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Acute hepatitis B in Edinburgh 1975–92: a retrospective study in a population where human immunodeficiency virus is highly prevalent

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SUMMARY

A retrospective study of notified hepatitis B virus (HBV) infection in Edinburgh during 1975–92 identified 525 acute cases. For 343 where a probable transmission route could be determined, 215 were due to shared equipment by injection drug users (IDUs), 29 to homosexual intercourse, 25 to heterosexual or household contact with IDUs, 21 to heterosexual contact with infected non-IDU partners and 53 to various other or multiple routes. Cases were unevenly distributed geographically, particularly those among IDUs. The highest incidence within a post code district was approximately 2·5 times that for all Edinburgh. Annual cases peaked in 1984 then declined to low levels in the early 1990s. This reduction was most marked among IDUs, and may be ascribed both to changed injecting behaviour and decreased susceptibility within this group. The latter factor implies that HBV infections may be an unreliable guide to human immunodeficiency virus (HIV) infection in populations where HBV is highly prevalent.

INTRODUCTION

Hepatitis B virus (HBV) infection has been monitored in Edinburgh since 1975. The insight this information provides into transmission of bloodborne viruses is pertinent as the city experienced a major epidemic of drug-related human immunodeficiency virus (HIV) infection as well as HBV infection in the mid 1980s, which resulted in an HIV seroprevalence estimated at 30–50% in the population of injection drug users (IDUs) [1–7]. Data about HBV infections straddle the time when HIV became established, providing important information about both infections.

METHODS

Lothian Health Board's Public Health Medicine Department has received notifications of viral hepatitis in Edinburgh and information from local hepatitis testing laboratories since 1975. Each case is investigated to identify the causative agent, its mode of acquisition, whether infection was acute or chronic and the clinical, demographic and social characteristics of the patient. A history is sought from all patients to supplement and confirm notified information and to inquire about contacts of the index case.

Notifications, laboratory reports and patient-visit records were retrospectively analysed. Data were held in dBase IV (Ashton–Tate) and analysed with the SPSS PC statistical package.

Tests to identify IgM antibody to the HBV core antigen became routinely available in Edinburgh in

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May 1983. Before this the diagnosis of acute hepatitis B infection was made on the presence of HBV surface antigen (HBsAg) in combination with clinical findings. HBsAg testing was initially by reverse passive haemagglutination until ELISA testing became available in the late 1970s.

RESULTS

In the period 1975–92, 693 notifications of HBV infection were made. Of these, 525 were classified as acute infection based on laboratory results and the notifying physician's opinion. The analysis was restricted to the 525 acute cases. Home or hospital visits or telephone contacts were made to 423 (80·6%) of the study group.

Age and sex distribution and travel history

Of the 525 cases, 346 (65·9%) were men, 178 (33·9%) women, and in one case sex was not recorded. Age, recorded for 524 patients, showed a mean of 26·5 years (25·1 for women, 27·2 for men) with 398 cases (75·8%) between the ages of 15 and 29 years (81·5% of women, 73·1% of men) (Table 1). Information about travel suggested that 50 (9·5%) cases were imported and 440 acquired in the UK, while for 35, geographic origin could not be determined.

Risk factors

A specific incident which could potentially transmit infection was identified for 255 (48·6%) cases. Sharing of drug injection equipment was cited for 151 (28·8%); sexual contact with a known infected person for 69 (13·1%); non-sexual contact with an infected person for 11 (2·1%); a medical injection administered abroad for 8 (1·5%); an occupational incident (e.g. needle-stick injury) for 5 (1·0%); skin piercing or tattooing for 2 (0·4%) and other or multiple causes for 9 (1·7%).

The majority (343, 65·3%) reported a life-style that may have put them at increased risk of HBV infection (Table 2). Two hundred and fifteen were IDUs; 29 homosexual men; 25 household or sexual contacts of IDUs; 13 had lived in or visited HBV-endemic areas; 14 had received medical treatment that put them at risk; 21 were heterosexuals with known infected, non-IDU, partners; 6 were in high-risk occupations; 2 were homosexual IDUs and 18 had other or multiple risk factors.

Table 1. *Age and sex of 525 patients with acute hepatitis B in Edinburgh 1975–92*

Age group (years)	Male	Female	All
0–4	1	1	2
5–9	1	—	1
10–14	—	—	—
15–19	60	49	109
20–24	117	70	187
25–29	75	25	100
30–34	34	12	46
35–39	24	4	29*
40–44	5	4	9
45–49	13	4	17
50–54	3	4	7
55–59	5	1	6
60–64	3	1	4
65–69	2	1	3
70–74	2	—	2
75+	1	1	2
Not known	—	1	1
All ages	346	178	525*

* Includes one case where sex was not recorded.

Table 2. *Risk category and sex of 525 patients with acute hepatitis B in Edinburgh 1975–92*

Risk category	Male	Female	All	(% total)
Injection drug user	157	58	215	(41·0)
Homosexual	29	0	29	(5·5)
Household or sexual contact of IDU	11	14	25	(4·8)
Lived/visited endemic area	9	4	13	(2·5)
Potentially infecting medical treatment	10	4	14	(2·7)
Infected, non-IDU, heterosexual partner	7	14	21	(4·0)
Occupational risk	2	4	6	(1·1)
Homosexual IDU	2	0	2	(0·4)
Multiple risk/other	12	6	18	(2·9)
No known risk	107	74	182	(34·7)
Total	346	178	525*	(100%)

* Includes one case where sex was not recorded.

There was a substantial difference in the age and sex distribution of the different risk category groups. The 29 homosexual men had a mean age of 34·4 years; the 215 IDUs had a mean age of 22·8 years (157 men of mean 23·0 years, 58 women of mean 22·2 years); the 25 household and heterosexual contacts of IDUs had a mean of 23·6 years (14 women of mean 24·3 years, 11 men of mean 22·8 years); the 21 heterosexual contacts of non-IDU infected partners had a mean of 25·7

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Table 3. *Year of notification by risk category of 525 patients with acute hepatitis B in Edinburgh 1975–92*

Year	Homosexual	IDU	Contacts*	Other	Unknown	Total
1975	—	1	—	3	3	7
1976	—	13	1	3	8	25
1977	1	12	1	3	17	34
1978	—	9	1	—	12	22
1979	2	8	2	2	11	25
1980	4	16	2	—	7	29
1981	3	30	4	4	11	52
1982	5	24	5	10	18	62
1983	1	24	10	6	24	65
1984	—	52	8	3	13	76
1985	1	11	5	8	20	45
1986	6	7	2	6	3	24
1987	1	1	2	—	5	9
1988	—	4	—	3	7	14
1989	—	1	—	—	9	10
1990	1	—	—	1	7	9
1991	3	2	1	—	5	11
1992	1	—	2	1	2	6
1975–92	29	215	46	53	182	525

* Household and sexual contacts of IDUs and heterosexual contacts of known infected, non-IDU partners.

years (7 men of mean 31·1 years, 14 women of mean 22·9 years). The 181 cases with no identified risk factor had a mean age of 28·7 years; 107 were men of mean 30·0 years; and 73 were women of mean 26·7 years. Sex was unrecorded for one case.

Occupation

Classification of occupations revealed that 32 (6·1%) of the study group were health-care workers; 23 (4·4%) students; 6 (1·1%) police officers; 200 (38·1%) in a variety of other occupations; and 177 (33·7%) unemployed. The occupation of 87 (16·6%) was not recorded. The distribution of occupations varied little, although the proportion unemployed peaked in 1984 at 31/76 (40·8%) and declined progressively to nil in 1990–2. This was due largely to a corresponding decrease in IDU cases, most of whom were unemployed.

District of residence

Edinburgh was the permanent address of 520 (99%) of the study group. The remainder were from elsewhere or unclassifiable due to incomplete information. The distribution of study subjects' addresses by postcode district was uneven. Of Edinburgh's 29 postcode districts, 23 had one or more cases. Four districts had more than 50 cases, between them containing 278 (52·9%) cases. The case-incidence rate in Edinburgh, based on the 1981 census population, averaged 6·86 per 100000 per year over the study period. The four high-incidence districts together had an average incidence of 10·15 cases per year. This uneven distribution was due mainly to a high concentration of IDU-associated and unclassified cases in parts of the city that contained a high concentration of public housing, deprived communities and recognized IDUs.

Annual incidence

Annual incidence increased progressively through the 1970s and early 1980s to peak at 76 cases in 1984. A profound decline followed so that by 1992, the year's six notifications were equivalent to 7·9% of the 1984 level (Table 3). The 1984 incidence per 100000 population for all Edinburgh was 17·87; for the highest incidence post-code district it was 41·47.

Individual risk category groups followed a similar time course. From a peak in 1982–5, they declined toward a low point in the 1990s, although the proportionate change by each differed (Table 3). In particular, cases amongst IDUs peaked sharply in

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1984, forming 52/76 (64·4%) of the year total. They then decreased rapidly, by 1989 constituting only 1/10 of notifications.

DISCUSSION

This study is based on a geographic community and is therefore free of bias caused by variations in referral that may occur with hospital-based series. The notification system was not materially changed during the study period and was augmented throughout by scrutiny of laboratory results and hospital admissions. Under-reporting of infectious diseases is always likely, but it is reasonable to believe the proportion coming to doctors' attention that was then notified remained relatively stable.

The incidence and epidemiology of HBV infection in Edinburgh was influenced considerably by injection drug use, although the true scale is probably underestimated. Cases among identified IDUs were 41% of the total; a further 4·8% were reported in sexual or household contacts of IDUs. However, some who reported sexual contact with non-IDU partners were likely to have been IDU-related infections where the partner's drug use was unknown to the index case. A proportion of cases where the mode of transmission was undetermined is also likely to have been due to undisclosed drug use, or sexual transmission from an infected IDU. It is of interest that post-code districts with most IDU-related cases had high levels of hepatitis for which no transmission route could be ascribed, suggesting an association between the two. Furthermore, many IDUs with acute HBV infection may not have attended for medical care, out of fear that their drug use might be disclosed.

A study from 1986–9 in Glasgow, a city which experienced a similar epidemic of injecting but with a low HIV prevalence among IDUs, identified 125 IDUs with acute HBV infection [8]. Comparison of the distributions of known HIV infections among IDUs identified that the IDUs with acute HBV infection were younger and more widely and evenly spread throughout the city than those positive for HIV.

The time-course of hepatitis B notifications in Edinburgh with an increase in cases during the 1970s, a peak in the mid 1980s and subsequent decline has been observed elsewhere [1, 5, 7, 9]. This has been attributed to corresponding behavioural change, particularly sex between men and injection drug use. The rapid rise in cases seen in Edinburgh during the early 1980s, with a peak in 1984, was due mainly to increased IDU-associated infection [5, 7, 9]. It is known that the prevalence of drug injection in the city during this period was rising [10]. This in turn was part of a wider UK epidemic of opiate use associated with increased availability of cheap brown heroin from Iran and Pakistan [11], and unemployment amongst young people from deprived communities in the country's larger cities [12–14]. Edinburgh's drug users were particularly likely to inject drugs, rather than use other routes of administration, and to share injection equipment [2, 4, 15, 16].

The cause of the rapid decrease in IDU-related cases in Edinburgh, which began in 1984 and was well established within 2 years, is less obvious. It is pertinent that evidence of Edinburgh's drug-related HIV epidemic did not emerge until mid 1985 and was not widely known 'on the street' for at least a further year [1]. Hepatitis never received the public or media attention later given to the HIV epidemic, and was not regarded by IDUs as a major hazard. For this reason, it is unlikely itself to have motivated major behavioural change among IDUs. There is a strong suggestion that the prevalence of drug injecting did not alter markedly as early as 1985, and that sharing of equipment remained common at least until 1986 [4, 15–18].

If any appreciable decrease in the IDU population, or in the prevalence of injecting, post-dated the fall in IDU-related hepatitis B notifications, what caused the decline? If significant notification artefact is excluded, on the grounds discussed earlier, and HBV infectivity is assumed constant, two main hypotheses may be advanced.

Firstly, subtle changes may have occurred in drug-using behaviour that reduced the risk of virus transmission (e.g. less group sharing, less interchange between groups, fewer 'shooting galleries', more cleaning of equipment). It is difficult to see why such hypothetical changes might have been rapid enough to account for the post-1984 decline, although they cannot be excluded, since variations in injecting behaviour are known to show complex interactions with patterns of drug consumption and sub-cultural trends [19].

Secondly, the IDU population may have become increasingly immune to HBV. In theory this might have been due to hepatitis B vaccination, but in practice in the mid 1980s vaccine was used almost exclusively, as initially recommended by the Department of Health, for protection of individuals at occupational risk rather than IDUs or those otherwise

exposed because of their life-style. A more likely explanation is that by 1984 the majority of IDUs at risk had experienced acute or sub-clinical HBV infection. The epidemic may, effectively, have run out of susceptible subjects. It is known that groups of IDUs tested during this period showed total markers for HBV at a level as high as 80% [1, 2, 5, 16].

The second hypothesis would explain the decreased incidence of acute HBV infection despite risk behaviours for viral spread remaining common. Acute hepatitis may therefore be a misleading indicator in populations where HBV is highly prevalent and should not be extrapolated to represent HIV incidence. Had any reassurance been drawn from decreased notifications of acute HBV infection about progression of the Edinburgh HIV epidemic, it would have been ill founded. In the Glasgow study [8], the geographical and age distribution of IDUs with acute HBV infection suggested that the potential for future spread of HIV remained considerable and hence another reason why acute hepatitis should not be used as a surrogate marker for HIV incidence. For both the reasons outlined above, we would suggest that acute hepatitis should not be used as a surrogate marker for risk behaviours nor be extrapolated to represent HIV incidence among IDU populations.

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