



Published in final edited form as:

JLGBT Health Res. 2007 ; 3(4): 29–36. doi:10.1080/15574090802263421.

Male Circumcision and HIV Status Among Latino Immigrant MSM in New York City

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Abstract

This study investigated protective effects of circumcision in a sample of immigrant Latino men who have sex with men (MSM). A survey in Portuguese, Spanish, or English was administered with computer-assisted self-interview technology with audio enhancement (A-CASI) to 482 MSM from Brazil ($n = 146$), Colombia ($n = 169$), and the Dominican Republic ($n = 167$), living in the New York metropolitan area. Logistic regression revealed that after controlling for age, income, education, having had syphilis, having done sex work, and preferring the receptive role in anal intercourse, uncircumcised men were almost twice as likely to be HIV-positive as circumcised men. Follow-up analyses revealed, however, that the protective effects occurred only among the group of Colombian men.

Keywords

HIV; circumcision; MSM; Latino

Research conducted in areas of Africa with generalized HIV epidemics has provided strong evidence for a protective effect of male circumcision relative to heterosexual HIV infection and has raised the possibility of public health initiatives to promote male circumcision (Williams et al., 2006). Although the extent to which results would be similar in other contexts is not yet clear, the research has potential relevance for other populations in which the epidemic is concentrated (National Institute of Allergy and Infectious Diseases [NIAID], 2006). This study examines circumcision in a population with a high prevalence of HIV in the United States—Latino men who have sex with men (MSM).

A link between male circumcision and HIV protection was first supported by observational studies showing lower HIV prevalence in areas of Africa where circumcision was practiced. A meta-analysis of 27 studies found reduced risk of HIV among circumcised men, with even greater effects for men at high risk (Weiss, Quigley, & Hayes, 2000). Marked differences in the magnitude of the effect in different studies, however, suggested that other factors, such as prevalence of ulcerative sexually transmitted infections (STIs), may moderate the degree of risk reduction afforded by circumcision.

Three recent randomized control trials conducted in areas of Africa with generalized HIV epidemics have provided stronger evidence that men who are circumcised are less likely to become infected with HIV from their female partners (Auvert et al., 2005; Bailey et al., 2007; Gray et al., 2007). All three studies were terminated early due to the clarity of findings

indicating protective effects of circumcision (Auvert et al., 2005; Bailey et al., 2007; Gray et al., 2007). The first study, conducted in Orange Farm Township, South Africa, found a 60% protection from circumcision. Additional analyses that controlled for behavioral factors, such as sexual activity and condom use, resulted in a similar, but slightly higher, estimate (61%). Furthermore, in a study in Rakai, Uganda (Gray et al., 2007), HIV infection was reduced 51% in the circumcised group. Similar results were found in Kisumu, Kenya (Bailey et al., 2007): there was a 53% reduction in infection in the circumcised group. Although the protection afforded by circumcision is not complete, in the African context it is clear that the procedure has a potentially important impact on the epidemic (NIAID, 2006).

It is difficult to extrapolate from the data obtained with heterosexuals in Africa and to estimate the degree of HIV protection that might be achieved through circumcision of MSM living in the United States. There are many important factors that differ in these two regions, including several that can influence HIV transmission. For example, higher viral loads, the presence of ulcerative STIs, and nutritional deficiencies increase infectivity of HIV; moreover, ulcerative and nonulcerative STIs, and other genital infections, increase susceptibility to the virus (Chan, 2005). Protective effects of circumcision could be substantially diminished in the United States compared to Africa, due to widespread treatment of HIV and other STIs. In addition, lower prevalence of HIV in the partner pool in the United States could render detection of the protective effects from circumcision difficult (Sullivan et al., 2007).

Generalizing from the heterosexual to the homosexual context is also challenging, due to variation in the risk posed by different sexual practices. The data from Africa indicated that circumcision decreased the likelihood that a man would become infected from his HIV-positive female partner; thus, the findings refer to men in the insertive role in penile–vaginal intercourse. In extrapolating to MSM, the data are most relevant to men who are insertive partners in anal intercourse. Although the risk posed by insertive anal intercourse with an infected partner is far lower than that posed by receptive anal intercourse, this practice is believed to carry greater risk than insertive vaginal intercourse (Chan, 2005). Estimates based on U.S. and European data put the risk of insertive anal and insertive vaginal intercourse at 6.5 and 5.0 per 10,000 exposures (Smith et al., 2005). Indeed, rectal mucosa secretions have been shown to contain higher concentrations of HIV RNA than either blood or semen (Zuckerman et al., 2004), and may be much greater than concentrations in vaginal or cervical secretions (Sullivan et al., 2007).

Three studies have investigated circumcision and HIV infection among MSM in the United States. The first examined the effect of circumcision on HIV serostatus in a sample of 502 gay men in Seattle (Kreiss & Hopkins, 1993). Circumcised and uncircumcised men did not differ in their sexual behavior, but uncircumcised men were more likely to be older, non-White, and to have had syphilis, although they were less likely to have used injection drugs. A multivariate analysis included control variables of age, number of male partners, and frequency of unprotected receptive anal intercourse. Findings revealed a significant effect of circumcision, with uncircumcised men twice as likely to be seropositive as circumcised men.

The second study examined risk factors for seroconversion in a sample of 3,257 MSM from six cities in the United States, followed over 18 months as part of the HIV Network for Prevention Trials Vaccine Preparedness Study (Buchbinder et al., 2005). In a multivariate model, strong predictors of seroconversion included the behavioral factors of having a large number of male sex partners, using nitrite inhalants (poppers), and engaging in receptive anal intercourse with a partner of unknown or positive HIV serostatus. Circumcision was also a significant predictor, and uncircumcised men were twice as likely as circumcised men

to become infected with HIV. The results of this study indicate the importance of prevention strategies aimed at reducing risk behaviors, but also raise the issue of whether promotion of circumcision among high-risk MSM would be a beneficial prevention strategy.

A recent study, however, failed to find an association between circumcision and prevalence of HIV in a sample of black and Latino MSM in New York, Philadelphia, and Los Angeles (Millett et al., 2007). Control variables included demographic characteristics (e.g., age, education, income, being born outside the United States, sexual identity) and risk characteristics (e.g., recent unprotected anal intercourse, taking the insertive role, having had an STI). In the analysis of the Latino sample, foreign-born men were more likely to be both uncircumcised and HIV-positive, so this variable may have captured some of relationship between circumcision and serostatus.

The data for this study came from questions concerning circumcision added to a survey instrument in a study on contextual factors of sexual risk among Latino immigrant MSM. This sample represents a population at high risk for HIV for several reasons. First, the men are part of two groups at risk for HIV in the United States: MSM and Latinos (Centers for Disease Control, 2007). Second, they come from sending countries with high prevalence rates of HIV among MSM, estimated at 7% to 14% in Brazil (Cáceres, 2002), 16% to 20% in Colombia (Cáceres, 2002), and 11% in the Dominican Republic (Tabet et al., 1996). We tested the hypothesis that circumcision status would be associated with lower likelihood of positive serostatus, controlling for variables that have been previously associated with serostatus: age, income, education, history of sex work, history of syphilis, and preference for a receptive role in anal sex.

Materials and Methods

The sample of 482 participants included 146 Brazilian, 169 Colombian, and 167 Dominican immigrant MSM living in New York City, recruited through advertisements in Latino gay media, flyers, and word-of-mouth. Eligibility criteria included being an immigrant from Brazil, Colombia, or the Dominican Republic, residing in the New York City metropolitan area, being at least 18 years of age, having had sex in the last 6 months, and having had sex with men.

We used computer-assisted self-interview technology with audio enhancement (A-CASI) to administer a survey in Portuguese, Spanish, or English, depending on the preference of the participant. Informed consent was obtained, and participants received reimbursement of \$50 and a \$15 stipend to cover transportation costs. On average, completion of the survey took approximately 60 min. All procedures were approved by the University Institutional Review Board.

Although the main focus of the survey was on specific sexual encounters and the characteristics associated with those encounters, pertinent questions for this study concerned circumcision, HIV and other STIs, sexual history, and demographic information. All questions were translated from English into Spanish and Portuguese, and back-translated into English, either for this study or in our previous research. The survey was reviewed by experts from different Spanish-speaking countries to ensure universality of the Spanish used. Participants were asked their circumcision status, their HIV status, their STI history, and whether they ever exchanged sex with a man for drugs or money. Demographic questions covered age, age of immigration, education, and income.

The indicator of HIV status used in this study was obtained through self-report. Although A-CASI methodology has been associated with more candid responding than face-to-face interviews (Tourangeau, Rasinski, Jobe, Smith, & Pratt, 1997; Tourangeau & Smith, 1996),

self-reported serostatus can underestimate the true prevalence of HIV (e.g., Fisher, Reynolds, Jaffe, & Johnson, 2007). This underestimation is thought to be smaller in populations of gay men than of drug users, however, due to the high proportion of MSM who get tested regularly (Xia et al., 2006). A recent population-based survey of MSM in California estimated HIV prevalence at 4.7% among men who had self-reported as HIV-negative (Xia et al., 2006).

We also asked participants about their preferred sexual role in anal intercourse, with response options of 1 = *Active (Top)*; 2 = *Passive (Bottom)*; 3 = *Versatile*; 4 = *I don't use these labels*. We validated this measure by examining the relationship between stated role preference and behavior in the most recent sexual encounter. There were significant differences in the percentage who reported insertive or receptive anal intercourse for the four groups, $\chi^2(3, N = 473) = 78.4, p < .0001$ for receptive; $\chi^2(3, N = 473) = 68.4, p < .0001$ for insertive. Among those who indicated a preference for the bottom role, 71% were receptive during anal intercourse at the most recent encounter, in contrast to 12% of those who labeled themselves as tops, 56% of those who labeled themselves as versatile, and 42% of those who said that they did not use labels. In the following analyses, a dummy variable was used to indicate preference for the receptive role (coded as 1) versus all other options (coded as 0).

Results

Table 1 provides descriptive statistics for the three national origin groups and shows several ways in which they differed. There were no differences among national origin groups on the demographic variables presented in the following, and therefore, they are reported in aggregate. Participants were given several options concerning employment and were instructed to indicate all that applied: 48% marked full-time employment, 25% part-time employment, 20% odd jobs, and 11% unemployment. In addition, the following percentages of participants reported having had these STIs: syphilis, 15%; gonorrhea, 20%; chlamydia, 6%; herpes, 10%; and HPV, 9%. Although there were no significant differences among the national origin groups in the frequency of each of these conditions, there was a trend for Dominican participants to be more likely to report that they had not had any of the STIs, $\chi^2(2, N = 482) = 5.8, p = .055$.

About one-fourth of the participants in this study reported that they were circumcised. No differences ($p > .40$) were found in the proportions of circumcised men from the three countries of origin (Brazilians, 21%; Colombians, 27%; Dominicans, 26%). Point bi-serial correlations between circumcision status and the demographic variables of age ($r = .00$) and income ($r = -0.05$) were negligible. Circumcision was related to education, however, with greater likelihood of circumcision among men who had at least some college education, Phi coefficient = $-0.10, \chi^2(1, N = 482) = 5.1, p < .05$.

Logistic regression analysis was performed to test the hypothesis that uncircumcised men would have a greater likelihood of being HIV-positive, controlling for demographic and behavioral risk factors (see Table 2). Fifty-five participants who reported that they did not know their serostatus were excluded from this analysis. We included the demographic variables of age, income, and education as controls in the model. Education was treated as a dichotomous variable with the value of 1 reflecting completion of some college or beyond versus 0 reflecting lower levels of education. In addition, we included three dummy control variables concerning behaviors that have been associated with increased risk of HIV in the literature: a history of having done sex work (Bacon et al., 2006), a history of having had syphilis (Chan, 2005), and self-categorization as receptive in anal intercourse (Smith et al., 2005).

Results showed a significant effect of circumcision: the adjusted odds ratio of 1.90 (95% CI: 1.01 to 3.59) indicated that after accounting for other variables in the model, uncircumcised men were almost twice as likely to be HIV-positive as circumcised men. Positive serostatus was also associated with older age, lower income, and having had syphilis. There was a trend toward greater likelihood of being HIV-positive among those who reported that they took the receptive role in anal intercourse ($p < .06$). Sex work was not significantly associated with serostatus, presumably due to the covariation among sex work, history of syphilis, and HIV status.

Circumcision status would be expected to be relevant to the risk for the insertive partner, but not the receptive partner in anal intercourse; therefore, we examined descriptive statistics comparing men who indicated that they typically or always took the insertive role (i.e., labeled themselves as *active* or a *top*) versus all other participants. Among the men who were insertive, 2 of 30 circumcised men (7%) and 14 of 62 uncircumcised men (22%) were HIV-positive. In contrast, among the men who did not label themselves as *active*, 26 out of 81 circumcised men (32%) and 87 out of 254 uncircumcised men (34%) were HIV-positive. Despite the small numbers, this descriptive analysis was consistent with the predicted pattern: circumcision appeared to be protective for insertive partners.

Because Brazilian, Colombian, and Dominican men in our sample did not differ in either circumcision or HIV status, we did not include country of origin as a control variable in the original logistic regression. We performed additional Chi square analyses on the subgroups, however, and found that the association between circumcision status and HIV-serostatus was significant for the Colombian group, $\chi^2(1, N = 148) = 6.94, p < .01$, but not for the Brazilian or the Dominican groups ($p > .50$). Despite the small sample sizes, we then ran separate logistic regressions to obtain estimates of the odds ratios for the effect of circumcision on serostatus controlling for demographic and behavioral risk factors. The adjusted odds ratio for the Colombians was 4.06 (95% CI: 1.40 to 11.75), in contrast to 1.27 for the Brazilians (95% CI: 0.35 to 4.65) and 0.84 for the Dominicans (95% CI: 0.25 to 2.89).

We performed follow-up analyses to explore possible sources of the discrepancies in the findings for the three national groups. We examined associations among demographic variables, STI and sex work history, sexual roles (e.g., insertive, receptive), circumcision status, and HIV status. Results did not provide an explanation for the fact that there was a protective effect of circumcision in the Colombian sample, but not the Brazilian or Dominican samples.

Discussion

The findings with the full sample in this study are consistent with previous research indicating a protective effect of circumcision against HIV infection among MSM in the United States (Buchbinder et al., 2005; Kreiss & Hopkins, 1993). In the model including all participants who knew their serostatus, the level of protection appeared to be similar to that reported in the previous research (Buchbinder et al., 2005; Kreiss & Hopkins, 1993), with uncircumcised MSM nearly twice as likely to be seropositive than circumcised MSM.

A major difference in the examination of the effect of circumcision on HIV transmission among heterosexual and homosexual populations stems from the fact that heterosexual men are invariably in the insertive role, whereas MSM can be either insertive or receptive. In generalizing results from heterosexuals, one would expect circumcision status to be protective for those who take the insertive role, but not necessarily for those who take the receptive role, which is consistent with the findings of this study. It should be noted,

however, that the receptive role in penile-anal intercourse carries much greater risk of infection than the insertive role (Smith et al., 2005) and that most MSM contract HIV as the anal-receptive partner (Sullivan et al., 2007). Thus, although circumcision may provide some protection for MSM, it would not be expected to have as great an impact as it does in heterosexual populations.

Findings from this study on the three national origin groups raised questions about other factors that could affect the impact of circumcision on HIV prevention. Although there was evidence of a strong association between being uncircumcised and being HIV-positive among Colombian participants, no such association was found in the other two groups. It has been suggested that the detection of protective effects of circumcision would be difficult in populations without a generalized epidemic, due to a lower probability of encountering seropositive partners (Sullivan et al, 2007). Thus, one possible explanation of the discrepancy among national origin groups is the higher HIV prevalence among MSM in Colombia than in Brazil or the Dominican Republic (Cáceres, 2002; Tabet et al., 1996). In addition, a greater proportion of the Colombian subgroup in this study were HIV-positive, which would result in higher power of the statistical test and, to the extent that individuals socialize and have sex with others from their own country, higher prevalence in the partner pool.

Confounding factors could also be responsible for the apparent presence or absence of the association between circumcision and serostatus in the three groups. This observational study used previously existing groups, as opposed to random assignment to condition, and therefore other factors may covary with country of origin, circumcision status, and HIV status. Potential confounds could include such factors as reasons for circumcision (e.g., medical, religious), class or education, and sexual risk pattern differences.

For example, widespread prevention efforts in Brazil could result in more consistent condom use, even among those who have emigrated. Indeed, Brazilian participants in this study reported less unprotected anal intercourse in the previous 3 months than Colombian and Dominican participants. Although this self-reported behavior referred only to a recent period, consistent condom use over time would lessen the relevance of the protective impact of circumcision. Future research could involve randomized control trials with MSM to assess, more rigorously, the impact of circumcision in a population with a concentrated HIV epidemic.

Additional confounding could occur if MSM from the different countries vary in their sexual role versatility. Despite preferences for specific roles, it is common that MSM are not exclusively insertive or receptive. Consequently, a circumcised man who typically takes the insertive role may become infected on an occasion when he takes the receptive role in unprotected anal intercourse, thus masking any protection that he has previously received in his insertive encounters. Future research could include a substantial sample of men who are exclusively insertive.

A limitation of this study stemmed from the use of self-reported HIV status, as opposed to serological or mucosal testing. The immigrants in this sample may have been motivated to report that they were HIV-negative, due to fears about potential repercussions relative to their ability to stay in the United States or to attain citizenship. It is also possible that men who reported negative status based on the result of a previous test had since seroconverted, but were unaware of that fact. Differences in the degree to which positive serostatus was underreported by Brazilian, Colombian, and Dominican men could be responsible for differences in the results with the three national groups.

In conclusion, although we found evidence that circumcision provides some protection against HIV, we believe that examination of the impact of circumcision as a protective factor for HIV transmission among MSM should not be isolated from characteristics of the specific population, including HIV prevalence in the partner pool, behavioral risk patterns, and sexual role-taking. Caution is merited in generalizing from the heterosexual epidemic in Africa to the concentrated epidemic among Latino MSM living in the United States. The discrepancies found among subgroups of Latino MSM further indicate that an understanding of the specific conditions experienced by the population in question is imperative before public policies concerning circumcision are enacted.

Furthermore, it should be emphasized that, regardless of circumcision status, MSM who consistently use condoms during anal intercourse are less vulnerable to contracting HIV than circumcised men who do not use condoms. Moreover, condom use provides protection not only for the insertive partner, as is the case with circumcision, but also for the receptive partner, for whom the risk of transmission is substantially greater. It is crucial that any efforts to promote circumcision be accompanied by clear messages concerning the importance of condom use and countering perceptions of circumcision as an alternative to condom use.

Acknowledgments

The preparation of this article was supported by a grant from the National Institutes of Health: NICHD- R01 HD 046258, Maria Cecilia Zea, Principal Investigator, Paul J. Poppen and Carol A. Reisen, Co-Investigators.

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Table 1

Characteristics for Brazilian, Colombian, and Dominican Samples

Characteristic	Brazilian (N = 146)	Colombian (N = 169)	Dominican (N = 167)
Age (mean in years) ****	37.5	38.2	33.6
Age of immigration (mean in years) ****	23.3	25.4	15.9
Education **			
Less than a high school diploma	8.2%	17.8%	16.8%
Completed high school or trade school	24.0%	15.4%	14.4%
Some college	25.3%	21.3%	34.7%
Completed college	32.2%	27.2%	21.0%
Graduate education	10.3%	18.3%	13.2%
Monthly income **			
Less than \$400	14.4%	17.8%	22.2%
\$401–\$800	19.2%	26.0%	26.4%
\$801–\$1600	23.3%	29.6%	25.8%
\$1601–\$2400	17.8%	17.2%	10.8%
\$2401 or more	25.3%	9.5%	15.0%
Sexual orientation labels (Participants could indicate more than one)			
Gay *	86.3%	87.6%	77.8%
Bisexual **	11.0%	14.8%	26.4%
MSM	12.3%	10.1%	14.4%
Circumcised	20.6%	26.6%	25.8%
HIV-status			
Positive	22.6%	32.0%	25.2%
Negative	65.1%	55.6%	65.3%
Don't know	12.3%	12.4%	9.6%
Unprotected anal intercourse previous 3 months	36.3%	46.2%	52.1%

* $p < .05$.** $p < .01$.*** $p < .001$.**** $p < .0001$.

Table 2Logistic Regression Predicting HIV-Positive Serostatus ($N = 427$)

Model	Parameter	Odds Ratio	Wald Chi-Square
Intercept	-4.14		34.29****
Age	0.08	1.09	33.28****
Income	-0.43	0.65	14.76****
Education	-0.19	0.83	0.46
History of sex work	0.56	1.75	2.68
History of syphilis	2.14	8.52	36.76****
Receptive role	0.64	1.89	3.62 ⁺
Uncircumcised	0.64	1.90	3.92*

⁺ $p < .06$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

**** $p < .0001$.