The risk of infection with HIV and hepatitis B in individuals who inject steroids in England and Wales

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SUMMARY

Data on injecting anabolic steroid users, within the national Unlinked Anonymous HIV Prevalence Monitoring Survey of injecting drug users (IDUs) were analysed to determine their risk of acquiring blood borne viruses. One hundred and forty-nine participants who had injected anabolic steroids in the previous month were identified from 1991–6, contributing 1·4% of all participation episodes in the survey. Rates of needle and syringe sharing by steroid users were low. Three of the 149 (2·0%) had anti-HBc and none had anti-HIV in their salivary specimens. The prevalence of anti-HBc in steroid injectors was significantly lower than in heroin injectors, 275/1509 (18%) ($P < 0.001$), or in amphetamine injectors, 28/239 (12%) ($P < 0.001$). The risk of blood borne virus transmission amongst these steroid injectors is low, probably due to hygienic use of injecting equipment and low levels of sharing. It is important to distinguish steroid injectors from other IDUs because they are a distinct group in terms of lifestyle and injecting practice.

INTRODUCTION

There are several reasons why people choose to use performance-enhancing drugs such as anabolic steroids, human chorionic gonadotrophin (HCG) or thyroxine. These include participation in competitive sport, body building and to attempt to improve their cosmetic appearance. The use of non-prescribed anabolic steroids is a recognized phenomenon and is widespread in the UK [1] although there have been no large British studies of prevalence. However, at a technology college in the Scottish borders, 4·4% of male students and 1·0% of female students admitted use of anabolic steroids [2]. Surveys conducted in gyms suggest that 6% of men and 1·4% of women attending gyms are currently using anabolic steroids and amongst attenders of gyms with a strong emphasis

on competition and who provide heavy weight training equipment, around half of male attenders have used steroids at some time [1, 3]. Studies from elsewhere in Europe and North America confirm that the phenomenon is widespread, with the prevalence in the groups of young men in educational establishments studied of 3–11/100 [4–6]. Steroid users are typically men in their twenties, the average age of first injection being 24 years [1].

Anabolic steroids are available in both oral and parenteral preparations. In UK studies around 80% of steroid users were found to inject habitually or to have injected in the past [1, 2]. Injecting steroid users, although in many ways different from other IDUs, have potentially similar risks from sepsis or blood borne viruses if injection technique is poor or equipment is shared, though as steroid injectors inject intramuscularly, usually into the buttock or thigh [1],

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the risks may be less. Injectable anabolic steroids are usually available ready constituted in single use vials, making use and sharing of injection equipment, other than a needle and syringe, unnecessary. There are, however, concerns that multi-use vials are used, increasing the risk of blood borne viruses and bacterial contamination if shared or used on more than one occasion. Anabolic steroids from reliable pharmaceutical sources are available on the black market but, increasingly, counterfeit drugs are being offered [7]. The Misuse of Drugs Act has recently been amended to include a range of performance enhancing drugs in Class C of the Act, making it an offence to import, export, produce or supply steroids. Possession will remain legal, but it is possible that the change in legislation will drive the practice further underground, adversely affecting the quality of drugs available and the availability of single use vials and needles and syringes within the gym setting.

Many steroid injectors obtain their injecting equipment from sources such as gym managers or dealers [1, 2], however, steroid injectors are forming an increasing proportion of clients of needle exchanges; in 1995, 213 (19%) of attenders at a Liverpool needle exchange gave steroids as their main drug of injection compared to 26 (1·8%) in 1991 [3]. In UK surveys few steroid injectors admit to sharing injecting equipment [1, 8] but this may be due to the comparatively crude methods of ascertainment [1].

There have been case reports in the medical literature of HIV and HBV transmission via injection among steroid users in the USA [9, 10] but none in the UK. Routine reporting of acute hepatitis B infections to the Communicable Disease Surveillance Centre does not enable discrimination between users of psychoactive drugs and injectors of steroids.

The Unlinked Anonymous HIV Prevalence Monitoring Programme in England and Wales is a family of surveys each using the unlinked anonymous technique to test samples obtained from populations at elevated risk or general risk of HIV infection [11]. For most of the component surveys this involves antibody testing of residual serum specimens remaining after routine screening of patient groups (GUM clinic attenders, antenatal clinic attenders, neonatal dried blood spots, hospital patients). Specimens are irreversibly 'unlinked' from patient/client identifiers, but limited demographic and risk behaviour information remain linked to the sample. The 'Injecting Drug Users Saliva Survey', one of the component surveys, uses samples of saliva obtained voluntarily and has been sampling IDUs attending a range of specialist agencies, from needle exchanges to inpatient units since 1990 [12]. Eligible attenders, i.e. those who have ever injected drugs, are asked to provide a sample of saliva and to fill out a brief questionnaire. The latter requests information on injecting practices with detail on the month prior to participation, and sexual activity within the last year. Saliva samples are tested for anti-HBc and anti-HIV. Clients are asked to participate once in each calendar year by drug workers. From 1991, the IDU survey has asked injectors who had injected in the month prior to participation in the survey ('current injectors') to indicate their main injected drug. This enables recognition of individuals who inject drugs for their physical rather than psychoactive effects. Since 1993, participants have also been asked if they have ever received used needles or syringes, and current injectors are asked whether they have passed on or received used needles or syringes in the past month. This paper describes the prevalences of HIV and hepatitis B infection as indicated by the presence of salivary anti-HIV and anti-HBc, as well as the characteristics of persons injecting anabolic steroids compared to other injectors, as recorded in this ongoing national survey of IDUs.

METHODS

Data from the Unlinked Anonymous HIV Prevalence Monitoring Survey of IDUs were analysed with extraction of data specifically relating to those who were current injectors of anabolic steroids or HCG. The questionnaire completed by clients recorded participation in the survey in previous years, making it possible to exclude individuals who had previously participated and thus identify a group of individual steroid injectors rather than a series of participation episodes. For single variable analysis, data on steroid injectors from 1991–6 were compared to heroin and amphetamine injectors sampled in 1996 only (nearly half of the steroid injectors were sampled in 1996). Multivariable analysis using logistic regression techniques was carried out utilizing data for heroin and amphetamine injectors sampled in all years.

RESULTS

Trend in survey participation by steroid injectors

In 1991 none of the 719 participants who were current IDUs were steroid injectors, but by 1996 the pro-

Table 1. *Proportion of 'current injectors' in survey giving steroids or HCG as main drug of injection*

	Year						
	1991 $n = 719$	1992 $n = 2172$	1993 $n = 2195$	1994 $n = 2273$	1995 $n = 1880$	1996 $n = 2300$	Total $n = 11539$
Percentage of all survey participants	0%	0·7%	1·0%	1·3%	1·4%	3·1%	1·4%
Number	0	15	23	30	26	72	166
(had participated before)	(−)	(0)	(5)	(5)	(3)	(4)	(17)

Table 2. *Age, frequency and time since first injection for current injectors*

	Drug used		
	Steroids/HCG 1991–6 $n = 149$	Heroin 1996 $n = 1535$	Amphetamines 1996 $n = 242$
Median age	25	28	28
Age range (years)	17–48	14–52	16–54
Median number days injected in past month	4	24	12
Range of number days injected in past month	1–28	1–28	1–28
Median time since first injection (years)	1	6	7
Range of years since first injection	< 1–15	< 1–33	< 1–29

portion had increased significantly to 3·1% (χ^2 for linear trend = 41·90, $P < 0·001$, Table 1). Over the 6-year period from 1991–6, 149 current steroid injectors participated on 166 occasions. A further nine individuals who though not currently injecting volunteered the information that they had injected steroids. In addition to the 11539 occasions on which current injectors of any drug participated, there were 5852 occasions when IDUs participated who had not injected in the previous month, and who were therefore not asked about their main drug of injection.

Of the 149 current steroid injectors who were participating in the survey for the first time, 118 reported steroids, 28 testosterone, 2 HCG, and 1 steroids plus HCG as the drugs they injected most often. The steroid injectors were widely spread across England and Wales from the South West to the North East, drawn from 14 of 87 participating agencies, with a maximum of 39 from any one centre. None was from the London area (25·8% of all injectors sampled between 1991 and 1996 came from participating centres in Greater London).

Characteristics of the steroid injectors

The ages of the steroid injectors ranged from 17–48 years (median 25) (Table 2), and the age at first injection ranged from 16 to 42 years (median 23). Only two (1%) were women compared to 30% of heroin users and 30% of amphetamine injectors sampled. The ages of the participants were similar for all three drugs, but the length of time since first injection was much shorter for steroid injectors (median 1 year) than heroin or amphetamine injectors (median 6 and 7 years respectively).

The number of days on which the steroid using participants injected in the month prior to participation ranged from 1 to 28 (mean 6, median 4). This is less frequently than IDUs who mainly inject other drugs (Table 2).

Reported injecting and sexual risk in steroid users

Eight of the 134 current steroid injectors included since 1993 reported 'ever having received' used needles or syringes (Table 3). This is significantly lower than the proportion of amphetamine injectors ($\chi^2 = 48·45$, $P < 0·001$) or heroin injectors ($\chi^2 = 91·21$, $P < 0·001$). Two steroid injectors had received or passed on used needles or syringes in the last month. Again this was significantly lower than the rates observed amongst amphetamine users ($\chi^2 = 22·10$, $P < 0·001$) and heroin users ($\chi^2 = 26·98$, $P < 0·001$). One steroid injector had shared spoons, filters

Table 3. *Sharing of needles and syringes; steroid injectors (1993–6) and injectors of heroin and amphetamines (1996)*

Current injectors of drug	Steroid/HCG 1993–6 n = 134	Heroin 1996 n = 1535	Amphetamines 1996 n = 242
Received used needles/syringes			
Ever	8 (6%)	746 (49%)	95 (40%)
In last month from 1 person	1 (< 1%)	170 (11%)	20 (8%)
In last month from > 1 person	0 (0%)	66 (4%)	9 (4%)
Passed on used needles/syringes			
In last month to 1 person	0 (0%)	181 (12%)	14 (6%)
In last month to > 1 person	1 (< 1%)	82 (5%)	14 (6%)

Table 4. *Anti-HBc and anti-HIV amongst steroid injectors, 1991–6*

	1991	1992	1993	1994	1995	1996	Total
Number	0	15	18	25	23	68	149
Antibody to HBc antigen (%)	—	0 (0)	1 (5·6)	1 (4·0)	1 (4·3)	0 (0)	3 (2·0)
Antibody to HIV	0	0	0	0	0	0	0

Table 5. *Prevalence of anti-HIV and anti-HBc*

Current injectors of drug	Steroid/HCG 1991–6 n = 149	Heroin 1996 n = 1535	Amphetamines 1996 n = 242
anti-HIV (%)	0 (0·0)	11 (0·7)	3 (1·3)
anti-HBc (%)	3 (2·0)	275 (18·2)	28 (11·7)

and water, but this may have been in connection with other drugs.

One hundred and forty of 149 steroid injectors reported having sex in the year prior to participation. Of the male steroid users, 10 (7·4%) reported sex with 10 or more women in the previous year and 5 (5·4%) reported sex with other men. Amongst men who were current heroin users in 1996 the proportions were 2·6% and 6·4% respectively. Amongst men who were current amphetamine users the proportions were 6·5% and 6·4% respectively.

Salivary antibody testing

On testing the saliva specimens, no steroid injector was found to have antibodies to HIV (Table 4). Saliva specimens from three steroid injectors contained antibodies to HBc, evidence of previous or current hepatitis B infection, an overall prevalence of 2%.

None of the three reported sharing injection equipment or large numbers of sexual partners. The proportion of current steroid injectors with salivary anti-HBc was significantly lower than for current heroin users ($\chi^2 = 25.32$, $P < 0.001$) or amphetamine users ($\chi^2 = 11.64$, $P < 0.001$) (Table 5). However, the lower prevalence of anti-HBc in steroid users compared to other injectors may be explained by factors other than drug injected. A multiple logistic regression with anti-HBc status as the outcome variable and steroid use as the explanatory variable was performed including all current injectors participating for the first time in the survey from 1992–6. Other potential confounders (age, number of years injecting, gender and study centre) were added to assess their effect on the relationship between steroid use and anti-HBc status. The unadjusted OR was 0·07 (95% C.I. 0·022 to 0·21, $P < 0.001$). The adjusted OR was still highly significant (OR = 0·18, 95% C.I. 0·055 to 0·566, $P < 0.004$), indicating a lower risk of hepatitis B infection

in steroid users compared to other injectors in the survey.

DISCUSSION

Anabolic steroid use is widespread [4–6] with a significant proportion of users injecting [1]. Drug agencies and needle exchanges are being increasingly used by steroid users [3], enabling participation in the Unlinked Anonymous HIV Prevalence Monitoring Survey and their inclusion in IDU statistics. It is possible that an even higher proportion of those attenders who had not injected in the last month were steroid injectors as steroid injection is typically a cyclical practice, with several months between courses of self-'treatment' [7]. Moreover, some centres reported either not asking steroid injectors to participate or steroid injectors refusing to participate as they did not consider themselves 'IDUs'.

Steroid injectors who share injection equipment are at risk of acquiring blood borne infections and there is evidence elsewhere of transmission of HIV and HBV between steroid injectors [9, 10]. It has been observed, however, that steroid injectors in the UK have a low rate of sharing of needles, syringes and other injection equipment. Although such data is reliant on the self-reporting of behaviour, and therefore there is a possibility of misreporting, this seems unlikely to be a significant bias given the anonymity of the study. From the lack of reports in the medical literature and the evidence presented here from salivary testing on 149 steroid injectors, it appears that the risk of transmission of blood borne viruses to date though theoretically possible is extremely low, and with the current injection practices of steroid injectors, the risk of exposure to HBV or HIV might be little higher than that for similar adults who are not steroid injectors. It is possible that steroid injectors attending drug agencies and needle exchanges are not representative of all steroid injectors and may be more aware than other steroid injectors of the risks associated with injection. The prevalence of anti-HBc (2 %) in steroid injectors, although based on a small sample, is similar to what might be expected in the general population [13, 14] but much lower than that of IDUs mainly using other drugs.

The reasons presented for the low risk of blood-borne virus transmission compared to other injecting drug users are speculative and relate both to the nature of injecting steroid use and the characteristics of the injectors themselves. There may be a lower risk of transmission with intramuscular injection compared to intravenous injection, there is less equipment to share, injections are less frequent, and there is less immediacy in a user's need to inject, allowing time to access new or clean injection equipment. The users themselves may lead more controlled lives and be more health and body conscious, wishing to minimize harm from injecting practices. Few people in this sample were sharing needles or syringes, however the questionnaire did not ask questions specific to steroid use, for example use of multi-dose vials. A low proportion of the steroid injectors studied here were men who have sex with men, although this proportion may vary with different geographical area; none of the 149 was from the London area where there is a higher reported prevalence of homosexual and bisexual males [15]. It may be less likely that their sexual partners are also injecting drug users, a situation where needle sharing is known to occur. Conversely, they are less likely to be targeted by HIV prevention campaigns directed at IDUs. Although the main issue of current public health importance is the occurrence of side effects of the drugs themselves, there is a need to raise awareness of the risk of acquiring blood borne viruses among steroid injectors, especially given the suggested recent increase in this population [3].

Given the differences between those who inject psychoactive drugs and those who inject drugs to enhance their physical performance or appearance, it seems appropriate to distinguish between the two groups, both in the Unlinked Anonymous HIV Prevalence Monitoring Survey and other data such as case reports of acute hepatitis B. This will both ascertain the true prevalence or incidence of blood borne viruses and sharing practices in IDUs who use psychoactive drugs, and provide a method of monitoring the situation amongst steroid injectors, in whom there is also the potential for transmission of HIV and HBV. Despite the reassurance that current information provides, the possible increase in prevalence of steroid use means that new groups of steroid injectors could introduce new patterns of behaviour and risk very rapidly.

ACKNOWLEDGEMENTS

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