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Awareness of Kaposi's Sarcoma-associated Herpesvirus among Men who Have Sex with Men

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Abstract

Background—Despite burgeoning scientific knowledge about Kaposi's sarcoma-associated herpesvirus (KSHV), the etiologic agent of Kaposi's sarcoma (KS), little is known about awareness of this virus in the general community. This is particularly the case for men who have sex with men (MSM), the group at greatest risk for infection.

Methods—The California Health Interview Survey was a random digit-dial survey of over 50,000 households. Men age 18–64 years who self-identified as gay or bisexual were subsequently re-contacted for a follow-up study of HIV-related knowledge and behavior in which they were asked if they had heard of KS and to describe the cause of KS.

Results—Of 398 MSM interviewed, 73.0% (95% CI: 65.0% to 79.7%) had heard of KS. However, only 6.4% (95% CI: 4.4% to 9.2%) of participants correctly identified that KS is caused by KSHV or a virus other than HIV. Postgraduate education, urban residence, and concurrent HIV infection were all independently associated with greater awareness of the viral origin of KS.

Conclusion—Awareness of KSHV is very low overall among MSM and only somewhat higher, but still unacceptably low, among HIV-infected MSM. Significant efforts are needed to increase awareness of KSHV as a sexually transmitted infection in this subpopulation

Keywords

men who have sex with men; homosexuality; male; Kaposi sarcoma; herpesvirus 8; human; herpesvirus; Kaposi's sarcoma-associated; sampling studies

Kaposi's sarcoma (KS) was the initial malignancy described [1] and remains the most common malignancy worldwide associated with HIV disease [2,3]. Among HIV-infected individuals, the disproportionate incidence of KS among men who have sex with men (MSM) relative to other risk groups led to the hypothesis that a sexually transmitted infection, besides HIV, was causally responsible for KS [4]. This speculation was later proven when Kaposi's sarcoma-associated herpesvirus (KSHV), also known as human herpesvirus 8 (HHV-8), was discovered [5] and etiologically linked to KS [6–8]. Amidst the large and growing body of scientific knowledge about KSHV is that in the U.S. and Northern Europe KSHV is sexually transmitted and predominantly found in MSM [8,9]. Specifically, KSHV seroprevalence is 30–60% in HIV-infected MSM, 20–30% in HIV-uninfected MSM, and less than 10% in other populations [8–13].

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Despite the high prevalence of KSHV infection among MSM and the threat it poses for development of KS, little is known about the awareness of KSHV in this group. Gauging the level of awareness of KSHV is important, for example, in crafting prevention messages to MSM as to how they might avoid infection with this virus. To address our limited knowledge in this area, we determined the magnitude and determinants of awareness of KSHV in a population-based sample of MSM.

Our population-based sample was drawn from the California Health Interview Survey (CHIS), a random digit-dial survey that interviews more than 50,000 adults every other year [14]. The CHIS Men who Have Sex with Men (MSM) Follow-up Study was conducted in 2002 to investigate HIV-related knowledge and behavior among MSM [15]. Of the 875 men aged 18–64 who self-identified as gay (593) or bisexual (282) in the CHIS, 741 (84.7%) agreed to be re-contacted for the Follow-up Study. No statistical differences were found between the men who agreed to participate and those who did not. Among the 741 participants who gave consent for re-contact, 193 (26.0%) could not be reached and 114 (15.4%) were excluded because they had not had sex with a man in the past 10 years. Of the remaining 434 (58.6%), 398 (91.7%) completed the follow-up interview.

All interviews were conducted in English or Spanish. Age, race/ethnicity, education, annual income, HIV infection status and area of residence were collected for all participants. In regards to this particular report, all participants were asked if they had heard of “Kaposi’s sarcoma or KS.” If a participant answered “yes”, then he was asked to name the cause of KS. If he responded “a virus”, then he was asked to identify the specific name of the virus.

In terms of statistical analysis, sampling weights designed for CHIS accounted for probability of selection, non-response, and undercoverage [16]. All analyses were conducted using the SVY procedures in Stata (College Station, TX), which adjust point estimates and standard errors to accommodate for the complex study design and sampling weights. Because of the sampling weights, final survey estimates, such as proportions, may differ from raw estimates. Correlates of the awareness of KSHV were evaluated using logistic regression. Factors associated (at $p < 0.05$ level) with awareness of KSHV were subsequently evaluated in a multivariable logistic regression model.

Of the 398 MSM in the survey, the majority (63.3%) were between 30 and 49 years old and were of white race/ethnicity (67.4%). Approximately half (52.7%) of the men did not have a college degree, while 31.3% reported having a college degree and 16.0 % reported having a postgraduate degree. Slightly under half (44.6%) of the men had an annual income > $60,000, while 39.5% had an income between $20,000 and $60,000/year, and 15.9% had an income < $20,000/year. The majority of participants resided in an urban area (65.3%); 23.3% lived in a suburban area, and 11.3% lived in a rural area. Sixteen percent reported being HIV-infected.

We found that, of the 398 survey participants, 73.0% responded that they had heard of KS (Table 1). Regarding knowledge of the cause of KS, the most common response was that it was caused by HIV (35.2%) (Table 1). Only 17 participants (2.5%) named KSHV or human herpesvirus 8 as the cause of KS, while 3 (0.5%) stated a “herpesvirus”, and 19 others (3.4%) stated a virus other than HIV but were not able to provide a name. When collectively considering mention of KSHV, HHV-8, a “herpesvirus”, or any virus other than HIV, 6.4% of participants (95% CI 4.4% to 9.2%) were deemed to have provided a correct response regarding awareness of a viral etiologic agent of KS.

In evaluating the determinants of a correct response regarding awareness of KSHV (among all 398 participants), multivariable logistic regression analysis identified three independent factors: HIV infection, urban residence, and holding a postgraduate degree (Table 2). Among these, persons holding a postgraduate degree had the highest absolute level of KSHV awareness

(20.8%), which translated to a 10.6-fold greater odds (95% CI 3.3 to 34.2) than those without a college degree. There was no strong evidence that age, number of sexual partners, interaction with the STD-oriented health care system, income, or race/ethnicity were independently associated with awareness of KSHV.

Following the discovery of KSHV in 1994, it has been stated that there are “few instances in cancer research where our understanding of the pathogenesis of a human cancer has progressed as rapidly as it has for Kaposi’s sarcoma [17].” A portion of this progress has been in the epidemiologic characterization of KSHV infection where, in the U.S. and Northern Europe, MSM have by far the highest seroprevalence [8,9]. In view of this tremendous scientific progress, we wondered how much knowledge had been translated to MSM, the sub-population most affected by the virus. In a population-based sample of MSM living in California, we found a moderate level of awareness of KS, but a very low level of awareness of KSHV. Awareness of KSHV was higher among HIV-infected MSM, the group at most risk for development of KS, but even among this sub-group awareness is still low in absolute terms.

There are several possible reasons why awareness of KSHV is so low. First, KSHV was discovered in 1994 and causally related to KS shortly thereafter, temporally coincident with the advent of combination antiretroviral therapy for HIV. The ensuing optimism associated with antiretroviral treatment and the subsequent decline in AIDS-related opportunistic infections/malignancies, such as KS, has resulted in decreased public attention to all AIDS-related complications. (Yet, KS continues to occur in HIV-infected individuals despite seemingly effective antiretroviral therapy [18].) Second, the considerable uncertainty regarding the specific route of KSHV transmission among MSM [19] has likely weakened attempts at prevention and education about the virus. For example, guidelines state that the routes of KSHV transmission appear to be “oral, (via) semen, and through blood via needle sharing” and that patients should be counseled that “kissing and sexual intercourse with persons who have high risk for being infected with HHV-8 (e.g., persons who have KS or who are HIV-infected) might lead to acquisition of the agent that causes KS [20].” This guideline may be so broad that it discourages attempts at community education and prevention.

Our finding of low KSHV awareness among MSM is consistent with other data on how often MSM volitionally exchange saliva among each other. Saliva is the body fluid that harbors KSHV most often [21]. If MSM were highly aware of KSHV and in which body fluids it resides, we might expect to see a low prevalence of explicit and avoidable saliva-exchanging behavior. Yet, among MSM in a population-based cohort, 47% used saliva as a lubricant in the act of fingering/fisting in the prior 6 months [22]; in a different study of sexual practices among MSM, 39% reported use of saliva as a lubricant for anal sex sometime in their lifetime [23].

A potential, but still theoretical, benefit of increasing the level of awareness of KSHV among MSM is that it might reduce KSHV transmission. That KSHV is not ubiquitous among MSM suggests one of three potential explanations: a) there is some type of natural genetic-based immunity that protects about half of the population; b) KSHV infection is truly ubiquitous but serologic detection is insensitive (i.e., there is a large segment of serosilent infection); or c) there are some discrete behavioral determinants (e.g., certain saliva-exchanging sexual practices such as those which involve saliva coming in contact with the rectum) as to why some MSM are KSHV-infected and others not. Because we are not aware of any data supporting the first two explanations (or any analogy among the other human herpesviruses), we hypothesize that behavioral determinants are the main explanation. Accordingly, if certain saliva-exchanging practices are operative in spreading KSHV among MSM and if greater awareness of KSHV led to a reduction in these practices, it is conceivable that KSHV transmission could be reduced. We acknowledge, however, that even if certain saliva-exchanging acts can be

identified that transmit KSHV, it may not be possible, depending upon the specific act, to reduce practice of the act in the community.

Awareness of KSHV among MSM appears to be lower than awareness of other oncogenic viruses of similar clinical importance. For example, in one report, 44.8% of MSM had heard of human papillomavirus (HPV) [24], compared to the less than 10% awareness of KSHV in our study. This finding, coupled with sub-optimal hepatitis B vaccination coverage, demonstrate need for a broader public health message educating MSM about all oncogenic viruses that affect them.

The major strength of our work is the generalizability afforded by our population-based sample with a broad representation of racial, socioeconomic, and residential status. A potential limitation of the study is that a fraction of potential participants either did not agree to be re-contacted for this survey or could not be contacted despite their prior willingness. Whether these non-participators would have had more or less awareness of KSHV than the study sample is not known. That the sample was limited to Californians is also a potential limitation, but there is little reason to believe that the level of KSHV awareness we observed underestimates nationwide trends. Finally, another potential limitation is that we used self-identification as gay or bisexual as an inclusion criterion; thus, we might be missing other men who truly have sex with men but do not consider themselves to be either gay or bisexual. Again, it is not known whether those who do not self-identify as gay/bisexual would have had more or less awareness of KSHV than the study sample.

In conclusion, MSM have inadequate awareness about KSHV. MSM who are HIV-infected, more educated, and urban-dwelling are more aware, but for each of these groups awareness is still unacceptably low in absolute terms. The scientific agenda for KSHV must now expand to include determining how KSHV is spread among MSM and educating these men about KSHV, their notable risk for KSHV infection, and how -- if possible -- to avoid it.

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Table 1

Awareness of KS and KSHV in a probability sample of MSM in California.

Question	Number of Men Responding (N = 398)	Percentage of Men Responding (95% CI)
Awareness of KS		
Have not heard of KS	70	27.0 (20.3 to 35.0)
Heard of KS	328	73.0 (65.0 to 79.7)
Knowledge of the cause of KS		
HIV or HIV/AIDS	166	35.2 (29.0 to 41.9)
Don't know	118	30.4 (23.8 to 37.8)
Sexual contact	3	0.6 (0.2 to 2.0)
Poppers	1	0.1 (0.02 to 1.0)
"Hepatitis retrovirus"	1	0.3 (0.04 to 2.1)
A virus other than HIV*	19	3.4 (2.0 to 5.7)
KSHV or HHV-8*	17	2.5 (1.4 to 4.4)
"A herpes virus"*	3	0.5 (0.1 to 1.8)

* Any of these responses: 6.4% (4.4 to 9.2)

Table 2

Factors associated with awareness of KSHV as the causal agent of KS in a probability sample of MSM in California.

Factor	Percentage of men correctly identifying viral origin of KS*	Odds Ratio (95% CI) Unadjusted	Odds Ratio (95% CI) Adjusted†
HIV infection status			
Uninfected/don't know	5.0	1.0	1.0
Infected	13.8	3.1 (1.3 to 7.4)	3.6 (1.3 to 9.9)
Age, in years			
< 30	2.7	1.0	1.0
30 to 49	6.7	2.6 (0.7 to 9.8)	0.8 (0.2 to 3.7)
≥ 50	12.0	4.8 (1.2 to 20.3)	1.6 (0.3 to 9.9)
Place of residence			
Rural	1.7	1.0	1.0
Urban	8.4	5.5 (1.1 to 27.0)	6.4 (1.1 to 36.5)
Suburban	3.2	2.0 (0.3 to 12.4)	2.9 (0.4 to 19.2)
Education			
< College graduate	2.6	1.0	1.0
College graduate	5.6	2.2 (0.8 to 6.4)	2.3 (0.8 to 6.9)
Postgraduate degree	20.8	9.9 (3.5 to 28.2)	10.6 (3.3 to 34.2)
Interaction with STD care system#			
No	5.0	1.0	-
Yes	7.0	1.4 (0.6 to 3.4)	-
Sexual partners in past 12 months			
0	4.2	1.0	-
1 to 4	6.5	1.6 (0.3 to 7.8)	-
≥ 5	7.1	1.7 (0.3 to 8.9)	-
Income, in dollars			
< 20,000	5.5	1.0	-
20,000 to 60,000	2.9	0.5 (0.1 to 2.3)	-
≥ 60,000	9.7	1.9 (0.5 to 6.9)	-
Race/ethnicity			
Non-white	3.2	1.0	-
White	8.0	2.7 (0.9 to 8.4)	-

*Correct responses include mention of KSHV, HHV-8, a herpesvirus, or a virus other than HIV.

†As obtained from a multivariable logistic regression model. All factors in column are included in model.

#Defined as being tested for a sexually transmitted disease (STD) in the past year