Hepatitis B Surface Antigen and Alpha-Fœtoprotein in Paediatric Hepatocellular Carcinoma and Hepatoblastoma in Thailand*

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SUMMARY **During the period 1972-1978, 17 children with hepatoma (9 hepatoblastomas and 8 hepatocellular carcinomas) were investigated for the presence of hepatitis B surface antigen (HBsAg) and alpha-foetoprotein (AFP). Positive HBsAg in hepatocellular carcinoma patients amounted to 75 per cent whereas in hepatoblastoma patients this was 22 per cent; the difference was statistically significant. AFP was detected in all cases; the mean concentrations were 223.5 and 215.9 mg/dl in the hepatoblastoma and hepatocellular carcinoma groups, respectively; the difference was not statistically significant. It is concluded that the estimation of AFP is of value in diagnosing primary hepatic cell carcinoma in children.**

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Hepatomas are more common in children in Asia and Africa than in the United States and Europe. There are two major histological types namely hepatoblastomas and hepatocellular carcinomas.[1] Hepatoblastomas appear mostly in infants under three years of age; also there is a better prognosis following surgical resection of hepatoblastomas than with hepatocellular carcinomas. The histological appearance of hepatocellular carcinomas in children is identical to that of hepatomas in adults. A significant proportion of these children have cirrhotic changes in the liver, but cirrhosis associated with hepatocellular carcinoma is much less common than in adults. This type of tumour almost always occurs in children over the age of five years. Alpha-foetoprotein (AFP), an alpha-l globulin produced in the foetus by embryonic hepatocytes, is not normally detected in the serum of children and adults, but it is found in high titre in most cases of hepatoma. The measurement of serum AFP is very helpful in the diagnosis of primary hepatic cell carcinoma (PHC), especially in the paediatric age group.[2-7] A close association between hepatitis B virus (HBV) and PHC has been demonstrated in various countries, especially in Asia and Africa.[8,9] In this report we would like to examine the relationship of AFP and hepatitis B surface antigen (HBsAg) found in cases of hepatoblastoma and hepatocellular carcinoma in Thai children.

MATERIALS AND METHODS

During the period from 1972 to 1983, there were 17 histologically proven cases of hepatoma found in patients aged between one day and 14 years who had been admitted to the Department of Paediatrics, Siriraj Hospital. There were nine cases of hepatoblastoma and eight of hepatocellular carcinoma. HBsAg was determined in all cases by the reversed passive haemagglutination method.[10] All HBsAg positive sera were further tested for HBeAg and anti-HBe by agarose gel diffusion after the serum had been concentrated five times with lyphogel.[11] The serum alpha-foetoprotein (AFP) was quantified by the radial immunoprecipitation method (Mancini) and the immunophotometric method, using laser nephelometer.

RESULTS

As shown in Table 1, the incidence of positive HBsAg in children with hepatocellular carcinoma (75%) which was higher than in cases of hepatoblastoma (22%) is

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Table 1 Hepatitis B surface antigen (HBsAg), hepatitis Be antigen (HBeAg), anti-hepatitis Be (anti-HBe) and alpha-1-foetoprotein (AFP) in case of hepatoblastoma and hepatocellular carcinoma in Thai children.

Type of PHC*	No. of patients	No. and % positive for				AFP (mg/dl) range & mean ± S.D.
		HBsAg	HBeAg	Anti-HBe	AFP	
Hepatoblastoma	9	2 22%	0	0	9 100%	40 – 850 223.5 ± 243.7
Hepatocellular carcinoma	8	6 75%	0	2 25%	8 100%	24 – 850 216 ± 255.6
Total	17	8 47%	0	2 12%	17 100%	24 – 850 220 ± 249.2

* PHC = primary hepatic cell carcinoma

statistically significant ($p<0.05$). None of the HBsAg carriers in both hepatoblastoma and hepatocellular carcinoma demonstrate HBeAg, while anti-HBe was found only in two cases (25%) of the group with HBsAg carrier hepatocellular carcinoma. These results indicate that HBsAg carriers in cases of childhood PHC seem to be less infective. AFP was detected in all cases of both hepatoblastoma and hepatocellular carcinoma. The mean concentration of AFP in the hepatoblastoma and hepatocellular carcinoma groups were 223.5 and 215.9 milligrams per decilitre respectively, which difference is not statistically significant ($p>0.01$).

DISCUSSION

There is a strong geographic correlation between the prevalence of HBsAg carrier and the incidence of primary hepatic cell carcinoma (PHC) throughout the world.[11] PHC accounts for 17.7 per cent of all cancers in Thailand.[12] HBsAg carriers are also at higher risk of developing PHC in children.[13,14] In the present study, HBsAg could be detected in hepatocellular carcinoma and hepatoblastoma in as many as 75 and 22 per cent of the patients, respectively. Both figures are much higher than those for the general population in Thailand,[15,16] thus indicating a causal relationship between HBV and PHC. In countries where HBV is hyperendemic, the transmission of HBV from carrier mothers to their infants has been estimated to be the cause of 20 to 50 per cent of all chronic HBV carriers in the population. This might account for as many as 2.5 million chronic HBV carriers in Thailand. Thus, prevention of HBV infection from carrier mothers to infants in the perinatal period emerges as one of the top priorities for the control and prevention of HBV infection and its associated sequelae such as developing primary hepatocellular carcinoma.

AFP in serum has been found very helpful in the diagnosis of primary hepatic cell carcinoma.[7,17] Several reports have suggested that age influences both the production and concentration of AFP.[5,18-20] It is normally present in newborn sera, and gradually declines and disappears by the age of one month. In the present study, AFP was detected in all cases of hepatoblastoma and hepatocellular carcinoma, with the concentrations much higher than normal levels and equally elevated in both groups. These findings differ from those of a previous report by Exelby[21] which showed elevated serum AFP in only 40 per cent of children with hepatocellular carcinoma and in approximately 70 per cent of those with hepatoblastoma. Therefore, we regard the semiquantitative or quantitative estimation of AFP as a rapid and most reliable method for diagnosing primary hepatic cell carcinoma in children.

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