

Risk of HIV infection attributable to oral sex among men who have sex with men and in the population of men who have sex with men

[RESEARCH LETTERS]

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We examined HIV infection and estimated the population-attributable risk percentage (PAR%) for HIV associated with fellatio among men who have sex with men (MSM). Among 239 MSM who practised exclusively fellatio in the past 6 months, 50% had three partners, 98% unprotected; and 28% had an HIV-positive partner; no HIV was detected. PAR%, based on the number of fellatio partners, ranges from 0.10% for one partner to 0.31% for three partners. The risk of HIV attributable to fellatio is extremely low.

Since HIV was identified as being sexually transmitted, there has been considerable interest in the risk associated with performing fellatio. Although early studies found no independent risk for fellatio, the high correlation among multiple sexual practices raised the possibility that risk existed but could not be detected. Subsequently, case reports accumulated, largely among men who denied other risk behaviors [1]. Researchers acknowledged that fellatio, although not an efficient route of infection, nonetheless appeared to carry a small risk. Two studies provided quantitative estimates of the low risk among men who have sex with men (MSM) [2,3]. One [3] estimated the per-contact risk of unprotected fellatio with an HIV-positive or unknown HIV status partner [4/10 000; 95% confidence interval (CI) 0.01%, 0.17%] to be lower than the per-contact risk of acquiring HIV from protected receptive anal intercourse (RAI) (0.18%; 95% CI 0.10%, 0.28%).

Current 'safe sex' guidelines specify that unprotected orogenital sex is unsafe but low risk. A recent study of primary infection in San Francisco [4] reported that 8% of HIV-positive participants acquired HIV from fellatio. This finding has been widely interpreted that as many as 8% of HIV infections among MSM are attributable to fellatio [5]. It is understandable, given these

conflicting messages, that individuals continue to ask for greater clarity regarding this risk. The population-attributable risk percentage (PAR%) is of special interest, because even a low-risk exposure could result in a substantial proportion of infections.

We present preliminary results from an ongoing study investigating orally acquired HIV infection demonstrating: (i) that such infection is rare; and (ii) conduct analyses using previously published data to show that the PAR% of HIV attributable to fellatio is also extremely low.

From December 1999 to 2001, individuals seeking HIV testing at an anonymous testing site in San Francisco were screened to identify those who in the past 6 months reported no anal or vaginal sex, had not injected drugs, and had performed fellatio on at least one male partner. Eligible participants completed a pre-HIV test survey, measuring a 6-month history of sexual practices. Post-interview HIV serology was conducted to determine participants' HIV serology using enzyme immunoassays, Western blot confirmation, and a sensitive/less sensitive enzyme immunoassay strategy [6] to identify recently acquired infection. PAR% was estimated using Levin's formula: $(p S(RR - 1))/(p(RR - 1) - 1) * 100$, where p is the population exposure prevalence, and RR is relative risk [7]. An estimate of RR from previously published data was used [2], and the prevalence p of fellatio partners was obtained from data collected in a population-based study of MSM [8]. We estimated the prevalence p from data collected in baseline interviews in which participants were asked how many fellatio (receptive oral sex) partners they had had in the previous year. Analyses have shown that the prevalence of fellatio [9] and fellatio partners (unpublished data) has not changed significantly since that study was initiated. As the median number of reported fellatio partners in the previous year reported by participants in this study was three (range 0-400), we estimated the PAR% for one, two, and three fellatio partners.

Of 10 283 anonymous testing site clients, 413 (4%) were eligible, and 243 (2.3%) participated. Of those, 239 (98%) were men, whose median age was 39 years, and all were MSM. Four women were dropped from the analysis. No recently acquired HIV infections were detected and the estimated probability of orally acquired HIV was 0 (95% CI 0, 1.5%). The median number of fellatio partners in the past 6 months was three (interquartile range 1-6), almost all (98%) were unprotected. One third (35%) reported getting semen in their mouth, and of those, 70% swallowed it. Fellatio on a known HIV-positive partner was reported by 28%; of those, 81% did not use a condom, and 39% had swallowed ejaculate.

The PAR% rises as the number of partners increases: PAR% for one fellatio partner ($p = 18\%$, $RR = 1.01$) was estimated at 0.18%, for two fellatio partners ($p = 12\%$, $RR = 1.02$) at 0.25% and for three fellatio partners ($p = 10\%$, $RR = 1.03$) as 0.31%. The cumulative PAR% for one to three fellatio partners could thus be 0.74%.

The absence of HIV infections detected in this sample confirms previous research that orally acquired HIV infection is rare. HIV prevalence and incidence among MSM who tested at the same anonymous testing sites in San Francisco during a similar time period (December 1999 to February 2001) were appreciably higher. The overall prevalence of HIV infection was 3.3% (95% CI 2.9-3.9), and among repeat testers the incidence was 1.9/100 person-years (95% CI 1.6-2.3). Among those who reported unprotected RAI, HIV prevalence and incidence were 5.1% (95% CI, 4.1-6.3) and 3.5/100 person-years (95% CI, 2.7-4.5), respectively. Among those who reported protected RAI, HIV prevalence and incidence was 2.3% (95% CI, 1.7-3.1) and 1.7/100 person-years (95%CI 1.2-2.3), respectively (T. Kellogg, San Francisco Department of Public Health, personal communication). These figures reveal the striking difference in the risk of HIV between those who report exclusively fellatio and those who report higher-risk sexual behaviors.

A strength of this study is that participants were queried about behaviors before HIV testing. Consistently, studies that rely on individuals identifying 'how they got infected', report a higher proportion of orally acquired infections than can be reliably established [4,5]. HIV-positive MSM may inaccurately report higher-risk exposures for reasons including social desirability and recall. Men may also report having only oral sex as a risk behavior because that is the only 'unprotected' sexual behavior they engage in, not acknowledging anal sex when a condom was used. Vittinghoff *et al.* [3] hypothesized that condom breakage or slippage could account for the higher per-act infectivity of protected anal sex compared with unprotected fellatio.

Our results are based on a modest sample size; therefore, we cannot rule out the possibility that the probability of infection is indeed greater than zero. Our data and those of others (D. Osmond, San Francisco Young Men's Health Study: $\leq 3\%$, unpublished data) show that the proportion of individuals who engage exclusively in fellatio is very low, thus obtaining precise and reliable estimates of the per-partner and per-contact risks of acquiring HIV from fellatio will be difficult. The likely importance of heterogeneity of susceptibility and infectiousness add further uncertainty to quantifying risk.

Our calculations showing very low PAR% are consistent with the findings of extremely low individual risk. In addition, if one considers that only a fraction of those who report fellatio are actually exposed to semen (35%), the PAR% will be considerably lower.

These data confirm that the risk of HIV infection attributable to fellatio among MSM and in the MSM population is especially low. It is important that health professionals, including HIV counsellors have valid information to impart to their sexually active clients. If individuals believe that the risk of HIV from fellatio is high or on a par with well-documented high-risk exposures such as anogenital sex, they may not feel that sexual behavior choices make a difference. Acquiring HIV through fellatio is significantly less risky than from anal sex, and therefore one's choice of sexual practices do matter.

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