A study on Some Antigens Associated with the Hepatitis B Virus Infection and Those Anti-antigens in Human Sera in Viti Levu, Fiji

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Introduction

Since the successful detection of the Australia antigen, by Blumberg et al. in 1965, in the serum of a patient recieved frequent blood transfusions, cause of the hepatitis B diseae have been rapidly elucidated.

Electron microscopy disclosed the structure of a hepatitis B virus(HBV) particle known as the Dane particle by Dane et al. in 1970, and serological studies clarified the HBV associated antigens(Magnius and Espmark, 1972) and their anti-antigens in the sera of HBV infected persons(Almeider et al., 1971). Today, a routine check in the clinical laboratory can detect several antigens of each portion of a HBV particle, such as the hepatits B surface antigens(HBsAg) also known as the Australia antigen, the hepatitis B envelope antigen(HBeAg) and the hepatitis B core antigen(HBcAg), and also detect the anti-antigens(antibodies) against HBsAg and HBeAg in the sera.

It is well known that the titers of each antigen and anti-antigen in the serum represents the clincal stages of HBV disease. Most of the HBV infected patients will be completely healed of acute hepatitis B in a short time. In the residual patients, some will become healthy carriers and others chronic hepatitis B patients both of which will continously have infective HBV. The later case will subsequently contract a type of liver cirrhoses and hepatocellular carcinoma in the late stage(Obata et al., 1980).

The purpose of this study was to investigate the distribution of HBV invasiveness in three areas in Viti Levu, Fiji, by serological examination.

Materials and Methoods

The sera collected from 156 healthy adults(118 Fijian and 38 Indo-Fijian) in 3

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locations(Galoa, Mau and Raiwaqa, Navua) in Viti Levu, Fiji, 1982, were qualitatively tested for HBV antigens and anti-antigens.

Both HBsAg and HBeAg were tested for by the reversed passive hemagglutination test(RPHA) and the presence of both the anti-HBsAg and anti-HBeAg were determined by the passive hemagglutination test(PHA). All of the tests were carried out using commercially available test kits developed by Kokusai Shiyaku Co. Ltd., Japan.

Results

Stratified incidences of positive tests in each serological examination by race, locotion and sex are summerized in Table 1.

The incidence of anti-HBsAg(+) in the Fiji population was 37.3 percent. The range of incidence in Fijian was from 25.0 percent up at Mau and Raiwaqa to 45.5 percent at Galoa. On the contrary, the positive incidences in Indo-Fijians were not higher than those of Fijian group(s). Two cases of each sex in the Fijians at Galoa and one male case in the Indo-Fijians at Raiwaqa tested positive in the HBsAg test.

HBsAg(+) cases were found in the highest incidence groups of the anti-HBsAg(+) test in both races. Anti-HbeAg(+) was present only in three Fijian females, one lived at Galoa and the other two at Mau.

Each person showing more than one positive test for the serological examinations was classified into seven categories according to the presence of antigen(s) and/or anti-antigen(s) for further clinical evaluation(Table 2).

The only case belonging to category first was a 65 year old Fijian male. No cases

Table 1. Incidence of antigens associated with HBV and those anti-antigens by race, location and sex, in Fijian and Indo-Fijian.

Race	Location	Sex	No. of Cases	No. of HBsAg(+)	No. of Anti-HBsAg(+)	No. of HBeAg(+)	No. of Anti-HBeAg(+)
Fijian	Galoa	Male	22	2 (9.1)	10 (45.5)	0	0
		Female	32	2 (6.3)	13 (40.6)	0	1 (3.1)
	Mau	Male	34	0	13 (38.2)	0	0
		Female	20	0	5 (25.0)	1 (5.0)	2 (10.0)
	Raiwaqa (Navua)	Male	6	0	2 (33.3)	0	0
		Female	4	0	1 (25.0)	0	0
	Total		118	4 (3.4)	44 (37.3)	1 (0.8)	3 (2.5)
Indo-Fijian*	Raiwaqa (Navua)	Male	21	1 (4.8)	3 (14.3)	0	0
		Female	17	0	1 (5.9)	0	0
	Total		38	1 (2.6)	4 (10.5)	0	0

Figures in parentheses are percent of cases.

*Indo-Fijian are living only in Raiwaqa

Table 2. Incidence of positive cases in antigens associated with HBV and those antiantigens by each case in Fijian and Indo-Fijian.

Category	HBsAg	Anti-HBsAg	HBeAg	Anti-HBeAg	No. of Cases (Fijian)	No. of Cases (Indo-Fijian)
I	+	+	−	−	1 (0.8%)	0
II		−	+	−	0	0
III		−	−	−	3 (2.5%)	1 (2.6%)
IV	−	+	−	−	41 (34.7%)	4 (10.5%)
V		+	+	+	1 (0.8%)	0
VI		+	−	+	1 (0.8%)	0
VII		−	−	+	1 (0.8%)	0

Table 3. Distribution of 41 Fijian cases in anti-HBsAg (+) only by sex and age groups.

Sex	Age (yrs)	16-19	20-29	30-39	40-49	50-59	60-69	70-79	Total
Male	No. Positive Anti-HBsAg	7	9	2	4	0	1	1	24
	No. of tested samples	13	18	6	8	5	5	7	62
	Percent of positive cases	53.8	50.0	33.3	50.0	0	20.0	14.3	38.7
Female	No. Positive Anti-HBsAg	1	6	5	3	1	1	0	17
	No. of tested samples	3	14	16	6	6	9	2	56
	Percent of positive cases	33.3	42.9	31.3	50.0	16.7	11.1	0	30.4

were found in category II. In category III there were three Fijians, one 22 year old male and a 35 and a 63 year old female in Galoa, and one Indo-Fijian case, a 28 year old male.

In category IV there were 41 Fijian cases, the age and sex stratification of which is shown in Table 3, and 4 Indo-Fijian case, 3 males(aged 32, 43 and 55) and a 42 year old female. Anti-HBsAg positive incidences in both sexes between the ages of 16 and 49 in the Fijians were higher than for those of the over 50 year old groups(Table 3).

Category V, VI and VII have only one case each, a 25 year old female in Mau, a 50 year old female in Galoa and a 46 year old female in Mau, respectively.

Discussion

As mentioned in the introduction, a few patients who retained the HBV after infection will remain as infection sources, the same as healthy carriers and persistent hepatitis patients who will subsequently contract a liver cirrhosis and finally hepatocellular carcinoma(Obata et al., 1980). Therefore, it is very important for the prevenion of the disease to carefully detect the shedders of HBV among the residents in each area. Maternal(Okada et al., 1975) and sexual transmission, and transmission with medical instruments(Ohbayashi, 1981) are well known routes of the infection.

A panel of serological examinations tested in this study will offer much useful information for detecting infection sources(Furuta et al., 1981).

A case mentioned in category first in table 2 might be a rare occasion about co-infection with two different subtypes of HBV, because the patient had both HBsAg and anti-HBsAg simultaneously in his serum.

In this study, no cases were found in category II, carriers which were thought to be the most infective sources.

Category III in this study should be included with the category containing the cases which tested positive for HBsAg and anti-HBeAg and negative for anti-HBsAg and HBeAg. Because both conditions in category III, HBeAg(−) and anti-HBeAg(−) or(+), were considered to be of equal infectiveness of the virus. In these conditions, the carriers have few HBV and very low infectivity.

Cases in category IV, which had one positive test only in the anti-HBsAg test and showed the highest positive incidence in these serological studies, were completely recovered cases from a HBV infection and resistant to reinfection and unable to infect other indivivuals.

Clinical evaluations of the three residual cases in categories V, VI and VII were very complicated and no clear explanations were available. These conditions might only be non-specific reactions in serological tests or might suggest momentary points in the course of HBV infection.

Differences of the incidences of the HBV infection in serological examinations between Fijian and Indo-Fijian was not clarified in this study. However, it would appear that in Fiji the Fijians would have more chanced to contract a HBV infection than would Indo-Fijians, as Gust et al. discribed in 1979.

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