

Medical Writers' Circle

July • 2003

a series of articles
written by medical
professionals about
the management
and treatment of
hepatitis C

José Azócar, MD
Medical Director
Northgate Medical,
Springfield, MA

This article was adapted from an earlier version by Jose Azocar, Judith Manola, Olga Goloubeva, and Christina Bromley.

Latinos and Hepatitis C

Hepatitis C virus (HCV) infection affects an estimated 1.8% of Americans (about 3.9-4 million people in the United States). Yet little is known about HCV prevalence and transmission rates in non-Caucasian populations.

To determine whether HCV seroprevalence rates are different in Latinos and Caucasians, my research group conducted a case-control study of Latinos living in a Western Massachusetts city. Our research included a prevalence study of HCV antibodies in blood samples from 500 randomly selected Latino patients receiving medical care at an **inner-city** health facility in Springfield, MA. We also conducted a case-control study of HCV transmission risk factors.

HCV Seroprevalence

Blood samples from clinic participants were tested for HCV antibodies using the enzyme immunoassay (EIA). An HCV RNA reverse transcriptase-polymerase chain reaction (RT-PCR) assay was done on positive samples to measure HCV viral load and a restriction fragment length polymorphism (RFLP) test was done to determine genotype; samples that were positive by EIA and negative by PCR were confirmed using a recombinant immunoblot assay (RIBA).

Among the 500 randomly

selected patients in the seroprevalence study, 40 tested positive for HCV. Thus, we estimate that the population prevalence rate in this **inner-city** Latino population is 8%—nearly four times greater than the rate previously reported for the population at large. HCV genotype was determined for 64 patients. Genotype 1 was most common in this group (75.2%; 62.7% 1a and 12.5% 1b); some patients had genotype 2 (1.5% 2a and 14% 2b), 3a (1.5%), or 4a (7.8%). The proportions of HCV genotypes in our study population were similar to those seen in other ethnic groups in the U.S.

Risk Factor Analysis

Known risk factors for hepatitis C include injection and inhaled drug use, needle sharing, tattooing and body piercing, sharing of sharp objects, a history of sexually transmitted diseases, unprotected sexual activity, and sexual activity with multiple partners. Although this list is lengthy, many people with HCV (40% or more by some estimates) lack any of these risk factors, suggesting that the list is likely incomplete.

To investigate this issue, we conducted a parallel case-control study of HCV risk factors that compared 105 HCV-infected Latino patients attending our hepatitis C clinic and 130 uninfected Latino controls receiving

routine health maintenance at an adjoining clinic. Participants were interviewed in English or Spanish by trained interviewers using a 40-item risk factor questionnaire divided into nine sections: demographic data, personal history, family history, incarceration history, risk factors for blood exposure, needlestick exposure, drug use history, tobacco and alcohol use, and sexual behavior. Education and counseling were provided after the questionnaire was completed.

All 235 participants in the study were of Puerto Rican ancestry. HCV positive and HCV negative (control) subjects were similar in age (a mean of 39.2 years vs 42.5 years). Most (80%) lived in Springfield, with the rest residing in neighboring communities such as Chicopee and Holyoke.

Among the 128 men and 107 women in the study, more men (70 individuals, or 54.69%) than women (35 individuals, or 32.71%) were HCV positive. There were approximately six times more Spanish-speaking than English-speaking individuals, with the HCV prevalence rate somewhat higher among the Spanish speakers. A large proportion (42%) were either divorced, separated, or widowed, while 30% were single and 27% were married. With respect to education, nearly 60% had either high school or some college education and about 40% had an 8th grade

Table 1.**Logistic regression analyses of personal and family history characteristics of patients in the risk factor study**

Risk factor	OR	95% CI	P value
Personal exposure			
Intravenous drugs	30.40	13.7 -67.3	<0.001**
Inhaled drugs	26.44	13.2 -53.1	<0.001**
History of drug use during sex	18.67	4.25 -81.9	<0.001**
Smoked drugs	18.13	9.39 -35.0	<0.001**
Sharing objects*	13.75	2.90 -65.2	0.001**
Tattoo done in jail	8.20	3.30 -20.4	<0.001**
Previous incarceration	7.79	4.24 -14.3	<0.001**
Needle accident	6.63	1.42 -31.0	0.016**
Tobacco smoking	5.19	2.96 -9.13	<0.001**
History of sexually transmitted diseases	4.5	91.97 -10.7	<0.001**
Tattoo	3.76	1.98 -7.10	<0.001**
Alcohol use	2.20	1.28 -3.79	0.004**
Body piercing	1.69	0.96 -2.97	0.068
Blood transfusion	1.89	0.77 -4.61	0.163
Surgical procedure**	0.65	0.39 -1.20	0.109
Family associated exposure			
Family member with HIV	0.63	0.34 -1.14	0.125
Family member with hepatitis A	0.66	0.18 -2.42	0.529
Family member with hepatitis B	0.48	0.12 -1.99	0.313
Family member with hepatitis C	0.29	0.14 -0.60	0.001***

OR = Odd ratios, 95% CI= 95% confidence intervals.

* Sharing objects: refers to sharing of cutting edge objects such as nail clippers, scissors and razors (among others).

** Surgical procedures: included procedures with the potential for the involvement of blood transfusion such as gunshot wounds, hysterectomy (among others).

*** Significant at P<0.05

education or less. About 70% of the group were unemployed, while about 24% were either employed or students (7% did not report employment status). Interestingly, those who were divorced/separated/widowed, had less education, or were unemployed were less likely to have HCV.

We conducted a logistic regression analysis to determine how several risk factors influenced the rates of HCV infection among the Latinos in our population (see Table 1).

All forms of drug use were associated with higher HCV

seroprevalence in our cohort. As expected, injection drug use was associated with a very high increase in relative risk (OR=30.40), but nasal inhalation (OR=26.44) and smoking of drugs (OR=18.1) were also correlated with higher rates of HCV infection. We also found that using drugs (injected, inhaled, or smoked) during sex was strongly associated with a higher risk of HCV infection (OR=18.67). Tobacco smoking (OR=5.19) and alcohol use (OR=2.20) were less strongly associated with higher HCV seroprevalence.

Almost half of our cohort (114 individuals, or 48%) had a history of incarceration, and more than half (148 individuals, or about 63%) had a history of incarceration within their families. A history of prior incarceration was associated with a large increase in HCV prevalence (OR=7.79). In particular, those who had received a tattoo in jail had a significantly higher risk of HCV (OR= 8.20). For tattooing in general, the risk was lower (OR=3.76) than for tattoos done in jail. For body piercing, the risk was lower still (OR=1.69). We also observed that

sharing of sharp objects such as nail clippers, razors, or scissors (OR=13.75) and prior needlestick accidents (OR=6.63) both increased the relative risk of HCV.

Along with drug use during sex, having more than one sexual partner during the past year and having a history of sexually transmitted diseases (OR=4.59) were both associated with an increased risk of HCV.

We looked at the timing of blood transfusions and surgical procedures likely to involve a blood transfusion—before or after the initiation of routine screening of donated blood—and found no significant difference in prevalence rates (OR=1.89 for transfusion; OR=0.65 for surgery). However, the number of subjects who had received a transfusion was small (22 individuals) and may not provide an adequate sample size to detect differences.

Interestingly, the presence of a family member with hepatitis C appeared to have a protective effect (OR=0.29) and was associated with a lower rate of HCV infection.

Conclusion

As noted previously, Miriam Alter and colleagues found an overall HCV prevalence among the general U.S. population of 1.8% based on the Center for Disease Controls and Prevention's NHANES III study, which included non-Hispanic whites, non-Hispanic blacks, and Mexican-Americans. In that study, neither sex nor race/ethnicity was independently associated with HCV infection. The strongest factors independently associated with HCV infection were illegal drug use and high-risk sexual behavior; other factors independently associated with HCV included poverty, having 12 or fewer years of education, and a history of divorce or separation.

Our results showed that in an inner-city Latino population the HCV seroprevalence rate—

8%—was strikingly higher than that previously described for the general population. This difference likely reflects different behavior patterns. Our study cohort was living in a densely populated area, was largely unemployed, had unstable marital status, and had high rates of incarceration within the family. However, our data suggest that low socioeconomic status, low education level, and marital dissolution were not independently associated with HCV infection. These data contrast with the findings of Alter and colleagues described above.

Studies of Latin American immigrants have shown that they tend to be younger, are more likely to receive tattoos and body piercings, and more often reside in multifamily dwellings. But these characteristics alone would not traditionally put the population at substantially higher risk for HCV infection, were they not accompanied by injection drug use.

We expected to find that injection drug use would put our study population at higher risk for HCV. However, we found that the use of drugs in other forms (inhaled and smoked) also strikingly increased the likelihood of HCV infection, as did high-risk sexual behavior and tattooing.

Tattooing as a risk factor for HCV infection has been controversial. Robert Haley and colleagues reported that individuals who had received a tattoo in a commercial tattoo parlor were nine times more likely to be infected with HCV than people who had not been tattooed, and a study of prisoners in Norway found that tattooing was significantly associated with HCV infection, independent of a history of injection drug use. Our data also showed that people who reported having a tattoo had higher rates of HCV infection. However, while the risk of HCV was greatly increased if the tattoos had been done in jail, the risk was not significantly higher if the tattoos had been done in other

settings. Similar data have been reported with respect to the association between tattooing and HIV in U.S. prisons.

While most prior studies of the epidemiology of HCV transmission have looked at cohorts of blood donors and recipients, our study of a community-based Latino population allowed us to examine the importance of risk factors other than blood transfusion. In the past ten years, intensive screening of donated blood has dramatically decreased transfusion-associated HCV transmission, and our data suggest that blood transfusion and surgical procedures were not significant risk factors for HCV infection in this population.

The high rate of HCV infection in our cohort suggests that there likely will be a large increase in HCV-related chronic liver disease in **inner-city** Latino populations within the next one or two decades. The presence of many potentially modifiable risk factors in this study suggests that a focus on preventive strategies targeted toward Latinos is extremely important. In our study, subjects who had family members with hepatitis C were less likely to be seropositive themselves, suggesting that awareness of the disease and education about its prevention can have a protective effect. In addition, education should be provided to the Latino population to encourage testing and early treatment of hepatitis C, which could help minimize long-term liver damage. Based on the characteristics of our population, such education should be targeted to individuals of all educational levels and should be provided in both Spanish and English. The prevalence in other Latino populations without a high rate of risk factors for HCV infection, mainly the use of drugs, is more likely to be close to the 1.8% found in the general US population. ■ ■ ■

Selected References

1. Alter MJ. Epidemiology of hepatitis C. *Hepatology*. 1997;26(3 Suppl 1):62S-65S.
2. Alter MJ, Mast EE. The epidemiology of viral hepatitis in the United States. *Gastroenterol Clin North Am*. 1994;2:437-455.
3. Choo QL, Kuo G, Weiner AJ, Overby LR, Bradley DW, Houghton M. Isolation of a cDNA clone derived from a blood-borne non-A, non-B viral hepatitis genome. *Science*. 1989;244:359-362.
4. Alter MJ, Margolis HS, Krawczynski K, Judson FN, Mares A, Alexander WI, et al. The natural history of community-acquired hepatitis C in the United States. The Sentinel Counties Chronic non-A, non-B Hepatitis Study Team. *N Engl J Med*. 1992;32:1899-1905.
5. Mansell CJ, Locarnini SA. Epidemiology of hepatitis C in the East. *Semin Liver Dis*. 1995;15:15-32.
6. Abdel-Wahab MF, Zakaria S, Kamel M, Abdel-Khalik MK, Mabrouk MA, Salama H, et al. High seroprevalence of hepatitis C infection among risk groups in Egypt. *Am J Trop Med Hyg*. 1994;51:563-567.
7. Chen TZ, Wu JC, Yen FS, Sheng WY, Hwang SJ, Huo TI, et al. Injection with nondisposable needles as an important route for transmission of acute community-acquired hepatitis C virus infection in Taiwan. *J Med Virol*. 1995;46:247-251.
8. Haley RW, Fischer RP. Commercial tattooing as a potentially important source of hepatitis C infection. Clinical epidemiology of 626 consecutive patients unaware of their hepatitis C serologic status. *Medicine (Baltimore)*. 2001;80:134-151.
9. Holsen DS, Harthug S, Myrmet H. Prevalence of antibodies to hepatitis C virus and association with intravenous drug abuse and tattooing in a national prison in Norway. *Eur J Clin Microbiol Infect Dis*. 1993;12:673-676.
10. Sun Dx, Zhang FG, Geng YQ, Xi DS. Hepatitis C transmission by cosmetic tattooing in women. *Lancet*. 1996;347:541.
11. Hayes MO, Harkness GA. Body piercing as a risk factor for viral hepatitis: an integrative research review. *Am J Infect Control*. 2001;29:271-274.
12. Braithwaite RL, Stephens T, Sterk C, Braithwaite K. Risks associated with tattooing and body piercing. *J Public Health Policy*. 1999;20:459-470.
13. Conry-Cantilena C, VanRaden M, Gibble J, Melpolder J, Shakil AO, Viladomiu L, et al. Routes of infection, viremia, and liver disease in blood donors found to have hepatitis C virus infection. *N Engl J Med*. 1996;334:1691-1696.
14. Weinstock HS, Bolan G, Reingold AL, Polish LB. Hepatitis C virus infection among patients attending a clinic for sexually transmitted diseases. *JAMA*. 1993;269:392-394.
15. Prevention CfDca. Recommendations for prevention and control of hepatitis C virus (HCV) infection and HCV-related chronic disease. *Morb Mortal Wkly Rep*. 1998;47:1-39.
16. Bureau UC. Justice Statistics. Bureau of Justice, *Statistic Bulletin* 2000;Sept.
17. Bureau UC. Current Population Survey. *Population Characteristics* 2000.
18. Doll DC. Tattooing in prison and HIV infection. *Lancet*. 1988;1:66-67.



Executive Director
Editor-in-Chief,
HCSP Publications
Alan Franciscus

Editor
Liz Highleyman

Webmaster
C.D. Mazoff, PhD

Design and Production
Paula Fener