

Factors Associated With Recent Sildenafil (Viagra) Use Among Men Who Have Sex With Men in the United States

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Background: Previous studies reported associations between sildenafil (Viagra; Pfizer, New York, NY) use and risk behaviors among men who have sex with men (MSM) in limited geographic areas or special populations. The purpose of the present study was to examine Viagra use among a broader MSM population.

Methods: The 2002 HIV Testing Survey data from MSM recruited at bars in 10 US states was used to examine Viagra use in the 12 months preceding the interview. Independent correlates of Viagra use were identified using logistic regression.

Results: Eleven percent (131/1177) of MSM reported recent Viagra use. Users were older (adjusted odds ratios [aOR] = 2.4 to 6.2, 95% CI: 1.2 to 13.6); were more likely to be infected with HIV (aOR = 2.0, CI: 1.0 to 3.9); reported more male sex partners (aOR = 2.4 to 2.7, CI: 1.2 to 5.4); were twice as likely to have unprotected anal intercourse with a nonprimary male partner (aOR = 2.1, CI: 1.2 to 3.5); and were 3 times more likely to report illicit drug usage (aOR = 3.1, CI: 1.9 to 5.2). Fifty-three percent (70/131) of Viagra users simultaneously took illicit drugs.

Conclusions: Among MSM from numerous US cities, Viagra use is common and is associated with several high-risk behaviors. These findings are consistent with previous reports and emphasize the need for additional prevention counseling for MSM that incorporates messages targeting Viagra usage and risk behavior.

Key Words: Viagra, sildenafil, men who have sex with men, gay, HIV

(*J Acquir Immune Defic Syndr* 2006;42:95–100)

In 1998 the Food and Drug Administration approved a new drug for erectile dysfunction, sildenafil (Viagra; Pfizer, New York, NY). As of December 2002, Viagra was prescribed to approximately 12 million US men.¹ In addition to the prescribed use of Viagra for the treatment of male erectile dysfunction, men who have sex with men (MSM) may also

acquire Viagra by means other than prescription and may use it in a recreational manner.^{2–6} Although there is no accurate estimate of the total number of MSM Viagra users, 14%–21% of MSM surveyed in previous studies have reported recently using Viagra.^{3,4,6} In one survey of MSM on the Internet, approximately 40% of respondents had ever used Viagra, and 54% had used Viagra solely for recreational purposes.⁷ MSM who use Viagra may also be more likely to use illicit drugs, engage in unprotected anal intercourse (UAI), and have more male sexual partners: all behaviors that may be associated with an increased risk of acquiring and transmitting HIV and other sexually transmitted diseases (STDs).^{3–6} The studies that have been conducted to date yielded valuable information but have been performed in limited geographic areas or among special populations (ie, circuit party attendees or STD clinic patients). No study has been performed using data from a more diverse US population of MSM. The objective of the current analysis was to examine Viagra use and the independent correlates of Viagra use among a potentially broader population of MSM.

MATERIALS AND METHODS

The HIV Testing Survey (HITS) was an anonymous cross-sectional interview study of groups at high risk of acquiring HIV. Since 1996 HITS had been conducted in 12-month project periods in different US cities. The data included in this analysis are from the 2002 cycle of HITS. HITS-2002 was conducted in several cities in the states of Florida, Illinois, Michigan, New Jersey, and Washington. HITS-2002 was also conducted in the cities of Los Angeles, California; New York, New York; Philadelphia, Pennsylvania; Houston, Texas; and Milwaukee, Wisconsin. States or cities (project areas) in this analysis are identified by a letter to improve participant anonymity. During HITS-2002, MSM were intercepted and interviewed in bars or clubs. Men were eligible to participate in HITS if they were at least 18 years of age, a resident of the state for at least 6 months, and gave informed consent. The methods used by HITS have been described in detail in a previous report.⁸ The HITS project was reviewed and approved by the institutional review boards of the Centers for Disease Control and Prevention and all participating health departments.

The HITS interview instrument was developed to collect data regarding demographics, HIV testing history, self-reported HIV serostatus, sex and drug use behavior, and

Received for publication August 23, 2004; accepted February 7, 2005.

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HIV prevention exposure. For this analysis, all behaviors were reported as occurring within the 12 months preceding the interview date (past 12 months). Sex behavior was delineated by the type of male sexual partner and role during anal intercourse. A primary male sex partner was defined as “someone you feel committed to above anyone else and who you have sex with.” A nonprimary male sex partner was defined as “a sex partner other than a primary partner.” For analysis purposes, the total number of male sex partners included all partners (primary and nonprimary). The role during anal intercourse was defined as either insertive, where the respondent put his penis in his partner’s anus; or receptive, where the partner put his penis in the respondent’s anus. UAI with a nonprimary partner was defined as either insertive or receptive anal intercourse without a condom. Illicit drug usage was use of noninjection drugs that were not prescribed by a doctor and were used to get high. Current HIV serostatus was self-reported. Those listed as HIV serostatus “unknown or untested” had either never been tested for HIV or had never received the results of an HIV test. STD diagnosis in the past 12 months (excluding HIV infection) was defined as “a doctor or nurse told you that you had a sexually transmitted disease, like genital herpes, gonorrhea, syphilis, *Chlamydia*, or genital warts.” Men were asked about their Viagra use in the past 12 months (recent Viagra use). Recent Viagra users were also asked if they were using any other drugs to get high at the same time they were using Viagra—“mixing” or “mixers.” Though information on the types of drugs used in the past 12 months is available, the specific type of drugs mixed with Viagra was not assessed in the survey.

We used multivariate logistic regression to control for the other independent variables in the model to identify independent correlates of Viagra use. The independent variables included in the analysis were age, race/ethnicity, education, project area, HIV serostatus, STD diagnosis, number of male sex partners, role during anal intercourse, UAI with a nonprimary partner, and illicit drug use. Results of the regression analysis are presented as adjusted odds ratios (aORs) and 95% CIs. We also examined factors associated with mixing Viagra and illicit drugs. Because the number of MSM who reported this behavior was small, we were unable to perform multivariate analysis. Univariate analysis was performed using χ^2 tests for proportions. Results from the univariate analysis are presented as crude odds ratios (cORs) and 95% CIs. An association was deemed statistically significant when $P \leq 0.05$. All data analysis was performed using SAS version 8.0 (SAS Institute, Cary, NC).

RESULTS

Of 2473 persons approached for study participation, 1838 (74%) agreed to be screened for eligibility, 1642 (89%) were eligible to participate, and 1384 (85%) completed the interview session. An additional 207 persons were excluded from analysis because they had either not reported sex with a man in the past 12 months ($n = 186$) or they were missing key variables such as age, residency, gender, or HIV serostatus ($n = 21$). Of the 1177 MSM included in this analysis, the median age was 29 years, 70% received some college education, and 9% reported being HIV infected (in all but 7,

HIV had been diagnosed >12 months prior to the interview date). Of the 1038 MSM with complete race and ethnicity data, 42% were white, not Hispanic; 32% were black, not Hispanic; 20% were Hispanic; and 5% were another race or multiracial. Eleven percent (131/1177) of MSM used Viagra in the past 12 months. Recent Viagra users had a median age of 32 years; 73% reported some college education; and 23% reported being HIV infected (in all but 2, HIV had been diagnosed >12 months before the interview date). Fifty-six percent of recent Viagra users were white, not Hispanic; 25% were black, not Hispanic; 14% were Hispanic; and 6% were another race or multiracial. Regarding the type of male sex partners in the past 12 months, 47% (61/131) of recent Viagra users had both primary and nonprimary partners; 37% (48/131) had only nonprimary partners; and 17% (22/131) had only primary partners. Twenty-five percent (32/129) of recent Viagra users reported having 1 or 2 male sex partners; 26% (34/129) had 3–6 partners; 18% (23/129) had 7–12 partners; and 31% (40/129) had ≥ 13 partners. Among recent Viagra users who reported engaging in anal intercourse with their male partners, 67% (83/124) had insertive and receptive anal sex; 23% (28/124) had only insertive anal sex; and 10% (13/124) had only receptive anal sex. Fifty percent (65/131) of recent Viagra users engaged in UAI with a nonprimary male sex partner; 14% (18/130) had a recent STD diagnosis; and 69% (89/129) reported illicit drug use. The illicit drugs used most commonly by recent Viagra users were as follows: marijuana (56%, 74/131); cocaine (47%, 61/131); club drugs like ecstasy, ketamine, or gamma hydroxy butyrate (40%, 53/131); speed or methamphetamine (37%, 49/131); and “poppers” or amyl nitrate (36%, 47/131).

During multivariate analysis we identified the following significant independent correlates of recent Viagra use: increasing age, being infected with HIV, increasing number of male sex partners, UAI with a nonprimary male partner, and illicit drug use (Table 1). Recent Viagra use was more than twice as likely among MSM who had ≥ 13 male sex partners (13+ vs. 3–6 partners, aOR = 2.4, CI: 1.2 to 5.0; 13+ vs. 7–12 partners, aOR = 2.7, CI: 1.4 to 5.2). Viagra use was more than twice as likely among MSM who reported UAI with a nonprimary male partner. We also found that recent Viagra use was 3 times more likely among MSM who used illicit drugs.

Of the 131 MSM who reported recent Viagra use, 37 (28%) sometimes and 33 (25%) always used Viagra and illicit drugs at the same time (Table 2). Compared with other Viagra users, these “mixers” reported more male sex partners. Mixers were more than twice as likely to report UAI with a nonprimary male partner. Though the finding was not statistically significant, mixers were more than twice as likely to report having an STD diagnosis in the past 12 months. Compared with illicit drug users who did not use Viagra, mixers reported using twice as many types of drugs (median number of drug types used: 4 vs. 2, $P < 0.001$ by Wilcoxon rank sum test).

DISCUSSION

Overall, 1 in 10 HIV-negative MSM and almost 1 in 3 HIV-positive MSM in our analysis reported recent Viagra

TABLE 1. Correlates of Recent Sildenafil (Viagra)* Use Among Men Who have Sex With Men: HIV Testing Survey Conducted in 10 US States, 2002

Characteristic	Total n	Viagra Usage Within the Past 12 Months		
		n (%)	aOR	95% CI
Race/Ethnicity				
White, not Hispanic	444	65 (15)		Referent
Black, not Hispanic	331	29 (9)	0.7	0.4–1.3
Hispanic	211	16 (8)	0.5	0.2–1.1
Other or multiracial	52	7 (13)	0.9	0.3–2.7
Age, y				
18–24	318	18 (5)		Referent
24–29	236	31 (12)	2.4	1.2–5.0†
30–39	333	37 (10)	2.7	1.3–5.5†
40+	159	45 (22)	6.2	2.8–13.6†
Education				
Did not complete high school	60	2 (3)	0.5	0.1–2.1
High school diploma or equivalent	288	34 (12)	1.5	0.9–2.5
More than high school	829	95 (11)		Referent
Project Area‡				
A	159	30 (19)		Referent
B	97	10 (10)	0.9	0.3–2.4
C	104	11 (11)	1.2	0.5–3.2
D	144	16 (11)	1.1	0.5–2.6
E	151	14 (9)	0.8	0.3–1.9
F	83	4 (5)	0.5	0.1–1.6
G	117	9 (8)	0.6	0.2–1.8
H	99	14 (14)	1.5	0.6–3.8
I	112	9 (8)	0.5	0.2–1.5
J	111	14 (13)	0.9	0.4–2.1
HIV serostatus				
HIV negative	928	86 (9)		Referent
HIV positive	102	30 (29)	2.0	1.0–3.9†
Unknown or untested	147	15 (10)	1.0	0.5–2.0
STD diagnosis				
No	1075	112 (10)		
Yes	100	100 (18)	1.2	0.6–2.5
Number of male sex partners				
1–2	491	32 (7)		Referent
3–6	362	34 (9)	1.0	0.5–1.8
7–12	175	23 (13)	1.1	0.5–2.2
13+	135	40 (30)	2.6	1.2–5.4†
Role during anal intercourse				
Receptive only	149	13 (9)		Referent
Insertive only	333	28 (8)	0.8	0.4–1.9
Receptive and insertive	608	83 (14)	1.3	0.6–2.6
Unprotected anal intercourse with a nonprimary male partner				
No	841	66 (8)		
Yes	336	65 (19)	2.1	1.2–3.5†
Illicit drug use				
No	614	40 (7)		
Yes	560	89 (16)	3.1	1.9–5.2*
Total	1177	131 (11)		

*Pfizer, Inc., New York, NY.

†Significant at $P \leq 0.05$.

‡Project area was coded to preserve participant confidentiality. The project areas include multiple cities in the states of Florida, Illinois, Michigan, New Jersey, and Washington; and the cities of Los Angeles, California; New York City, New York; Philadelphia, Pennsylvania; Houston, Texas; and Milwaukee, Wisconsin.

TABLE 2. Characteristics of Men Who have Sex With Men Who Mix Sildenafil (Viagra)* and Illicit Drugs Among Those Who Reported Using Viagra Within the Past 12 Months: HIV Testing Survey Conducted in 10 US States, 2002

Characteristic	Total n	Viagra Mixing Within the Past 12 Months		
		n (%)	cOR	95% CI
Race/Ethnicity				
White, not Hispanic	65	36 (55)		Referent
Black, not Hispanic	29	12 (41)	1.7	0.7–4.3
Hispanic	16	8 (50)	1.2	0.4–3.7
Other or multiracial	7	5 (71)	0.5	0.1–2.7
Age, y				
18–24	18	11 (61)		Referent
24–29	31	14 (45)	0.5	0.2–1.7
30–39	37	22 (60)	0.9	0.3–3.0
40+	45	23 (51)	0.7	0.2–2.0
Education				
Did not complete high school	7	2 (100)	—	
High school diploma or equivalent	31	20 (59)	1.4	0.6–3.1
More than high school	127	48 (51)		Referent
Project Area†				
A	30	20 (67)		Referent
B	10	8 (80)	2.0	0.4–11.2
C	11	8 (73)	1.3	0.3–6.1
D	16	3 (19)	0.1	0.1–0.5‡
E	14	3 (21)	0.1	0.1–0.6‡
F	4	4 (100)	—	—
G	9	3 (33)	0.3	0.1–1.2
H	14	10 (71)	1.3	0.3–5.0
I	9	4 (44)	0.4	0.1–1.8
J	14	7 (50)	0.5	0.1–1.8
HIV serostatus				
HIV negative	86	44 (51)		Referent
HIV positive	30	18 (60)	1.4	0.6–3.3
Unknown or untested	15	8 (53)	1.1	0.4–3.3
Sexually transmitted disease diagnosis				
No	109	56 (51)		
Yes	18	13 (72)	2.6	0.9–7.8
Number of male sex partners				
1–2	32	12 (38)		Referent
3–6	34	15 (44)	1.3	0.5–3.5
7–12	23	11 (48)	1.5	0.5–4.5
13+	40	31 (78)	5.7	2.0–16.1‡
Role during anal intercourse				
Receptive	13	6 (46)		Referent
Insertive	28	11 (39)	0.8	0.2–2.8
Both receptive and insertive	83	50 (60)	1.8	0.5–5.7
Unprotected anal intercourse with a nonprimary male partner				
No	32	15 (47)		
Yes	65	42 (65)	2.5	2.1–5.0‡
Total	131	70 (53)		

*Pfizer, Inc., New York, NY.

†Project area was coded to preserve participant confidentiality. The project areas include multiple cities in the states of Florida, Illinois, Michigan, New Jersey, and Washington; and the cities of Los Angeles, California; New York, New York; Philadelphia, Pennsylvania; Houston, Texas; and Milwaukee, Wisconsin.

‡Significant at $P \leq 0.05$.

Numbers may not add to totals due to missing data.

Reported behaviors and STD diagnosis were all within the 12 months preceding the interview date.

use. Factors independently associated with recent Viagra use were as follows: being older, being infected with HIV, having a larger number of male sex partners, engaging in UAI with a nonprimary male sex partner, and using illicit drugs. Older men may be more likely to use Viagra to improve sexual performance or treat erectile dysfunction. Men who are infected with HIV may be more likely to use Viagra because of HIV-associated physical or psychologic effects on sexual function.^{9–12} Although not all sexual dysfunction among MSM with HIV infection is due to male erectile dysfunction, a proportion of these men may be using Viagra to improve sexual performance. The association between Viagra use and high-risk sex behaviors is potentially complex. For example, the use of Viagra may increase the potential for MSM to engage in additional sexual activity, including UAI with nonprimary partners. Alternatively, those who engage in UAI with nonprimary male partners may be more likely to use Viagra as a means of sustaining sexual activity. The desire to sustain sexual activity may be especially strong during concomitant illicit drug use. More than half of the MSM who used Viagra used it with illicit drugs. This “mixing” behavior was also statistically associated with high-risk sex behaviors. Compared with other drug users, those who use Viagra and illicit drugs together may also be at higher risk for HIV infection because of increased drug usage patterns.

We should note several study limitations. The direction of association between Viagra use and risk behaviors could not be determined because of the study’s cross-sectional nature. Because of the structure of the questionnaire, we were unable to assess the HIV serostatus of all male sex partners. Due to this lack of information, it is difficult to draw more specific conclusions regarding the association between Viagra use and sexual risk behavior. The sample of MSM was obtained solely from bars or clubs and only in selected cities: Findings cannot be generalized to all MSM. Stratification of the analysis by HIV serostatus would be useful in examining the differences between groups more closely, but the small numbers of MSM with HIV infection do not allow for meaningful stratification. Information regarding Viagra’s combination with other drugs was limited in the survey and reduces our ability to make more detailed conclusions about this behavior. Because of the small number of respondents in some strata, results involving the mixing of Viagra and illicit drugs should be interpreted with caution. Finally, an interviewer-administered survey might produce underestimates of less socially desirable behaviors such as UAI and illicit drug use.

Compared with studies among MSM in San Francisco and London, the prevalence of Viagra use reported here is lower.^{3–6} One possible reason for the lower prevalence is that HITS-2002 was performed in a larger geographic area than previous studies. HITS-2002 also had more representation from cities with smaller populations of MSM. It is feasible that MSM from the smaller cities where HITS was conducted may have had less availability of Viagra. The lower prevalence of Viagra use in the present study may also be related to the fact that the sample contained a large proportion of nonwhite MSM. Although we did not identify race as an independent predictor, another study found that Viagra use is

more common among white MSM.⁶ The independent correlates of recent Viagra use reported here are consistent with those reported in previous studies.^{4,6} Previous research also exists regarding the mixing of Viagra and illicit drugs.^{2–7}

This report corroborates previous studies concerning Viagra use among MSM. Our findings expand upon the previous literature by providing information from a potentially broader population of MSM. Similar investigation should also be performed regarding 2 new erectile dysfunction medications, vardenafil (Levitra; Bayer Pharmaceuticals Corp., Westhaven, CT, and GlaxoSmithKline, Philadelphia, PA) and tadalafil (Cialis, Lilly ICOS, LLC, Indianapolis, IN). Increased scrutiny of the recreational use of this class of medications may be especially important because of the potential for serious drug interactions. Several MSM in our study reported using Viagra in combination with amyl nitrate or “poppers.” This particular combination could result in life-threatening hypotension.^{13,14} Researchers have also found that some common antiretroviral medications can inhibit Viagra metabolism, which could markedly increase the blood levels of Viagra. This could also lead to an increased risk of Viagra-induced hypotension.^{15,16}

The relationship between Viagra use, illicit drugs, and sexual risk taking should be further scrutinized to better understand how MSM are using Viagra in the context of their sexual and drug use behavior. In 2003, the Centers for Disease Control and Prevention launched a new National HIV Behavioral Surveillance system (NHBS). The 1st year of data collection will involve MSM from 15 US cities. Part of the behavioral assessment includes more detailed questions about sexual behavior, illicit drug use before or during sex, and Viagra use.

Viagra use among MSM clients should be of concern for HIV and STD prevention programs because it appears that Viagra is associated with certain high-risk behaviors. Two potential ways in which this information could benefit prevention providers is as a means to identify higher-risk clients or as the groundwork for development of additional counseling information about recreational Viagra use. Acknowledgment of the high prevalence of Viagra use among certain MSM clients, especially those with HIV infection, may also assist health care providers in considering appropriate client counseling and treatment options. Additional safe usage information and prevention counseling related to Viagra use among MSM should be incorporated into client education plans.

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APPENDIX

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