

Role of sexual and non-sexual practices in the transmission of hepatitis B

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SUMMARY Medical, social, and sexual histories were taken from 198 men attending a department for sexually transmitted diseases. Their blood was tested for hepatitis B surface antigen and its antibody, and also for syphilis and liver function. Infection with hepatitis B virus was found to be common among practising homosexuals and to occur much more frequently in them than in heterosexuals. Hepatitis B appeared to be transmitted sexually rather than by other means, but it was not possible in this study to link its transmission with any particular homosexual practice. However, risk of infection increased considerably with the number of sexual partners and nearly half of those with more than 40 sexual partners had been infected.

Introduction

In a previous investigation we showed that the incidence of antibody to hepatitis B surface antigen (anti-HBs) in patients attending a department of sexually transmitted diseases was about 10 times higher than that found in blood donors (Fulford *et al.*, 1973). The possession of anti-HBs was clearly associated with male homosexuality and promiscuity among men of British and western European origin. In another study a high incidence of male homosexuality and previous venereal infection was found among patients who had hepatitis B (Heathcote and Sherlock, 1973). The presence of hepatitis B surface antigen (HBsAg) in the saliva and semen of some patients carrying the antigen in their blood was demonstrated (Heathcote *et al.*, 1974), but it was not possible to determine the precise way in which hepatitis B was transmitted between sexual partners. The current study was designed to extend the range and detail of our clinical and epidemiological knowledge about hepatitis B in male homosexuals and, if possible, to provide information on the mechanism of transmission. The preliminary results of this study have already been published (Lim *et al.*, 1976).

Patients and methods

PATIENTS

A random selection of male patients was made, but

those from countries known to have a high incidence of hepatitis B were excluded. Of the 198 patients a few declined interview and some refused to donate samples for laboratory analysis. Detailed histories of sexually transmitted diseases and sexual practices were taken by one of us (KSL); another of us (VTW) recorded the history of each patient's general health, past and present, including information relating to possible liver disease and social habits. The two sets of observations were made independently.

TESTS

Treponema pallidum haemagglutination and VDRL tests

These tests were used to determine whether or not a patient was or had been infected with syphilis.

Detection of HBsAg and anti-HBs

A solid phase radioimmunoassay technique was used for detecting HBsAg and for subtyping antigens ad or ay (Heathcote *et al.*, 1974). A commercial radioimmunoassay technique was used for detecting anti-HBs (Ausab, Abbott Laboratories Ltd).

Liver function tests

These were done using a Vickers M300 autoanalyser.

Analysis of data

Information obtained from patients and the results of laboratory tests were coded and analysed on a CDC 6600 computer. Patients were classified as 'hepatitis B positive' if their blood contained either HBsAg or anti-HBs. Hepatitis B positive and negative patients in the group as a whole, and in

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subgroups by sexual orientation, were compared using sexual and non-sexual practices as variables.

Results

Three HBsAg and 32 anti-HBs positive patients were identified. Analyses of the differences between these patients and those who were negative provided information in three main areas:

1. The influence of non-sexual practices on the chance of becoming infected with hepatitis B virus.
2. The clinical course of hepatitis B in its sexually acquired form.
3. The influence of various sexual practices and the risks of infection.

NON-SEXUAL PRACTICES

Inquiries were made about a wide variety of possible non-sexual sources of infection. No significant differences were found between the hepatitis B positive group and the negative group for visits to hospital, occupation, living abroad, tattooing, blood transfusions, dental treatment, sharing of toothbrushes and wet razors, inoculations, drug and alcohol abuse, engagement in traumatic sports, and insect bites.

CLINICAL COURSE

One of the three HBsAg positive patients was jaundiced at the time of his attendance. The other two HBsAg positive patients gave a history of jaundice in the preceding month. The patients reported general malaise and loss of appetite resulting in a period of time off work although hospital admission had not been advised by their general practitioners. Abnormal levels of alkaline phosphatase and aspartate transaminase were recorded. All three antigens were subtype ad.

Altogether 136 patients gave no history suggestive of jaundice although 24 were anti-HBs positive. Fifteen patients gave a history of jaundice of whom eight were anti-HBs positive (Table 1). The standard liver function tests (total bilirubin, alkaline phosphatase, aspartate transaminase, albumen, total protein, and cholesterol) were in a similar range for patients with and without anti-HBs.

Table 1 *HBsAg and anti-HBs in relation to a history of jaundice*

Variable	HBsAg or anti-HBs positive	HBsAg and anti-HBs negative	Total
History of jaundice	8	7	15
No history of jaundice	24	112	136

With Yates's continuity correction $\chi_1^2 = 8.3$, $P < 0.01$

SEXUAL PRACTICE

Of the 30 homosexuals and 46 bisexual patients, 10 and 17 respectively were HBsAg or anti-HBs positive. In marked contrast only six out of 117 heterosexual patients were anti-HBs positive (Table 2).

Table 2 *HBsAg and anti-HBs in relation to sexual orientation*

Variable	HBsAg or anti-HBs positive	HBsAg and anti-HBs negative	Total
Heterosexual	6	111	117
Bisexual	17	29	46
Homosexual	10	20	30

With Yates's continuity correction $\chi_1^2 = 26.6$, $P < 0.001$

In the bisexual group only one patient was a practising bisexual at the time of the interview. Another patient was heterosexually orientated, but admitted to being a passive partner during rectal intercourse when he was a teenager. The remaining 44 patients were practising homosexuals and had been for several years, although they had limited experience of heterosexual intercourse. The association of hepatitis B with homosexual practice becomes more significant ($P < 0.001$) if the homosexuals and bisexuals together are compared with the heterosexuals.

There was no significant association between the positive and negative groups of patients and the practice of sexual intercourse during menstruation, different methods of contraception, or the type of relationship (regular, casual, or prostitute). The age of the patients ranged from 16 to 70 years with an average of 30. The average age of first sexual intercourse was 20 years.

The homosexual and bisexual patients had had on average more than 130 different sexual partners whereas the heterosexual patients had had 36. These figures did not include homosexual partners with whom only mutual masturbation or fellatio had been practised. The number of sexual contacts would increase by a large but uncertain amount if these had been included. The homosexual and bisexual patients with 40 or more sexual partners were more at risk of being infected with hepatitis B virus than those who had had fewer relationships (Table 3).

Although rectal intercourse is not a particularly common practice in a heterosexual relationship it is widely practised by homosexuals. Thirty-five heterosexuals admitted to rectal intercourse with their female partners. Of the six anti-HBs positive cases in this group, three admitted to having practised rectal intercourse.

Table 3 *HBsAg and anti-HBs in relation to numbers of sexual partners within the homosexual and bisexual group*

Variable	HBs or anti-HBs positive	HBsAg and anti-HBs negative	Total
1-40 partners	5	23	28
40 or more partners	22	26	48

With Yates continuity correction $\chi_1^2=4.8$, $P<0.05$

There was no statistical evidence ($P\leq 0.05$) to show that the passive homosexual was more at risk than his active partner. However, the proportion of patients with anti-HBs increased with the amount of passive intercourse practised (Table 4).

Table 4 *HBsAg and anti-HBs in relation to homosexual rectal intercourse*

Variable	HBsAg or anti-HBs positive	HBsAg and anti-HBs negative	Total
Active > passive	16	35	51
Active \leq passive	10	11	21

With Yates continuity correction $\chi_1^2=1.1$, $P\leq 0.05$

Orogenital contact (cunnilingus and fellatio) was not significantly associated with hepatitis B in the group as a whole or in the subgroups and, contrary to our earlier impression (Lim *et al.*, 1976), neither was oro-anal contact nor the practice of swallowing semen during fellatio. Semen from the patient with acute antigenaemia and jaundice contained HBsAg, but samples of semen and saliva from the other patients were negative.

In the group as a whole the hepatitis B positive patients were more likely than the negative patients to have had a history of gonorrhoea ($P=0.001$) or serological evidence of past syphilis ($P=0.0001$).

Discussion

Evidence of past or present infection with hepatitis B virus was not found to be related to occupation, social habits, or iatrogenic causes in men attending a department for sexually transmitted diseases. On the other hand there was a clear association between hepatitis B infection and homosexual as opposed to heterosexual practices. However, we were unable to show that any particular form of intercourse was significantly associated with the spread of hepatitis B virus among homosexuals, although the chances of acquiring infection did appear to be greater in those who assumed the passive role during rectal intercourse. This is in agreement with the observations of

Szmunn *et al.* (1975) who reported a high incidence of hepatitis B in homosexuals who practised rectal intercourse, with those who predominantly assumed the passive role being at greater risk. Rectal intercourse is associated with trauma, bleeding, and proctitis. If the rectal mucosa was susceptible to infection with the virus then the passive partner might be at risk from virus present in blood or semen. The homosexuals had many more sexual contacts than the heterosexuals and this may have been as important a factor in virus transmission as any particular form of intercourse. The significant association found between gonorrhoea, syphilis, and hepatitis B was thought to reflect the prevalence of all three infections in homosexuals; it also fits with the concept of hepatitis B as a disease which can be transmitted sexually.

Only eight out of 32 patients with anti-HBs gave a history of having had jaundice which suggests that three-quarters of hepatitis B infections were inapparent or subicteric. Patients with a history of jaundice were three times as likely to have anti-HBs as those without, and just over half of those who gave a history of having had jaundice were anti-HBs positive. We conclude that hepatitis B was a common cause of jaundice in the population studied, although most infections with the virus did not cause jaundice.

Although our results confirm the association we had previously found between homosexual practice and hepatitis B infection we were unable to discover whether any particular form of sexual intercourse favoured transmission of the virus.

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