

# Seroprevalence of HIV-1 and Hepatitis B and C in Prostitutes in Albuquerque, New Mexico

## ABSTRACT

A survey of persons soliciting sex in an area known to be frequented by prostitutes in Albuquerque, NM, included 43 females and 66 males. Seroprevalence rates found in this population-based study were as follows: human immunodeficiency virus type 1 (HIV-1), 3%; hepatitis B, 39%; hepatitis C, 45%. Increased age, intravenous drug use, and condom use were independent risk factors for hepatitis B. Female gender and intravenous drug use were independent risk factors for hepatitis C. Neither sharing injection equipment nor engaging in receptive anal intercourse was independently associated with hepatitis B or C. (*Am J Public Health*. 1992;82:1151-1154)

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### Introduction

Prevalence rates of human immunodeficiency virus type 1 (HIV-1) infection in female prostitutes in the United States have been reported to be as high as 58 percent.<sup>1,2</sup> These prostitutes' risk of infection is probably associated more with intravenous (IV) drug use than with sexual activity.<sup>3,4</sup> Male and female prostitutes have high rates of hepatitis B (HBV) infection.<sup>5</sup> Hepatitis C (HCV) rates in prostitutes are not well known, but a high prevalence in IV drug users has been documented.<sup>6,7</sup> Although transmission patterns for human lymphotropic virus types I and II (HTLV I/II) are unclear, the prevalence in 1305 female prostitutes in the United States was almost 7%.<sup>8</sup>

Most published surveys of prostitutes have been subject to selection bias because prostitutes were sampled at clinics, prisons, or treatment programs. The current study minimized such bias by sampling all street prostitutes in a circumscribed area known to be frequented by prostitutes.

The purpose of this study was to assess risk behaviors and to quantify the prevalence of HIV-1, HBV, HCV, syphilis, and HTLV I/II in street prostitutes and others soliciting sex.

### Methods

In July and August of 1990 we contacted all persons who appeared to be soliciting clients for sexual activity in a geographically defined area known to be frequented by prostitutes. Subjects were offered \$20 to be interviewed and provide an anonymous blood sample. A standard questionnaire was used and one investigator (S.R.T.) was always present. Test results and posttest counseling were made available through street outreach and the public sexually transmitted disease (STD) clinic.

HIV-1 antibodies were detected by enzyme immunoassay and confirmed by immunofluorescence assay. HBV infection was assessed by core antibody-IgG

(HBcAb) and surface antigen (HBsAg). Antibodies to HCV and HTLV I/II were detected by enzyme immunoassay. The micro-hemagglutination assay was used for *Treponema pallidum* antibodies.

Individuals were classified as prostitutes if they reported having ever received money or drugs for sex. Condom use was assayed by reported use during any sexual activity in the previous month.

All analyses were carried out with the EGRET statistical package.<sup>9</sup> Odds ratios and confidence intervals for univariate and multivariate effects were estimated by logistic regression.<sup>10</sup>

### Results

Of the 120 persons approached, 109 (91%) agreed to participate. All accepted voluntary HIV-1 testing and counseling. Participant characteristics are shown in Table 1. Although all participants were soliciting sex, only 73% reported doing so to receive money or drugs. All reported clients were male. One third of the male prostitutes behaved and were dressed as women at the time of interview. Most study participants expressed great concern about their health status, especially

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This paper was submitted to the *Journal* May 8, 1991, and accepted with revisions February 24, 1992.

TABLE 1—Distribution of Age, Ethnicity, and Other Variables for Male and Female Street Study Participants

	Male (n = 66)		Female (n = 43)	
	No.	%	No.	%
Age, y				
<25	38	57.6	13	30.2
25–29	17	25.8	11	25.6
≥30	11	16.7	18	41.9
Unknown	0	0.0	1	2.3
Ethnicity				
Anglo	21	31.8	12	27.9
Afro-American	5	7.6	11	25.6
Hispanic	29	43.9	16	37.2
Other	11	16.7	4	9.3
Condom use				
Always	28	42.4	25	58.1
Often	17	25.8	9	20.9
Sometimes/never	21	31.8	9	20.9
Number of sexual partners per night				
0–1	39	59.1	6	14.0
2–5	22	33.3	22	51.2
>5	5	7.6	15	34.9
Prostitution				
No	26	39.4	3	7.0
Yes	40	60.6	40	93.0
Intravenous drug use				
No	32	48.5	10	23.3
Yes	34	51.5	33	76.7
Share needles				
No	11	33.3	8	24.2
Yes	22	66.7	25	75.8

the risk of HIV infection, and responded enthusiastically to education.

Three persons had antibodies to HIV-1. Two were Hispanic homosexual males who reported engaging in receptive anal intercourse; one of these also reported intravenous (IV) drug use. Both had antibodies to HBV, but not to HCV. The third person who was HIV-positive was a non-Hispanic white female prostitute who used IV drugs and had antibodies to HBV and HCV.

Fifty-eight percent of the study participants had antibodies to either HBV or HCV; 42% were negative for both. Of all participants, 14% had antibodies to HBV only, 20% had antibodies to HCV only, and 25% had antibodies to both. Seven percent had detectable HBsAg. Individuals reporting IV drug use had HBV and HCV rates of 46% and 64%, respectively. Eight (8%) had antibodies to syphilis. Two persons had antibodies to HTLV I/II (but not to HIV-1).

Table 2 shows the univariate associations of various factors with hepatitis antibodies. Variables associated with both HBV and HCV included increased age,

female gender, and IV drug use. Individuals reporting IV drug use were 45 times more likely to have HCV antibodies than were those reporting non IV drug use. Of the 19 study participants who were younger than 20 years of age, none showed infection with HBV; one had antibodies to HCV. Females were six times more likely than males to have HCV antibodies. HCV was associated with both prostitution and increased number of sexual partners per night. Seropositivity to HBV was related to reported condom use. Neither ethnicity nor sharing needles was significantly related to HBV or HCV. Receptive anal intercourse was not associated with HBV or HCV infection. To test the independence of significant univariate associations, we used a stepwise logistic regression model (Table 3). Increased age, IV drug use, and reported use of condoms were independent risk factors for antibodies to HBV. For HCV, IV drug use and female gender were independent risk factors.

The effect of female gender on HCV infection was evaluated separately for IV drug users and nonusers. The odds ratios

were 6.9 (95% CI = 1.7, 27.6) and 4.4 (95% CI = 0.3, 79.7) for drug users and nonusers, respectively. Thus, female gender remained significant only for IV drug users.

Condom use was compared for those older and younger than 25 years of age; the positive association of condom use with HBV remained significant only in those older than 25 years.

## Discussion

The HIV-1 seroprevalence rate in this population was surprisingly low (3%), especially when compared with the 27% seroprevalence rate in homosexual men attending the local public STD clinic (New Mexico Department of Health, Office of Epidemiology, unpublished data, 1991). The relatively high prevalence of HBV and HCV allowed us to analyze risk factors known to be associated with HIV-1 transmission.

IV drug use was strongly associated with HBV and HCV infection. However, we found no significant association between self-reports of sharing injection equipment and HBV or HCV infection. An analogous lack of association between reported use of shared equipment and HIV infection has been documented.<sup>11,12</sup> Responses to questions about shared injection equipment may be unreliable because of reluctance to admit this behavior and because of ambiguous definitions of "sharing."<sup>3</sup>

Unexpectedly, reported use of condoms was positively associated with HBV infection, as has been previously observed,<sup>13</sup> though this association was statistically significant only for those older than 25 years of age. We speculate that high rates of *current* condom use may be associated with *past* high-risk behavior or exposures.

That receptive anal intercourse was not associated with HCV infection in our study sample is not surprising. Most published surveys suggest that HCV is inefficiently transmitted sexually, compared with HBV and HIV.<sup>6,14,15</sup> The lack of association between receptive anal intercourse and HBV is unclear. Self-reports of sexual activity may be unreliable; also, infection may have occurred prior to the period for which the behavior was assessed.<sup>6</sup>

Age was an important risk factor for HBV, reflecting the cumulative effect of risk behaviors. Female gender remained a risk factor for HCV. Subjectively, it

TABLE 2—Seroprevalence Rates and Univariate Odds Ratios (ORs) for Street Study Participants

	Hepatitis B				Hepatitis C			
	No. Positive/Total	%	OR	95% CI	No. Positive/Total	%	OR	95% CI
Age, y								
<25	12/51	24	1.0		15/51	29	1.0	
25–29	13/28	46	3.2*	1.2, 8.7	15/28	54	3.5*	1.3, 9.5
≥30	14/29	48	4.4**	1.6, 12.5	16/29	55	4.3**	1.5, 12.0
Gender								
Male	20/66	30	1.0		19/66	29	1.0	
Female	19/43	44	2.5*	1.1, 5.8	26/43	60	6.3***	2.5, 15.6
Ethnicity								
Anglo	9/33	27	1.0		14/33	42	1.0	
Afro-American	5/16	31	1.2	0.3, 4.4	7/16	44	1.0	0.3, 3.5
Hispanic	21/45	47	2.2	0.9, 6.0	22/45	49	1.2	0.5, 3.0
Other	4/15	27	1.0	0.3, 4.3	2/15	13	0.2	0.04, 1.1
Condom use								
Always	23/53	43	1.0		23/53	43	1.0	
Often	10/26	38	0.7	0.3, 2.0	11/26	42	0.9	0.3, 2.4
Sometimes/never	6/30	20	0.3*	0.1, 0.8	11/30	37	0.6	0.2, 1.5
Number of sexual partners per night								
0–1	14/45	31	1.0		13/45	29	1.0	
2–5	15/44	34	1.4	0.6, 3.6	19/44	43	2.5*	1.0, 6.1
>5	10/20	50	2.8	0.9, 8.5	13/20	65	6.4**	1.9, 21.6
Prostitution								
No	9/29	31	1.0		7/29	24	1.0	
Yes	30/80	38	1.6	0.6, 4.0	38/80	48	3.5*	1.3, 9.3
Intravenous drug use								
No	8/42	19	1.0		2/42	5	1.0	
Yes	31/67	46	4.5**	1.6, 10.4	43/67	64	45.4***	9.9, 208.5
Share needles								
No	6/19	32	1.0		12/19	63	1.0	
Yes	24/47	51	2.7	0.8, 8.5	31/47	66	1.4	0.4, 4.7
Receptive anal intercourse								
No	26/66	39	1.0		29/66	44	1.0	
Yes	13/38	34	0.7	0.3, 1.6	15/38	39	0.7	0.3, 1.6

\**P* < .05; \*\**P* < .005; \*\*\**P* < .001.

appeared that female IV drug users had more needle-sharing partners than did males.

The population we studied is characterized by alarming rates of behaviors associated with transmission of infectious diseases, as evidenced by the 58% seroprevalence of HBV, HCV, or both. The current low rate of HIV-1 infection in this group signals an opportunity for preventive intervention. Historically, prostitutes and IV drug users have been assumed to be nonresponsive to preventive efforts. In our study, however, most individuals were very responsive to information and appeared likely to attempt to protect themselves by using condoms and clean needles. The very high level of study participation (91%) of prostitutes who were approached in their work environment in-

TABLE 3—Adjusted Odds Ratios (ORs) for Street Study Participants

	Hepatitis B		Hepatitis C	
	OR	95% CI	OR	95% CI
Intravenous drug use				
No	1.0	...	1.0	...
Yes	2.9**	1.0, 8.2	45.9***	9.1, 230.5
Gender				
Male	...	...	1.0	...
Female	...	...	6.4***	1.9, 21.9
Age				
Per year	1.12*	1.03, 1.22	...	...
Condom use				
Always	1.0	...	...	...
Often	0.6	0.2, 1.9	...	...
Sometimes/never	0.3*	0.1, 0.9	...	...

\**P* < .05; \*\**P* < .01; \*\*\**P* < .001.

dicates that street-based outreach programs may be an effective method for reaching this population. □

### Acknowledgments

This study was supported in part by a grant from the Health of the Public Program of the Pew Charitable Trust and Rockefeller Foundation and a grant from the University of New Mexico School of Medicine Dean's Fund.

We would like to thank the following persons for their assistance and contributions to the success of this project: Sarah Allen, Steve Baca, Elizabeth Cordova, Patti Doherty, Nick Keller, Lori Lambert, Nili Lange, Anna Levy, Steve Lopez, Sandra McCollum, Bogdan Pathak, Amber Staley, Rick Steece, and the 109 street study participants. Laboratory studies were provided by the Laboratory Division of the New Mexico Department of Health. Condoms were donated for distribution by the Gay Men's Health Project.

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## Call for Abstracts for International Conference on Chronic Diseases and Changing Care Patterns

Organized by the Netherlands Society for Public Health and Science and the University of Amsterdam, an international conference on "Chronic Diseases and Changing Care Patterns in an Aging Society" will be held in Amsterdam, the Netherlands, June 9-11, 1993.

A broad range of multidisciplinary topics on both somatic and psychiatric chronic conditions will be addressed. In the plenary sessions, international experts will give their views on research and ongoing programs and their implications for care and policy. Keynote speakers include Dr. Trudi van den Bos, Dr. Jacob A. Brody, Dr. Alain Colvez, Dr. Robbert Huijsman, Dr. Louise J. Gunning-Schepers, Dr. Henk J. J. Leenen, Dr.

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For the parallel sessions, you are invited to submit abstracts on these issues: epidemiological, care, psychological and social, policy, economic, and ethical and legal.

Abstracts must be submitted before *October 31, 1992*. For further details and information on submission and format of abstracts, please write to: Dr. Trudi van den Bos or Wien Limburg, Institute of Social Medicine, University of Amsterdam, Meibergdreef 15, 1105 AZ Amsterdam, The Netherlands; fax 31 20.6912401.