

## The prevalence of hepatitis B and C in an antenatal population of various ethnic origins

E. BOXALL<sup>1</sup>, S. SKIDMORE<sup>1</sup>, C. EVANS<sup>1</sup>, AND S. NIGHTINGALE<sup>2</sup>

<sup>1</sup> *Regional Virus Laboratory, Public Health Laboratory, Birmingham Heartlands Hospital, Birmingham B9 5SS*

<sup>2</sup> *Midlands Centre for Neurosurgery and Neurology, Smethwick, West Midlands B67 7JX*

(Accepted 27 June 1994)

### SUMMARY

A total of 3522 samples of serum, collected anonymously from women attending an antenatal clinic, was tested for hepatitis B surface antigen and antibody to hepatitis C. The prevalence of anti-HCV was low; only five confirmed positives were found (0.14%). The prevalence of hepatitis B overall was 0.56%, but was 1.04% in women from immigrant groups. Hepatitis B carriage is therefore four times more common than hepatitis C carriage in the antenatal population comprised of various ethnic origins. The patterns of infection in the two viruses are reversed, hepatitis B being more common in Asian, S.E. Asian and West Indian mothers and hepatitis C being more common in mothers of white Caucasian origin. Routine antenatal screening for anti-HCV is discussed.

### INTRODUCTION

Antenatal screening for hepatitis B has been carried out universally within the West Midlands since 1974. Although data have been collected on the ethnic origins of those mother found positive for hepatitis B surface antigen (HBsAg) [1, 2] it has proved difficult to obtain a denominator for each ethnic group. Recent unlinked anonymous studies into the prevalence of human lymphotropic virus type 1 (HTLV1) in the population of the West Midlands [3] included a study on 3522 attendances at an inner-city hospital antenatal clinic attending between February 1990 and the end of January 1991. This hospital was chosen because it was known to have a high proportion of immigrant women attending the antenatal unit.

We have recently tested these sera for both hepatitis B surface antigen (HBsAg) and antibody to hepatitis C virus (anti HCV) in order to establish the prevalence of these infections in this antenatal population.

### PATIENTS AND METHODS

#### *Study population*

The patients have been previously described [3]. The following data were collected on each mother; age (in 5-year age bands), ethnic group, place of birth and age (in 5-year age bands) at immigration. 1918 out of 3522 (54%) of the

Table 1. *Unlinked anonymised screening in an antenatal clinic, Birmingham February 1990–January 1991; place of birth and ethnic origin of subpopulation*

Ethnic origin	Number of women with place of birth in							Total no. of women by ethnic origin	Total no. of women by ethnic origin (%)
	UK	Asia	West Indies	Africa	S.E. Asia	Europe (Non-UK)	Other		
White Caucasian	1548	4		1		46	5	1604	(45.5)
Asian	328	886	1	51	6		2	1274	(36.2)
West Indian	423	2	78				1	504	(14.3)
African	3			12				15	(0.4)
S.E. Asia					40		1	41	(1.2)
Other	70		1	1			12	84	(2.4)
Total no. of women by place of birth	2372 (67.3)	892 (25.3)	80 (2.3)	65 (1.8)	46 (1.3)	47 (1.3)	20 (0.6)	3522	(100.0)

women attending the antenatal clinic were from immigrant groups. To delineate the ethnic origin for the purpose of this study the following conventions were employed: Asia refers to only the Indian Subcontinent (India, Bangladesh, Pakistan), whereas SE Asia includes countries of the Far East (Hong Kong, Singapore, Malaysia, Vietnam, Korea, China). The West Indies comprises the American New Commonwealth countries. The terms Asian, African and West Indian refer to ethnic origins rather than to country of birth, residence or nationality. The designation white Caucasians is used to distinguish people of European ancestry from ethnic Asians, Africans and West Indians. The breakdown of the ethnic origins and the place of birth are shown in Table 1; 'others' included women of mixed race.

#### *Hepatitis B surface antigen*

HBsAg was detected by Blood Products Laboratory radioimmunoassay (RIA) or enzyme immunoassay (ELISA) on single sera. Those found positive were confirmed using an alternative assay (reverse passive haemagglutination; 'Hepatest', Murex Laboratories).

#### *Antibody to hepatitis C*

Hepatitis C antibody was screened for using Murex Laboratories enzyme immunoassay VK45 on pools of 10 sera. This approach was validated initially by screening pools of 10 sera seeded with a known positive serum and following this with dilution studies. The weakest positive sample could still be detected at a dilution of 1/40. This approach has previously been used for anti-HIV positive sera [4]. All sera in reactive pools were retested singly by Ortho Diagnostics EIA and single reactive sera were confirmed by recombinant immunoblot assay (RIBA, Ortho Diagnostics) where the criteria for a reactive sera is that at least two bands have equal or greater intensity to the human IgG control band.

## RESULTS

### *Hepatitis B*

Twenty sera (0.56%) were positive for HBsAg; the ethnic origins of these mothers are shown in Table 2. The highest number of women infected with hepatitis B were from Asia.

Only 1 of the 13 Asian women found HBsAg positive was born in the UK; her age was between 16 and 20 years. The other 12 women were all born in the Indian Subcontinent and emigrated here as adults; youngest age range 16–20 years, oldest 36–40. All 3 oriental and 2 of the 4 Afro-Caribbean women were born abroad. Five of the 20 HBsAg carrier women were known to be hepatitis B carriers at the time the blood samples were taken, probably from antenatal screening during a previous pregnancy.

Table 3 shows the prevalence of hepatitis B carriage in relation to ethnic origin and place of birth. For all ethnic groups the hepatitis B carriage is 4–5 times higher in those born abroad than in those born in the UK. Table 3 shows the different patterns of immigration in the three ethnic groups. Most West Indian mothers (84%) were born in this country, but women of Asian and S.E. Asian origin are more likely to have come here recently.

Table 2. *Prevalence of hepatitis B carriage in antenatal patients of various ethnic origins*

Ethnic origin	Confirmed HBsAg	Total	Prevalence
White Caucasian	0	1604	< 1:1604
Asian	13	1274	1 in 100
Afro-Caribbean	4	504	1 in 141
African	0	15	< 1 in 15
S.E. Asian	3	41	1 in 14
Others	0	84	< 1 in 84
Total	20	3522	1 in 176

Table 3. *Prevalence of hepatitis B carriage, ethnic origin and place of birth*

Ethnic origin	Born abroad			Born in UK		
	Total	HBsAg positive	Prevalence	Total	HBsAg positive	Prevalence
Asian	946	12	1 in 79 (1.27%)	328	1	1 in 328 (0.3%)
S.E. Asia	40	3	1 in 13 (7.7%)	1	0	—
W. Indies	78	2	1 in 39 (2.56%)	423	2	1 in 212 (0.47%)

Table 4. *Prevalence of hepatitis C infection in antenatal patients of various ethnic origins*

Ethnic origin	Confirmed anti HCV	Total	Prevalence
White Caucasian	4	1604	1 in 401
Asian	1	1274	1 in 1295
Afro-Caribbean	0	504	< 1 in 562
African	0	15	< 1 in 15
S.E. Asian	0	41	< 1 in 41
Others	0	84	< 1 in 84
Total	5	3522	1 in 704

### *Hepatitis C*

Five women in this group of patients were found to have anti-HCV giving an overall prevalence of 0.14% (Table 4). Four of these mothers were of European origin, and only one belonged to an immigrant group. This was an Asian aged 26–30 who had emigrated to this country from Pakistan within the previous 5 years. The anti-HCV positive white Caucasian women were in the age groups 21–25 (1 women) and 26–30 (3 women). Three were born in England, and one in France. The anti-HCV reactive sera were confirmed by recombinant immunoblot assay (RIBA).

### DISCUSSION

In our population of antenatal patients we have shown that hepatitis B carriage is four times more common than infection with hepatitis C virus (1 in 176 and 1 in 704 respectively). All those infected with hepatitis B were from immigrant groups

whereas only 1 of the 5 anti-HCV positive mothers was not white Caucasian. The prevalence of anti-HCV in the European mothers was 1 in 401 against a prevalence of 1 in 3121 for all the immigrant groups.

The prevalence of hepatitis B carriage is strongly related to ethnic origin, being more common outside Western Europe and North America [5]. In populations with a high prevalence of hepatitis B carriage there is also a significant level of perinatal transmission which is important in the maintenance of the infection in the population [6]. The absence of any significant levels of anti-HCV in our immigrant mothers is interesting and suggests that the infection may not yet be established in those populations. The infectivity of hepatitis C is lower than that of hepatitis B reducing the risk of horizontal and vertical transmission. A recent paper [7] has reported that vertical transmission of hepatitis C is infrequent (4 out of 62 children (6.5%)). However, early studies on perinatal transmission of hepatitis B showed overall transmission rates of 14% [1] and it was only when infection in the babies was related to the infectivity status (HBe antigen) of the mother that a significant risk of infection was observed.

There is no information on risk behaviour or activities in our group of mothers as the original study was designed to look at ethnic origin and place of birth. We do not know if the five women found positive for anti HCV had a history of exposure to blood or blood products or intravenous drug abuse (IVDA). Both are associated with increased risk of exposure [8]. None of the women in our study was positive for both hepatitis B and C. Also no women positive for markers of hepatitis B or C infections was positive for anti-HTLV1. We would stress that the group we studied was highly selected and does not reflect the prevalence of antibody in the general population. We have made personal observations that anti-HCV appears to be common in older Asian patients presenting with liver disease. It is generally thought that this population was exposed parenterally in early life via vaccinations, etc., and they obviously represent a different population from that described here.

On the basis of these results it would seem that universal routine screening of antenatal patients for anti-HCV in the UK is not necessary. The incidence of vertical transmission of hepatitis C appears to be low. The assays have been associated with a level of non-specificity which incurs further assessment with resulting indeterminate results and, in addition, appropriate interventions have not been evaluated. Further studies are needed in this area, particularly in those mothers perceived to be at high risk, e.g. IVDU. This is in contrast to the proven value of antenatal screening for hepatitis B where perinatal transmission is common but can be prevented by early vaccination.

#### REFERENCES

1. Derso A, Boxall EH, Tarlow MJ, Flewett TH. Transmission of HBsAg from mother to infant in four ethnic groups. *BMJ* 1978; **1**: 949-52.
2. Wheeley SM, Jackson PT, Boxall EH, et al. Prevention of perinatal transmission of hepatitis B virus (HBV): a comparison of two prophylactic schedules. *J Med Virol* 1991; **35**: 212-15.
3. Nightingale S, Orton D, Ratcliffe KW, et al. Antenatal survey for the seroprevalence of HTLV-1 infections in the West Midlands, England. *Epidemiol Infect* 1993; **110**: 379-87.

4. Mawson S, Skidmore S, Pandov H, Desselberger U. Anonymous testing for HIV infection. *Lancet* 1990; **i**: 858–9.
5. Szmuness W, Harley EJ, Ikram H, Stevens CE. Sociodemographic aspects of the epidemiology of hepatitis B. In: Vyas GN, Cohen SN, Schmid R, eds. *Viral hepatitis*. Philadelphia: Franklin Institute Press, 1978: 297–311.
6. Nishioka K. Predominant mode of transmission of hepatitis B virus: perinatal transmission in Asia. In: Vyas GN, Dienstag JL, Hoofnagle JH, eds. *Viral hepatitis and liver diseases*. Orlando, Florida: Grune and Stratton, 1984: 423–32.
7. Lam JPH, McOmish F, Burns SM, et al. Infrequent vertical transmission of hepatitis C virus. *J Inf Dis* 1993; **167**: 572–6.
8. Skidmore SJ. Hepatitis C virus – epidemiology and serological diagnosis. *J Med Microbiol* 1993; **39**: 321–2.