIS ACCORDING TO RACE AND AGE

Age	MALAYS				CHINESE				INDIANS			
	No. Tested	No. (+)	% (+)	No. Tested	No. (+)	% (+)	No. Tested	No. (+)	% (+)	No. Tested	No. (+)	% (+)
<20	12	1	8.3	76	8	10.5	10	1	10			
20 - 29	88	6	6.8	71	14	19.7	81	2	2.5			
30 - 39	37	3	8.1	1	0	0	40	4	10			
40 - 49	11	0	0	1	0	0	15	2	13.3			
>50	1	1	-	0	0	0	3	0	0			
Total	149	11	7.4	149	22	14.8	149	9	6			

TABLE II
770 PATIENTS SPECIMENS FROM CROSSMATCH SAMPLES INVESTIGATED FOR
HB_sAg WITH HEPATITIS

Age	MALAYS						CHINESE						INDIANS					
	(-)			(+)			(-)			(+)			(-)			(+)		
	M	F	Total	%(+)	M	F	Total	%(+)	M	F	Total	%(+)	M	F	Total	%(+)		
<10	2	2	4	24	8	5	13	27	3	3	6	27	2	-	2	3	40	
10 - 19	3	2	5	21	7	12	19	22	6	3	9	22	-	1	1	8	6	
20 - 29	2	7	9	11	20	50	70	20	8	9	17	20	-	3	3	6	10	
30 - 39	1	9	10	16	11	40	51	11	5	2	7	11	-	2	2	6	11	
>40	10	2	12	20	50	20	70	20	16	10	26	20	7	6	13	40	16	
Unknown	1	-	1	-	7	1	8	-	3	-	3	-	-	-	-	1	2	
Total	19	22	41	17.7	103	128	231	23.6	41	25	66	23.6	9	12	21	64	15.9	

TABLE III
HB_sAg by RIA (AUSRIA II-125)

Blood Donors	No. Tested	No. Positive	% Positive
Malays	125	7	5.6
Chinese	122	16	13.1
Indians	105	5	4.8
Total	352	28	7.8

TABLE IV
HB_sAb by RIA (AUS AB)

Blood Donors	No. Tested	No. Positive	% Positive
Malays	98	20	20.4
Chinese	96	21	21.9
Indians	96	24	25.0
Total	290	65	22.4

1 blood donor has HB_sAg and HB_sAb

TABLE V
USING AUSRIA 11-125 & AUSAB

	Nos. Tested	for HB _s Ag	% Pos	Nos. Tested	Nos. Pos. for Anti Hb _s Ab	% Pos.
HDU Staff	19	0	0	19	3	15
Blood Bank Staff	25	0	0	25	2	8
Urology Patients	23	6	26	23	11	48

1 Urology staff member has HB_sAg and Anti HB_sAb

1 Urology patient has HB_sAg and Anti HB_sAb

offer some degree of protection against manifestation of post-transfusion hepatitis. In a recent report¹⁰ on the blood transfusion service in Papua New Guinea it is stated that 15% of the donors are HbsAg positive by radio-immunoassay. As most New Guineans have been shown to be immunized, blood which is HbsAg positive is not discarded, but is used as packed cells. The report states that cases of post-transfusion hepatitis, if they occur at all, must be extremely rare in Melanesians. However, other risk factors have to be taken into account when considering the high expenditure required for establishing third generation tests as a routine procedure in the screening of blood donors. This includes the danger of outbreaks of hepatitis in specialized hospital units such as the dialysis unit, and the risk of spread of infection both laterally and vertically from persisting reservoirs of infection, particularly HBsAg positive blood donors. The relatively high incidence of chronic liver disease and liver cancer associated with HbsAg positively¹¹ is another issue of prime importance in this part of the world where chronic liver disease and liver cancer are serious problems.¹²

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