Incidence of Hepatitis B in the Penitentiary of New Mexico

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Abstract: A study was conducted to determine the incidence of hepatitis B (HB) in a prison population. Forty-seven per cent of 455 male prisoners had evidence of past HB infection. HB seropositivity was most strongly correlated with: 1) a history of IV drug abuse; 2) age; 3) total time in any prison; and 4) race. During a one-year study period there were no clinical cases of HB in the prison and the seroconversion rate was 0.8 per cent among prisoners still incarcerated. (*Am J Public Health* 1985; 75:1213–1214.)

Introduction

Hepatitis B (HB) vaccine has been commercially available in the United States since 1982. Both the manufacturer and the Advisory Committee on Immunization Practices of the US Public Health Service have recommended that male inmates of long-term correctional facilities be considered for vaccination.[1] This recommendation is based on limited data from prison populations showing a high prevalence of serologic markers for HB infection in a population that has multiple risk factors for hepatitis B. Since no clinical cases of HB had been observed at the Penitentiary of New Mexico (PNM) during the two years before HB vaccine became available, a study to determine the incidence of HB infection at PNM was judged necessary before a HB vaccination policy could be adopted for the NM state prison system.

Methods

PNM is a medium and maximum security state correctional institution designed to hold 700 inmates. On August 14, 1982, all male inmates at PNM were offered a blood test to determine their immunity to HB. Individual letters had been sent one week earlier to each prisoner informing him about the reasons for the blood test. Ethical and legal considerations necessitated that participation be voluntary and no inducement offered. A short questionnaire administered at the time of the blood drawing asked about demographic risk factors for HB infection. All blood samples were tested by radioimmunoassay for hepatitis B surface antigen (HBsAg), hepatitis B surface antibody (anti-HBs), and hepatitis B core antibody (anti-HBc) using commercial reagents (AUSRIA®-II; AUSAB®; CORAB®; Abbott Medical Laboratories, North Chicago, Illinois).* A prisoner who had any combination of HBsAg, anti-HBc, and/or anti-HBs was considered HB immune. A prisoner who had three negative tests was considered HB susceptible. One year later, a second blood specimen was requested from all HB susceptible men still incarcerated in the New Mexico penal system.

*Use of trade names is for identification only and does not imply endorsement by the Public Health Service or by the US Department of Health and Human Services.

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TABLE 1—Hepatitis B Risk Factors for All 455 Participants, Hepatitis B Serosurvey, Penitentiary of New Mexico, August 14, 1982

Risk Factor	%
Age 30 years or greater	43.5
PNM time 5 years or more	17.4
Total prison time 5 years or more	47.7
Ethnicity-White, Non-Spanish Surname	25.1
Spanish Surnamed	59.1
Black	7.9
Other	5.3
History of hepatitis (ever)	19.1
Blood transfusion (ever)	16.3
Tattoos	81.7
Intravenous drug use (ever)	41.3
Homosexuality (ever)	3.6

All clinical cases of hepatitis B in the New Mexico penal system from August 1982 to August 1983 were reported to the PNM staff physician (LHL).

Results

Of the 659 men in PNM, 455 (69.0 per cent) consented to participate in the study and submitted initial blood specimens. These 455 men ranged in age from 18 to 71 years with a mean of 30.3 years. They had been incarcerated at PNM for a mean of 2.5 years and had been in any prison for a mean of 5.8 years (Table 1). The initial serosurvey showed that 213 (46.8 per cent) of the prison inmates were HB immune. As shown in Table 2, multiple logistic regression demonstrated that HB immunity was independently and strongly associated with a history of intravenous drug abuse and age, and less strongly with total time in all prisons, history of hepatitis, and a Spanish surname. (The Spanish surnamed population of New Mexico is primarily composed of two groups—the New Mexicans, the descendants of the Spanish families who settled New Mexico in the 16th and 17th centuries, and more recent immigrants, primarily Mexican Americans.)

After one year, 139 of the 242 susceptible men (57.4 per cent) remained in the New Mexico corrections system. One hundred twenty-two of these 139 men (87.8 per cent) consented to a repeat blood specimen. Susceptible men consenting to a repeat blood test were younger and had spent less time in prisons than either those men who refused a second blood test or the combination of all men who either refused a second blood test or were released. Among the 122 men submitting a second blood test, one seroconverted to anti-HBs with a negative HBsAg and anti-HBc test. The inmate who seroconverted was a 26-year-old white man with a non-Spanish surname. He denied symptoms suggestive of hepatitis and had no risk factors for HB. The incidence of HB infection in PNM was 0.82 per cent (for the study year) with a 95 per cent confidence interval of 0.02 per cent to 4.49 per cent.

No clinical cases of hepatitis B were recorded during the year after the initial blood drawing in any of the institutions administered by the New Mexico Corrections Department.

Discussion

While prison inmates uniformly appear to have a high prevalence of serologic markers of past HB infection,[2–10] the

TABLE 2—Hepatitis B Risk Factor Analysis for 455 Male Inmates, Hepatitis B Serosurvey, Penitentiary of New Mexico, August 14, 1982

Risk Factor	Factor+ N	Factor+ %HB+	Factor− N	Factor− %HB+	Odds Ratio	95% Confidence Limits
IV drug use	186	70.4	264	29.9	5.4	(3.2–8.9)
Age 30+ yrs.	198	69.2	257	31.9	4.2	(2.5–7.1)
Total penitentiary time 5+ years	218	62.8	237	32.1	2.0	(1.2–3.5)
Spanish surname	269	53.5	174	31.4	1.9	(1.1–3.0)
Hx hepatitis	85	70.6	361	42.1	1.7	(0.9–3.3)
Tattoos	371	50.4	83	31.3	1.3	(0.4–2.6)
Blood transfusion	73	54.8	275	44.8	1.2	(0.4–2.4)
PNM time 5+ years	79	62.0	376	43.6	1.0	(0.5–2.0)
Homosexuality	16	25.0	429	47.3	0.4	(0.1–1.9)

actual risk of HB transmission within the prison walls has not been determined. Inmates have a number of risk factors that may predispose them to acquiring HB while incarcerated (intravenous drug abuse, homosexual practices, and crowding), but they often have these same risk factors prior to entry into the prison system. Male prisoners have been shown to have a high prevalence of HB seropositivity on entry into the prison system.[8,9] Thus, the high prevalence of HB immunity among prisoners could be explained by exposure to HB virus prior to incarceration and may reflect past rather than future risk. A recent prevalence study in the Tennessee prison system found that illicit drug use while *not* incarcerated was the single most important variable associated with past HB infection.[11] The estimates of relative risk in this study also suggest that history of drug abuse is the most important factor in determining a prisoner's HB immune status and that time in prison, per se, is a minor risk factor.

There were no clinical cases of HB during the study period and the incidence of subclinical HB was very low. The low incidence could reflect a lack of exposure to HB among inmates at PNM. We think that this is unlikely because HB carriers were identified in the serosurvey and ancedoctal reports indicate that homosexual acts and IV drug abuse are not uncommon. A more reasonable explanation of the low incidence of HB at PNM would be that the individuals at highest risk of being exposed to HB are already immune. A final explanation of the low incidence could be that this study is flawed by self-selection of the study population and short study period. It is possible that the highest risk population could have selectively refused to participate in the study, or that we studied an interepidemic period. However, the absence of clinical HB at PNM for at least two years prior to and the one year since the completion of this study suggests that the study period is representative and the true incidence of HB at PNM is quite low. A one-year study in the Tennessee prison system found an HB incidence of 1.32 per cent,[12] suggesting that the PNM experience may not be atypical.

Mulley has estimated tht HB vaccination will save medical costs for populations with annual attack rates greater than 5 per cent and is cost-effective for groups with attack rates as low as 1 to 2 per cent.[13] Because of high turnover rates in prisons, a stategy of screening all men on entry to prison and vaccination of susceptibles would result in many incomplete series being given. The incidence data from PNM suggest that unselective HB vaccination programs in prisons may not be cost effective.

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