Epidem. Inf. (1988), **100**, 145–151
Printed in Great Britain

Hepatitis B markers in Lancashire police officers

By P. MORGAN-CAPNER, P. HUDSON
Department of Virology, Pathology Laboratory, Preston Infirmary, Preston PR1 6PS

and A. ARMSTRONG
Police Federation, Federation Office, Police Headquarters, Hutton, Preston PR4 5SB

(*Accepted 24 August 1987*)

SUMMARY

A total of 284 Lancashire police officers each with a minimum of 5 years experience was tested for evidence of hepatitis B infection. None was hepatitis B surface antigen positive (HBsAg). Three were positive for both antibody to hepatitis B core antigen (anti-HBc) and HBsAg (anti-HBs). Five were positive for anti-HBc alone. Thus the overall prevalence was 2·8% which is within the range reported for blood donors in the UK. There was no association with working in the drug squad or custody office but there was a higher prevalence in those who had worked in the scene-of-crime's squad. However, the numbers were small, and of this group of 28 officers, 2 of the 3 with detectable hepatitis B markers were positive for anti-HBc alone. Therefore for police officers in mixed rural/urban areas of the UK, routine administration of hepatitis B vaccine is not justified although special consideration should be given to those working in selected groups. Further studies are required to ascertain whether there may be an increased risk for police officers working in conurbations.

INTRODUCTION

By the nature of their work police officers are likely to come into close contact with the blood or body secretions of members of the public. Consequently they may be considered to be at increased risk of being infected with hepatitis B virus (HBV). This risk is likely to be greater for those police officers who have more contact with individuals belonging to risk groups, such as parenteral drug abusers, or who are more likely to have contact with body fluids, such as custody office staff or scene-of-crime officers. Therefore it has been stated that selected police personnel should be offered hepatitis B vaccine, although they were placed in a 'lower risk' category (Zuckerman, 1984, 1986; Deinhardt & Zuckerman, 1985; Fagan, 1986; Smith, 1986).

However there is only one report of hepatitis B markers in police officers in the United Kingdom and that was based on testing police officers who were to be given specific hepatitis B immunoglobulin (HBIG) following exposure to material containing hepatitis B surface antigen (HBsAg) (Peterkin *et al.* 1986). Therefore

we have tested a population of police officers in Lancashire for serological evidence of exposure to HBV and compare the prevalence with that reported for blood donors and other occupational groups in the UK.

MATERIALS AND METHODS

Study population

Police officers at five large police stations in Lancashire (Blackpool, Blackburn, Burnley, Preston and the Lancashire Police Headquarters, Hutton) were asked to take part in the study which was organized by the Police Federation. An arbitrary minimum of 5 years in the police was taken as necessary for inclusion to ensure an adequate period for occupational exposure. Police officers were given written details of the study and asked to complete an anonymous questionnaire. After consent, 5–10 ml of blood were taken and marked with a number which was also used to identify the corresponding questionnaire. Thus, although the study was anonymous, the serological results could be correlated with the epidemiological details of the source police officer.

The questionnaire asked: sex; age; number of years in the police force; other employments; whether the police officers' position brought them into close contact with the public; whether they had worked as police officers outside Lancashire for longer than 1 month, and, if so, where and for how long; whether they had worked in the drug squad, custody office or scene-of-crime's squad for longer than 3 months; worked outside Western Europe and North America and, if so, where and for how long; whether they were homosexual; had intravenously abused drugs or had been transfused with more than 10 units of blood; whether they had had hepatitis B vaccine or proven hepatitis B.

Testing for hepatis B markers

All sera were tested for HBsAg by reverse passive haemagglutination (RPHA; Wellcome Diagnostics, Dartford, Kent). Sera negative by RPHA but which were positive only for antibody to HBV core antigen (anti-HBc) were retested for HBsAg by radioimmunoassay (RIA; Blood Products Laboratory, Elstree, Hertfordshire). Sera were tested for anti-HBc and hepatitis B surface antibody (anti HBs) by ELISA (Corzyme & Ausab EIA; Abbott Diagnostics, Wokingham, Berkshire). Selected sera were retested by Corzyme and Ausab EIA and also by another enzyme immunoassay (EIA) for anti-HBc (Wellcozyme anti-HBc; Wellcome Diagnostics) and for anti-HBs (Connaught Laboratories Ltd, Willowdale, Ontario, Canada). For anti-HBc, sera were considered positive or negative by the kit manufacturers' criteria, whereas for anti-HBs sera were assessed by comparison with control sera containing 10 and 50 international units (i.u.) of antibody. Sera with an anti-HBs concentration of less that 10 i.u. were considered negative. Where indicated, sera were tested by EIA for IgM anti-HBc (Corzyme M; Abbott Diagnostics) and antibody against HBe antigen (anti-HBe) (Division of Microbiological Reagents and Quality Control, Central Public Health Laboratory, Colindale Avenue, London).

RESULTS

Blood specimens were obtained from 293 police officers. One police officer did not give details of age or number of years in the police force and eight had not completed 5 years in service. These nine police officers are excluded from the analysis. Of the remaining 284, 265 were male and 19 were female. The mean ages were 38 years (range 23–57 years) for men and 31 years (range 24–48 years) for women. The men had spent an average of 17 years (5–32 years) in the police whereas the women had served for an average of 11 years (range 5–26 years). All police officers had performed duties which brought them into close contact with the public. Eighteen had previously worked as police officers in rural areas and 16 in conurbations outside Lancashire. Although 133 officers had had other jobs in the UK prior to joining the police force, none had been employed in occupations that have ever been suggested as posing an occupational risk of hepatitis B. Eighteen officers had been employed in the armed forces or worked outside Western Europe and North America: 5 had served in the Royal Navy and had travelled the world; 2 had spent time in Malaya, 2 in the Middle East, 1 in Hong Kong and 1 in West Africa with the Army; 3 had worked in India and the Far East, 2 in Africa and 2 in South America. No police officers had been intravenous drug abusers but one had been transfused 11 units of blood in 1962 and one was homosexual.

Eighty-seven officers had worked in the custody office, 28 in scene-of-crime's squad and 18 in the drug squad. Of these 6 had worked in both the custody office and scene-of-crime's squad and 3 in the custody office and drug squad. None had had proven hepatitis B but 19 officers within the last year had started or had completed a course of hepatitis B vaccine, 14 being from one police station. Two officers had completed their course, 9 had had two injections and 8 had had one injection.

No officers had detectable HBsAg (Table 1). Three had both anti-HBc and anti-HBs detectable (> 50 i.u.). Five were repeatedly positive for anti-HBc by Corzyme and also positive by Wellcozyme anti-HBc, although they were negative for anti-HBs by Ausab EIA and the EIA of Connaught Laboratories Ltd, negative for IgM anti-HBc and anti-HBe, and HBsAg was not detected by RIA. In 4 of the 5, the optical density was close to that of the cut-off level for the anti-HBc assays. Thus the overall maximum prevalence of HBV serological markers suggesting past infection was 2·8% (8 of 284). All the 8 were male and none had worked overseas or as police officers in conurbations. Four had worked in the custody office but the prevalence in this group was not significantly higher than in the remaining officers. However, 3 had experience in the scene-of-crime's squad and the prevalence in this group of 28 officers was higher compared with the remaining officers (χ^2 with Yates's correction; $0{\cdot}05 > P > 0{\cdot}02$). The police officer who was homosexual and the police officer who had been transfused 11 units were both negative for all markers. The mean age of these 8 police officers was 41 years (range 32–51 years) and their mean length of service was 21 years (range 13–28 years).

Anti-HBs alone was detected in a further eight sera. All these sera were collected from officers with an immunization history. Both officers who had had a full course

Table 1. *Hepatitis B serological markers in police officers*

	No.	HBsAg	Hepatitis B markers: Anti-HBc pos Anti-HBs pos	Anti-HBc pos Anti-HBs neg	Anti-HBc neg Anti-HBs pos
Total police officers	284	0	3	5	8
Specific features					
Worked as police officers in conurbations	16	0	0	0	0
Worked outside Western Europe or North America	18	0	0	0	0
Custody office	87	0	1	3*	0
Scene-of-crime's squad	28	0	1	2*	0
Drug squad	18	0	0	0	0
Hepatitis B vaccine					
1 injection	8	0	0	0	0
2 injections	9	0	0	0	6
3 injections	2	0	0	0	2
None of the above	136	0	1	2	0

* Two officers had worked in both scene-of-crime's squad and custody office.

of vaccine had anti-HBs at more than 50 i.u., 6 of 9 who had had two injections had anti-HBs (4 more than 50 i.u., 2 at 10–50 i.u.) but none of the 8 who had had only one injection had detectable anti-HBs.

DISCUSSION

Police officers are exposed to body fluids and blood-contaminated instruments and needles by the nature of their work. This may put them at an increased risk of being infected with hepatitis B virus and this risk is likely to be increased for specific subsections of the police force, namely those in drug squads, custody officers and members of the scene-of-crime's squads. Consequently it has been advised that, although they may be considered at 'lower risk', consideration should be given to offering hepatitis B immunization to selected police personnel as well as to other selected community occupational groups such as members of the ambulance and rescue services (Zuckerman, 1984, 1986; Deinhardt & Zuckerman, 1985). There has been a growing awareness in the police force of the dangers of their acquiring infection from the public and the above recommendation has been much publicized with the result that a number of officers have already been immunized – 19 in our study. In addition this growing awareness, accentuated by the publicity surrounding human immunodeficiency virus infection, has led to the police reviewing a number of their procedures in an effort to reduce the risk of infection. For example, considerably more care is taken when personal searches are made with the detainee being requested to evert their own pockets rather than the police officer risking a needlestick accident by inserting a hand into the pocket. Also, disposable gloves are becoming increasingly available

in police forces for use when contact with blood or other body fluids is anticipated.

There has been only one study (Peterkin *et al.* 1986; Peterkin & Crawford, 1986) of hepatitis B in police officers. They reported that in Scotland the incidence of indigenously-acquired hepatitis B in police officers in 1981–5 was 4·6 per 100000. This rate was similar to that of 6 per 100000 for male adults aged 15–64 years in England, Wales and Ireland but less than that for specified categories of health care workers except nurses (Polakoff, 1986). They also examined 61 blood samples from police officers, collected prior to the administration of HBIG, for markers of HBV infection. None had evidence of current or previous HBV infection. Thus they concluded that the widespread use of hepatitis B vaccine in police officers did not seem justified.

Our survey of 284 demonstrated no HBV carriers but definitive previous HBV infection in three (anti-HBc pos, anti-HBs pos). A further five officers had only anti-HBc detectable with no confirmation from other markers of the validity of this result as indicating past HBV infection. Therefore there must be some doubt in these five as to the specificity of the anti-HBc result, particularly as in 4 of the 5 the result in both anti-HBc assays was close to the cut-off optical density. It is worth noting that only 3 of 8 (37·5%) of those with any HBV serological marker who had not been immunized had both anti-HBs and anti-HBc, compared with, for instance, the long-term follow-up of soldiers exposed to probable HBV-containing yellow fever vaccine in the Second World War and who had been asymptomatic where 120 of 131 (91·6%) with any HBV marker had both anti-HBc and anti-HBs (Seeff *et al.* 1987). Tedder and others (Tedder *et al.* 1980; Tedder, 1983) have previously questioned the validity of the detection of anti-HBc as a sole marker being indicative of HBV infection. Thus for our population of police officers the overall prevalence of previous HBV infection is 1·1% (3 of 284) at a minimum and 2·8% (8 of 284) at a maximum. Therefore there was no increased prevalence over that of some reports for health care workers, or even blood donors who may be considered as representing the 'normal' population (Table 2).

Lancashire is a mixed rural and urban county with no large conurbations. Although the majority of officers tested worked in large towns, our results may not reflect the situation in other parts of the country where high-risk individuals such as intravenous drug abusers and homosexuals may occur more frequently in the local community. Therefore our results should not be used to assess the risk for police officers in large conurbations. There is need for similar studies to be performed in such areas. However, none of the 16 police officers who had worked in conurbations had evidence of previous hepatitis B.

Of the selected groups within the police who may be considered at increased risk and who we identified, none with experience in the drug squad was positive. There was a higher prevalence in officers with experience of the scene-of-crime's squad but the numbers are small and of the 3 officers positive for HBV markers, 2 had anti-HBc only.

Thus, although police work may be considered as presenting a degree of risk of HBV infection higher than most other non-health-care occupations or the 'normal' community, this is not supported by our study. We would support the

Table 2. *Hepatitis B serological markers in blood donors and various occupational groups in the UK*

Group	HBV serological markers examined	No. positive/ no. tested (%)	References
Blood donors (South East England)	HBsAg/anti-HBc/ anti-HBs/anti-HBe	57/2005 (2·8)	Tedder *et al.* 1980
Blood donors (Scotland)	Anti-HBc/anti-HBs	52/2400 (2·2)	Follett *et al.* 1980
Blood donors* (South West England)	Anti-HBc/anti-HBs	13/2509 (0·5)	Archer, Cohen & Mortimer, 1983
Blood donors (North London)			
1983-4	Anti-HBc	NS/NS (1·8)	Anderson *et al.* 1987
1985‡		NS/NS (0·6)	
Blood donors (Scotland)	Anti-HBc/anti-HBs/ anti-HBe	42/2086 (2)	Gillon *et al.* 1987
Hospital staff	Anti-HBc/anti-HBs	NS/> 1000 (6)	Vandervelde & Mortimer, 1985
Health-care workers (of Western origin)	HBsAg/anti-HBs	6/491 (1·2)	Abbas, Denton & Francis, 1985,
Staff in hospital for the mentally retarded	Anti-HBc/anti-HBs	26/439 (5·9)	Holt *et al.* 1986
Dental workers	HBsAg/anti-HBc/ anti-HBs	1/88 (0·9)	Cumming, Peutherer & Smith, 1986
Health-care workers (high risk)	Anti-HBs	10/144 (6·9)	Fagan *et al.* 1987
Health-care workers	HBsAg/anti-HBc/ anti-HBs	17/561 (3·1)	Smith, 1987

* Excluding prisoners.
‡ Following initiation of donor self-referral for HIV risk groups. NS, not stated.

conclusion of Peterkin & Crawford (1986) that administration of hepatitis B vaccine to all police officers is not justified. Our numbers are insufficient to know whether selected groups of police officers, such as members of drug squads, are at higher risk, but a knowledge of the situations the police may meet when dealing with certain incidents or with certain subgroups of the population means that it is hard to deny the request for hepatitis B immunization from police officers in these groups.

We thank the Police Federation for the funding of this study.

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